INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

R E P O R T
for biennial period, 2002-03
PART I (2002) - Vol. 2
English version

MADRID, SPAIN 2003

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

CONTRACTING PARTIES

(as of December 31, 2002)

Algeria, Angola, Barbados, Brazil, Canada, Cape Verde, China, Côte d'Ivoire, Croatia, Equatorial Guinea, European Community, France (St. Pierre & Miquelon), Gabon, Ghana, Guinea Conakry, Honduras, Iceland, Japan, Korea (Rep.), Libya, Mexico, Morocco, Namibia, Panama, Russia, Sao Tomé & Principe, South Africa, Trinidad & Tobago, Tunisia, United Kingdom (Overseas Territories), United States, Uruguay, Vanuatu, Venezuela

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Panel No.	***PANEL MEMBERSHIP***	***Chair***
-1- Tropical tunas	Angola, Brazil, Canada, Cape Verde, China, Côte d'Ivoire, European Community, Gabon, Ghana, Honduras, Japan, Korea (Rep.), Libya, Mexico, Morocco, Namibia, Panama, Russia, Sao Tome & Principe, Trinidad & Tobago, United Kingdom (Overseas Territories), United States, Venezuela	United Kingdom (Overseas Territories)
-2- Temperate tunas, North	Algeria, Canada, China, Croatia, European Community, France (St. Pierre & Miquelon), Iceland, Japan, Libya, Mexico, Morocco, Panama, Tunisia, United Kingdom (Overseas Territories), United States	European Community
-3- Temperate tunas, South	European Community, Japan, Korea (Rep.), Namibia, South Africa, United Kingdom (Overseas Territories), United States	South Africa
-4- Other species	Algeria, Angola, Brazil, Canada, China, Côte d'Ivoire, European Community, France (St. Pierre & Miquelon), Gabon, Japan, Mexico, Morocco, Namibia, South Africa, Trinidad & Tobago, United Kingdom (Overseas Territories), United States, Uruguay, Venezuela	United States

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CONSERVATION & MANAGEMENT MEASURES COMPLIANCE COMMITTEE	F. WIELAND, EC (since November 19, 2001)
PERMANENT WORKING GROUP FOR THE IMPROVEMENT OF ICCAT STATISTICS AND CONSERVATION MEASURES (PWG)	K. BLANKENBEKER, United States (since November 19, 2001)

ICCAT SECRETARIAT

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FOREWORD

The Chairman of the International Commission for the Conservation of Atlantic Tunas presents his compliments to the Contracting Parties of the International Convention for the Conservation of Atlantic Tunas (signed in Rio de Janeiro, May 14, 1966), as well as to the Delegates and Advisers that represent said Contracting Parties, and has the honor to transmit to them the ***"Report for the Biennial Period, 2002-2003, Part I (2002)"***, which describes the activities of the Commission during the first half of said biennial period.

This issue of the Biennial Report contains the Report of the Final Session of the 17th Regular Meeting of the Commission (initially held in Murcia, Spain, in November 2001 and continued in Bilbao Spain in October-November 2002), the Report of the 13th Special Meeting of the Commission (Bilbao, Spain, October 28-November 4, 2002) and the reports of all the meetings of the Panels, Standing Committees and Sub-Committees, as well as some of the Working Groups. It also includes a summary of the activities of the Secretariat and a series of National Reports of the Contracting Parties of the Commission, relative to their activities in tuna and tuna-like fisheries in the Convention Area.

The Report for 2002 has been published in three volumes. ***Volume 1*** includes the Secretariat's Administrative and Financial Reports, the Proceedings of the Commission Meetings and the reports of all the associated meetings (with the exception of the Report of the Standing Committee on Research and Statistics -SCRS). ***Volume 2*** contains the Secretariat's Report on Statistics and Research and the Report of the Standing Committee on Research and Statistics (SCRS) and its appendices. ***Volume 3*** contains the National Reports of the Contracting Parties of the Commission.

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

MASANORI MIYAHARA
Commission Chairman

TABLE OF CONTENTS

SECRETARIAT'S REPORT ON STATISTICS AND COORDINATION OF RESEARCH IN 2001-2002

1. Introduction

This report summarizes the work carried out by the Secretariat between October 2001 and September 2002 as concerns statistics and research.

2. Submission and processing of Task I and Task II data

To date in 2002, the Secretariat processed almost 100 electronic files (including preliminary and final versions), amounting to a total of approximately 70 MB. As in previous years, the file formats vary widely and only a small proportion are submitted in the ICCAT standard format.

Table 1 provides a list of the data transmitted to the Secretariat. The deadlines established previously have been changed by the SCRS during its 2001 session to taken into account the difficulties of some Parties that have fleets operating in areas far distant from their countries. As Table 1 also shows, it seems that meeting the deadlines continues to cause some problems that have repercussions on the Secretariat's work during the stock assessments.

For the stock assessments scheduled this year, the catch-at-size and catch-at-age files were updated to 2000 for bluefin tuna and swordfish and up to 2001 for bigeye tuna.

Another GFCM/ICCAT was held in Malta (April 15 to 19, 2002) to prepare the data for the Mediterranean. This working group resulted in the collection of rather important Task II information.

The Task I data for Ghana received at the Secretariat were adjusted according to the normal procedure established for the composition of sampled species.

To complete the survey on the data collection systems by the national administrations, a reminder was sent in early 2002 to the Parties that had not responded to last year's survey. Following this reminder, the Secretariat received new information from three Parties. The summary **Table 2** was updated.

3. Working files (CATDIS)

Taking into account the small amount of Task II data for recent years and the delay in the transmission of these data, the updating of this file has not yet been completed.

4. Tagging data

The United States, France, Spain and Venezuela have submitted recovery and tagging information that will be incorporated in the database and in the lottery file.

In spite of the SCRS recommendation, the Secretariat still does not have an inventory of the archival and/or electronic tags applied by the national laboratories.

Besides, the Secretary sometimes receives requests relative to some tags for which no tagging information is available. In view of these problems, the Sub-Committee should adopt precise instructions and criteria concerning the tagging problems.

5. Shark database

Some new species have been coded, which have been added to the nomenclature and entered in the file. The Secretariat is currently integrating data that have been submitted in various formats during in previous years and

hopes to finalize this process in 2003. The data continue to be sent in different formats and often they do not include a breakdown by species.

6. Revision of historical data

6.1 Task I data

- *Algeria:* In its National Report, Algeria presented a new version of the revision of catch data. The Species Groups (bluefin tuna and swordfish) considered that these revisions could not be taken into account without a scientific document justifying these changes. Therefore, the Secretariat has not modified the Algerian catches prior to 1997.

- *Libya:* During the bluefin tuna stock assessment, Libya presented a revision of their catch data for 1990 to 2000. These figures are from the catches by longliners and purse seiners that fish in joint ventures with Tunisia, Korea and Japan. As these catches have not been reported by other countries, the Bluefin Working Group accepted these explanations and the Secretariat has thus updated the Libyan catches.

- *Malta:* During last year's SCRS meeting, Malta presented a scientific document that revised the bluefin tuna catch data for 1990 to 1999. This document was submitted late and the SCRS did not have time to study it. This same document was presented again this year during the joint GFCM/ICCAT Meeting and to the Bluefin Working Group, which accepted these revisions.

- *NEI-Combined:* The GFCM/ICCAT Meeting (Malta 2002) established a new criterion to estimate the bluefin tuna catches by this combined fleet. The principle agreed upon is described in SCRS/2002/010. The bluefin database has been revised based on this conclusion.

- *Trinidad and Tobago:* Catches by the foreign flag fleet have been added to the database after the verifications made after the verifications carried out by United States and St. Vincent to avoid double reporting.

- *United States:* The United States presented a revision of data on discards of bluefin tuna by some longliners that had been reported by the United States for the 1987 to 1999 period. The Bluefin Working Group accepted these changes.

Following last year's SCRS recommendation, the Secretariat updated the Task I database to replace the catches of less than 1 MT by the real catch data, wherever possible. More than 50% of the records of less than 1 MT have been replaced.

6.2 Task II data

Portugal: Historical revisions of size sampling data were received from the Madeira fishery for bigeye, skipjack and albacore for 1979 to 2001 and for yellowfin tuna for1983 to 2001.

Venezuela: Venezuela submitted an historical revision of size samples from the Playa Verde artisanal (gill net) fishery for 1991-2001, covering the most important species.

7. Trade data

The European Community, Japan, and the United States submitted bi-annual reports for the Bluefin Tuna Statistical Document Program corresponding to the first half of 2001. A table with estimates of the imports of bigeye tuna was also presented by Japan during the Bigeye Tuna Stock Assessment session. SCRS/2002/014 provides more complete information on trade data.

8. Progress on the development of the database

All the Task I data as well as the size data and the preparation of the tables and other routines are now operational. For Task II, the validation procedure is in process. All information has already been integrated into

the catch and effort and size databases, and the synchronization process between catch and effort data and the data catalogue has been completed. Validation and quality control procedures are currently being developed, as are input procedures and catalogue synchronization. Procedures for weighting and substitution to create the catch-at-size and catch-at-age files remain to be developed. SCRS/2002/010 describes quite clearly the status of the progress of this work.

9. Vessel database

It should be noted that the FAO has an on-going project aimed at developing an information system relative to the vessels authorized to fish on the high seas. There is a possibility of exchanging information among the various regional fishing bodies and the FAO to verify these data.

10. Compliance table

In accordance with the Commission's recommendations, the Secretariat must present, each year, to the Compliance Committee a summary table of the tables received from the Contracting Parties. For the development of these tables, neither Task I nor Task II data are utilized, except in the case of the calculation of the quotas if no national information is available. The compliance table attached to the Report of the Compliance Committee provides detailed information on these files.

11. Publications

- *Data Record (D.R.):* This year, this publication is late due to migration to the database (S.Q.L.) and the validations. We hope to change the format of the output file so as to include all the information available at the Secretariat and to prepare a publication on CD.

- *Statistical Bulletin:* This publication was produced in February 2002 with the versions available on line and updated on Internet and a version on diskette in addition to a summary published in a brochure.

- *Collective Volume (Red Book):* In August 2002, Volume 54 was published on CD-ROM, which contained 123 documents and a total of 1,170 pages. Furthermore, due to the request from numerous scientists and libraries that wished to continue receiving the printer version of the publication, 50 copies of Volume 54 were printed, and were sent to those addresses indicted by the Chief Scientists in response to a survey.

- *Biennial Report:* The ICCAT Report for the 2000-2001 Biennial Period, Part II, was published in two volumes (SCRS and Commission), in Spanish, French and English. As last year, the National Reports were included in Volume 1 (Commission). The SCRS volume contains about 200 pages and that of the Commission has about 600, which will make it necessary to revise the contents of these volumes in 2003 to obtain a better distribution.

- *A.S.F.A.:* The Secretariat prepared 113 bibliographic entries for the ASFA in 2001 and 25 entries in 2002. Currently, there is some delay in producing these entries as compared to the scientific documents published in the Collective Volume, but it is hoped that this problem will be alleviated with the incorporation of the new Scientific Editor. In 2002, progress was made on the preparation of a bibliographic database geared more to the needs of ICCAT. It is hoped that in 2003 this database can be used after extracting the data corresponding to ICCAT that are found in the ASFA. Information from ASFA (approximately 2,500 references) corresponding to ICCAT entries have been integrated into the ICCAT bibliographic database.

12. Internet

Two parallel web pages continue to be maintained: www.iccat.es and www.iccat.org. These web pages are in the same format as last year and they have been updated with the meeting announcements, new publications, and the documents of Volume 54 of the Collective Volume. These pages contain about 470 files and 160 WWW links, occupying 95 MB of space

Due to the need to exchange large files or reports between the Secretariat and the other Parties we have setup a new FTP server accessible on request at info@iccat.es.

13. Electronic equipment

In 2002, the Secretariat purchased a Compaq ML580 dual processor with 2 GB of RAM and 4 hard disks with a capacity of 37 GB each as a server to host the ICCAT databases. Computer equipment, including laptop, scanner and printer was also purchases for the Scientific Editor, and two faulty desktop computers were replaced. An extra printer was purchased for the use of visiting scientists during inter-sessional meetings.

Next year, all the computers that are over 4 years of age will be replaced, following the 1999 SCRS recommendation, and new computer programs will also be needed.

14. Standardization of codes

In one of the recommendations of the CWP, it was suggested that the regional fishery bodies unify and standardize the codes used. For improved functioning of the database, the ICCAT codes should also be changed. These revisions would essentially involved the following points:

- fishing gear,
- fleets,
- fishing areas and stock limits
- type of catch
- clearer definition of the aquaculture

Some codes used for the fishing gears refer, for example, to a target species or are used to differentiate the fleets of the same country. In other cases, this code refers to the type of catch (discards or catches).

15. Scientific meetings

Appendix 1 provides the list of meetings as well as the pertinent results of the various meetings.

16. Special programs

The BETYP Coordinator's report presented to the SCRS provides detailed information on the Bigeye Year Program (BETYP). As concerns the Enhanced Billfish Research Program and the Bluefin Year Program (BYP), the species groups will submit a report on the status of the progress of these programs.

Table 1. Data reported to ICCAT in 2002 □ **As of September 24, 2002**

FLAG	DATA	DATE	BFT	YFT	ALB	BET	SKJ	BON	SWO	OTHERS	SHK	AREA	REMARKS
CONTRACTING PARTIES													
ALGERIA	TASK1	1.iv.2002	LL, TRP, HAND				UNCL	PS, GILL,UNCL	LL,PS,GILL,UNC	LTA,FRI,BOP	NO	MEDI	
			PS,GILL,UNCL										
ANGOLA	TASK I												
	C&E												
	SIZE												
BARBADOS	TASK I	8.viii.2002		LL	LL	LL		LL	LL	BIL	NO	NW	
	C&E												
	SIZE	8.viii.2002		LL									
BRAZIL	TASK I	30.vii.2002		LL,BB,PS	LL,BB,PS	LL,BB	BB,PS		LL	OTH,BIL	YES	SW	& REV. 2000
	C&E	30.vii.2002		LL,BB	LL,BB	LL,BB	BB		LL	OTH,BIL	YES		
	SIZE	30.vii.2002		LL		LL			LL	OTH,BIL			
CANADA	TASK I	30.iv.2002	LL,GILL, TL, RR	LL,TL,RR	LL,HARP,TL,RR	LL,TL,RR			LL,GILL,HARP	WHM	YES	NW	
			HRP,TRAP,LLD						LLD				
	C&E	30.iv.2002	LL,GILL, TL, RR	LL,TL,RR	LL,HARP,TL,RR	LL,TL,RR			LL,GILL,HARP	WHM	YES	NW	
			HARP,TRAP										
	SIZE	31.v.2002	LLD						LLD				
		24. vii.200	LL,RR,TRP,HRP						LL,HARP	WHM			
	C-A-S	28.vi.2002		LL,HARP,TROL	LL,HARP,TROL	LL,HARP,TROL			LL,HARP	WHM			
CAPE VERDE	TASK I	06.ix.2002		HAND			PS,HAND		LTA, WAH				
	C&E	06.ix.2002		HAND			PS,HAND		FRI,LTA,WAH				
	SIZE	8.viii.2002		HAND			HAND			WAH,LTA,FRI			
CHINA, P. REP	TASK I	20.viii.2002	LL	LL	LL	LL			LL	OTH, BIL		ALL	
	C&E	20.viii.2002	LL	LL	LL	LL			LL	OTH, BIL			
	SIZE												
COTE DIVOIRE	TASK I	7.v.2002								WHM, BUM,SAI		SE	
	TASK I	9.ix.2002							GILL		YES		
	C&E												
	SIZE												
CROATIA	TASK I	6.iii.02	PS, LL, SPOR									Adriatic	
	C&E	26.iii.02	PS, LL, SPOR										
EUR. COMM.													
EC-ESPAÑA													
ALL AREAS	TASK I	Preliminary estimates of Task 1 were provided for assessments of BFT, SWO, BET											
CANARIAS	C&E	8.viii.2002	BB	BB	BB	BB	BB						
TROPICAL	C&E	16.ix.2002		BB,PS	BB,PS	BB,PS	BB,PS			SMA			
NORTH EAST	C&E	8.viii.2002			BB,TROL								
MEDI	C&E												
CANARIAS	SIZE	8.viii.2002	BB	BB	BB	BB	BB						
NORTH EAST	SIZE	8.viii.2002			BB,TROL								
NORTH EAST	SIZE	17.ix.2002				BB, TROL							
MEDI	SIZE												
TROPICAL	SIZE	16.ix.2002		BB,PS	BB,PS	BB,PS	BB,PS			SMA			
TROPICAL	CAS	8.ix.2002		BB,PS	BB,PS	BB,PS	BB,PS			SMA			

Table 1. Continued:

FLAG	DATA	DATE	BFT	YFT	ALB	BET	SKJ	BON	SWO	OTHERS	SHK	AREA	REMARKS
EC-FRANCE	TASK I	02.iv.2002	TRW,GILL,BB,PS		PS				UNCL			NE,MEDI	
	TASK I	Preliminary estimates of Task 1 were provided			BET assessment								
	C&E	16.iv.2002	PS										
	C&E	8.viii.2002		PS,BB	BB,PS	PS,BB	PS,BB						
	C-A-S	8.viii.2002		PS,BB	BB,PS	PS,BB	PS,BB						
	SIZE	16.iv.2002	PS										
	SIZE	8.viii.2002		PS,BB		PS,BB	PS,BB					ETRO	
	SIZE	9.ix.2002			MWT, GILL								
EC-GREECE	TASKI	13.viii.2002	LL,PS,HAND		LL,PS,HAND		PS	PS	LL			MEDI	
	C&E												Size + c+e for
	SIZE	16.iv.2002	LL						LL				previous years
EC-IRELAND	TASK I												
	C&E												
	SIZE												
EC-ITALIA	TASK I	24.vii.2002	GILL,HND,HRP,									MEDI	
			LL,PS,RR,SPOR										
			TRP,OTH										
	C&E												
	SIZE	16.iv.2002	HAND,GILL,LL		LL								PS for 2000
	SIZE	16.iv.2002	PS									MEDI	SWO for 1998
EC-PORTUGAL													
MAINLAND	TASK I	09.vii.2002	TRP,SURF,LL	PS,LL	SURF,LL		TRP,SRF,LL,PS	TRP,SRF,PS,L	TRP,SRF,PS,LL	BLT,BUM,MIX,BIL	YES		
MADEIRA	TASK I	09.vii.2002	BB,LL	BB	BB,TROL	BB	BB		LL	FRI,BUM	YES		
AZORES	TASKI	09.vii.2002	BB	BB	BB	BB	BB		LL				
AZORES	C&E	09.vii.2002	BB	BB	BB	BB	BB		LL				
MADEIRA	C&E	09.vii.2002	BB,LL	BB	BB	BB	BB			BIL			
MAINLAND	C&E	09.vii.2002	TRP,SURF,LL	PS,LL	SURF,LL		TRP,SRF,LL,PS	TRP,SRF,PS,L	TRP,SRF,PS,LL	BLT,BUM,MIX,BIL			
AZORES	SIZE	26.vii.2002			BB	BB	BB						AND1999-2000
MADEIRA	SIZE	30.xii.2002				BB	BB						1979-2001
MADEIRA	SIZE	6.ix.2002	BB		BB								1979-2001
MADEIRA	SIZE	09.ix.2002		BB									1983-2001
MAINLAND	SIZE	09.vii.2002	TRAP					TRAP	LL				
EC-U.K.	TASK I												
	C&E												
	SIZE												
FRANCE (ST P&M)	TASK I												
	C&E												
	SIZE												
GABON	TASK I	10.vii.2002		TRAW,SURF		TRW,SRF,GILL	GILL			LTA,SAI	NO	ETRO	
	C&E												
	SIZE												

Table 1. Continued

FLAG	DATA	DATE	BFT	YFT	ALB	BET	SKJ	BON	SWO	OTHERS	SHK	AREA	REMARKS
GHANA	TASK I	14.v.2002		BB,PS		BB,PS	BB,PS			WHM, LTA	NO	SE	
	C&E	14.v.2002		BB,PS		BB,PS	BB,PS			LTA			
	SIZE	14.v.2002		BB,PS		BB,PS	BB,PS						
GUINEA EQU.	TASK I												
	C&E												
	SIZE												
GUINEA REP.	TASK I												
	C&E												
	SIZE												
HONDURAS	TASK I												
	C&E												
	SIZE												
JAPAN	TASK I	22.viii.2002	LL									E,W.MED	
	TASK I	17.ix.2002	LL	LL	LL	LL	LL		LL	BIL	YES	ALL	& revisons 2000
	C&E												
	SIZE												
	C-A-S	30.xiii.2002				LL							
	C-A-S	06.ix.2002							LL				
KOREA	TASK I	25.vii.2002	LL	LL	LL	LL			LL	BUM	YES		
	C&E	25.vii.2002	LL	LL	LL	LL			LL	BUM	YES		
	SIZE												
LIBYA	TASK I	16.vi.2002	LL,TRAP	LL		LL			LL	LTA	COMB.	MEDI,NE	
	C&E	16.iv.2002	LL						LL				SWO 2000
	SIZE	18.IV.2002	TRAP										
MAROC	TASK I												
	C&E	16.iv.2002	HAND,TRAP						GILL				
	SIZE	16.iv.2002	HAND,TRAP						GILL				
MEXICO	TASKI	19.vii.2002	LL	LL	LL	LL	LL	LL	LL	BIL, BLF, SMT	YES	GOFM	
	C&E	19.vii.2002	LL	LL	LL	LL	LL	LL	LL	BIL, BLF, SMT	YES		
	SIZE	19.vii.2002	LL	LL		LL	LL		LL	BLF,BIL	YES		
NAMIBIA	TASK I	22.viii.2002		LL,BB	LL,BB	LL,BB	BB		LL,BB		NO	SE	
	C&E	22.viii.2002		LL,BB	LL,BB	LL,BB			LL,BB				
	SIZE	22.viii.2002			LL,BB	LL,BB			LL,BB				
PANAMA	TASK I												
	C&E												
	SIZE												
RUSSIA	TASK I	05.vii.2002						TRAW		BLT	NO	NE/SE	
	C&E												
	SIZE												
SAO TOME & P.	TASK I												
	C&E												
	SIZE												

Table 1. Continued.

FLAG	DATA	DATE	BFT	YFT	ALB	BET	SKJ	BON	SWO	OTHERS	SHK	AREA	REMARKS
SOUTH AFRICA	TASK I	8.viii.2002		BB,SPOR,LL	BB,SPOR,LL	BB,LL	BB		LL	BUM,MIX	YES	SE	was later revised
	C&E	8.viii.2002		BB,LL	BB,LL	BB,LL			LL				
	SIZE	8.viii.2002		BB,LL	BB,LL	BB,LL			LL				
TUNISIE	TASK I												
	C&E	16.iv.2002	PS,TRAP,PS						LL				BFT 98-00
	SIZE												98-00 SWO,BFT
TRINID. & TOB.	TASK I	29.vii.2002		LL	LL	LL		SURF	LL	BIL,KGM,BRS	YES	N, NW	
	C&E												
	SIZE												
UK - OT	TASK I												
BERMUDA	C&E												
	SIZE												
UK - OT	TASKI	17.iv.2002		BB,LL	BB,LL	BB,LL	BB		LL	BUM	COMB.	SE	
STA HELENA	C&E	17.iv.2002		BB,LL	BB,LL	BB,LL	BB		LL	BUM			
	SIZE												
UK- OT	TASKI	31.vii.2002								SLT	YES		
FALKLANDS	C&E	31.vii.2002								SLT			
U.S.A.	TASK I	18.vii.2002	All gears								YES		
	TASK I	13.viii.2002		All gears	All gears	All gears	All gears	All gears	All gears	BIL, FRI,LTA,BLF			
	C&E	13.viii.2002		All gears	All gears	All gears	All gears	All gears	All gears	BIL, FRI,LTA,BLF	YES		
	SIZE	13.viii.2002									YES		
	C-A-S	13.viii.2002		All gears	All gears	All gears			All gears		YES		
	C-A-S	18.vii.2002	All gears										
URUGUAY	TASK I												
	C&E												
	SIZE												
VENEZUELA	TASK I	8.viii.2002		PS,BB,LLGILL	PS,BB,LL,BILL	PS,BB,LL	PS,BB		LL,GILL	BIL, BLF,WAH	YES	NW	
	C&E	8.viii.2002		BB,PS	BB,PS	BB,PS	BB,PS			BLF,FRI			
	SIZE	8.viii.2002		BB,PS	BB,PS	BB,PS	BB,PS		LL,GILL	BLF,FRI,BIL			
COOP. STATUS													
CHINESE TAIPEI	TASK I	8.viii.2002	LL	LL	LL	LL	LL		LL	BUM,WHM,BLM	YES	ALL	
	C&E	8.viii.2002	LL	LL	LL	LL	LL		LL	BUM,WHM,BLM			1999 DATA
	C&E	11.ix.2002	LL	LL	LL	LL	LL		LL	BUM,WHM,BLM			1997-2000
	SIZE	8.viii.2002		LL	LL	LL				BUM,WHM,BLM			1999 DATA
	SIZE	11.ix2002	LL	LL	LL	LL			LL	BUM,WHM,BLM			1998-2000
PHILIPPINES	TASK I	03.iv.2002		LL		LL			LL		NO	ALL	
	C&E	03.iv.2002		LL		LL			LL				

Table 1. Continued.

FLAG	DATA	DATE	BFT	YFT	ALB	BET	SKJ	BON	SWO	OTHERS	SHK	AREA	REMARKS
OTHERS													
ARGENTINA	TASK I	5.iii.2002							TRAW	BON, BGT		SW	
CARICOM*	TASK I	18.ix.2002		UNCL	UNCL	UNCL	UNCL	UNCL	UNCL	SMA	YES	WTRO	
CYPRUS	TASK I	18.iv.2002							LL			MEDI	by hand GFCM
	C&E	18.iv.2002							LL			MEDI	by hand GFCM
EGYPT	TASKI	20.iii.2002								BON		MEDI	
FAROE ISLANDS	TASK I	29.vii.2002	No vessels fishing for tuna in 2001 and 0 catch reported										
LATVIA	TASKI	24.vii.2002		TRAW				TRAW		MIX		ETRO	
MALTA	TASKI	16.iv.2002	LL		LL			LL	LL				1999-2001
	C&E	16.iv.2002	LL		LL			LL	LL				1999-2001
	SIZE	16.iv.2002	LL		LL			LL	LL				1999-2001
NEI-1	TASK 1	8.ix.2002		BB,PS	BB,PS	BB,PS	BB,PS						
	C&E	8.ix.2002		BB,PS	BB,PS	BB,PS	BB,PS						
	SIZE	8.ix.2002		BB,PS	BB,PS	BB,PS	BB,PS						
JP.OB.SH	TASKI			LL	LL	LL			LL	BLM,SAI	COMB.	SE	
	C&E			LL	LL	LL			LL	BLM,SAI			
TP.OB.SH	TASKI	17.iv.2002		LL	LL	LL			LL	BUM	COMB.	SE	
	C&E			LL	LL	LL			LL	BUM			
SENEGAL	TASKI	03.vii.2002		BB		BB	BB				YES		
	C&E	03.vii.2002		BB		BB	BB						
SEYCHELLES	TASKI	24.vii.2002	LL	LL	LL	LL			LL	SAI,BIL	COMB		2000 & 2002
SIERRA LEONE	TASK 1	1.iv.2002	LL	LL		LL						NE	
St. VINCENT	TASK1	various		LL	LL	LL			LL	BIL		UNCL	
STA. LUCIA	TASK1	8.vii.2002		HAND	HAND	HAND	HAND	HAND		BLF,BLT,SMM,KG	NO	NW	
THAILAND		4.iv.2002	Replied: Thailand has no tuna fishing vessels operating in the ICCAT Convention Area										
TURKEY	TASK1	26.vii.2002	UNCL										
* CARICOM = Dominica, Dominican Republic, Grenada, Guyane, Jamaica, Sta Lucia, St. Vicente, St Kitts & Nevis													
FISHING FLEET STATISTICS (number of boats) WERE RECEIVED FROM:													
Barbados			Argentina										
Brazil			Philippines										
Canada			Senegal										
China			Seychelles										
Croatia			Sta Lucia										
Ghana													
Libya													
Mexico													
Namibia													
South Africa													
Trinidad & Tobago													
UKOT-Sta Helena													
USA													

Table 2. Results of the ICCAT Survey on Statistical Collection Systems (Empty cells mean that no information was received.)

Party/ Entity	Gears	Species	Current Fleet Size	Fishing area(s)	Fishing season	Average Size	Period	Continuity	Observ. Prog.	Landing & catch	Catch & effort	Size data	By-catch	Discards	Quality control	Other biol. Info
ALGERIE	Longline Haul Seine Hand Trap	ALB SWO BON LTA BOP SSM YOU FRI SKJ	10 vessels for large pelagics. 985 multi-specific small boats	Medit.	August to May	BFT = 125cm SWO = 125cm LTA = 33 cm	1950 to 2001	No	All foreign boats have observers	Census from dealer	Port sampling	Fish not measured	By-catch included in system	No discards	Verification carried out in 3 major ports	Yes, not specified
CANADA	Longline	SWO BET YFT ALB	77 vessels	N.W.Atl	April to Nov.	swo=58kg bet=41kgr yft=36kgr alb=19kgr	1960-2001 1980-2001	Yes	Yes	Logbook and census	Logbook and census	All fish measured and weighed when unloading	by-catch recorded but not always sampled	Discards estimated & reported to ICCAT		
	Harpoon	SWO BFT	1248 persons 757 persons	N.W.Atl	June to Nov.	swo=111 kg bft= medium	1940-2001 1980-2001		0 % for SWO and 5% for BFT	Logbook and census	Logbook and census	All Fish measured & weighed at dockside	No No			
	Tended Line	BFT BET YFT ALB	757 persons	N.W.Atl	June to Nov.	200 kg	1980 to 2000	Yes	5% coverage	Logbook and census	Logbook and census	All fish measured and weighed when unloading		No discards		
	Rod & Reel	BFT	757 persons	N.W. Atl	June to Nov.	300-400 kg	1500-2001	Yes	5% coverage	Logbook census	Logbook census	All measured		No discards		
	Trap	BFT	4*6 traps nets	N.W. Atl	June_Oct:	med.-larg.	1970-2001	Yes		Logbook census	Logbook census	All measured		No discards		
CAP-VERT	Baitboat, Hand, Purse Seine	SKJ YFT BET LTA FRI WAH	68 indust. vessels & 1257 artisanal boats	EEZ of Cape Verde	All year	Medium size	First year not known	Yes	No observ.	Logbook	Port sampling	Port sampling	By-catch data included in data collection	No discards estimated	No verification done	No
CHINA P. R.	Longline	BFT BET YFT ALB SWO BLM WHM SAI		Trop. Atl for BET Medit. & North Atl for BFT	All year for BET, and variable for BFT	Medium and large fish	1993 to 2001	Yes	1 observ for 1994-96 and 3 for 2001	Full log coverage	Full log coverage		By-catch included in system	Discards estimated from scient. Observ.	Validation made by TUNA Working Group	No

Table 2. Continued.

EC FRANCE	Trawl	ALB BFT BET SWO	78 vessels	N.E Atl	August to Sept.	Juvenils & adults	1986 to 2001	Yes	No observ.	Logbook & census from dealer	Logbook & census from dealer	0.054% of catch measured	By-catch included in system	No discards estimated	No verification done	No
	Gillnet	ALB BFT SWO	38 vessels	N.E Atl	July to Sept.	Juvenils & sub_adults	1987 to 2001	Yes	No observ.	Logbook & census from dealer	Logbook & census from dealer	0.84% of catch measured	By-catch included in system	No discards estimated	No verification done	No
	Baitboat	ALB BFT	4 vessels	N.E Atl	Summer	Juvenils & sub_adults	1950 to 2001	Yes	No observ.	Logbook & census	Logbook & census	No fish measured	Inluded in system	No discards estimated	No verification	No
	Purse seine	BFT	38 vessels	West Medit.	Mar to Nov.	Variable	1960 to 2001	Yes	No observ.	Logbook & census	Logbook & census	Size from dealer	No bycatch	No discards observ	BFTMED E.C. project	No
	Purse seine	YFT BET SKJ ALB LTA FRI BUM WHM SAI WAH OTH	14 vessels	East Trop	All year	30-80 cm FADS 40-160 cm FREE 35-100 cm 30-60 cm 90-130 cm	1963 to 2001	Yes - up to 1990 data included Cote d'Ivoire, Senegal and sometimes Morocco	Associated fauna study 3% coverage 90% during Moratorium, BET >15% under BETYP	Complete cov of comm landings corrected for species comp local market sampling, since 1994 inc other sources	Logbooks Observer estimates	Double sampling - actual size from catch and size composition by main species- about 1 sample per 130 tons	Included in catch data but not regularly sampled	Not usually estimated, occasional data from observers	Verification procedures for each trip and for annual data for the whole fleet	Sex-ratio planed for YFT and BET Occasional biometric relations, sexual maturity, growth
	Bait Boat	YFT BET SKJ LTA FRI BUM WHM SAI WAH OTH	5 vessels	East Trop	All year	30-100 cm 35-100 cm 35-65 cm	1956-2001	Yes - up to 1990 data included Cote d'Ivoire, Senegal and sometimes Morocco	No observ.	Complete cov of comm landings corrected for species comp from logbooks	Logbooks Rarely included	1 sample for each 500 tons		Rarely included		

Table 2. Continued.

E.C FRANCE-MARTINIQUE	Hand (flotsams)	WAH		West Trop	January to June			Yes		Weekly survey on landing sites and markets	Weekly survey on landing sites and markets	Sampling conduct at landing site				
		FRI														
		LTA														
		YFT														
		BLF														
		SKJ														
	Hand (FAD)	WAH		West Trop	All year	84 CM	1990 to 2001	Yes		Weekly survey on landing sites and markets	Weekly survey on landing sites and markets	Sampling conduct at landing site				
		FRI				28 CM										
		LTA				27 CM										
		SAI				157 CM										
		SKJ				32 CM										
		BUM				203 CM										
		SPF				-										
		YFT				57 CM										
		BLF				33 CM										
EC-NEI	Purse seine	YFT		East Trop	All year	30-80 cm FADS	1991-2001	Yes	No observ.	As for EC-France	As for EC-France	As for EC-France	As for EC-France	As for EC-France	As for EC-France	No
						40-160 FREE										
		BET				35-100 cm										
		SKJ				30-60 cm										
		ALB				90-130 cm										
		LTA														
		FRI														
		BUM														
		WHM														
		SAI														
		WAH														
		OTH														
JAPAN	Longline	BFT	250 vessels	All Atlantic including Medit.	All year	Medium to large	1972 to 2001	Yes	< 1 % coverage for observ.	Logbook and extrapolation based on effort	Logbook and extrapolation based on effort	20 % of catch sampled	Billfish and major shark species are covered	Discards from obs. pgm	Logbook checked by personnel when landing and reviewed by biologist and by computer	No
		SBF														
		YFT														
		ALB														
		BET														
		SKJ														
		BLM														
		BUM														
		WHM														
		SPF														
		SWO														

Table 2. Continued.

LIBYA	Trap	BFT	3 Traps	Medit.	May-June	Medium-large	1919-2001	yes	No	Full logbook coverage	logbook and sampling by day	80% sampled	Sharks and Perciforms	no discards	visit by scientist	Sex and maturity
		LTA														
	longline	BFT	6 exc. Joint ventures	Medit.	May	Medium-large	1975-2001	yes	yes	Full logbook coverage	Full log coverage	weight only. 100%	--	--	visit by scientist	only weight
		SWO														
	Purse seine	BFT	5 boats	Medit.	May-June	Medium-large	1990-2001	yes	-	By dealer census	--	--	--	no discards	--	length-weight. Sex Mat
MEXICO	Longline	YFT	40 vessels	Gulf of Mexico	All year	137 cm	1981 to 2001	Yes except 1988	All trips covered	Logbooks and observ.	Logbooks and observ.	80-100 % catch measured	Included in the collection system	Some data available but not sent to ICCAT	Logbooks vs census	
RUSSIA	Longline	ALB	6 vessels and 3 process-ing boats	East Trop	All year	Lurge fish	From 1964 to 1990	Yes	70 % of fishing time covered by observ.	Logbook full coverage	Logbook full coverage	25 % of catch measured	Shark catches collected in L.L until 1990.No by-catch data availabe for PS	No discards	Catch estimates vs cunning	Wgting sex gonads muscle morphometry
		YFT														
		BET														
		WAH														
		SAI														
		BUM														
		WHM														
		SWO														
		SHK														
	Purse seine	YFT	from 3 to 12 vessels depend-ing on the year	East Trop	All year	Variable	From 1979 to 2000	Yes	50 % of fishing time covered by observ.	Daily report from fishing vessel	Daily report from fishing vessel	1 % of catch measured	No data available	No data available	Verification only with observers data	Wgting sex gonads stomach
		BET														
		SKJ														
		LTA														
		FRI														
		BLT														
TRINIDAD & TOBAGO	Artisanal	BET	1190 boats	Carribean area	All year		? To 2001	Yes		Interviews with fishermen or vendors	Interviews with fishermen or vendors	Sample size freq. Done at landing site	All catch data collected	No data available	Data entry process verification	
		SKJ														
		BON														
		FRI														
		WAH														
		KGM														
		SAI														
		BUM														
		BRS														
		MIX														
	Longline	YFT	10 vessels	Carribean area	All year		1950 to 2001	Yes		Export data and domestic sales	Export data and domestic sales	Wgt of fish recorded when exported	Export data and domestic sales	No data available	No process established except fro swo to monitor quota	
		ALB														
		BET														
		KGM														
		SAI														
		BUM														
		WHM														
		SWO														

Table 2. Continued.

URUGUAY	Longline	SWO BET YFT ALB SHK BUM WHM OTH	8 vessels	S.W. Atl	All year but 1st quarter min and 3rd quarter max	Large fish	Since 1981	Yes	Observ. pgm each 3 months	Logbooks but less coverage and landings form	Logbooks but less coverage and landings form	Fish sampled on board	Some shark species. Birds and marine mammals	Discards from observ. Pgm	Low coverage of data less quality	
UKOT-BERMUDA	Hook and Line (RR-LL)	YFT ALB BET BLF LTA SKJ WAH BUM WHM SWO SPF	200 vessels	N.W. Atl	All year most effort in summer		1950 to 2001	Yes	No observ pgm; some vessels take commercial fisheries officers	Full census	Full census	Some size sampling conducted at dockside	By-catch included in system	Not collected but very low	Opportunis-tic verification & data entry process verification	Sex gonad maturity hard part tissues
BENIN	Haul Seine	BLF BET SKJ MAW	76 boats	Gulf of Guinea	Sept. to Jan.	Medium size				Random sampling	Random sampling	No size sample				
ICELAND	Longline	BFT	5 vessels	Iceland EEZ	August-October	200 cm	1996-2001	Yes	100% covered	100% observer coverage	100% observer coverage	98% sampled	yes	not reported	checked with Jap. logbooks	Sex, diet, maturity, genetics
CHINESE TAIPEI	Longline	ALB BET YFT BFT SKJ SAI BLM BUM WHM SWO OTH	190-200 vessels	All Atlantic including Medit.	January to Dec.	alb=100cm bet=120 cm yft=120 cm bft=220 cm swo = 150 cm whm = 170 cm bum = 200 cm blm = 180 cm sai = 130 cm skj = 70 cm oth = 130 cm	1967 to 2001	Yes	No obs. pgm	Census from dealer	From logbooks	First 30 fish caught each fishing day measured (20 % of catch)	Included in the collection system	Not available	Cross check with sales record verification sales settlement certification NJS	

Table 2. Continued.

STA LUCIA	Hand line	BLF ALB YFT SKJ BON BET LTA BLT WAH CER SMM BIL	--	Sto Lucia EEZ	Main fishing season January - April but also Dec. June	Mainly small and medium but some large fish	Year of commencement unknown	Yes	No obs. pgm	sampling programmes	sampling programmes	specific projects only, pelagic species, tuna, wahoo and dolphin	not categorized	Discards are rare as all of the catch is utilized	comparison of estimates with major purchasers	Maturity and ageing under CFRAMP

ALBANIA	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC-DENMARK	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EC-SWEDEN	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GUATEMALA	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SALVADOR	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SINGAPORE	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
THAILAND	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UKOT-FALKLAND	Responded - Do not have tuna fisheries in Convention Area	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 1

Meetings at which ICCAT was represented between November 2001 and October 2002

SUMMARY

This document presents basic information about scientific and administrative meetings where ICCAT was represented either by a member of the Secretariat staff or by someone else on behalf of the Secretariat. Basic information presented for each meeting includes substantive agenda items and the main implications for ICCAT.

4TH MEETING OF THE SCIENTIFIC COMMITTEE OF THE INDIAN OCEAN TUNA COMMISSION (IOTC)

VENUE: Mahé (Seychelles), December 4-7, 2001.

REPRESENTATIVE: Pilar Pallarés (Instituto Español de Oceanografía, Madrid, Spain).

SUBSTANTIVE AGENDA ITEMS: Progress Report of the Secretariat. Report of the Permanent Working Party on Data Collection and Statistics. Report of the Working Party on Tropical Tunas. Report of the Working Party on Tagging. Report of the Working Party on Billfish. Report of the Working Party on Methods. Advice of the Scientific Committee on questions asked by the Commission. Progress on a survey of predation of longline-caught fish. Improvement in the statistical system by coordinated projects.

COMMENTS: As a result of the work carried out by the IOTC Secretariat, there were notable improvements in the database. Notwithstanding, there continue to be important deficiencies, specifically as concerns the catches by IUU fleets, catches by Chinese Taipei and historical size distributions of the major longline fisheries. Because of the lack of appropriate statistics, a complete assessment of the swordfish stock could not be carried out. However, the Committee considered that the strong increase in catches would not be sustainable and could lead to a situation of over-fishing, for which it was recommended that there be no increase in catch and/or effort until a stock assessment is carried out. With respect to Bigeye tuna, the age structured production model (ASPM), applied following the recommendations of the methods group, showed catches higher than MSY since 1994, fishing mortality close to F_{RMS} and the current biomass over SSB_{MSY}. The forecasts by the group showed a reduction in catches toward the MSY maintaining the current F and a collapse of the stock maintaining the current catch levels. The Committee recommended a reduction in catches to MSY levels, either by limiting the catches and/or by limiting effort. The lack of budgetary initiatives to start the major tagging project on tropical species that was approved in 2000 was cause for concern by the Committee. However, new sources of funding have made possible to put a pilot plan in effect. The results of the project that is being developed for the Indian Ocean to estimate mortality by mammal predation on the longline catches showed the importance of this cause of death in some areas (20-30% of the total catch). Implementation and/or coordinated actions (IOTC-OFCF and IOTC-OFCF-SCIRO) were considered very positive as a means to improve the statistics of the countries in the area. The need was also expressed to have information available on the activity of the supply vessels of the purse seiners, as web as those of floating objects. The Committee considered it convenient to establish a model report, similar to the SCRS, which includes executive summaries on the species and national reports.

ACTION ITEMS:

SCRS: Maintain the coordination in the development of the integrated statistical models for the assessment of the tropical species. Evaluate the usefulness of carrying out studies on predation in the longline fleets. Adopt the necessary measures to improve information relative to the objects fishing technique (activity of the supplies, characteristics of the floating objects, etc.).

REPORT AVAILABILITY: Available as Appendix to the Report of the Sixth Session of the Indian Ocean Tuna Commission, ftp://ftp.fao.org/fi/document/IOTC/Reports/IOTC-00-05(E).pdf

6TH SESSION OF THE INDIAN OCEAN TUNA COMMISSION

VENUE: Victoria, Seychelles, December 10-14, 2001.

REPRESENTATIVE: F. Curcio-Ruigómez (MAPA, Spain).

SUBSTANTIVE AGENDA ITEMS: Matters arising from the 5th Session; report of the Secretariat; Report of meeting on Elaboration of a Control and Inspection Scheme; Report of the Scientific Committee.

COMMENTS: The meeting was preceded by the meeting of the Scientific Committee, which recommended management measures for bigeye tuna and swordfish, and which also recommended the improvement of statistical systems in several coastal states. The Commission adopted various recommendations, including (a) the establishment of National Observer Programs, to be presented before the 7th Session, and (b) a statistical document program for bigeye tuna, similar to that adopted by ICCAT in 2001. Another resolution for the limitation of the fishing capacity of contracting parties and cooperating non-contracting parties was also discussed with much interest; this issue will be taken up again at the 7th Session.

ACTION ITEMS: None.

REPORT AVAILABILITY: from www.iotc.org

EXPERT CONSULTATION OF THE REGIONAL FISHERIES MANAGEMENT BODIES ON THE HARMONIZATION OF CATCH CERTIFICATION

VENUE: La Jolla, USA, January 9-11, 2002.

REPRESENTATIVE: P. Scida (NMFS, Silver Spring, USA).

SUBSTANTIVE AGENDA ITEMS: Review of the current status of catch certification and trade documentation programs, and the impacts they have had in the fisheries in which they have been introduced. Linkage between logbook requirements, catch reporting, catch certification, and trade documentation. Evaluation of possible methods to harmonize catch certification and trade documentation schemes. Criteria for the identification of fisheries that would benefit from catch certification and trade documentation. Recommendation on catch certification and trade documentation for the FAO COFI Sub-Committee on Fish Trade.

COMMENTS: Representatives from eight Regional Fisheries Management Organizations (RFMOs) (including FAO and non-FAO bodies) attended the meeting. In discussing the catch certification and trade documentation programs already in place, as well as the impacts of the programs, it became clear that there are two different kinds of programs in place: one that is meant to track and certify trade (documentation begins at the point where the product enters international trade), and another in which tracking and certification begins at the time of catch. The participants developed recommendations on catch certification and trade documentation programs, including a list of basic/minimum information that should be collected and suggested standard procedures that should be followed in the operations of such programs. The final products of the Expert Consultation, the report and recommendations, will be presented to the COFI Sub-Committee on Fish Trade in Bremen, Germany, in February 2002. The report of the expert consultation will be published in the FAO Report Series, along with important information papers.

ACTION ITEMS:

Commission: Continue participation in discussions on harmonizing catch certification and trade documentation programs, both with the FAO and other RFMOs; seek to implement recommendations of the Expert Consultation in the bluefin tuna statistical document program and the soon to be implemented bigeye and swordfish statistical document programs.

REPORT AVAILABILITY: from FAO

NORTH ATLANTIC BLUE SHARK DISCUSSION MEETING

VENUE: Dublin, Ireland, January 24-25, 2002.

REPRESENTATIVES: J. Pereira (SCRS Chair, Portugal), H. Nakano (NRIFSF, Japan), V. Restrepo (ICCAT Secretariat).

SUBSTANTIVE AGENDA ITEMS: Review of biological information; Review of existing data and analyses; Possible blue shark assessment within ICES in 2002; Data availability; Discussion of ICES-ICCAT co-operation on future assessments.

COMMENTS: The impetus for this meeting came from "DELASS", a EU-funded project that aims to develop appropriate methods for shark assessments and to carry out preliminary analyses for nine stocks (including blue sharks in the North Atlantic). Much of the discussion centered on the need for ICCAT and ICES scientists to collaborate in order to come up with a sound assessment. Meeting participants agreed that it would be worthwhile for ICES to include tentative analyses of blue shark stock status as part of the meeting of the ICES Study Group on Elasmobranchs (May 6-10, 2002), and that the ICCAT Secretariat would forward information on this meeting to interested scientists. As well, it was noted that the SCRS has recommended that shark assessments be carried out in 2004 and it is expected that ICES scientists will participate actively in this work.

ACTION ITEMS: The ICCAT and ICES Secretariats should continue to maintain good communications on shark research issues in order to foster further collaboration between scientists affiliated with both organizations.

REPORT AVAILABILITY: Dr. Maurice Clarke, Marine Institute, Dublin, Ireland.

1ST INTERNATIONAL SYMPOSIUM ON DOMESTICATION OF BLUEFIN TUNA

VENUE: Cartagena, Spain, February 3-8, 2002.

REPRESENTATIVES: V. Restrepo (ICCAT Secretariat).

SUBSTANTIVE AGENDA ITEMS: Presentation of talks and abstracts; round table discussions.

COMMENTS: The symposium was planned by a group of scientists representing about 25 scientific and commercial entities who formed a group called DOTT ("Domestication of *Thunnus thynnus*"). The objective of DOTT is to foster cooperative research and development, in basic and applied sciences, for bluefin farming. There were multiple presentations made at the symposium that covered a wide spectrum of issues such as physiology, behavior, nutrition, fattening practices, marketing, engineering, etc. A principal focus of the discussions was the creation of a BFT domestication research center that would attempt the necessary work to close the life history cycle of bluefin in laboratory/penning conditions (i.e., complete grow-out operations starting from larvae, and not simply fattening as is the current practice in the Mediterranean).

ACTION ITEMS:

SCRS: Scientists should monitor the progress made by DOTT scientists, as it is likely that any research carried by it would have potential applications to ICCAT's work.

REPORT AVAILABILITY: www.mu.ieo.es/thunnus

INTER-SESSIONAL MEETING OF CWP AGENCIES

VENUE: Rome, Italy, March 21-22, 2002.

REPRESENTATIVES: V. Restrepo (ICCAT Secretariat).

SUBSTANTIVE AGENDA ITEMS: FIGIS/FIRMS partnership agreements; Proposed IPOA on Status and Trends; Advocacy role for CWP; Review of recommendations of CWP-19; Provisional agenda for CWP-20.

COMMENTS: The Coordinating Working Party on Fishery Statistics (CWP) meets every other year. Participating agencies meet in the inter-sessional year to discuss progress and to identify important issues of relevance for the following CWP meeting. An important issue discussed was how to go forward with the implementation of FIRMS/FIGIS partnership agreements in which RFBs and FAO would work together to publish stock status reports on the Internet in which the RFBs would maintain complete ownership and also responsibility for maintenance of up-to-date reports. A draft partnership agreement was distributed and edited during the meeting. Meeting participants agreed to take the document to their decision-making bodies so that they could evaluate it before the end of 2002. Another issue was the upcoming Technical Consultation to review a draft IPOA on Status and Trends. Meeting participants agreed that it was not their role to provide official support to the IPOA; however, participants agreed that it would be useful to point out how the CWP was already taking several of the actions that the draft IPOA called for in terms of inter-agency coordination.

ACTION ITEMS:

SCRS and Commission: The SCRS and Commission should evaluate the usefulness of direct involvement in FIRMS/FIGIS via a partnership agreement.

REPORT AVAILABILITY: from FAO – FIDI.

FAO TECHNICAL CONSULTATION ON IMPROVING INFORMATION ON STATUS AND TRENDS OF CAPTURE FISHERIES

VENUE: Rome, Italy, March 25-28, 2002.

REPRESENTATIVES: V. Restrepo (ICCAT Secretariat).

SUBSTANTIVE AGENDA ITEMS: Discussion of the proposal for improved status and trends reporting on capture fisheries.

COMMENTS: In 2001, COFI reviewed a draft proposal for an IPOA on Status and Trends Reporting; COFI recommended that FAO should hold a technical consultation to elaborate on the concerns expressed by various members. The proposed document reviewed during this meeting incorporated many changes relative to the 2001 draft, primarily dealing with the needs for capacity-building in developing countries. Delegates reviewed the proposal in detail. In the end, it was a greed that an IPOA was not the ideal type of instrument for what was being sought, because IPOAs are of a discrete time-scale. It was decided that the document should be a Strategy for the improvement of information on status and trends, with a more long-term view.

ACTION ITEMS:

None.

REPORT AVAILABILITY: from FAO.

FIRST WORKSHOP OF THE FAO TCP PROJECT FOR THE PREPARATION FOR EXPANSION OF DOMESTIC FISHERIES FOR LARGE PELAGICS SPECIES BY CARICOM COUNTRIES

VENUE: Barbados, June 24-26, 2002.

REPRESENTATIVES: D. Die (University of Miami, USA).

SUBSTANTIVE AGENDA ITEMS: Presentation and discussion of the consultant's reports on (a) assessment of large pelagic stocks of importance to CARICOM countries, (b) the harvest sector, (c) the post-harvest sector, (d) national management and fishery development, (e) international agreements, (f) options for management; discussions for "The way forward".

COMMENTS: The most important outcomes of the meeting were: (1) Adoption of a report that summarizes the biological status of resources and the fisheries in the CARICOM countries. All the resources discussed are those under the responsibility of ICCAT and dolphin fish. Most of the information on ICCAT managed resources comes from ICCAT or FAO but there are a few additional data and analyses in the report. There is also substantial new information on the

socioeconomic profiles of the pelagic fisheries in CARICOM countries. (2) Agreement to use the Caribbean Regional Fisheries Mechanism (CRFM) as an approach to coordinate the regional management efforts for these resources for all CARICOM Member States, given that many countries are not ICCAT members. (3) To encourage CARICOM member states to participate in ICCAT. (4) CARICOM countries requested feedback from the ICCAT Secretariat regarding proxy representation, during ICCAT meetings, of CARICOM countries that are ICCAT members but unable to attend certain ICCAT meetings.

ACTION ITEMS:

SCRS:

COMMISSION:

REPORT AVAILABILITY: from FAO.

FIGIS/FIRMS METHODOLOGICAL WORKSHOP

VENUE: Rome, Italy, July 1-5, 2002.

REPRESENTATIVE: C. Palma (ICCAT Secretariat).

SUBSTANTIVE AGENDA ITEMS: Presentation of FIGIS/FIRMS requirements as a consequence of FAO proposed strategy for Improving Information on Status and Trends; Strategy for the implementation of Stocks and Resources inventory; FIGIS/FIRMS proposed definitions and conceptual design; the Fisheries inventory; review of Inventoried resource objects and critical review of case studies by data owners; discussion on the development and adoption of standards; proposal of methods for data exchange workflows and the development of agreed standards; maintenance of FIRMS information.

COMMENTS: This was the 1st FIGIS/FIRMS Methodological Workshop to address issues arising from a preliminary development of Fisheries Resources Monitoring System (FIRMS) within the FAO Global Fisheries Information System (FIGIS). Representatives from 13 regional fisheries organizations (including FAO bodies), three fisheries projects and six countries attended the workshop. The main goals were: to anticipate the framework of discussions that might be addressed following the establishment of a FIRMS Steering Committee, to enable advice from subject specialists on the FIGIS/FIRMS approach, to receive feedback on the "case studies", to discuss further developments on the adoption of standards, and to prepare short term work plans. The Coordinating Working Party on Fishery Statistics (CWP) had been proposed as a vehicle for establishing FIRMS Steering Committee. The meeting asked the CWP Secretariat and FAO to coordinate the discussions of the next CWP meeting (March 31, 2003) in order to settle efficiently the partnership arrangements. In what concerns the 2 ICCAT case studies (north Atlantic Albacore and south Atlantic Albacore, where the respective fact sheets were built up using the 2000 Executive Summaries) the first version was considered adequate for the purpose. However, a special concern was presented by the ICCAT representative when considering the possibility of the software to aggregate both fact sheets in a unique vision of the entire Atlantic, which could lead to misinterpretations of the SCRS point of view. The general point of the Group was that the solution to the problem could be based on the ownership rights (data and structure of the output), such that the ICCAT Secretariat could retain control over how the information is published. Another question that needs to be taken into account is the consequence, at the human resources and monetary levels, of a possible partnership of ICCAT in the FIRMS Steering Committee.

ACTION ITEMS:

SCRS: Deliberate on the possible consequences (human resources and budget) of a possible partnership within FIRMS. In the case of a positive commitment, measures should be taken to ensure the partnership arrangement at the next CWP meeting.

COMMISSION: The Commission should ultimately decide to what degree the Secretariat should be involved in a FIGIS/FIRMS Partnership.

REPORT AVAILABILITY: Available at: http://www.fao.org/fi/meetings/FIGIS-FIRMS/default.asp

5TH SESSION OF THE SCIENTIFIC ADVISORY COMMITTEE, GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

VENUE: Rome, Italy, July 1-4, 2002.

REPRESENTATIVE: V. Restrepo (ICCAT Secretariat).

SUBSTANTIVE AGENDA ITEMS: Review of intersessional activities, including the meeting of the GFCM-ICCAT Working Group; updating of the glossary.

COMMENTS: The SAC meets annually to review the reports of its various subcommittees and working groups, and to make recommendations to the GFCM. In this context, it reviewed the report of the 6th GFCM-ICCAT working group meeting (Malta, 15-19 April, 2002) and endorsed all of its recommendations to the GFCM. Discussions were also held about a recommendation made by SAC's Sub-Committee on Stock Assessment to create a working group to develop a "code of conduct" for the practice of bluefin tuna fattening operations in the region. The SAC decided to create such an *ad hoc* working group and drafted terms of reference that encompass statistical, assessment, aquaculture, management, environmental and socioeconomic considerations. In addition, the SAC agreed on a definition of the term "tuna farming" that broadly captures this practice, as it exists today in the region.

ACTION ITEMS:

SCRS: Because the practice of tuna farming is having a considerable impact on the collection of bluefin catch statistics, SCRS scientists should take a leading role in the working group to develop a code of conduct for tuna farming.

REPORT AVAILABILITY: FAO Fisheries Report No. 684.

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

(Madrid, Spain – September 30 to October 4, 2002)

1. Opening of the meeting

The 2002 meeting of the Standing Committee on Research and Statistics (SCRS) was opened on Monday, September 30, at the Hotel Reina Victoria, in Madrid, by Dr. Joao Gil Pereira, the Chairman of the Committee. Dr. Pereira welcomed the participants to the annual meeting.

2. Adoption of Agenda and arrangements for the meeting

The Tentative Agenda was reviewed and adopted as in **Appendix 1.**

The following scientists served as rapporteurs for the species sections (Agenda item 7) of the 2002 SCRS Report:

Tropical tunas- general	R. Pianet
YFT - Yellowfin tuna	C. Brown
BET - Bigeye tuna	N. Miyabe
SKJ - Skipjack tuna	J. Ariz
ALB - Albacore	M. Keatinge
BFT - Bluefin tuna	J. Powers, M. Sissenwine (W), J.M. Fromentin (E)
BIL - Billfishes	D. Die
SWO - Swordfish	J. Porter
SBF - Southern Bluefin	Z. Suzuki
SMT - Small tunas	L. Gouveia

The ICCAT Secretariat served as rapporteur for all other SCRS Agenda items.

3. Introduction of Contracting Party delegations

Delegates from the following 17 Contracting Parties were present at the 2002 SCRS Meeting: Brazil, Canada, China, Côte d'Ivoire, Croatia, European Community, Ghana, Japan, Korea, Libya, Mexico, Morocco, Namibia, South Africa, Tunisia, United Kingdom (Overseas Territories), and United States of America. The List of Participants is attached as **Appendix 2.**

4. Introduction and admission of observers

Scientists from FAO, Chinese Taipei, Iceland, Malta, the Inter-American Tropical Tuna Commission (IATTC), the International Whaling Commission (IWC), and SEO/Birdlife were admitted to the meeting as observers (see **Appendix 2**, List of Participants).

5. Admission of scientific documents

The Secretariat informed the Committee that about 140 scientific documents were submitted during the year, many prepared for inter-sessional meetings. Not all of these documents have been made available for the SCRS meeting, as authors must provide 80 copies for distribution at the Plenary. In addition there are six meeting reports, 19 National Reports, and several Secretariat documents. The List of Documents is attached as **Appendix 3.**

6. Review of national fisheries and research programs

Brazil

In 2001, the Brazilian tuna longline fleet consisted of 124 vessels, a 39% increase from 2000, when 89 vessels were operating. The number of baitboats operating in 2001 was 39. The Brazilian catch of tunas and tuna-like fishes, including billfishes, sharks, and other species of minor importance, was 51,307 MT (round weight), representing a decrease of about 2.5% from 2000. The majority of the catch again was taken by baitboats (about 50%), with skipjack tuna being the most abundant species. The total catch of the tuna longline fishery, equal to 23,249 MT, was about 22% higher than in 2000. Albacore, accounting for about 27% of the catches, was the most caught species. Swordfish catches in 2001 reached about 4,000 MT, representing 17% of the total catch of longliners and a decrease of 13% from 2000, when 4,696 MT were caught.

Several research activities continued to be conducted on tuna species in Brazil. A total of 4,664 fish were measured at landing, as follows: 1,295 yellowfin, 876 bigeye, 1,452 swordfish, 269 sailfish, 430 white marlins, and 343 blue marlins. Data have also been collected from several recreational fisheries based off southeast and northeast Brazil, where sport tournaments are conducted by local yacht clubs.

In order to adequately comply with ICCAT recommendations, the Brazilian government has, in the past, implemented several fishery regulations. A new Rule (I.N. 35/2002), regulating the Brazilian tuna fishery, was published on April 5, 2002, establishing the following:

- A catch limit for swordfish of 4,720 MT;
- Prohibition of swordfish catches to the North of 5°N;
- A catch limit of 52 MT of white marlin and 253 MT of blue marlin was established for all boats. Although these limits were established, when the catches of these species attain 47 MT and 228 MT, respectively, their commercialisation will be forbidden. The release of all specimens that are still alive by the time of boarding was also made mandatory;
- Leasing contract of foreign boats will not be authorized to vessels included in the ICCAT and CCAMLR list of IUU fishing vessels. When foreign fishing boats temporarily suspend their operations in Brazil, to carry out maintenance abroad, for instance, the Brazilian company leasing the vessel will have to provide evidence that the vessel operated in accordance with ICCAT conservation and management measures, having declared all its catches to the Commission.

Furthermore, on July 1, 2002, the Brazilian Government established a new fishery regulation forbidding the commercialisation of white marlin and blue marlin from July 1 to December 31, 2002.

Canada

The Canadian nominal landings of Atlantic bluefin tuna in 2001 were 523.7, of which 13.2 t were estimated to be discarded deadline from swordfish longline fleet.

Canadian bluefin tuna fisheries currently operate in several geographic areas off the Atlantic coast from July to November when bluefin tuna have migrated into Canadian waters. The main commercial fisheries occur off the coast of Nova Scotia (Hell Hole rod and reel/tended line), Bay of Fundy harpoon, St. Margaret's Bay trap, Canso rod and reel, and Halifax rod and reel/tended line), in the southern Gulf of St. Lawrence (tended line/rod and reel) and sporadically along western edge and central region of the Grand Banks (tended line/rod and reel). Generally, locations of bluefin tuna captured within these areas have been consistent over the past two years, and are comparable to those previously reported for 1994 through 1999. Since the inception of the Hell Hole fishery in 1988, catches from the Hell Hole have predominated the Canadian fishery, with the exception of 2000 when the Gulf of St. Lawrence when the Gulf of St. Lawrence surpassed the Hell Hole in importance. However, in 2001, the trend was again similar to the 1990s. The major fisheries (e.g., Gulf of St. Lawrence, Hell Hole, Bay of Fundy) have shown a general trend of declining mean weight over the past five years.

The Canadian nominal landings of swordfish in 2001 were 1,079 MT, taken by pelagic longline (958 MT) and harpoon (121 MT). In addition, based on data from at-sea observers, approximately 26 MT of dead discards

were estimated to be taken from the longline fleet. Only 63 of the 77 licensed longline vessels landed fish in 2001, a decrease relative to the 1993-1996 level when nearly all of the swordfish licenses were active. The reduced effort in recent years is a result of a combination of factors including reduced quota, increased opportunities for fishing other species, and relatively low prices.

There were major changes in the fishing patterns of the longline fleet in 1999-2001. Generally, the pelagic longline fishery occurs from May through October, however, due to the declining quotas combined with a competitive fishery the directed swordfish fishery was closed by the end of August in each of the three years. A limited other tunas fishery with trip limits for swordfish was permitted after the closure, and in 2000 and 2001 a tuna fishery was permitted in late autumn where all swordfish were discarded. Further to this, much more attention has been given to fishing other tuna species, especially bigeye, in light of the reduction in swordfish quota. In recent years, pelagic longline vessels have directed for bigeye early and late in the season, and fished to the geographic limit of their license. This level of fishing activity east of the Grand Banks has not been observed since the early 1990s.

Recent Canadian research activities have focused on continued improvements in the catch rate indices used for the bluefin tuna and swordfish assessments, participation in the multi-national central North Atlantic bluefin tuna research, and collaboration with U.S. investigators in conducting satellite tagging studies of the movement of bluefin tuna.

China

Longline is the only fishing gear used by the Chinese fishing fleet in the Atlantic Ocean. The total number of tuna longliners operating in the Atlantic Ocean was 54 in 2001. The total catch of tuna and tuna-like species amounted to 9,370.4 MT, slightly higher than that of 2000. Bigeye tuna (7,210 MT) is the most important species, accounting for 76.9% of the total, 9.8% higher than in 2000. Yellowfin tuna catches decreased from 1,674.2 MT in 2000 to 1,055.8 MT in 2001. The swordfish fish was 302 MT, a decrease of 17% from the previous year.

Data collected, including Task I and Task II, as well as the number of fishing vessels, has been routinely reported to the ICCAT Secretariat by Shanghai Fisheries University (SHFU). China began to carry out a tuna observer program in the ICCAT Convention area in 2001. Three observers were sent to the Chinese Atlantic tuna longline fishery fleet. The area covered by observers was 17°N-8°S, 12°W-43°W. A summary report including data collection, size measurements and biological sampling of tunas and other fishes has been presented to 2002 SCRS meeting.

In terms of implementation of the relevant ICCAT conservation and management measures, the fisheries administration authorities of China required all fishing companies operating in the Atlantic Ocean to report their catch monthly to the Tuna Working Group in Shanghai Fisheries University, in order to comply with the catch limits. The Government of China is initiating a fishing vessel management system, including the issuance of licenses to all Chinese fishing vessels on the high seas of the world's oceans, and the implementation of a VMS program in two years.

Côte d'Ivoire

Since 1985, Côte d'Ivoire does not have tuna vessels and therefore has not had an industrial tuna fishery since that time. However, scientists from the Côte d'Ivoire, in collaboration with their French and Spanish colleagues, monitor the landings of the French and Spanish fleets at the fishing port of Abidjan, as well as Ghanaian vessels. Abidjan is the second most important tuna port in Africa after Victoria (Seychelles), and an average of 100,000 tons of tuna are landed there annually to supply the three tuna canneries.

In 2001, the scientists based at CRO registered the entry of 62 vessels at the port of Abidjan: 25 Spanish, 18 French, 16 Ghanaian, 3 from St. Vincent and 1 from the Seychelles. The 38 vessels (excluding the Spanish vessels) that were monitored by the CRO and IRD scientists, made 184 trips with a total duration of 109,512 hours at sea and 53, 609 fishing hours. Reporting the quantities of tuna landed by these fleets is the responsibility of the scientists of these countries. At the same time, about 10,000 MT of "false tuna" were recorded. The consumption of these "false tuna" is increasing in Côte d'Ivoire.

The only Ivorian tuna fishery is the artisinal gillnet fishery that operates mainly along the coast of Abidjan, and targets tuna and tuna-like species (billfish and sharks). This fishery has been monitored by CRO since 1988 and the data are regularly submitted to ICCAT.

In 2001, around 120 canoes made 13,994 trips, landing 47 MT of sailfish (*Istiophorus albidus*), 196 MT of blue marlin (*Makaira nigricans*), 2 MT of white marlin (*Tetrapturus albicans*) and 19 MT of swordfish (*Xiphias gladius*). In addition, there were 68 MT of shark catches: 15 MT mako *(surus oxyrynchus)*, 49 MT hammerhead (*Sphyrna zygaena et S. lewin*) and 4 MT silky shark (*C. falciformis*).

This fishery has extended towards the west of the country where landings are made at the port of St. Pedro. An inspector has been hired this year (2002) to monitor these activities.

Croatia

Total Croatian catches of tuna and tuna-like fishes in 2001 were 903 MT; 100% of the catch is bluefin tuna. An estimated 98% of the fish have been caught by purse seine, and the rest by longliners and sport fishing (hooks). Almost the total purse seine catch is transferred to floating cages for growing purposes. Growing activity is still increasing and there is a lot of pressure to increase the catch quota. The Republic of Croatia is facing considerable difficulties in its desire to fulfill the requirements coming from the farmers as well as from the fishermen. Because of limited quota and a lack of giant bluefin tuna, Croatian farmers are forced to buy other member's quota, so that 1,100 MT of bluefin tuna have been imported in Croatia in 2001.

The number of licensed vessels fishing for tuna and tuna-like species is 76, while the number of active vessels is 30. There are 22 licensed large-scale vessels (>24 m).

As the official adjustment of quota for 2001 was done after the closing of the catch season, it was considered by Croatian regulations as 876 MT. The adjusted quota for 2001 is 1,259 MT. The 2001 catch was 890 MT by purse seine, 9 MT by longline, and 4 MT by sport fishing (hooks).

The estimated catch of other tuna-like fishes is 54 MT of bonito *(Sarda Sarda)*.

Research activities have been carried out to analyze catch-at-size data for 1999 through 2001 (SCRS/2001/091), and showed an increased proportion in the number of small bluefin tuna in the catches, as compared to the data for previous years. Final data for 2001 show 72.16% of small tunas (5-10 kg) in the total catch structure. These data are raising questions about the efficiency of the ICCAT recommendation on the closure of purse seine fishing in the Adriatic Sea from May 1 to 31 to protect juveniles. In practice, this has resulted in a shift in fishing effort from and into the Adriatic Sea. In the 2001 SCRS Report, under Agenda item 18 "Other matters", it was concluded that this matter would be discussed at the next meeting of the Bluefin Species Group so that the next SCRS could make specific recommendations to the Commission. Croatia suggests that this recommendation be changed, in order to establish the closed season for the bluefin purse seine fishery during the same period for the entire Mediterranean Sea fishing area.

Due to the increased activities on bluefin growing and uncertainty in catch-trade data, preliminary research has been carried out on the growth rates of bluefin tuna from the Adriatic Sea when reared in floating cages (SCRS/2001/092), providing some very important preliminary indices. As this should be considered as a very important issue in the future, a study was initiated in 2002 on the growth rates of small bluefin tuna when reared in the growth-out floating cages within the framework of the BYP (SCRS/2002/171).

European Community

EC-France

Information on national fisheries

The total French catches of tunas and tuna-like species in the Atlantic Ocean and Mediterranean in 2001 amounted to 67,263 MT, a level slightly below that of 2000. This shows a declining trend in French catches since the mid-1990s, mainly due to the effect of the moratorium in the Gulf of Guinea, to the decrease in the number of tropical purse seiners, and to the decline in the catches of temperate species.

• Temperate tunas

Albacore: Albacore fishing in the Atlantic Ocean in 2001 was carried out by the three fleets that normally catch this species: driftnet, pelagic trawl, and baitboat. The total catches amounted to 6,350 MT, which represents a slight increase as compared to those of 2000. This increase is due essentially to the pelagic trawl catches.

In the Mediterranean albacore are caught as by-catch by purse seiners and are fished actively by the sport fishery from mid-August to the end of October; their catches vary between 3 and 5 MT.

Bluefin tuna: The overall French catches of bluefin tuna in 2001 amounted to 6,748 MT.

In the Mediterranean, bluefin tuna were mainly caught by purse seiners since the 1970s. The catch in 2001 (6,119 MT) has shown a declining trend since 1994 (11,800 MT). The majority of the fishing effort is concentrated in the western part of the Mediterranean basin, with however a marked extension towards North Africa. The majority of the catches are comprised of fish whose average weight is between 10-30 kg, except during the Balearic season, when the catches are comprised of fish weighing from 140-250 kg. It seems that the level of the catches, particularly during the Balearic seasons, are in part affected by environmental factors.

Catches of bluefin tuna in the East Atlantic were 629 MT in 2001, which is slightly above the average of the last decade. Albacore is the main target species of the French tuna fisheries in the northeast Atlantic, whereas bluefin tuna catches are minor. The other fleets catch bluefin tuna as by-catch using pelagic trawl or driftnet.

Other species: Swordfish are caught occasionally in the northeast Atlantic, as by-catch of the fleets that target albacore; catches in 2001 were 101 MT.

• Tropical tunas

Given the multi-species character of the tropical tuna fisheries, information by fleet is more appropriate than information by species. The most notable fact concerning this fishery is the important decline in the catches due both to the effect of the moratorium in the Gulf of Guinea and to the decrease in fishing effort. The total catches of tropical tunas were 54,023 MT in 2001.

Purse seine fleet: In 2001, 17 French purse seiners caught a total of 49,177 MT, as follows: 31,526 MT of yellowfin tuna, 14,043 MT of skipjack tuna, 3,355 MT of bigeye tuna, 11 MT of albacore, and 109 MT of small tunas. A comparison of the average catches made during the period prior to the moratorium (1993-96) with those made during the period of the moratorium (1997-2000), shows catches are generally considerably less, particularly for skipjack (-39%) and bigeye (-57%); yellowfin catches remained relatively stable. This is due mainly to the important decline in the number of sets on floating objects (-43%) and to some reported fishing effort on free schools.

Size sampling and species composition of the landings continued for the overall European fleet (France, Spain and the associated NEI fleet), in collaboration with the IEO, Côte d'Ivoire and Senegal. There were more than 900 samples taken in 2001, with 335,000 tuna identified to estimate species composition of the catches, and 180,000 fish measured. As a result, the catch statistics were transmitted to ICCAT by species and by size category for the 1991-2001 period.

Baitboat fleet: In 2001, the five French-flagged baitboats based at Dakar caught a total of 4,845 MT, comprised as follows: 684 MT of yellowfin, 2,551 MT of skipjack, and 1,593 MT of bigeye. This catch has increased as compared to 2000, within the general context of a decline in catches. There were 52 samples taken in 2001, with 26,500 tunas sampled for species composition and more than 11,000 fish sampled for size composition.

Research and statistics

French research on tuna and tuna-like species is carried out by the *Institut Français de Recherche pour l'Exploitation de la Mer* (IFREMER) as concerns the temperate species. The *Institut de Recherche pour le Développement* (IRD) conducts research on the tropical species.

•Temperate tunas

For the North Atlantic, biological sampling is carried out on the landings of catches of some fleets to analyze the size structure of the catches.

Bluefin tuna: A program co-financed by the European Union (EU), "Stromboli" on bluefin tuna and coordinated by France, was initiated in the spring of 2000 and will finalize at the end of 2002. Its major objectives are as follows: *(i)* to collect and analyze the historical catch data from the Atlantic and Mediterranean traps; *(ii)* to test, by simulation models, the potential of this species to withstand exploitation based on its biological and ecological characteristics; and *(iii)* to study the possibility of establishing abundance indices based on aerial surveys in the area of the Balearic Islands and Sicily.

A new research program, co-financed by the EU, "FEMS", coordinated by CEFAS (UK) and in which France is actively participating, was initiated in 2002 and will continue until 2005. Its objective is to develop simulation models to evaluate the different management strategies of the fish stocks exploited. The tuna stocks concerned in this project are: the East Atlantic bluefin tuna stock, the North Atlantic albacore stock, and the three major Atlantic tropical tuna species.

These programs contribute to the objectives of the ICCAT Bluefin Year Program (BYP).

Albacore: Technological trials have been carried out in view of the re-conversion of the fleets involved in the prohibition on driftnets that entered into force on January 1, 2002. The techniques tested up to now include mainly longline, "automatic" troll line and purse seine.

• Tropical tunas

As concerns tropical tunas, fishery statistics, biological sampling and research are carried out in close collaboration with the IEO, most often within the framework of European research programs, as well as with the research institutes of Côte d'Ivoire and Senegal. These statistics cover 100% of the logbooks of this fleet.

The research carried out on tropical tunas in 2001 covered the following:

- Collection, compilation and analysis of fishery statistics and data on the biology of the major species under ICCAT mandate: 7 documents (on tropical tunas, albacore, and billfishes) were presented to the various working groups;

- The analysis of the results of the MAC Program ("spots" associated with baitboats, Dakar, 1991-2000) is the subject of 3 documents on the biology of bigeye tuna (natural mortality, movements and growth);

- The European program ESTHER (DG-Fisheries, IEO and IRD), concerning the evaluation of fishing power of the European purse seiners, finalized at the end of 2001 and the results of the first analyses have been transmitted to ICCAT on CD-ROM.

- The implementation of a study on the feeding dynamics the high seas pelagic fishery environment is well advanced and is the subject of 2 documents presented to the Working Group on Tropical Tunas;

- Lastly, the IRD is closely involved in the BETYP Program: continuing with the development of an "integrated statistical production model" to better integrate available knowledge on the fisheries and The biology of these species (FASST), support for the collection of statistics on the baitboat and purse seine fisheries of Ghana in collaboration with the Marine Fisheries Research Department (MFRD), as well as tagging activities, and participation in oceanographic cruises of the Japanese research vessel *Shoyo-maru*.

EC-Ireland

Irish fishermen have been fishing albacore since 1990 with more than 30 vessels employing driftnets taking part in the fishery annually at its peak. Between 1999 and 2001 participation in the drift-net fishery was restricted to 18 vessels in line with European Union regulations. In addition, domestic legislation was introduced in 2000 restricting all fishing for tuna to vessels specifically licensed to do so.

The total Irish catch of albacore tuna in the 2001 fishery amounted to 2,004 MT, along with a by-catch of bluefin tuna of 9 MT, a by-catch of swordfish of 17 MT, a by-catch of yellowfin of 4 MT and a by-catch of bigeye of 9 MT.

In 1998 Ireland initiated, with financial assistance from the European Union, commercial trials on vessels using pair pelagic/mid-water trawls, longlines and mechanized trolls. During 2001, apart from the 18 vessels licensed to use driftnets, a further 10 vessels participated in diversification trials. Two of these vessels employed trolling gear while 8 employed mid-water trawls. The Irish albacore fishery took place between July and October with catches taken mainly in an area bounded by latitudes 46°-50° North and longitudes 11°-15° West and in an area bounded by 46°-47° North and 5°-6° West.

A scientific monitoring program has been conducted in the fishery each year since 1998. This program includes onboard observers on all vessels taking part in experimental fishing trials and comprehensive sampling of landings from the driftnet fishery. Biological information was collected from 112 hauls taken by Irish vessels during 2001.

The 8 vessels (4 pairs) employing mid-water trawls split their effort between the Bay of Biscay in ICES area VIIIb and off the southwestern coast of Ireland in ICES Area VIIk. These vessels caught approximately 225 MT of tuna and 2 MT of other fish, mainly swordfish. Landings increased steadily as the season progressed with the period from the end of August/start of September being the most productive. During this time one of the pair of vessels (1000hp) landed around 75 MT of tuna for a 10-day trip. In the same period two smaller vessels (600hp) landed 39 MT of tuna from two five-day trips.

Two vessels participated in the troll fishery for albacore. After one unsuccessful trip in the Bay of Biscay, these vessels concentrated their efforts off the southwestern coast of Ireland, working alongside the Spanish trolling fleet. These two vessels landed 14 MT of albacore. In general catch rates tended to fluctuate widely, a trend also observed in previous years (1998-2000).

EC-Italy

The Italian fishery for large pelagic species shows some relevant changes in the last six years, due to several factors. The most important was the enforcement of the ICCAT regulation on the bluefin tuna quota system, established for the first time in Italy and even in the Mediterranean. To better enforce the quota system, the Italian Government adopted domestic legislation, identifying all the vessels fishing for bluefin tuna and attributing them individual quotas, shared among gear.

The system is quite complicated to monitor (due to the high number of landing places along the Italian coasts), even if each vessel has to submit a statistical declaration of the catches to the maritime authorities. Any unused or undeclared small percentage of catches by single vessels should rise to important quantities at the national level and for this reason new improvements in the system are forecast.

As concerns the bluefin tuna fishery, the catches match the quota, but the difficulties to follow this important fishery are increasing, due to tuna farming. As a matter of fact, only a minor quantity of the catches are from the tuna purse seine fishery (the most relevant one) were landed in Italy in 2001 and 2002, because the tunas were sold at sea in international waters and moved into floating cages, mostly in other countries. As a direct consequence, it was almost impossible to obtain a size distribution of these catches and this problem is expected to increase even more in the future. All the catches obtained by other techniques showed small variations in 2001. The unusually bad weather conditions in the spring and summer of 2002 and the changes noted in the oceanographic patters in several Mediterranean areas during the same seasons are expected to strongly and negatively affect catches in 2002.

From the observations made at sea by several observers and from fishermen's reports, the presence of bluefin tuna in the central Mediterranean basis appears quite relevant in the last six years while, according to the population model output, this was not expected.

The swordfish fishery took a minor quantity of catches in 2001, due to the progressive ban on driftnets adopted by the EC and enforced by the Italian Government. The shift in effort to the longline fishery was only partial and was unable to balance the previous level of production. The size frequencies of the catches show a

stable situation until 2001. As also reported for bluefin tuna, adverse weather conditions in the spring and summer of 2002, together with the enforcement of the EC ban on driftnets since January 1, 2002, are expected to strongly affect swordfish catches.

The albacore fishery in 2001 showed a different pattern than in previous years, with a major concentration of catches in two short seasons, possibly due to environmental factors. Even for albacore, the unusual environmental and oceanographic conditions in 2002 are expected to affect the total catch, but the fishing season was unusually prolonged even in summer.

The catches of minor tuna-like species (frigate tuna, Mediterranean spearfish, and others), are only partially monitored, but the situation appears almost stable, within the usual variability.

Several Italian institutions have been involved in various research activities, providing a series of data collection and specific studies on tuna movements, on longline by-catch, on micro-constituent elements, genetics, and swordfish population dynamics. The length frequencies for the various species (based on several thousand samples) and from several areas were provided in detail to the GFCM/ICCAT Expert Consultation and to the SCRS, while the results of the studies were also provided during the same meetings.

A new series of research and studies on large pelagic species have been funded by the Italian General Directorate of Fisheries and Aquaculture (Ministry of Agriculture and Forestry Policies) since July 2002, to continue the collection of the most important indices for the major fisheries. This research will permit several institutes to monitor the large pelagic fisheries and several aspects of the biology of the species concerned.

At the same time, a new data collection system has been established by the EC (DG Fishery) and co-funded by each Member State. The system was set up by the Italian General Directorate for Fisheries and Aquaculture in July 2002 and the most relevant scientific institutions are involved, which includes length and weight data, as well as detailed data on biology (age, maturity, etc.), based on a common statistical sampling design.

EC-Portugal

The Portuguese catches of tuna and tuna-like-species amounted to 7,750 MT in 2001 which represents a decrease of 45% over the catch of 1998 (13,979 MT). This decreasing trend is mainly due to the decline in baitboat fisheries in recent years. However, an increase of 25% over the catch of 2000 was observed in 2001.

The Portuguese tuna fisheries take place mainly in the Azores and Madeira archipelagos, where local baitboat fleets target different species of tuna, depending on the season and local abundance of each species. In 2001, these baitboat fleets caught 1,775 MT in Azores and 2,292 MT in Madeira, which included 2,074 MT of skipjack, 1,137 MT of albacore, 917 MT of bigeye tuna and 3 MT of yellowfin tuna. Part of the Azores fleet fished in the Madeira area during 2001.

A longline fleet based at Mainland Portugal targeting mainly swordfish and operating both in the North and South Atlantic, caught a total of 869 MT of swordfish in 2001, of which 393 MT were caught in the South Atlantic. The catch of the longline fleet based in the Azores amounted to 235 MT in the northeastern Atlantic. A new fishery of longliners targeting swordfish is developing in the Mediterranean Sea. Their total catch in 2001 reached 115 MT.

Longliners based in Madeira have been operating since 1990 in the eastern Atlantic and in the Mediterranean, catching an average of 300 MT of bluefin tuna per year. A total of 446 MT of bluefin was caught in 2001.

One trap has been operating in the South of Portugal since 1995, targeting mainly bluefin tuna. In 2001, the catch of this species amounted to 15 MT.

Research programs on tuna and tuna-like species have been carried out by the Azores University, the Fisheries Research Laboratory of Madeira and the Fisheries and Marine Research Institute (IPIMAR) in Mainland Portugal. The collection of tuna statistics and sampling size frequencies has been routinely reported to the ICCAT Secretariat and the results of the scientific research have also been submitted to the regular meetings and inter-sessional workshops of the SCRS. A revision on historical size data for several species (BFT, BET,

SKJ, ALB, and YFT) for the period 1979-2001, caught by the Madeira local baitboats, was submitted in 2002 to the ICCAT Secretariat.

An observer program on the Azores baitboat fishery has been carried out since 1998, covering more than 50% of the fleet.

In 2002, under the ICCAT Bigeye Year Program (BETYP), 7 bigeye tuna were tagged with pop-up tags in the Azores during two tagging trials.

EC-Spain

General

Spanish catches of tuna and tuna-like species in 2001 were 102,782 MT (preliminary data) of which 31,608 MT were yellowfin, 9,923 MT bigeye, 32,912 MT skipjack, 9,254 MT albacore, 11,370 MT swordfish, 5,953 MT bluefin and 1,760 MT other tuna species and tuna-like species. There were 222,788 fish sampled (preliminary data), and 94,000 specimens of tropical tunas were identified. A total of 36 scientific documents were presented to the SCRS in 2002, in which Spanish scientists from various research organizations participated (see Document NAT/2002/010).

Fisheries

• Tropical tunas and Canary Island tuna

The purse seine fishery targeting yellowfin and skipjack, which have by-catch of bigeye and small tunas comprises 17 units. Carrying capacity has increased slightly, from 11,051 MT in 2000 to 11,442 MT in 2001. Effort decreased from 4,794 days (5,706 days in 2000). Catches made by this purse seine fleet increased to 65,185 MT (61,070 MT in 2000). The breakdown by species is as follows: 30,433 MT of yellowfin, 27,798 of skipjack and 5,923 MT of bigeye, with 1,031 MT of other tuna. The baitboat fishery is carried out by five baitboat vessels, with total catches of 3,005 MT. Of these, 489 MT were yellowfin, 1,618 MT skipjack and 898 MT bigeye. Effort was 828 fishing days. 383 baitboat vessels operated in the fishing area around the Canary Islands with an estimated duration of 5,402 days at sea. Catches were 5,700 MT, being the second lowest catch of the series (1975-2001), due to the termination of the fishing agreement between the EU and Morocco.

• Temperate tuna

Catches of bluefin tuna in the east Atlantic and Mediterranean were 5,953 MT (3,633 MT in the east Atlantic and 2,320 MT in the Mediterranean). Catches of albacore in the fisheries of the Cantabrian Sea and adjacent waters in the east Atlantic north of 35°N were 7,665 MT (baitboat: 3,420 MT, trolling: 4,245 MT). 77.5 MT were caught in the Mediterranean. Swordfish catches amounted 11,370 MT, of which 9,895 MT were taken in the Atlantic and 1,475 MT in the Mediterranean. The following catches of small tuna were made: 115 MT of frigate (*Auxis* spp.) 40 MT of bonito (*Sarda sarda*) and 40 MT of little tuna (*Euthynnus alleteratus*).

Research and statistics

Work continued on the Information and Sampling Network to develop ICCAT basic scientific statistics.

• Tropical tunas and Canary Islands tunas

The BIOTHON project continued to reinforce the level of sampling for species composition and size at the main landing ports of the purse seine tuna fleet. Sampling was carried out at the ports of Abidjan (Côte d'Ivoire), Dakar (Senegal) and at the ten main ports of the Canary Islands. Within the BETYP program, two new bigeye tagging cruises were conducted in waters around the Canary Islands. During these cruises, a total of 716 fish were tagged (711 bigeye, 1 yellowfin and 4 skipjack). There were 366 tags recovered (350 bigeye, 8 yellowfin and 8 skipjack). Furthermore, in the Canary Islands, purse seine fishing experiments were started, aimed at catching tuna, especially bigeye and yellowfin, for fattening later in captivity.

• Temperate tunas

Bluefin: A total of 11,828 fish were sampled. Studies on statistics, stock structure, biology, abundance indices and environmental effects were carried out, and fish farming activities were monitored. A larval survey was carried out in waters around the Balearic Islands.

Albacore: In the Atlantic, 14,157 fish were sampled from baitboats and 29,711 from trolling, and 570 were sampled in the Mediterranean. Documents about the surface fleets' activities were presented, with regard to the various methodologies used to obtain catch-at-age and to migration using traditional tagging data.

Swordfish and associated species: 92,342 swordfish were sampled in the Atlantic and Mediterranean. Size-sex ratio sampling was continued. Documents on age abundance indices, recruitment of swordfish in relation to the environment, swordfish reproduction, and the activity carried out by the surface longline fleet in the Atlantic, release-recovery of swordfish tagged by the Spanish surface longline fleet and by other foreign fleets, and the time-area distribution of juvenile swordfish of LJFL<125 cm. were presented. One document dealt with genetic studies. Voluntary tagging was carried out on swordfish, pelagic sharks and billfish by observers on the industrial fleet. Some 228 recoveries of various species were made. The project to analyze the nuclear DNA (FAIR-CT-3941) continued. At the end of 2001, the SHKLL2 project was approved to study the by-catch of the surface longline fishery. In the Mediterranean, the EU DG-XIV-99-032 project to develop a comparative study and standardize abundance indices of swordfish taken by the Spanish, Italian and Greek longline fisheries continued, and the DG-XIV-99/SIDS project on sexual maturity of Mediterranean swordfish through histological and hormonal analyses was concluded.

Other activities

The FAO-COPEMED project on large pelagics, coordinated by the IEO in Malaga, continued to carry out activities, mainly on several aspects of the biology of bluefin tuna and swordfish. As a result of this project, papers were presented to the Ad Hoc GFCM/ICCAT Joint Working Group held in Malta (April 2002) and to the Bluefin Tuna Stock Assessment Group held in Madrid (July 2002). The tuna tagging program, which began in 2000 on board recreational vessels has continued, through encouraging no-kill fishing. A total of 80 albacore and 1 bluefin were tagged in 2001. Within the BETYP Program, two tagging cruises were carried out for the second year in a row, using pop-up type tags in the waters around the Azores, in which 7 fish were tagged, with an expected pop-up time of between 60-180 days.

Ghana

Baitboats and purse seiners exploited tuna resources off the EEZ of Ghana. The total number of vessels currently in operation is 36, comprised of 26 baitboats and 10 purse seiners. Catches for the year 2001 rose to 88,000 MT from 53,000 MT in 2000. This significant rise was attributed to the extensive use of FADs in the fishery. All the vessels operated in 2001, whereas 5 out of the 10 purse seiners did not operate in 2000. Of the overall tuna landings, 64% were by the baitboats. Reported landings showed 64% skipjack, 33% yellowfin, and 3% bigeye, respectively. Purse seiners continue to work in association with baitboats often sharing the catch off FADs. This collaboration has led to a mixture of varying sizes of fish often landed by the baitboats, leading to some problems in stratification by gear. Ghanaian scientists participated in a tagging cruise organized by the Bigeye Year Program (BETYP) off Sao Tome during the months of April to July 2001. Over 200 tuna species have been recovered up September 2001. Catch records of billfishes continued off the western coast of Ghana as part of the Enhanced Billfish Program of ICCAT.

Japan

Longline is the only gear currently used by Japan in the Atlantic Ocean. The number of Japanese longline vessels that operated in the Atlantic in 2001 was estimated to be about 204. This number is very similar to 2000, which is the lowest since 1988 and corresponds to two-thirds of the highest number recorded in 1981. The 2000 catch of tunas and tuna-like fishes in the Atlantic Ocean and Mediterranean Sea by the Japanese fishery is estimated to be 36,088 MT (2,000 MT or a 6% increase from 1999). In 2000 and 2001, bigeye tuna, which is the most important species, accounted for about 65% to 70% of the total catch of tuna and tuna-like species. In terms of weight, yellowfin tuna, bluefin tuna and albacore or southern bluefin tuna are next important species in this order. The 2000 and 2001 swordfish catch was reduced in the North Atlantic as all catches of this species were discarded since February 2000. In 2000, the catch by species was similar for most species except for southern

Following up the ICCAT tagging program, three tags were recovered in Libyan waters, two of which were traditional tags and one was an electronic tag.

The Marine Biology Research Center is taking part in a large program (COPEMED) to study the biology of bluefin tuna. Several papers and information have been published.

Mexico

The Mexican longline fishery in the Gulf of Mexico is directed mainly at yellowfin tuna. In 2001, there were 29 active vessels, which carried out a total of 341 fishing trips. The yellowfin catch is estimated at 1,084 MT, which represents 78% of the tuna catch in 2000. Yellowfin tuna represented 97% of the total catches of tuna species. Other tuna species were as follows: blackfin, *T. atlanticus* (1%), bluefin, *T. thynnus* (0.9%), skipjack, *Katsuwonus pelamis* (0.9%), bigeye, *(T. obesus)*, Atlantic bonito *(Sarda Sarda)* and some species of small tunas. Besides, there were by-catches of billfishes and similar species, which represented 12% of the total tuna and billfish catches. Among these species, catches of white marlin and sailfish catches are noteworthy, and, to a lesser degree, catches of swordfish, blue marlin and black marlin. As concerns by-catches of sharks the following is noted. Of the 1,323 specimens, oceanic whitetip *(Carcharhunus longimanus)* represented slightly more than 18%, followed by mako shark *(Isurus oxyrhinchus)* with 17%, and blacktip shark *(C. limbatus)* with 14%. Hammerhead sharks *(Sphyrna* spp*)* and thresher *(Alopias vulpinus)*, each represented close to 9% of the shark by-catch. Lastly, unidentified specimens represented 27% of this shark by-catch.

Mexico has an on-board observer program since 1992. In 2001, coverage of the fishing trips was 100%. Currently there are two areas of priority research: (1) Development of a database on tunas caught by longline in the Gulf of Mexico. Besides the observer program, this base includes information obtained from the fishing logbooks. With these two sources, the information obtained can be validated. (2) Research for the management of longline tuna fishing in the Gulf of Mexico. For this year, the following objectives are contemplated: Evaluation of time-area catch and effort trends; analysis of yellowfin size structure; and time-area analysis of by-catches of billfish and shark species.

Morocco

In 2001, the catches of tunas and tuna-like species amounted to 11,761,813 kg (11,761 MT), which represent an 11.5% decrease as compared to catches in 2000. This decline is due mainly to a decrease in the catches of small tunas, particularly Atlantic black skipjack, skipjack, Atlantic bonito, and frigate tuna. In terms of weight, bluefin tuna and swordfish represent 25% and 30% of the total, respectively.

Bluefin tuna catches amounted to 3,008 MT, an increase of 3% as compared to 2000. For swordfish, Mediterranean catches (3,026 MT) this year showed a 9% decrease as compared to the average of the 1996-2000 period. In the Atlantic, 524 MT were caught in 2001, for which the swordfish catches amounted to 3,550 MT.

As regards management measures, Morocco has a ministerial decree in effect that establishes the minimum size limits of species caught in its national waters. The monitoring of fishing activities, both on land and at sea, is reinforced by the presence of maritime control authorities, scientific observers, etc.

On the other hand, there is a center for monitoring and control of fishing activities by satellite (DRS/GPS).

With respect to research, the *Institut National de Recherche Halieutique* carried out various research activities, in collaboration with the COPEMED program, and aimed at the study of the biology and exploitation of tunas.

South Africa

The South African tuna fishery comprises three sub-sectors, namely baitboat, sport and tuna longline. Approximately 200 baitboat and sport vessels operate in the southeast Atlantic, and a further 25 tuna longline vessels operate in both the southeast Atlantic and southwest Indian Ocean. Tuna are also taken as a by-catch in the shark longline fishery.

Two large pelagic species are predominately targeted by the South African fleets, namely: albacore – which is targeted by baitboat and sport vessels, and; swordfish – which is targeted by tuna longline vessels. The best

estimate of total albacore catch for 2001 is 7,236 MT. Similarly, the best estimate for swordfish is 791 MT, of which 265 MT are reported from the ICCAT region, 229 MT from the IOTC region, and a further 297 MT for which the region (ICCAT or IOTC) is unknown.

The availability of albacore in near-shore waters is strongly influenced by environmental conditions, which has led to poor catches in 1999 and 2000. In contrast, a substantially higher catch was attained in 2001 due to improved availability in near-shore waters. This catch was more than double that caught in 2000.

Total swordfish landings for South Africa have also doubled in 2001, possibly as a result of the fishery expanding into new fishing grounds and fishers being more experienced in targeting this species. An experimental tuna longline fishery was introduced in 1997. South Africa is in the process of formalizing the fishery into a commercial fishery, and fishing rights will be allocated in 2003.

In 2001 substantial catches of yellowfin tuna (317 MT), bigeye tuna (167 MT), blue shark (82 MT) and mako shark (79 MT) were also made.

As South Africa is situated on the boundary between the Atlantic and Indian Oceans it is therefore important to determine stock identity for fisheries management. Swordfish genetic material has been collected and was sent to the USA for analysis. Trans-boundary movements will also be investigated by a tagging study that is due to be implemented in 2003. Trans-boundary migration of yellowfin tuna has also been identified as a research priority. Swordfish biological material has been collected since the inception of the experimental tuna longline fishery.

Tunisia

In 2002, about 52 tuna vessels measuring between 15 and 38 m in overall draft, two longliners and three traps in the Gulf of Tunisia carried out tuna fishing along the Tunisian coasts. Besides, about 40 longliners continue to operate in Tunisian waters targeting swordfish.

In 2001, catches of tunas and tuna-like species (swordfish) amounted to 8,580 MT. In terms of proportion, small tunas comprised 64% of the total catches, i.e. 5,628 MT, while bluefin tuna catches amounted to 2,513 MT, only representing 29.3% of the catches. The percentage of swordfish catches remains at about 6.6%, with 567 MT of the national catch of large pelagics.

Purse seine landings of bluefin tuna currently comprise more than 96.5% of the national catches.

The contribution of the two Tunisian traps that were active in 2001 to the national catches of bluefin tuna continues to decline. Their accumulated production does not surpass 3 MT of bluefin tuna, which represents less than 0.2% of the national catches.

In 2001, bluefin tuna fishing by purse seiners was carried out in group. After fishing, the product is unloaded to cages specifically made for this purpose. The fish are towed to Cartagena, Spain, where they are fattened before they are exported to Japan. About 1,400 MT of bluefin tuna have been exported in this manner to Spain. During 2002, the services involved informed us that 2,000 MT of bluefin tuna, whose individual weight varies between 40 and 50 kg, were also exported to Spain.

As concerns research activities, Tunisia, through the *Institut National des Sciences et Technologie de la Mer* (INSTM), continues to participate in COPEMED research activities, a program aimed at improving knowledge on the fishery, biology and ecology of large pelagic species in the Mediterranean, and which is co-financed by FAO/COPEMED and the INSTM.

United Kingdom (Overseas Territories)

The Bermuda commercial fishing fleet for tuna and tuna-like species consisted of 211 vessels during 2001 with approximately one-third of the vessels actively fishing for tuna and tuna-like species. Most of the fishing effort is carried out in the inner 50 km of the Bermuda Exclusive Economic Zone while longline vessels work considerably further offshore. All Bermuda-based longliners are equipped with an Andronics satellite-based vessel monitoring system (VMS).

For the year 2001, the total catch of tuna and tuna-like species was 108 MT.

Bermuda continues to be involved in the ICCAT Enhanced Program for Billfish Research. A study on the post-release survival of blue marlin caught on longlines utilizing pop-up tags continued this year. The Bermuda Division of Fisheries continues to be engaged in a number of regional research programs directed at various pelagic species including wahoo and yellowfin tuna.

Regulations were passed and came into force in 2001 which introduced minimum sizes of retention for blue marlin (250 lbs/114 kg) and white marlin (50 lbs/23 kg).

During the summer of 2002, Bermuda was involved on the Steering Committee for Central North Atlantic Bluefin Tuna Research that conducted exploratory longline fishing operations to collect data on the presence of bluefin tuna in the central North Atlantic.

Scientists act as observers on fishing vessels when sampling pelagic species as well as conducting tagging programs. The collection of scientific data on billfish and other species is ongoing. Data collection helps ensure compliance with management measures as well as providing the material for research programs. Recreational fishing for tuna and tuna-like species is monitored as well thus ensuring compliance with all ICCAT recommendations.

United States

Total (preliminary) reported U.S. catch of tuna and tuna-like fishes (including swordfish, but excluding other billfishes) in 2001 was 25,747 MT, an increase of about 6% from 24,202 MT in 2000. Estimated swordfish catch (including estimated dead discards) decreased 913 MT to 2,568 MT, and provisional landings from the U.S. fishery for yellowfin in the Gulf of Mexico decreased in 2001 to 2,043 MT from 2,214 MT in 2000. The estimated 2001 Gulf of Mexico landings of yellowfin tuna accounted for about 30% of the estimated total U.S. yellowfin landings in 2001. U.S. vessels fishing in the northwest Atlantic landed an estimated 1,583 MT of bluefin, an increase of 370 MT compared to 2000. Provisional skipjack landings increased by 26 MT to 70 MT from 2000 to 2001, estimated bigeye landings increased by 511 MT compared to 2000 to an estimated 1,085 MT in 2001, and estimated albacore landings decreased from 2000 to 2001 by 83 MT to 324 MT.

In addition to monitoring landings and size of swordfish, bluefin tuna, yellowfin tuna, billfish, and other large pelagic species through continued port and tournament sampling, logbook and dealer reporting procedures, and scientific observer sampling of the U.S. fleet, major research activities in 2001 and 2002 focused on several items. Research on development of methodologies to determine the genetic discreteness of large pelagic fishes in the Atlantic continued as were larval surveys for bluefin tuna and other large pelagics in the Gulf of Mexico. Research on development of robust estimation techniques for population analyses and on approaches for characterization of uncertainty in assessments and methods for translating that uncertainty into risk levels associated with alternative management approaches was further conducted. U.S. scientists also continued to coordinate efforts for the ICCAT Enhanced Research Program for Billfish and for the Bluefin Year Program. Participants in the Southeast Fisheries Science Center's Cooperative Tagging Center (CTC) and the Billfish Foundation tagging program tagged and released 7,785 billfishes (swordfish, marlins, sailfish, and spearfish) and 490 tunas in 2001. This represents a decrease of 15% for billfish and a 42% decrease for tunas from 2000 levels. Electronic tagging studies of bluefin tuna and of marlins were substantially enhanced. Cooperative research was conducted with scientists from other nations on development of assessment methodologies, on biological investigations and on development of indices of abundance for species of concern to ICCAT.

Observers

Chinese Taipei

In 2001, the Chinese Taipei fishing fleet consisted of 180 vessels (125 for deep sets and the remainder for shallow sets) and used only longline gear to target tunas and tuna-like species in the Atlantic Ocean. The total landings were estimated at about 46,685 MT for all species, indicating a 10.7% decrease from 49,956 MT in 2000. Of those landings, albacore (21,049 MT) is the predominate species, estimated at about 45.09%. There was a decrease from 5,299 MT in 2000 to 4,399 MT in 2001 for the North stock and from 17,221 MT in 2000 to 16,650 MT in 2001 for the South stock. Bigeye tuna (16,429 MT) comprised about 35.19% of the catch, which fully complied with the catch limit set at 16,500 MT. Yellowfin tuna (4,805 MT) accounted for about 10.29% and showed a decrease from 5,661 MT in 2000. Other species, including bluefin tuna, swordfish, billfishes, southern bluefin tuna, etc. comprised only 10%. Bluefin were only caught in the eastern Atlantic and Mediterranean and produced 633 MT in 2001. The other species were all regulated by catch quotas. Catch and effort statistics were compiled from logbooks and other information, such as trade reports, etc. and submitted to the ICCAT Secretariat regularly as they became available. The Chinese Taipei Fisheries Administration supports

the Enhanced Billfish Research Program, the Bluefin Year Program, and the Bigeye Year Program and grants to national scientists on data analyses and participation in relative species working groups for all species. For scientific purposes, observer programs have been initiated in all oceans, including the Atlantic, since 2001. The Bluefin, Bigeye and Swordfish Statistical Document Programs developed by ICCAT are fully implemented.

Iceland

No landings of tuna and tuna like species were reported from Icelandic vessels in 2001.

A program of experimental fisheries for bluefin tuna has been carried out within the Icelandic EEZ since 1996. The program is organized and supervised by the Marine Research Institute of Iceland and conducted in cooperation with a Japanese fishery agency. Three to five Japanese longline vessels operated in the region South of Iceland in the autumn and the catch is reported as Japanese catch. Icelandic observers are onboard each of the vessels and report information on the catch and collect various tissue samples for biological analyses (vertebrae, spine (age), gonads (maturity), gill, liver (genetic), muscle, blood (e.g. hormone levels).

The results from the five previous years of data collection show that large bluefin tuna migrate into Icelandic waters in the autumn. The magnitude of the migrations may, however, vary between years (SCRS/2002/142).

The size and age of the fish range from 1 to 3 meters and 3 to 17 years, respectively, and the modal size and year classes are around 2 meters and 8 years. The observed age distribution for the catch in 1999 and a lack of trends in size between fishing seasons from 1997 to 2001 indicate that the catch in these years consisted of at least several cohorts.

The bluefin that are caught in Icelandic waters in the autumn show the same length and age distribution throughout the fishing season. Furthermore, the condition of the fish does not seem to change considerably during the fishing period. There are therefore no indications of separate influx of bluefin into the area or any sign of complex migration routes visible from the catch data obtained from these fisheries. The potentials for mixed origin of bluefin in these waters must however be analyzed by other methods that focus directly on the biological characteristics of the fish. Genetic studies are being performed on Icelandic samples at Japanese, Spanish and US laboratories. Furthermore, various tissue samples from the catch are ready to be sent to the ICCAT sample archives where they will be available to other laboratories.

Length at age for the bluefin caught in Iceland in 1999 shows considerable overlap of size between cohorts (SCRS/2002/143). Further age determination for the catch in 2000-2002 is planned in the year 2003.

Other studies on bluefin tuna that are under progress at the Marine Research Institute in Iceland are analyses on the histology of the ovaries. The results show that maturity stage and sexual activity cannot be detected from the histology for fish caught in August to October. Finally, diet analyses are being continued and results are expected in 2003

7. Executive Summaries on species

The Committee stresses that the main purpose of an Executive Summary is to provide a succinct overview to the Commission. These are summaries of the biology and fisheries affecting stocks of concern, the status and outlooks for these stocks, evaluations of effectiveness of management measures agreed by the Commission, and recommendations for additional management measures that the Committee feels would improve the odds of meeting the Commission's objective of attaining Maximum Sustainable Yield levels from the stocks. In order to avoid misunderstanding the Committee's intent, the SCRS stresses the need to recognize and cite all the conditions and uncertainties identified in the Executive Summary, if figures and tables are used apart from the entire Executive Summary Report.

The Committee also suggests that, in order to obtain a more rigorous scientific understanding of these Executive Summaries, readers consult 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 meetings 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.

bluefin tuna, swordfish and white marlin. Southern bluefin tuna and white marlin catches increased by more than 50% while swordfish catches were reduced by 50%.

Geographical distribution of the longline fishing effort in 2001 and 2000 shows much of the fishing effort was exerted in the northeast Atlantic, tropical eastern Atlantic as well as waters off South Africa. There is also a tendency of higher concentration of fishing effort in the tropical North Atlantic between 0° and 20°N as well as in the central North Atlantic, North of 25°N. On the other hand, fishing effort seems to be decreasing in the Gulf of Guinea where it used to be the main fishing ground for the Japanese longline fishery during the 1980s and the early to mid-1990s.

The monitoring of fishing activities, including data collection, submission of fishing data, and the study on the improvement of stock assessment methodology, are important research items, for which the National Research Institute for Far Seas Fisheries has been responsible. This year, Japan participated in all the ICCAT meetings and continued to provide routine fisheries statistics (Task I and Task II). With regard to the ICCAT Bluefin Year Program, Japan presented a brief summary on the cooperative research cruise in the central North Atlantic, which was conducted in 2002. This is a collaborating work among the central North Atlantic bluefin research group (Canada, Japan, and the USA), in order to investigate the possibility of bluefin spawning there. Unfortunately however, no bluefin tuna were caught on longline sets. Samples from larval nets, in which some tuna-like larvae were observed, are now being identified. The results from this cruise will be presented at next year's SCRS meeting. After completion of its research leg in the late August, the boat went down to the tropical Atlantic and continued its investigation to study swimming behavior of swordfish, other billfishes as well as bigeye tuna. Pop-up tagging is scheduled for fish caught by longline operation. At the same time, samples for genetic studies as well as growth study will be collected until the end of this cruise in late October. The genetic study on the stock structure of swordfish has continued and information was provided to the SCRS. The recent study indicates that samples collected from 15°N had the same allele frequencies with the stock in the south Atlantic.

Japan carried out seven observer trips on longline boats in the Atlantic were conducted between November in 2001 and March 2002. Five trips were made on bluefin fishing in the north Atlantic and two others were made in the tropical waters off Abidjan and Dakar targeting on bigeye tuna. A total of 310 fishing days were monitored. A summary report regarding data collection, size measurements and biological sampling on tunas and other fishes including sharks of these cruises has been presented as an SCRS paper. More trips are scheduled for later this year.

Korea

The 2001 catch of tunas and tuna-like fishes by the Korean longline fishery in the Atlantic Ocean amounted to 192.3 MT, representing a decrease by 34% from the previous year's figure. Southern bluefin tuna made up a major component of the total Korean catch, accounting for 82% of the total catch. The recent retreat of Korean longliners from this area and the change in target species to southern bluefin tuna caused a sudden decrease in bigeye and yellowfin catches. Other tunas and billfishes were also caught by the longliners in small quantity.

Routine scientific monitoring work was carried out by the National Fisheries Research and Development Institute (NFRDI). This monitoring covers the collection of catch and fishing effort statistics from the Korean tuna longliners in the Atlantic to meet ICCAT's data requirements. To implement recommendations adopted by ICCAT, Korea has taken the necessary measures, including the introduction of new domestic regulations. Starting this year, a fisheries observer program was initiated to monitor the Korean distant water fisheries, including those for tunas.

Libya

The bluefin fishing season in Libya started early in 2001, at the end of April and beginning of May. In 2001, only two gears (longline and trap net) were in operation targeting bluefin in Libyan waters.

Surface longline fishing was carried out by 18 longliners that caught a total of 1866.367 MT. There was also a total of 5.570 MT of swordfish and 11.192 MT of sharks caught in Libyan waters.

As regards the trap nets, only three operated in 2001, and caught a total of 74.122 MT of bluefin, 4.230 MT of little tuna *(E. alletteratus)* and four sharks *(Alopias vulpinus)*.

7.1 YFT - YELLOWFIN TUNA

No new assessment was conducted for yellowfin tuna this year. The conclusions reported here generally reflect the results of the last assessment, which was conducted during 2000. However, there have been revisions to historical catches (1991-1999) since that assessment, largely due to the improved classification of NEI catches by country as well as the removal of duplicate catch reports. The total catch values from 1991-1999 changed to varying degrees from the values used for the last assessment. The text of this report has been updated as necessary to reflect data changes and additions.

YFT-1. Biology

Yellowfin tuna is a cosmopolitan species distributed mainly in the tropical and subtropical oceanic waters of the three oceans, where they form large schools. The sizes exploited range from 30 cm to 170 cm FL. Smaller fish (juveniles) form mixed schools with skipjack and juvenile bigeye and are mainly limited to surface waters, while larger fish are found in surface and sub-surface waters. Since the inception of the yellowfin tagging program, which has been carried out in the North American sport fishery since 1985, individuals of this species have often been recovered in the West Atlantic, but the majority of the long-term recoveries are made in the East Atlantic where several recaptures are recorded each year. The main spawning ground is the equatorial zone of the Gulf of Guinea, with spawning occurring from January to April. Juveniles are generally found in coastal waters off Africa. In addition, spawning occurs during May to August in the Gulf of Mexico and from July to November in the southeastern Caribbean Sea, although the relative importance of these spawning grounds is unknown. Such separate spawning areas might imply separate stocks or substantial heterogeneity in the distribution of yellowfin tuna. Nevertheless, taking into account the transatlantic migration indicated by tagging, as well as other information (e.g. time-area size frequency distributions and locations of fishing grounds), a single stock for the entire Atlantic is assumed as a working hypothesis (Atlantic Yellowfin Working Group: Tenerife, 1993). A 40-year time series of longline catch data indicates that yellowfin are distributed continuously throughout the entire tropical Atlantic Ocean. Growth patterns are variable with size, being relatively slow initially, and increasing at the time the fish leave the nursery grounds. Males are predominant in the catches of larger sized fish. Natural mortality is assumed to be higher for juveniles than for adults. This assumption is supported by tagging studies for Pacific yellowfin.

YFT-2. Description of the fisheries

The distribution of yellowfin tuna catches in the Atlantic is shown in **YFT-Figure** 1.Yellowfin tuna are caught between 45°N and 40°S by surface gears (purse seine, baitboat, troll and handline) and with sub-surface gears (longline). Troll and handline, although used in artisanal fisheries, have never been a large component of the yellowfin fisheries, although these gear types can represent a large proportion of the catch by a nation. The baitboat fisheries in equatorial areas have always targeted juveniles in coastal waters, together with skipjack, young bigeye and other small tunas. Baitboat fisheries are still active in waters of Mauritania and Senegal, Ghana (Tema), the Canary Islands, Cape Verde, Madeira, Venezuela and Brazil. In the 1980's, the fleets that operate in the areas off Senegal developed a new fishing method in which the baitboat acts as a floating object that attracts bigeye, skipjack and, to a lesser extent, yellowfin; the Canary Islands began to adopt this method in the 1990s. Since the early 1990s, Ghanaian baitboats have fished on artificial floating objects.

Purse seine fisheries began operating in the East Atlantic in the 1960's, and developed rapidly in the 1970's. Beginning in 1975, the fishing area was extended from coastal waters to the high seas, especially at the equator, where large sized yellowfin are caught during the spawning season. In coastal areas, purse seiners catch juveniles in mixed schools. This gear is very efficient as it catches a wide range of sizes (40 to 160 cm), although catches in the east include very few intermediate-sized fish (70 to 100 cm) whereas both small and larger fish are caught. Venezuelan purse seiners operating mostly in coastal areas of the West Atlantic mainly catch fish of intermediate sizes.

Particularly since 1991, the purse seine fleets that operate in the East Atlantic have developed a fishery that targets schools associated with artificial floating objects. This translates into an important increase in catches of skipjack, juvenile bigeye and, to a lesser extent, increases in catches of juvenile yellowfin and by-catch, extending the fishing grounds westward to 30°W and south of the equator.

In Ghana, baitboats have historically been the most important gear, although some purse-seiners operated between 1975 and 1987 .The introduction of drifting Fish Aggregating Devices (FADs) in the early 1990's improved the catch rate of baitboats. Beginning in 1997, purse seiners were re-introduced to the fishery, along with new methodologies resulting from the cooperative operations of baitboat and purse seiners (purse seiners would make sets on schools aggregating around the baitboats, thereby increasing their overall fishing efficiency). Fishing operations on FADs also continued for baitboats and purse seiners. An additional change beginning about 1999 was the introduction of the practice of transshipping at sea from small purse seiners to "carriers" (old baitboats and, later, "reefers"), which collect the frozen tuna for transport to Tema. The number of purse seiners has been increasing regularly. These successive changes have notably increased the overall catches of Ghana, which reached an unprecedented level in 1999-2001.

Longline fisheries principally catch yellowfin larger than 70 cm. However, deep longlines, which began being used in the early 1980's, mainly target bigeye, and therefore the proportion of yellowfin caught by longliners in the Atlantic is becoming less important (in 2001, it amounted to 14% of the total). There are, however, longline fisheries directed at yellowfin tuna, most notably in the Gulf of Mexico and the Caribbean Basin. Coincident to the development of purse seine fisheries during the 1960's and 1970's, longline catches diminished. Amounts caught by longline gear now tend to be somewhat higher in the West Atlantic than in the East Atlantic.

Yellowfin catches in the Atlantic as a whole reached a historical high in 1990 (192,500 MT), but have since followed a generally declining trend, falling to 133,000 MT in 2000 before increasing sharply to 157,000 MT in 2001 **(YFT-Table 1)**. Most of this increase took place in the East Atlantic, where total catches rose from 95,000 MT in 2000 to 116,000 MT in 2001. The overall relative contributions of the various gear types have remained similar since the mid-1980s **(YFT-Figure 2a)**. In the East Atlantic, purse seine catches have represented nearly 80% of the landings on average, with about 15% being taken by baitboats and about 5% by longline. In the West Atlantic, where total catches have exhibited relatively little fluctuation during this time period, purse seine catches have represented about one-third of the landings on average, with about one-third being taken by longline and the remaining third being split evenly among baitboat and other surface gears. The changes to the historical catch trend that have been implemented since the last assessment are depicted in **YFT-Figure 2b**; this figure also shows the dramatic increase in catches between 2000 and 2001.

The eastern tropical Atlantic purse seine nominal effort in terms of both number of boats and total carrying capacity has decreased since 1991. This reflects different trends, with a relatively large decrease for the European and associated fleets (from 70 to 44 boats) partially compensated by an increase from 0 to 10 purse seiners for the Ghanaian fleet. The baitboat fishery remained stable for both European and associated (15-20 boats) and Ghanaian (25-30 boats) fleets. In conclusion, the nominal effort has decreased, and –taking in account the potential changes in efficiency of these fleets due to changes in technology and fishing methodology– the effective effort is assumed to have remained relatively stable in 1999-2001. Size frequency data from the eastern tropical Atlantic purse seine fleet indicate that the catches in numbers of yellowfin smaller than 60 cm (ages 0 and 1) have shown an increasing trend in recent years, with the highest numbers being caught in 2001. The average catch in numbers of ages 0 and 1 increased by 36% in 1999-2001 over the average for 1996-1998. It is unclear whether this increase reflects a change in selectivity or an increase in recruitment.

YFT-3. State of the stock

A full assessment was last conducted for yellowfin tuna in 2000 using various age-structured and production models; emphasis was placed on the development of the production models, the results of which cover a plausible range of F_{MSY} and MSY estimates. Thus the results from the production models were the basis for the Committee's advice.

Trends in catch at age are shown in **YFT-Figure 3**. The variability in overall catch at age is primarily due to variability in catches of ages 0 and 1 (note that the catches of age 1 have increased in 1998 and to a greater extent in 1999).

Both equilibrium and non-equilibrium production models were examined in 2000. The effective effort for the European and associated fleets operating in the eastern tropical Atlantic purse seine fishery used for the equilibrium models was estimated by first standardizing to French class 5 purse seiners, and then further adjusting based on the assumption of an estimated annual increase of 3% in fishing power since 1981. The need

to adjust for increases in efficiency resulted from the many improvements in the purse seine fishery, including the use of floating objects, bird radar, sonar, and satellite imagery, and is supported by data analysis (See 2000 Yellowfin Tuna Detailed Report). These calculations indicated that effective effort for the purse seine fishery reached a high of 27,600 standard fishing days in 1983, declined to a low of 14,700 in 1986, increased again to a new high of 30,000 in 1992 before declining to the 1999 level of 21,000 standard fishing days. In contrast, the non-equilibrium model 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 144,600 to 147,300 MT; the estimates of F_{MSY} ranged from 70,000 to 52,700 standard fishing days. The total 1999 yellowfin catch was 143,000 (recorded as 140,000 MT at the time of the assessment). The overall effective effort for 1999 was estimated to be 60,100 standard fishing days. Therefore, the equilibrium model results estimated that the fishing effort in 1999 was near F_{MSY}.

The point estimate of MSY based upon the non-equilibrium model was 152,200 MT; the point estimate for F_{1999}/F_{MSY} was 0.88 **(YFT-Figures 4a and 4b)**. The Committee was unable to estimate the level of uncertainty associated with these point estimates. Therefore, the non-equilibrium model results estimated that the fishing effort in 1999 was somewhat below F_{MSY}. Estimates of changes in fishing power partially agreed with the 3% assumption used in the equilibrium models for the French purse seine fleet and for the Spanish purse seine fleet until 1990 but differed for the Spanish purse seine fleet after 1990.

In summary, the production model analyses implied that although catches could be slightly lower than MSY levels, effort may be either above or below the MSY level, depending on the assumptions made about changes in fishing power. Consistent with the production model results, yield-per-recruit analyses also indicated that 1999 fishing mortality rates could either be above or about levels 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 **(YFT-Figure 5)**.

YFT-4. Outlook

Since reported yellowfin landings in 2001 appear to be somewhat above the MSY level estimated during the 2000 assessment and fishing effort and fishing mortality may be in excess of the levels associated with MSY, it is important to ensure that effective effort does not increase beyond the current level. 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. Had the (generally downward) historical revisions to the catch trend been available during the 2000 assessment, it is likely that the estimates of MSY at that time would have been lower. Bearing this in mind, the lower point estimates of MSY from the 2000 assessment should receive greater emphasis when considering the current situation relative to MSY.

YFT-5. Effects of current regulations

In 1973, the Commission adopted a regulation that imposed a minimum size of 3.2 kg for yellowfin tuna, with a 15% tolerance in the number of fish per landing. This regulation has not been adhered to, as the proportion of landings of yellowfin tuna less than 3.2 kg has been far in excess of 15% per year for the purse seine and baitboat fisheries. Based on the catch species composition and catch at size data available during the 2000 assessment, which arose from improved analyses of the European and associated fleets purse seine data and other revisions of the database, it now appears that overall catches in number by purse seiners averaged 53.1% undersized yellowfin tuna over the period 1993-98. In the same period, baitboat fisheries landed 75.2% undersized fish. Landings of undersized fish occur primarily in the equatorial baitboat fisheries. In 1999, the calculated proportions of undersized yellowfin were 70.9% for the purse seine fleet and 80.7% for the baitboat fleets. Overall percentages of undersized yellowfin considering all gears were estimated to be 54.5% in 1998 and 69.9% in 1999. The potential size sampling problems may have influenced these percentages. However, the overall percentages are almost certainly considerably higher than the 15% tolerance level. Almost all undersized yellowfin tuna are caught in eastern Atlantic waters, since larger sizes dominate in the West Atlantic. Unfortunately, it may be difficult to realize substantial reductions in catches of undersized fish in the East Atlantic because small yellowfin are mostly associated with skipjack, especially when fishing occurs on floating

objects; thus it is difficult to avoid catching small yellowfin when catching skipjack, the latter being an important component of eastern Atlantic purse seine fleet catches. The Committee suggests that the Commission consider the practicality of maintaining the 3.2 kg minimum size regulation.

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". Although the overall nominal effort has declined since the early 1990s, current estimates suggest that total effective effort has remained relatively stable or slightly declined since 1992.

The effects of the moratorium on FAD fishing are detailed in the 2001 Report of the Working Group for the Evaluation of a Closed Area-Season for the Use of FADs by Surface Fisheries.

YFT-6. Management recommendations

Estimated catches of yellowfin tuna have averaged 144,000 MT over the past three years. This average falls near the lower estimate of the range of MSY from the equilibrium and non-equilibrium production model analyses conducted during the last assessment. However, the estimated catch in 2001 was 157,000 MT, which is somewhat above the range of MSY. It is unclear how the changes to the historical catch trend and the addition of catch values through 2001 would affect these results. Nevertheless, the Committee considers that large changes in the estimates of MSY are unlikely, and the conclusion is maintained that the yield in 2001 likely somewhat above the replacement yield. However, depending on the assumption about annual rates of increase in efficiency, recent levels of fishing effort and fishing mortality may be somewhat above or below the levels associated with equilibrium MSY catches. There are many other sources of uncertainty that may affect the estimates; these are discussed fully in the 2000 SCRS Yellowfin Tuna Detailed Report. Therefore the Committee reaffirms its support for the Commission's 1993 recommendation "that there be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992". The Committee's most recent point estimates of effective fishing effort fall below the estimate for 1992.

The Committee also continues to recommend that effective measures be found to reduce fishing mortality of small yellowfin, based on results of yield per recruit analysis. Although there are insufficient data to fully evaluate the effects of the moratorium on fishing on floating objects (and other measures to reduce catches of small fish) begun in late 1997, in general, the approach was intended to benefit bigeye tuna and is not expected to reduce the mortality of juvenile yellowfin tuna. In fact, the fishing mortality on juvenile yellowfin tuna appears to have increased substantially during the moratorium years, although it is unclear that this is related to the moratorium.

ATLANTIC YELLOWFIN TUNA SUMMARY
(Yields in 1,000 MT)

Maximum Sustainable Yield (MSY)[1,3]	144.6 - 152.2
Current (2001) Yield	157
Current (2001) Replacement Yield	May be somewhat below the current yield
Relative Biomass B_{1999}/ B_{MSY}[2,3]	103%
Relative Fishing Mortality: F_{1999}/F_{MSY}[1,3]	88-116%
Management measures in effect:	- 3.2 kg minimum size [Ref. 74-1] - Effective fishing effort not to exceed 1992 level [Ref. 93-1] - Closed area/season for fishing on FADs [Ref.99-1]

[1] These are ranges of point estimates and no confidence limits are given.
[2] No estimate of uncertainty was calculated around this point estimate during the assessment. Point estimates during the 1998 assessment ranged from 92-135%.
[3] Result from 2000 SCRS.

YFT-Table 1. Estimated landings of yellowfin tuna in 1977-2001, by major area, gear and flag.

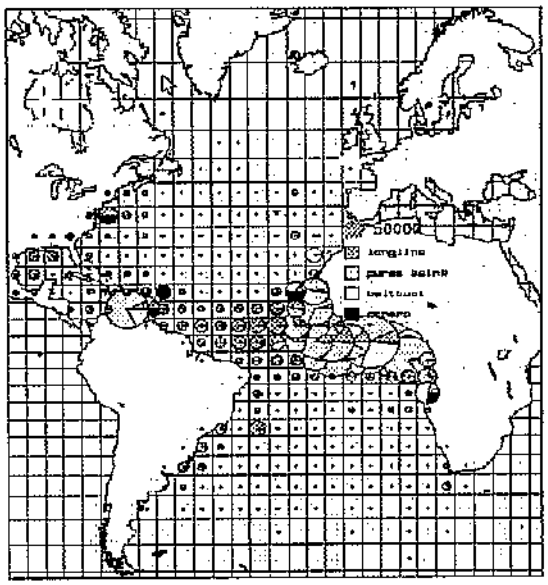
			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL			131013	134044	127517	130961	155818	165001	165373	113940	156547	146535	144428	135219	161322	192456	164795	161364	159974	170534	151960	152125	137134	141477	142765	132882	157269
	AT.E		117541	119246	114158	117798	138114	138711	124953	76053	113656	106606	110304	99180	123139	157112	124318	121039	116800	116218	110923	113403	100269	104736	105782	95033	115911
	AT.W		13472	14798	13359	13163	17704	26290	39666	37481	42365	31751	27680	30284	32807	27095	32640	32895	37230	46335	34047	30682	29609	28044	29189	30624	37824
	UNCL		0	0	0	0	0	0	754	406	526	8178	6444	5755	5276	8249	7837	7430	5944	7982	6990	8040	7256	8697	7794	7225	3534
Landings	AT.E	Bait boat	10943	8980	13715	7690	9788	13211	11507	14694	16120	15301	16750	16020	12168	19560	17851	15095	18483	15658	13516	13734	13912	17478	19056	13009	19886
		Longline	15662	11290	6777	12508	7986	10456	6040	8092	9444	3684	4481	7511	6385	7610	5502	3903	4107	8503	7955	8567	5964	8036	7675	8311	6185
		Other Surf.	384	878	1375	574	5947	3224	3904	2407	1516	2296	2932	2532	2485	2239	3783	2509	2081	1905	1854	1946	2029	1551	1469	1632	1735
		Purse seine	90552	98098	92291	97026	114993	111820	103502	50860	86576	85325	86141	73117	102200	127673	97182	99532	92130	90151	87598	89156	78364	78200	77581	72081	88105
	AT.W	Bait boat	0	1012	605	392	1917	2970	3603	5698	5178	2421	5468	5822	4834	4718	5359	6276	6383	7094	5297	4560	4275	5511	5349	5721	5315
		Longline	11374	9572	9277	6735	11323	9926	6969	8503	9743	12407	9990	14736	13033	13215	9410	11777	9925	9463	8833	8737	8823	8705	11805	11370	11816
		Other Surf.	1025	552	3442	901	1642	1282	3345	2077	6150	7101	5557	3692	3293	2362	3457	3483	4842	10166	13580	6601	4801	4580	5345	5200	6948
		Purse seine	1073	3662	1035	5135	2822	12112	25749	23203	20994	9822	6665	6034	11647	6800	14414	11359	16081	19612	6338	10784	11710	9157	6523	8333	13745
	UNCL	Longline	0	0	0	0	0	0	754	406	526	8178	6444	5755	5276	8249	7837	7430	5944	7982	6990	8040	7256	8697	7794	7225	3534
Discards	AT.W	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	
Landings	AT.E	ANGOLA	2085	2296	904	558	959	1467	788	237	350	59	51	246	67	292	510	441	211	137	216	78	70	115	170	35	34
		BELIZE SH.OB	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	0	0	48	95	100	113	49	65	60	19	3	2	7	1	1	1	1	1	1	1	3	1	1	1	1
		CAMBODIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	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	
		CAP-VERT	104	470	581	864	5281	3500	4341	2820	1901	3326	2675	2468	2870	2136	1932	1426	1536	1727	1781	1448	1721	1418	1603	1851	1684
		CAYMAN ILS	0	0	0	602	1460	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	71	1535	1652	586
		CHINESE TAIPEI	208	203	190	71	432	203	452	87	146	251	193	207	96	2244	2163	1554	1301	3851	2681	3985	2993	3643	3389	4014	3407
		CONGO	0	0	0	140	50	0	0	0	11	20	15	15	21	22	17	18	17	14	13	12	12	12	12	12	12
		COTE DIVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	
		CUBA	3000	2339	3168	5128	2945	2251	1916	1467	1585	1332	1295	1694	703	798	658	653	541	238	212	257	269	0	0	0	
		EC-ESPANA	35525	33636	40083	38759	51428	54164	51946	40049	66874	61878	66093	50167	61649	68503	53464	49902	48403	40612	38278	34879	34550	31337	19947	24681	30937
		EC-FRANCE	49948	55192	47776	51372	55085	45717	40470	7946	12304	17756	17491	21323	30807	45681	34840	33961	36064	35468	29567	33819	29965	30739	31246	29769	32711
		EC-PORTUGAL	0	125	185	77	208	981	1333	1527	36	295	278	188	182	179	328	195	128	126	231	288	176	267	178	194	3
		ESTONIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	234	0	0	0	0	0	0	0	0	0	
		FAROE-ISLANDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		G.EQUATORIAL	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	0	0	0	0	0	0	12	88	218	225	225	295	225	162	278	
		GAMBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	2	16	15	0	0	0	0	0	0	0	0	
		GEORGIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	22	10	0	0	0	0	0	0	0	
		GHANA	621	546	1426	1971	5510	9797	7689	9039	12550	11821	10830	8555	7035	11988	9251	9331	13283	9984	9268	12160	10501	17807	28328	17010	30642
		JAPAN	2647	1722	1241	2217	2863	4815	3062	4344	5765	3634	4521	5808	5882	5887	4467	2961	2627	4194	4770	4246	2733	4092	2281	2143	1833
		KOREA	11060	8625	6449	5349	4288	4010	1629	1917	1668	965	1221	1218	1480	321	259	171	169	436	453	297	101	23	94	142	
		LATVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	255	54	16	0	55	151	223	97	25	36	72

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	208
	LITUANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	332	0	0	0	0	0	0	0	0	0	
	MAROC	2167	3440	2986	3243	4817	4540	2331	614	2270	2266	1529	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	14	72	69	3	147	59	165
	NEI-1	0	0	0	0	0	3121	5388	1104	0	0	2077	3140	5456	12513	4935	10921	9888	8550	8991	12680	12719	7872	9797	4873	13163
	NETHERLAND.ANT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5626	
	NORWAY	0	0	0	0	0	0	0	0	0	813	418	493	1787	1790	0	0	0	0	0	0	0	0	0	0	
	PANAMA	1736	1477	739	1661	341	1933	1568	1653	3100	0	0	0	0	0	6706	7041	7838	8644	10854	5759	3137	1753	932	1179	
	PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	126	173	86	0
	POLAND	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3200	1862	2160	1503	2936	2696	1275	1931	1359	737	0
	SAO TOME & PRINCIPE	45	39	28	31	97	195	194	177	180	180	178	184	198	228	223	229	140	0	0	1	1	1	1	1	
	SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	2	90	132	40	19	6	20	41	208	251	834	252	295
	SEYCHELLES.SH.OB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	
	SOUTH AFRICA	167	281	4595	540	178	49	456	759	382	55	68	137	671	624	52	69	266	486	183	157	116	229	318	353	316
	U.S.A	6400	8131	2884	1614	1472	636	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	U.S.S.R	1794	687	806	448	541	1004	1282	2168	3768	1851	1275	3207	4246	3615	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	315	0	0	0	0	0	0	0	0	0	
	UK-S.HELENA	34	37	69	55	59	97	59	80	72	82	93	98	100	92	100	166	171	150	181	151	109	181	116	136	72
	VENEZUELA	0	0	0	0	0	0	0	0	634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
AT.W	ARGENTINA	43	4	0	0	8	7	0	0	44	23	18	66	33	23	34	1	0	0	0	0	0	0	0	0	
	BARBADOS	58	67	81	40	30	36	51	90	57	39	57	236	62	89	108	179	161	156	255	160	149	150	155	155	142
	BRASIL	1302	852	1553	1008	2084	1979	2844	2149	2947	1837	2266	2512	2533	1758	1838	4228	5131	4169	4021	2767	2705	2514	4127	6145	6239
	CANADA	0	318	0	0	0	0	0	0	0	2	40	30	7	7	29	25	71	52	174	155	100	57	33	105	125
	CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	628	655	22	470
	CHINESE TAIPEI	164	188	848	616	435	407	87	559	780	1156	709	1641	762	5221	2009	2974	2895	2809	2017	2668	1478	1685	1022	1647	1398
	COLOMBIA	0	0	0	0	0	3	29	0	180	311	258	206	136	237	92	95	2404	3418	7172	238	46	46	46	46	46
	CUBA	900	661	232	689	1997	1503	793	2538	1906	2081	1062	98	91	53	18	11	1	14	54	40	40	15	15	0	
	DOMINICA	0	0	0	0	0	0	0	0	0	0	0	0	0	18	12	23	30	31	9	0	0	0	80	78	78
	DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	89	220	226	226
	EC-ESPANA	266	2029	1052	0	0	0	1957	3976	1000	0	0	1	3	2	1462	1314	989	7	4	36	34	46	30	171	672
	EC-FRANCE	0	0	86	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	1
	GHANA	0	0	0	265	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GRENADA	364	166	108	487	64	59	169	146	170	506	186	215	235	530	620	595	858	385	110	523	302	484	430	403	759
	JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	21	0	0	0	
	JAPAN	1408	1647	1707	1117	2983	3288	1218	1030	2169	2103	1647	2395	3178	1734	1698	1591	469	589	457	1024	806	1081	1513	1507	927
	KOREA	6522	4259	4114	1933	3325	2209	1920	989	1655	853	236	120	1055	484	1	45	11	0	0	84	156	0	0	0	
	MEXICO	0	0	0	16	42	128	612	1059	562	658	33	283	345	112	433	742	856	1093	1126	771	826	788	1283	1390	1084
	NETHERLAND.ANT	151	173	173	173	173	173	173	173	150	150	160	170	170	170	150	160	170	155	140	130	130	130	130	130	

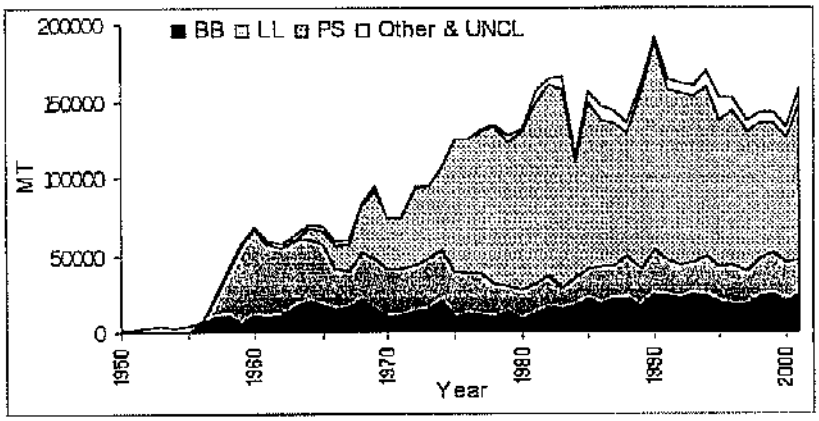
			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
		PANAMA	582	1440	102	807	262	675	62	246	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	535	
		PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	
		SEYCHELLES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	
		ST.LUCIA	67	67	28	27	25	26	23	56	79	125	76	97	70	58	49	58	92	130	141	110	110	276	123	134	145
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	1	40	48	22	65	16	43	37	35	48	38	33	24
		TRINIDAD & TOBAGO	0	0	0	0	0	0	232	31	0	0	0	1	11	304	543	4	4	120	79	183	223	213	163	112	122
		U.S.A	808	1616	298	553	1688	1095	3553	2180	9735	9938	9661	11064	8462	5666	6914	6938	6283	8298	8131	7745	7674	5621	7567	7058	6703
		UK-BERMUDA	10	12	26	35	21	22	10	11	42	44	25	23	22	15	17	42	58	44	44	67	55	53	59	38	
		URUGUAY	0	0	0	0	67	214	357	368	351	270	109	177	64	18	62	74	20	59	53	171	53	88	45	45	
		VENEZUELA	827	1306	2811	5397	4500	14426	26576	21879	20535	11755	11137	10949	15567	10556	16503	13773	16663	24789	9714	13772	14671	13895	11187	10549	18652
	UNCL	CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	156	200	124	0	0	0	0	
		CHINESE TAIPEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI-166																									110
		NEI-7																									23
		NEI-42																									1
		NEI-79																								77	54
		NEI-105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284	400	59	62	0	0	
		NEI-111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	649	0	
		NEI-134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	604	862	1315	1399	2894	1911	1584	1478
		NEI-140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
		NEI-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63
		NEI-10	0	0	0	0	0	0	0	0	0	0	0	0	137	162	78	68	18	174	143	223	48	81	0	11	29
		NEI-71	0	0	0	0	0	0	754	406	526	956	1297	2324	2643	3938	4240	3768	3555	3626	2913	3970	4155	4057	3453	2646	332
		NEI-81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	393	1263	1396	951	762
		NEI-94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	46	22	0	0	
		PANAMA	0	0	0	0	0	0	0	0	0	7222	5147	3431	2486	4149	3519	3594	3134	3422	2588	1954	1156	358	385	0	
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1956	660
Discards	AT.W	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	167	0	

* This series was not used in the assessment since these catches were reported by another fishery: 1215, 1030, 1022, 1329, 1560.

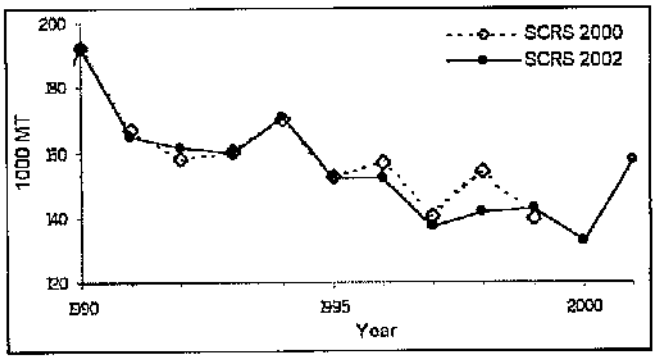
Note: For 2001, UK-Bermuda reported 37 MT during the SCRS Plenary.



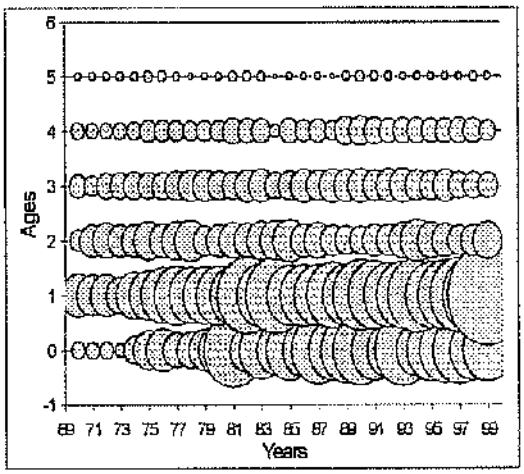
YFT-Fig. 1. Geographical distribution of annual yellowfin catches in 1950-1997, by gear.



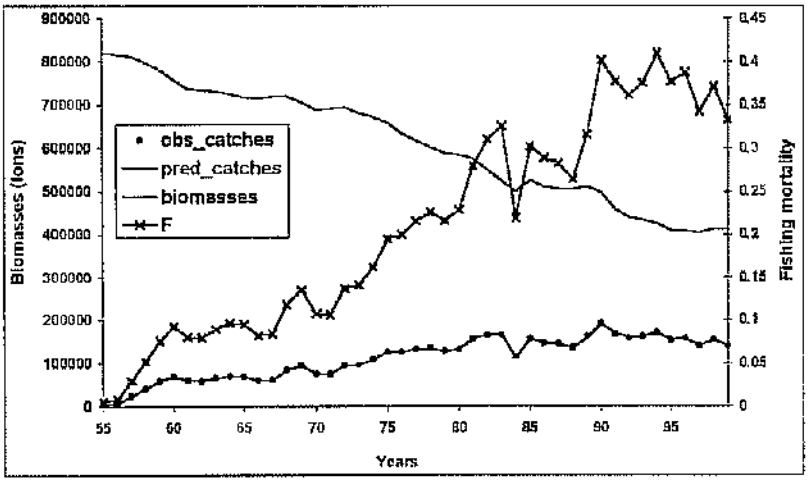
YFT-Fig. 2a. Estimated landings (in MT) of yellowfin tuna by fishing gear in the Atlantic, 1950-2001.



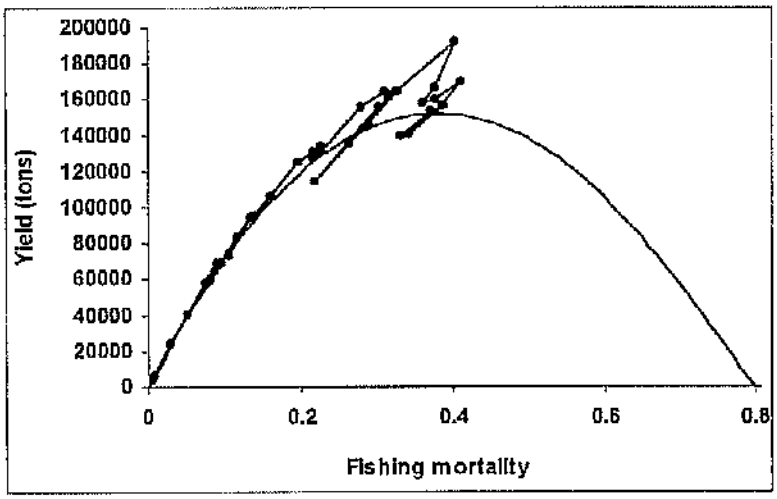
YFT-Fig. 2b. Changes to the available historical catch trend between the last assessment (SCRS 2000) and the current report (SCRS 2002).



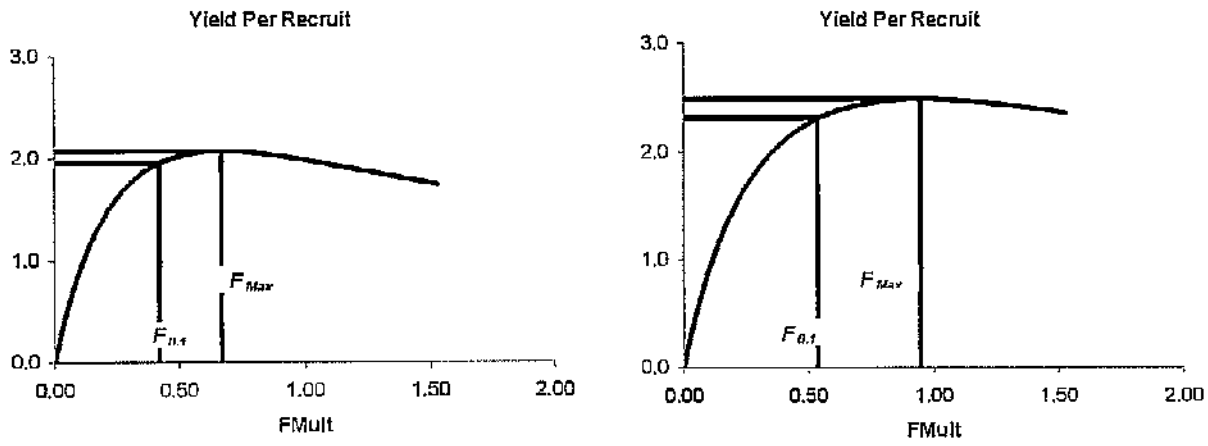
YFT-Fig. 3. Relative distribution of Atlantic yellowfin catches by age and year (bubble size is proportional to total catches).



YFT-Fig. 4(a). Non-equilibrium production model results for Atlantic yellowfin: Trajectories of estimated biomass and fishing mortality, and observed catches. Predicted catches correspond almost exactly to observed catches because the model estimates q using a random walk.



YFT-Fig. 4(b). Non-equilibrium production model results for Atlantic yellowfin: Equilibrium yield curve and observed catch trajectory (line with symbols).



YFT-Fig. 5. Results of equilibrium yield per recruit analyses for yellowfin tuna assuming a current exploitation pattern (left) or assuming zero catch of undersized fish (right). The assumed values of natural mortality (M) are 0.8 for ages 0-1 and 0.6 for ages 2+.

7.2 BET - BIGEYE TUNA

A new stock assessment was conducted this year for bigeye tuna. This report includes updated fisheries statistics and conclusions from the new analyses.

Compared to other tuna species, bigeye tuna has received less attention in the past with respect to research on basic biological characteristics, in spite of the importance of this species for the Atlantic fisheries that are currently exploiting it. The lack of reasonable estimates of some biological parameters considerably hindered the stock assessment process, and sometimes led to unrealistic results. The ambitious Bigeye Tuna Year Program (BETYP) was proposed and was adopted by the Commission in 1996. The activities were started in 1999 after external funds were made available. The major part of the Program such as tagging and sampling will end soon, and the wrap-up meeting to complete this Program will be organized in the near future. The on-going activities and results are being provided to the SCRS as given in the Report of BETYP Activities (SEC/2002/013) and other SCRS documents. The outcome of this program is expected to assist and improve the task of the Committee substantially.

BET-1. Biology

The geographical distribution of bigeye tuna is very wide and covers almost the entire Atlantic Ocean between 50°N and 45°S. This species dwells in deeper water than other tuna species and exhibits extensive vertical movements. Archival tagging and sonic tracking studies conducted on adult fish in other oceans revealed that they exhibit clear diurnal patterns being much deeper in the daytime than at night. Spawning takes place in tropical waters when the environment is favorable. From the spawning area fish tend to migrate into temperate waters as they grow larger. Catch information from the surface gears indicates that the Gulf of Guinea is a major nursery ground for this species. Various prey organisms such as fish, mollusks, and crustaceans are found in stomach contents. Bigeye exhibit relatively fast growth; fish about 100 cm in fork length correspond to three years old, and this is when they become mature, although there are some uncertainties on the growth parameters. a preliminary growth study based on otolith and tagging data was submitted and thus will provide improved information in the near future. Young fish form schools mostly mixed with other tunas such as yellowfin and skipjack tunas. These schools are often associated with drifting objects, whale shark and sea mounts. This association appears to happen less and less as they grow larger.

An estimate of natural mortality (M) for juvenile fish was provided for the first time based on the results of an IRD tagging program conducted in relation to the BETYP. According to this study, the level of M is at a similar level as currently used for the Atlantic stock as well as for other oceans.

Circumstantial evidence, such as the time-area distribution of fish and movements of tagged fish, suggests an Atlantic-wide single stock for this species, which is currently accepted by the Committee. However, the possibility of other scenarios, such as north and south stocks, should not be disregarded.

BET-2. Description of the fisheries

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 purse seine fisheries. Corresponding average weights are 45-50 kg, 20-30 kg and 3-4 kg for these three types of fisheries, respectively. The economic value of fish is also different depending on the fishing gear and market. Generally speaking, the price per kg of longline-caught fish at the unloading site is at least several times higher than that for fish caught by other fisheries such as purse seine.

The longline and baitboat fisheries have a long history that dates back before 1960. The major baitboat fisheries are located in Ghana, Senegal, the Canary Islands, Madeira and Azores. Unlike other oceans, baitboats catch significant amounts of medium and large size bigeye tuna except in Ghana where mainly small fish are caught. 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. The fleets are comprised of EC-France EC-Spain, Ghana and other flag vessels

managed by EU countries in the East, and the Venezuelan fleet operates in the West. The bigeye catch by the Venezuelan fleet was very minor. While bigeye tuna is a primary target species for most of longline and baitboat fisheries, except Ghana, this species has been of secondary importance for the purse seine fisheries and the Ghanaian baitboat fishery.

There are two major longline fisheries, operated by Japan (19,000 MT in 2001) and Chinese Taipei (16,400 MT in 2001), whose catch accounted for slightly less than 40% of the total catch in weight, in 2001. Korea has reduced its activity in the Atlantic considerably since 1990. In more recent years, China and the Philippines started fishing in 1993 and 1998, respectively. China increased its catch thereafter and the 2001 catch was 7,200 MT. The Philippines's catch was the highest in 1999 (2,100 MT) but declined thereafter and was less than 400 MT in 2001.

Since about 1991, the purse seine and Ghanaian baitboat fisheries introduced a fishing technique that utilizes artificial fish aggregating devices (FADs). Similarly, baitboat fleets in Senegal and the Canary Islands have developed a method that makes use of baitboats as FADs. These new techniques have apparently improved fishing efficiency and contributed to the increase of the bigeye catch.

The activities of the illegal, unreported and unregulated (IUU) longliners that fly flags of convenience appear to have started in the early 1980s, and became significant thereafter. In 1999, catches suspected to have been made by the IUU longline fleet were tabled and studied by the Committee for the first time. Those estimates were based on Japanese import statistics which are available since 1983. The estimates of unreported catch are considered to be minimum estimates and they are uncertain. For 2000 and 2001, St. Vincent reported its bigeye catch for the large longline vessels to ICCAT. Because of the apparent decrease in catches by IUU activities, the estimated total unreported catch in 2001 was 7,200 MT, i.e. a 70% decline from the high of 25,000 MT estimated for 1998 (**BET-Figure 2**).

Total annual catch (**BET-Figure 3**) exhibited an increase up to the mid-1970s reaching 60,000 MT and fluctuating between 45,000 and 84,000 MT over the next 15 years. In 1991, it passed 95,000 MT and continued to increase, reaching a historic high of about 132,000 MT in 1994. It has declined since then with some fluctuation. The provisional total catch in 2001 was about 96,500 MT. This declining trend in catch after 1994 was similarly observed in all three types of fisheries (purse seine, baitboat and longline) during the same time, although some countries increased their catches significantly. The recent purse seine and baitboat catches have shown relatively large variation (16,400-32,700MT, 10,400-25,600 MT), while the longline catch has been more stable (68,300-78,900 MT) except in 2001. The longline catch in 2001 declined to 55,200 MT, which is the lowest since 1988.

According to the Committee's estimate, the Ghanaian baitboat and purse seine fisheries have shown a large increase from about 5,000 MT in the early 1990s to more than 11,000 MT in three of the most recent four years.

BET-3. State of the stocks

The 2002 assessment was hampered by the lack of detailed information from some of the major fisheries operating in the Atlantic. Important sources of uncertainty in the assessment include (a) catches made by IUU longliners, (b) the species composition of Ghanaian fisheries that target tropical tunas, and (c) the lack of reliable indices of abundance for small bigeye.

Two indices of relative abundance were used to assess the status of the stock: one based on Japanese longline catch and effort data (**BET-Figure 4**) that targets this species and represents roughly 20-40 % of the total catch, and another one from the U.S. longline fishery that accounts for a smaller fraction of the catch. Both of these indices relate to medium and large-size fish.

Various types of production models were applied to the available data. In some cases, the models were unable to produce parameter estimates within a biologically meaningful range, and therefore strong assumptions had to be made in these cases about stock productivity. The range of MSY estimates obtained from production models was 79,000-105,000 MT. The upper limit of this range is larger than the one estimated in the last (1999) assessment, probably as a result of the addition of high catches since the last assessment. Such increases in MSY estimates are common when maximum observed catches are revised upwards. MSY estimates can also vary

depending on the type of models used. Estimates obtained from other type of model ranged from 91,000 to 112,000 MT.

The production model analyses estimate that the total catch was larger than the upper limit of MSY estimates for the years between 1993 and 1999, causing the stock to decline considerably, followed by a leveling off of the biomass in recent years as total catches decreased. These results also indicate that the current biomass is about 10-20% below the biomass corresponding to MSY and that current fishing mortality is about 15% higher than the rate that would achieve MSY (see Summary Table and **BET-Figure 5**).

Several types of age-structured analyses were conducted using the Japanese and U.S. longline indices and catch-at-age data converted from the available catch-at-size data. Although all results indicate a sharp increase in fishing mortality and an opposite decline in biomass in recent years, the results were unstable and thus the analyses were considered to be inconclusive. The uncertainties in the catch of some fleets and the lack of reliable size and CPUE data for some fisheries may be the reasons for this.

Yield-per-recruit analyses and other models (**BET-Figure 6**) provided estimates of $F_{0.1}$ and F_{max}, which are often used as benchmarks in the stock assessment (potentially as surrogates of F_{MSY}). Current F appears to exceed $F_{0.1}$ and is also likely to be higher than F_{max}, adding support to the production model's conclusion that the bigeye stock is being over-exploited. Spawning stock biomass-per-recruit (**BET-Figure 6**) is lower than its $F_{SPR30\%}$ by about 20%, which corresponds to a threshold at which recruitment over-fishing may occur for other fish species. Multi-gear yield-per-recruit analysis suggests that there cannot be an increase in yield by intensifying fishing effort of any sector; however, yield-per-recruit can be increased with a reduction of fishing effort for small-fish fisheries (**BET-Figure 7**).

In many of the analyses conducted by the Committee, the role of natural mortality (M), particularly for small fish, is very important; i.e., the impact of the small-fish catch on the large-fish fishery is large if M is relatively low, but it will be smaller if M is high. Without precise estimates of M, results could be misleading. It is very encouraging that an estimate of M for juvenile fish was provided. This will enhance the Committee's ability in reducing uncertainty in the stock assessment.

BET-4. Outlook

Stock projections were conducted based on the production model results and assuming a catch of 100,000 MT in 2002 and varying levels of constant catch thereafter. The 100,000 MT level assumed for 2002 presupposes that all fisheries will maintain similar catch levels as in 2001 as shown in BET-Table 1. The projection results suggest that the biomass of the stock will not decline further with constant catches of 100,000 MT, which is very close to the reported catch for 2001. Increases in biomass are expected with catches of 95,000 MT or less, and further declines in biomass are expected with catches of 105,000 MT or more (**BET-Figure 8**).

BET-5. Effects of current regulations

The bigeye minimum size regulation of 3.2 kg was adopted in 1980 to reinforce the same regulation for yellowfin. It is clear that a large quantity of juvenile bigeye tuna smaller than 3.2 kg continues to be captured mostly from the equatorial surface fleets (baitboat and purse seine). The percentage of fish smaller than the minimum size (**BET-Figure 9**) has increased since 1990 and was more than 50% of the total fish caught thereafter except in 2000, although the absolute number of undersized fish might have been reduced in some fisheries. According to the yield-per-recruit analysis (**BET-Figure 6**), a full implementation of this regulation could result in an increase in yield-per-recruit by almost 20 % at F_{max}.

Although a full evaluation of the moratorium on FAD fishery was not possible due to the multi-species nature of surface fisheries and the existence of other types of fishery, this regulation appears effective in reducing fishing mortality for juvenile bigeye, at least for the purse seine fishery which complied with this regulation (see 2001 SCRS Report on "updated report of the impact of the moratorium on tropical tuna stocks"). The full compliance with this regulation by all the fisheries including baitboat will greatly increase the effectiveness in reducing fishing mortality for juvenile.

Limiting the catch in 2001 to the average catch in two years of 1991 and 1992 was entered into force for the major fishing countries whose 1999 catch reported in 2000 SCRS was larger than 2,100 MT (Ref. 00-1). The total reported catch for the major countries and fishing entities to which the catch limit applies (EC-Spain, EC-France, EC-Portugal, Japan, Ghana, China and Chinese Taipei) were 13,000 MT lower than the total catch limit (86,500 MT). As a whole the total catch in 2001 for all countries is about 1,000 MT lower than the average total catch of 1991 and 1992.

BET-6. Management recommendations

The yield-per-recruit and spawning-per-recruit analyses highlighted a potential importance in reducing F on small fish. However, the percentage of fish less than this minimum size (3.2 kg) is very high (45-59% of the total fish caught) since 1990. The Committee, therefore, recommends the full implementation of the moratorium on fishing FADs by all surface fisheries in the Gulf of Guinea.

This year's assessment indicated that the stock has declined due to the large catches made since around the mid-1990s below the level that produces the MSY and current F is higher than F_{MSY}. Projections indicate that catches of more than 100,000 MT will result in continued stock decline. The Commission should be aware that if major countries were to take the entire catch limit set under Recommendation (Ref. 01-01) and other countries were to maintain 2001 catch levels, then the total catch would be about 110,000 MT. Thus, if the Commission wants to ensure that the decline in the stock will be halted, it should consider limiting the total catches made by all countries fishing in the Atlantic to be 100,000 MT or less.

The Committee expresses its appreciation for the effort made by the Commission in establishing the Statistical Document Program for this species. This Program is very helpful in identifying the unreported catches in the Atlantic and will make the catch limit regulation more effective, and thus will contribute to reduce uncertainties in the bigeye stock assessment.

ATLANTIC BIGEYE TUNA SUMMARY
(Yields in MT)

Maximum Sustainable Yield (likely range)	79,000 - 105,000 [1]
Current (2001) Yield	96,482
Replacement Yield	
2002 [2]	102,200
2003 [3]	104,000
Relative Biomass (B_{2002}/B_{MSY})[4]	0.81 - 0.91
Relative Fishing Mortality	
(F_{2001}/F_{MSY})[2]	1.15
($F_{2001}/F_{0.1}$)[3]	1.12
(F_{2001}/F_{max})[5]	0.99
Conservation management measures in effect:	- 3.2kg minimum size [Ref. 79-1] - 25% of FADs fishing vessels and 5% of others to be covered with observers [Ref. 96-1] - Limits on numbers of vessels [Refs. 98-3, 01-1] - Catch limits for those who reported 1999 catch in 2000 was larger than 2,100 MT [Ref. 01-1] - Moratorium on FAD fishing for all surface fleets, Nov 1 to Jan 31, in eastern tropical area [Ref. 99-1]

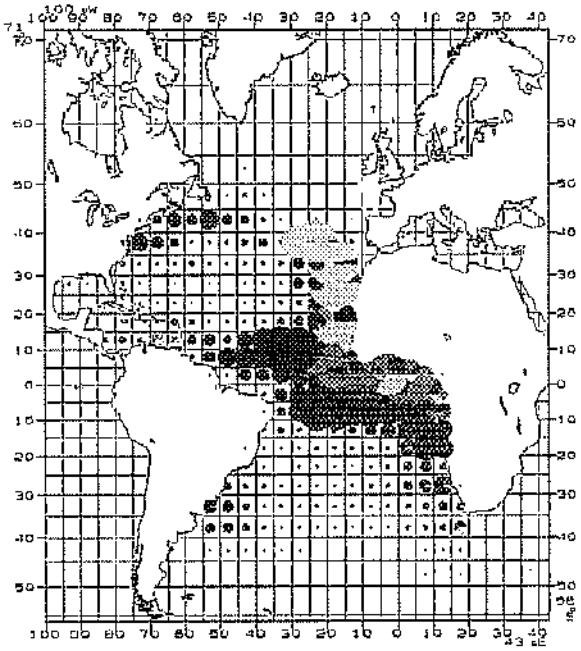
1 Range based on point estimates from various production models. MSY estimates obtained by delay-difference model range from 91,000 to 112,000 MT.
2 Point estimate from non-equilibrium generalized production model.
3 Point estimate from delay-difference model.
4 Range based on point estimates from a non-equilibrium production model and a delay-difference model (estimated from $B_{2002}/B_{0.1}$).
5. Yield-per-recruit estimate based on the 2001 selectivity pattern of 1998-2001 in the moratorium analysis.

BET-Table 1. Estimated Catches (landings and discards, MT) of bigeye tuna by Major Gear and Flag

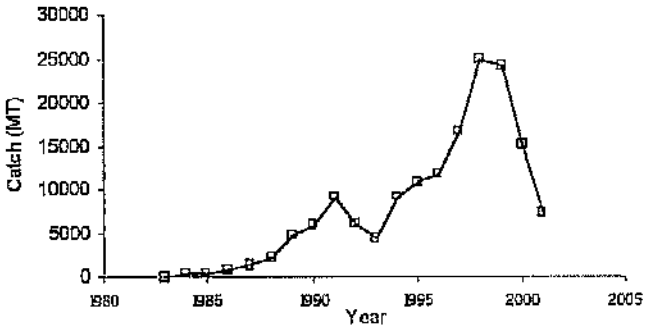
		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL		54880	52693	45975	63596	67753	73493	59384	71052	78215	65396	55976	65796	78068	84337	95930	99012	112189	132222	126284	121208	106565	109882	123735	100413	96482
Landings	Bait boat	12758	14629	9591	12349	10124	6922	9796	11439	17651	15618	12631	9710	13672	18106	17750	16248	16467	20287	25552	19036	18721	21261	22062	10440	17733
	Longline	29531	28796	27560	41677	41608	51805	33757	43303	52595	39942	35570	47758	58389	56537	61556	62359	62871	78296	74816	74900	68251	71825	78864	70377	55159
	Other Surf.	716	174	481	366	365	290	177	247	415	350	526	469	636	287	434	604	648	974	561	353	536	426	1372	1218	1530
	Purse seine	11875	9094	8343	9204	15656	14476	15654	16063	7554	9286	7148	7859	6371	9407	16190	19801	32203	32665	25355	26919	19057	16370	21437	18378	22050
Landings	ARGENTINA	84	23	0	0	0	0	0	0	100	41	72	50	17	78	22	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	24	17	18	18	6
	BELIZE.SH.OB	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	0	0	0	0	40	45	0	0	0	15	6	7	8	10	10	7	8	9	9	9	30	13	11	0	
	BRASIL	1183	812	782	698	505	776	535	656	419	873	756	946	512	591	350	790	1256	596	1935	1707	1237	644	2024	2768	2622
	CAMBODIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	
	CANADA	0	0	0	0	0	0	0	0	0	0	0	95	31	10	26	67	124	111	148	144	166	120	263	327	241
	CANADA-JPN	0	0	0	0	0	0	0	0	0	11	144	0	0	0	0	0	0	0	0	0	0	0	0	0	
	CAP-VERT	47	464	45	27	72	200	293	167	112	86	60	117	100	52	151	105	85	209	66	16	10	1	1	2	0
	CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	428	476	520	427	1503	7347	6564	7210
	CHINESE TAIPEI	3364	2970	2486	2561	1887	2147	1623	925	1220	1125	1488	1469	940	5755	13850	11546	13426	19680	18023	21850	19242	16314	16837	16795	16429
	CONGO	0	0	0	5	0	0	0	0	8	19	10	10	14	15	12	12	14	9	9	8	8	8	8	8	8
	COTE D'IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	***	***	***	***	***	
	CUBA	1800	2300	2300	1385	711	521	421	447	239	171	190	151	87	62	34	56	36	7	7	5	0	0	0	0	
	EC-ESPANA	9736	6849	5419	8430	10010	9332	8794	13617	10340	10884	8875	8475	8263	10355	14705	14656	16782	22096	17849	15393	12513	7115	13739	11249	9923
	EC-FRANCE	8970	8985	7308	6283	8020	7074	8124	4254	4615	4266	3905	4161	3261	5023	5581	6888	12719	12263	8363	9171	5980	5624	5529	5949	4946
	EC-PORTUGAL	4522	5350	3483	3706	3086	1861	4075	4354	6457	7428	5036	2818	5295	6233	5718	5796	5616	3099	9662	5810	5437	6334	3313	1498	1605
	FAROE-ISLANDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	8	0
	G.EQUATORIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	
	GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	87	10	0	0	0	184	150	121
	GHANA	237	124	238	332	780	791	491	2162	1887	1720	1178	1214	2158	5031	4090	2856	3577	4738	5517	5805	7431	13252	11460	5586	14095
	GRENADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	25	20	10	10	0	1	0	0	0	
	ICELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	JAPAN	10144	9863	12150	20922	22091	33513	15212	24870	32103	23081	18961	32064	39540	35231	30356	34722	35053	38503	35477	33171	26490	24330	24184	23812	19031
	KOREA	8090	9716	8022	10235	12274	10809	9383	8989	10704	6084	4438	4919	7896	2690	802	866	377	386	423	1250	796	163	124	43	43
	LIBERIA	0	0	0	0	0	0	0	0	0	0	0	0	206	16	13	42	65	53	57	57	57	57	57	57	57
	LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	508	1085	500	400	400	400	400	400	400	31
	MAROC	324	394	414	387	622	625	552	120	30	0	8	0	0	0	0	0	0	0	0	0	0	0	700	770	770
	MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	6	8	6	2	2
	NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	29	7	46	16	423	589	640
	NEI-1	0	0	0	0	0	338	1141	157	0	0	85	20	93	785	1896	2705	4921	5036	5197	7812	5841	5278	9068	1696	7929
	NEI-104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
	NEI-105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	403	468	42	196	194	27	0
	NEI-111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1412	1870	0	
	NEI-112	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	38	15	6	1	2	0	0	0	0
	NEI-134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155	607	1458	3077	4721	7322	7964	4450	3658
	NEI-157	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0
	NEI-40	0	0	0	0	0	0	0	0	0	0	0	0	319	182	194	234	42	100	222	210	97	44	0	0	39

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
NEI-66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
NEI-71	0	0	0	0	0	0	46	369	354	757	1406	2155	4331	5674	8787	5911	4143	8244	8601	7827	9970	11474	9471	6134	1880
NEI-81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	210	1690	4412	4561	4481	1652
NEI-94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	43	36	0	0	
NEI-UK-OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	
NETHERLAND.ANT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2627	
NORWAY	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	
PANAMA	1493	2127	513	4518	2500	2844	2732	3165	4461	5173	5616	3847	3157	5258	7447	10002	10438	13234	9927	4777	2098	1252	318	995	
PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1154	2113	975	377
POLAND	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	38	4	8	91	0
SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	4	126	177	135	135	54	0	0	900
SEYCHELLES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	
SIERRA LEONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2
SOUTH AFRICA	0	0	19	422	381	137	187	60	102	168	200	553	367	296	72	43	88	76	27	7	10	41	41	225	175
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	4	2	0	1	1215	252
TOGO	0	0	0	0	0	0	14	52	18	24	22	7	12	12	6	2	86	23	6	33	33	33	0	0	
TRINIDAD & TOBAGO	0	0	0	0	0	0	191	41	22	0	0	1	19	57	263	0	3	29	27	37	36	24	19	5	11
U.S.A	331	248	212	202	158	422	315	539	639	1085	1074	1127	847	623	975	813	1090	1402	1209	882	1138	929	1263	574	1085
U.S.S.R	4086	2202	2229	2813	2832	635	352	1233	870	1071	1887	1077	424	95	0	0	0	0	0	0	0	0	0	0	
UK-BERMUDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK-S.HELENA	5	22	8	9	14	23	14	19	0	0	5	1	1	3	3	10	6	6	10	10	12	17	6	8	5
URUGUAY	0	0	0	0	86	397	605	714	597	177	204	120	55	38	20	56	48	37	80	124	69	59	28	25	25
VENEZUELA	464	244	347	661	1684	999	4284	3315	2861	1122	349	226	115	161	476	270	809	457	457	189	274	222	140	226	661
VENEZUELA-FOR	0	0	0	0	0	0	0	827	57	14	0	106	0	0	0	0	0	0	0	0	0	0	0	0	47

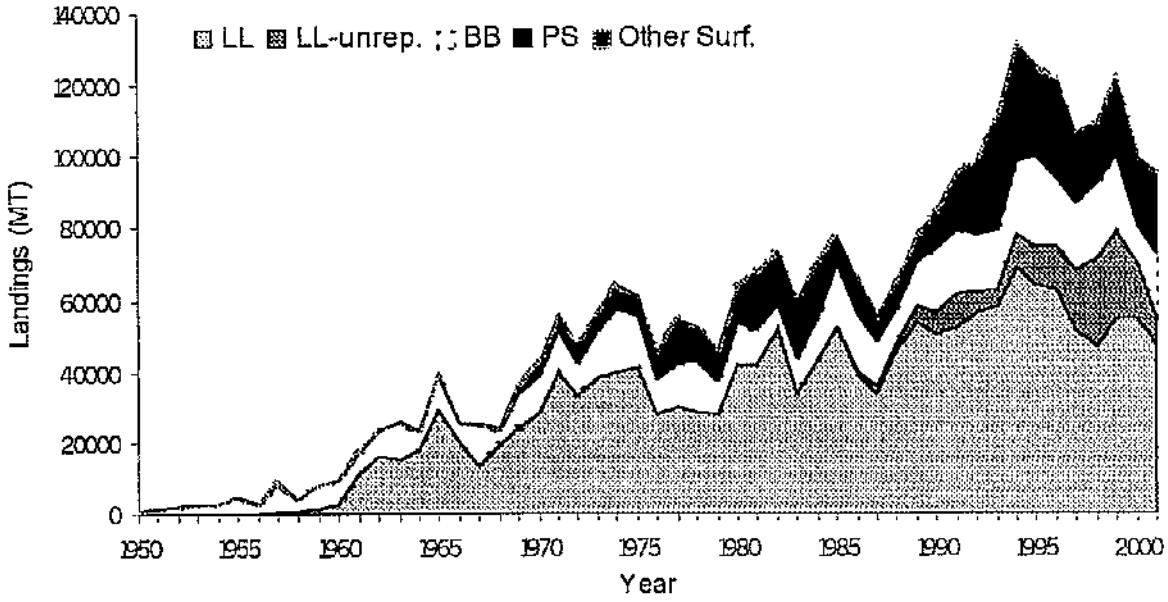
*** This series was not used in the assessment since these catches were reported by another fishery: 357, 302, 300, 390, 458.



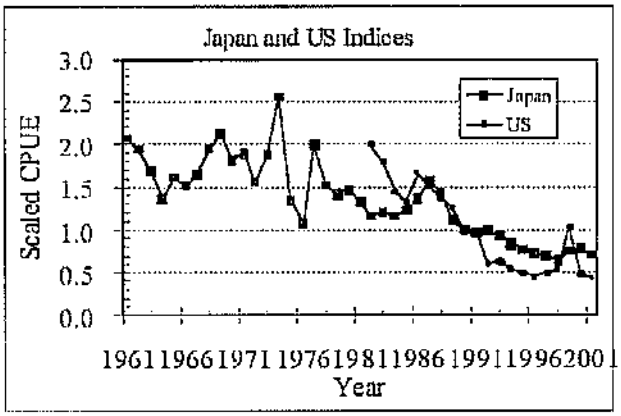
BET-Fig. 1. Geographical distribution of bigeye catches (1950-1997) by major tuna fishery. Dark shaded, light shaded, medium shaded and black areas in circles correspond to catches by longline, purse seine, baitboat and other fisheries, respectively.



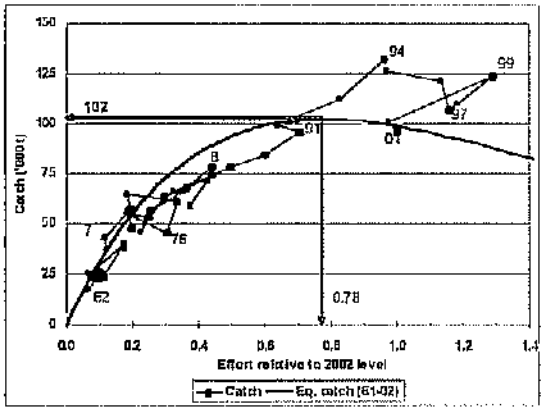
BET-Fig. 2. Estimates of unreported catch of bigeye by longline vessels, based on Japanese import statistics.



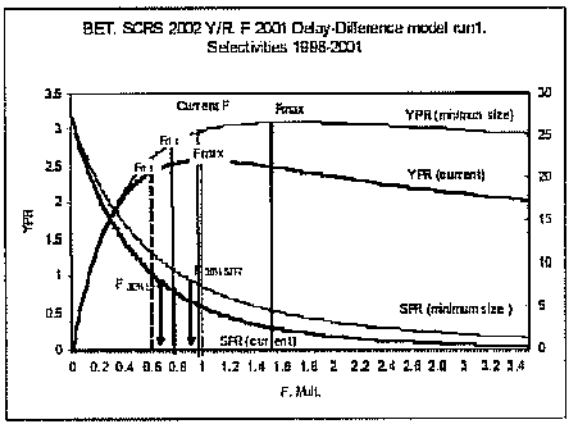
BET-Fig. 3. Cumulative 1950-2001 landings (MT) of bigeye tuna in the Atlantic by gear categories; longline (LL), longline un-reported (LL-unrep), baitboat (BB), purse seine (PS) and other surface fishery.



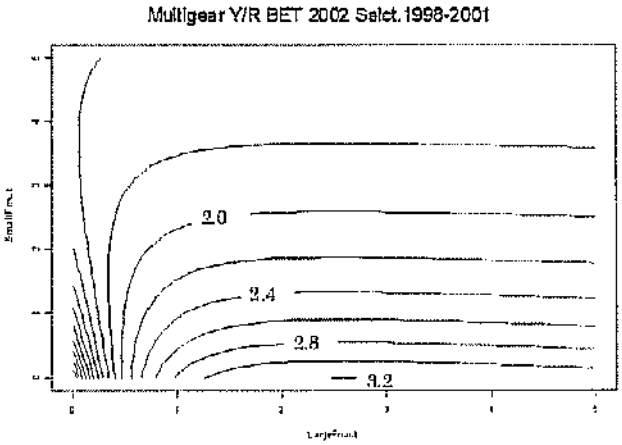
BET-Fig. 4. Abundance indices used in the stock assessment of bigeye tuna obtained from longline fishery.



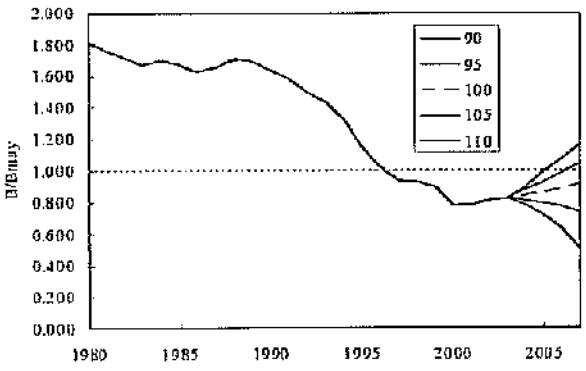
BET-Fig. 5. Production curve estimated by an equilibrium production model (Fox shape) plotted with observed catch-effort trajectory.



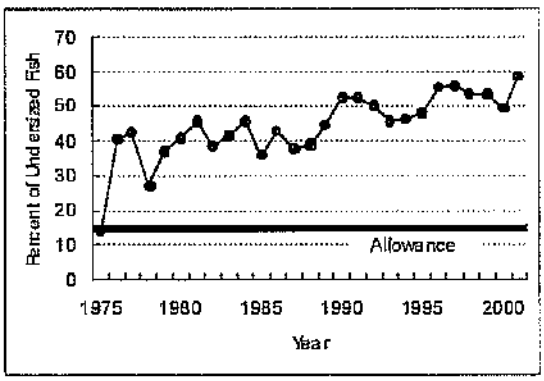
BET-Fig. 6. Yield-per-recruit (YPR) and spawning biomass-per-recruit (SPR) for bigeye tuna assuming current selectivity (heavy lower curves) and selectivity of a full compliance of a 3.2 kg minimum size (fine upper curves). Vertical lines indicate $F_{30\%SPR}$, F_{max} and $F_{0.1}$.



BET-Fig. 7. Results of multi-gear yield-per-recruit analysis reflecting the 2001 situation. The large-fish fishery (X-axis) and small fish fishery (Y-axis) correspond to the longline fishery plus the baitboat fishery in the North Atlantic and all other fisheries, respectively.



BET-Fig. 8. Future projections based on the production model analysis. Future catch was assumed to be 100,000 MT in 2002 and constant catches of various amounts (in thousand MT) thereafter.



BET-Fig. 9. Annual trend of undersized fish (below the 3.2 kg minimum size) for the overall fishery.

7.3 SKJ - SKIPJACK TUNA

No stock assessment was carried out it 2002. However, this report includes the latest data available on the catches and the fisheries.

SKJ-1. Biology

Skipjack tuna is a cosmopolitan species forming schools in the tropical and subtropical waters of the three oceans. Skipjack spawn opportunistically throughout the year in vast areas of the Atlantic Ocean. The size at first maturity is about 45 cm for males and about 42 cm for females in the East Atlantic, while in the West sexual maturity is reached at 51 cm for females and at 52 cm for males. Skipjack growth is variable and seasonal, and substantial differences in growth rates have been reported between areas. There remain considerable uncertainties about these growth rates and the variability in growth between areas. It is therefore a priority to gain more knowledge on the growth schemes of this species.

Skipjack is a species that is often associated with floating objects, both natural objects or diverse FADs that have been used extensively since the early 1990s by purse seiners and baitboats (during the 1991 to 2001 period, about 36% of skipjack were caught with FADs). The concept of viscosity (low interchange between areas) could be appropriate for the skipjack stocks. A viscose stock can have the following characteristics:

- A local decline of a segment of the stock;
- Over-fishing of that component may have little, if any, repercussion on the abundance of the stock in other areas;
- There is a minor proportion of fish that make large-scale migrations.

The introduction of fish aggregating devices could have changed the behavior of the schools and the migrations of this species. Prior to the use of those devices, free schools of mixed species were much more common than now. Due to the large number of FADs, and the tendency of skipjack to associate with floating objects, substantial behavioral changes, including movements patterns, may occur. These behavioral changes may imply changes in the biological parameters of this species as a result of the changes in the availability of food, predation and fishing mortality. Skipjack caught with FADs are usually associated with small yellowfin (20%) and with small bigeye (17%) and also with other small tuna species.

A comparison of size distributions of skipjack between periods prior to and after the introduction of FADs show that, in the East Atlantic, there has been an increase in the proportion of small fish in the catches, as well as a decline in the total catch in recent years in some areas.

The Committee reviewed the current stock structure hypothesis that consists of two separate management units, one in the East Atlantic and another in the West Atlantic, separated at 30°W. The boundary of 30°W was established when the fisheries were coastal, whereas in recent years the East Atlantic fisheries have extended towards the West, surpassing this longitude, and showing the presence of juvenile skipjack tuna along the Equator, to the West of 30°W, following the drift of the FADs. This would imply the possibility of a certain degree of mixing (**SKJ-Figure 1**).

However, taking into account the large distances, various environmental restrictions, the existence of a spawning area in the East Atlantic as well as in the northern zone of the Brazilian fishery, and the lack of additional evidence (e.g. transatlantic migrations in the tagging data), the hypothesis of separate East and West Atlantic stock has been maintained as the more plausible alternative.

In addition, taking into account the biological characteristics of this species and the different areas where fishing takes place, smaller management units could be considered.

SKJ-2. Description of the fisheries

Skipjack are caught almost exclusively by surface gears in the entire Atlantic Ocean, although minor amounts of skipjack are taken by longline as by-catch (see **Figure 1** for catch distribution). Reported catches are

considered to be somewhat under-estimated, due to the discards of small-sized tunas, which include skipjack, by the purse seine fleets fishing under objects and by some baitboat fleets in the equatorial area of the East Atlantic.

Total Atlantic catches in 2001 amounted to 143,217 MT (**SKJ-Table 1, SKJ-Figure 2**).

As concerns the East Atlantic, the skipjack fishery underwent important changes in 1991, with the introduction of artificial floating objects (FADs), with the subsequent expansion of the purse seine fishery towards the West (30°W), in latitudes close to the Equator, following the drift of the objects, the introduction of FADs in the Ghanaian purse seine and baitboat fisheries (1992), and the development of a fishing technique (whose main target species is bigeye) in which the baitboat is used as the aggregating device, fixing the school (comprised of bigeye, yellowfin and skipjack) during the entire fishing season in waters off Senegal, Mauritania and the Canary Islands (1992). These changes have resulted in an increase in the exploitable biomass of the skipjack stock (due to the expansion of the fishing area) and in its catchability. At present, the most important fisheries are the purse seine fisheries, mainly those of EC-Spain, EC-France, the NEI fleet (Vanuatu, Malta, Morocco, Belize, Guinea, and St. Vincent), Ghana and Netherlands Antilles, followed by the baitboat fisheries (Ghana, EC-Spain and EC-France). In 2001, catches in the eastern Atlantic reached 109,897 MT, which represents a slight increase as compared to 2000 (107,856 MT) (**SKJ-Figure 2**).

The most important fishery in the West Atlantic is the Brazilian baitboat fishery. As concerns the purse seine fisheries, whose catches are considerably less than those taken by baitboat, catches were only made by the Venezuelan and EC-Spain fleets. Western Atlantic catches in 2001 amounted to 33,320 MT, 10% more than in 2000 (30,263 MT) (**SKJ-Figure 4**).

There is no information available on the effective fishing effort exerted on skipjack in the East, particularly after the introduction of fishing with artificial floating objects. Considering the carrying capacity of the vessels as a measure of nominal effort, in the East Atlantic Ocean, the total carrying capacity of the baitboat fleets remained relatively stable between 1972 and 2001. On the other hand, purse seine carrying capacity showed an increasing trend until 1983, and a spectacular decline in 1984, due to the shift of a part of the fleet to the Indian Ocean. Since 1991, this carrying capacity of the purse seine fleet has declined gradually until 1997, and since then it has remained stable at about 32,000 MT of transport, and in 2001, it increased to 36,000 MT (**SKJ-Figure 5**).

The increase in the efficiency of the fleet due to technological improvements, the development of fishing with floating objects, etc., as described by the Working Group on Abundance Indices in the Tropical Tuna Surface Fisheries (Miami, 1998), have resulted in an increase (not well quantified) in the effective effort of the different fleets. Preliminary analyses estimated an average annual increase of 5% in efficiency of all the fleets for the period considered (1969-1998) for this species and fishery. Therefore, fishing effort expressed in number of fishing days is not a precise measure of effective fishing effort on skipjack, even though this type of information should be taken into account.

Fishing effort of Brazilian baitboats decreased by half between 1985 and 1996, whereas an increase in effort was observed between 1997 and 1998. In 1999, 2000 and 2001 it remained at the level of 1998.

The fluctuation in the overall size of the area exploited by a fishery is an important component in the assessment of the eastern stock. The number of 1°x1° squares in which the purse seine fishery caught skipjack in the East Atlantic has shown an increasing trend since the end of the early 1970s (**SKJ-Figure 6**). However, the expansion of the fishing grounds was not continuous throughout the years. It seems skipjack catches are very much related to the number of 1°x1° squares exploited. In the absence of other measures of fishing effort, the number of squares exploited could be considered as an alternative measure.

SKJ-3. State of the stocks

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

The state of the Atlantic skipjack stocks, as well as the rest of the stocks of this species, show a series of characteristics that make it extremely difficult to conduct an assessment using current models. Of these characteristics, the most noteworthy are:

- 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;

- The 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 were 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 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°x1° squares exploited (**SKJ-Figure 7**), 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 by an increase in the catchability of the purse seiners. 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 trends of the indices showed a completely distinct stock situation (they remain stable).

On an overall level, the Grainger and García index (**SKJ-Figure 8a**), a gross indicator of stock status for situations such as that of the skipjack fisheries in the East Atlantic with increasing effort, showed negative values since the early 1990s. This could be interpreted as a warning sign that catches are too high. However, the Group expressed doubts about the validity of this conclusion to the entire eastern stock. The Committee was informed that since the Madeira Working Group devoted to stock assessment of Skipjack, a recent scientific paper was published on this topic. Because this method presupposes that fishing effort increased over the period concerned, the changes over time in the relative rate of catch increase (RRCI) was broken down in two historical periods (data before 1984 in one hand and data from 1990 to 1999 in the other hand; **SKJ-Figure 8b**). In contrast with the previous analysis, the years from 1985 to 1989 were not used in the analysis because fishing effort decreased due to the partial relocation of European Union purse seiners to the Indian Ocean in the second half of the 1980s. Notice that the last period began in the early 1990's with the massive use of FADs fishing operations.

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 considered too preliminary 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 (**SKJ-Figure 9**), and in both cases the indices showed a stable stock status.

SKJ-4. 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 were 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, in the last three years (1997, 1998 and 1999) 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, has resulted in a reduction in the skipjack catches associated with FADs. Maintaining this closure could have a positive effect on the resource.

SKJ-5. Effects of current regulations

There is currently no specific regulation in effect for skipjack. However, the French and Spanish boat owners voluntarily applied a moratorium for the period of November 1997 through January 1998, and November 1998 through January 1999. The moratorium was implemented in order to protect bigeye tuna. A similar moratorium was recommended by the Commission and applied during the months of November-December and January of 1999 and 2000. The average purse seine skipjack catches during November-January by fleets that applied the moratoria were reduced by 68% compared to the average catches for the 1993-1996 period (before the moratoria), and those corresponding to the 1998-2000 period. For the entire period, the average skipjack catches made by the purse seine fleets that applied the moratoria decreased by 36%, which is equivalent to 37,000 MT per year.

SKJ-6. Management recommendations

No management recommendations were proposed.

ATLANTIC SKIPJACK TUNA SUMMARY

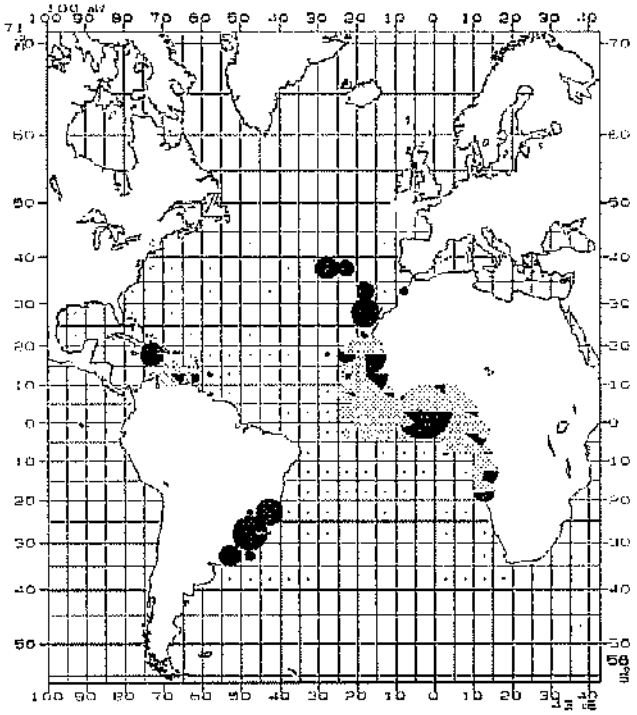
	East Atlantic	**West Atlantic**
Maximum Sustainable Yield	Not estimated	Not estimated
Current (2001) Yield	109,897 MT	33,320 MT
Current Replacement Yield	Not estimated	Not estimated
Relative Biomass (B_{2001}/B_{MSY})	Not estimated	Not estimated
Relative Fishing Mortality: F_{2001}/F_{MSY}	Not estimated	Not estimated
Management measures in effect	None	None

SKJ-Table 1. Estimated landings (reported and carried over, MT) of skipjack tuna in 1977-2001, by gear, region and flag

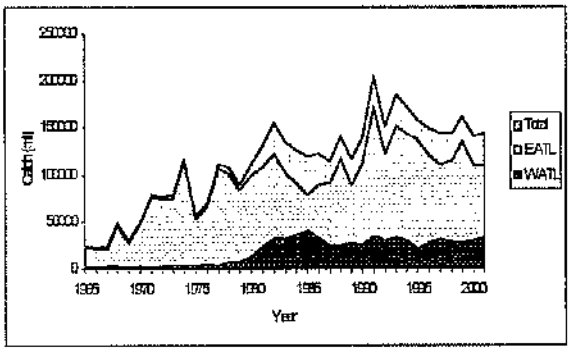
		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	TOTAL	110577	108115	89696	111358	131061	154909	135038	126826	118713	122172	114566	139962	116120	138659	204628	152146	185916	173207	159510	146547	141112	141812	159441	138119	143217
	AT.E	107218	100885	83119	98774	107941	122368	102669	91230	78441	90021	90402	116226	89738	112549	171224	121992	152695	143258	137651	118986	109394	112748	133114	107856	109897
	AT.W	3350	7176	6565	12573	23070	32520	31839	35596	40272	32151	24164	23736	26382	26110	33404	30155	33221	29949	21859	27561	31718	29064	27327	30263	33330
	UNCL	9	54	12	11	47	21	530	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
AT.E	*Bait boat*	42386	41365	44645	38134	38918	44488	34873	28085	29868	30009	38503	48015	41000	36569	41921	35660	31699	37876	33709	31936	38355	41451	41325	30547	44137
	Longline	90	0	0	0	22	2	62	22	6	19	6	4	9	0	5	3	2	10	3	7	47	85	42	48	54
	Other Surf.	7059	840	1508	3906	2528	3054	2242	1328	219	1610	1040	1332	1469	1178	1890	1419	1028	311	308	323	138	930	288	1162	1252
	Purse seine	57683	58680	36966	55734	66473	74824	65492	61795	48348	58353	50555	66875	47260	74802	127408	84880	119966	105060	103630	86720	70853	70282	90159	76099	64154
AT.W	*Bait boat*	2400	2812	4365	9351	17999	22402	20057	16771	28490	25278	18675	21057	23292	22346	23972	20852	19697	22645	17744	23741	26797	24724	23881	25888	25142
	Longline	2	2	1	1	9	23	8	25	24	8	6	5	25	23	33	29	20	16	33	19	18	14	9	12	16
	Other Surf.	348	908	710	149	410	390	653	842	597	1657	518	355	600	600	871	764	710	1577	2023	452	556	499	500	465	906
	Purse seine	600	3461	1489	3072	4654	9705	11121	17958	11191	5208	4964	2315	2466	3241	8527	8509	12394	5712	2059	3349	4347	3826	2936	3897	7256
	Trawl	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
UNCL	*Longline*	9	54	12	11	47	21	530	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
AT.E	ALGERIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	43	89	77
	ANGOLA	4036	3501	3628	3482	2502	2257	318	46	131	56	80	30	85	69	66	41	13	7	3	15	52	2	32	14	14
	BENIN	0	0	8	30	60	68	38	10	20	11	5	3	7	2	2	2	2	2	2	2	7	3	2	2	
	BULGARIA	0	0	0	0	0	0	7	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	0	0	0	0	0	0	0	0	0	0	0	0	0	
	CAP-VERT	748	1284	998	2094	1588	1636	1400	1391	2030	877	2076	1456	971	806	1333	864	860	1007	1314	470	591	684	962	789	794
	CAYMAN ILS	0	0	0	289	1800	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	CHINA PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
	CHINESE TAIPEI	0	0	0	0	0	2	2	7	4	0	0	1	3	0	5	3	2	10	3	5	47	73	39	41	25
	CONGO	0	0	0	1250	200	0	5	10	8	8	8	8	11	12	9	9	10	7	7	6	6	6	6	6	
	COTE D'IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	***	***	***	***	***	
	CUBA	100	200	100	196	198	189	135	310	246	569	81	206	331	86	0	0	7	0	0	0	0	0	0	0	
	EC-ESPANA	22347	25066	18748	26384	35458	38016	28934	46659	35100	41992	33076	47643	35300	47834	79908	53319	63660	50538	51591	38538	38513	36008	44520	37236	30954
	EC-FRANCE	31138	25903	18602	25767	26926	31132	29727	12994	13646	13045	17114	16501	15211	17099	33271	21890	33735	32779	25188	23107	17023	18383	20344	18183	16593
	EC-GERMANY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	
	EC-PORTUGAL	4388	4561	3074	1954	2825	5530	8113	3974	2109	5446	8420	14257	7725	3987	8059	7477	5651	7528	4096	8297	4599	4514	1810	1302	2367
	ESTONIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	102	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	1	11	51	26	0	59	76	21	101
	GHANA	3492	2856	4299	5812	7858	18272	24376	30697	19082	22268	24347	26597	22751	24251	25052	18967	20225	21258	18607	19602	27667	34150	43160	29930	43340
	JAPAN	16845	14614	14686	12504	12935	9930	6062	1504	2098	2031	1982	3200	2243	2566	4702	2378	0	0	0	0	0	0	0	0	1
	KOREA	3600	8132	12017	6716	7538	2827	1553	699	155	5	6	3	6	0	0	0	0	0	0	0	0	0	0	0	
	LATVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92	0	0	0	0	0	0	0	0	0	
	LITUANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	221	0	0	0	0	0	0	0	0	0	
	MAROC	3881	1891	1863	5001	3017	3956	2532	885	1015	1222	1011	428	295	1197	253	559	312	248	5021	684	4513	2486	836	1199	1898
	NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	15	0	1	0	0	0	8
	NEI-I	0	0	0	0	0	1560	3383	927	590	540	791	2911	2263	10516	7501	6273	14469	15293	11105	21745	13367	11251	15582	3728	13157
	NETHERLAND.ANT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11074	
	NORWAY	0	0	0	0	0	0	0	0	0	0	581	708	0	0	0	0	0	0	0	0	0	0	0	0	
	PANAMA	3470	2980	1750	1735	144	2511	1681	0	0	0	0	0	0	6317	8719	13027	12978	11853	5865	1300	572	1306	2287		

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	RUMANIA	0	0	0	8	0	0	0	0	0	3	0	0	59	142	349	73	0	0	0	0	0	0	0	0	
	RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1175	1110	540	1471	1450	381	1146	2086	1426	374	0
	SAO TOME & PRINCIPE	116	100	34	33	50	78	103	18	20	20	20	21	22	25	24	25	15	0	0	0	7	0	0	0	
	SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	47	134	652	260	95	59	18	163	455	1963	1631	1506	1271
	SOUTH AFRICA	40	90	2	48	110	37	104	14	66	101	88	157	96	17	15	7	6	4	4	1	6	2	1	0	1
	U.S.A	5859	6797	2073	2608	2800	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	U.S.S.R	6674	2856	1161	2991	1750	3957	1223	1000	1404	1688	547	1822	1915	3035	0	0	0	0	0	0	0	0	0	0	
	UK-S.HELENA	12	21	76	70	112	271	103	85	62	139	139	158	397	171	24	16	65	55	115	86	294	298	13	64	205
	VENEZUELA	0	0	0	0	0	0	0	0	358	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
AT.W	ARGENTINA	33	4	0	17	1	137	243	505	101	138	90	7	111	106	272	123	50	1	0	0	0	0	0	0	
	BARBADOS	0	0	0	0	78	72	39	48	36	33	21	3	9	11	14	5	6	6	6	5	5	10	3	3	
	BRASIL	190	635	2065	6071	13913	18322	15945	13567	25101	23155	16286	17316	20750	20130	20548	18535	17771	20588	16560	22528	26564	23789	23188	25164	24146
	CANADA	0	86	0	0	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	CHINESE TAIPEI	0	0	0	0	9	18	6	6	3	1	2	7	19	0	32	26	9	7	2	10	7	2	1	0	
	COLOMBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2074	789	1583	0	0	0	0	0	
	CUBA	2400	1600	2000	2255	1036	1134	1700	1248	1652	1277	1101	1631	1449	1443	1596	1638	1017	1268	885	1000	1000	651	651	651	
	DOMINICA	0	0	0	0	0	0	0	0	0	0	0	0	0	60	38	41	24	43	33	33	33	33	85	86	
	DOMINICAN REP.	41	61	87	59	71	80	106	68	204	600	62	63	117	110	156	135	143	257	145	140	0	0	0	0	
	EC-ESPANA	266	2031	1032	0	0	0	209	2610	500	0	0	0	0	0	1592	1120	397	0	0	0	0	0	1	1	1959
	EC-FRANCE	0	0	86	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	1	1
	GUIANA	0	0	0	185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GRENADA	0	1	1	8	1	1	15	12	7	9	5	22	11	23	25	30	25	11	12	11	15	23	23	23	15
	JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	0	0	0	0	
	JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	KOREA	0	0	0	0	0	0	0	17	20	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	MEXICO	0	0	0	1	3	0	25	30	48	11	13	10	14	4	9	8	1	1	0	2	3	0	2	3	11
	NETHERLAND.ANT	0	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	45	40	35	30	30	30	30	30	
	PANAMA	0	720	161	1026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	968	
	ST.LUCIA	100	100	41	40	37	38	35	51	53	76	60	53	38	37	51	39	53	66	72	38	100	263	153	216	151
	ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	17	28	29	37	20	66	56	53	37	42	42	57	68	97
	TRINIDAD & TOBAGO	0	0	0	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	
	U.S.A	320	1695	1029	981	2753	33	697	853	1814	1115	734	57	73	304	658	560	367	99	81	85	84	106	152	44	70
	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
	VENEZUELA	0	0	0	1890	4900	12645	12758	16526	10712	5990	5750	4589	3723	3815	8146	7834	11172	6697	2397	3574	3834	4114	2981	3003	6870
UNCL	CHINESE TAIPEI	0	12	10	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	KOREA	9	42	2	4	47	21	530	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	

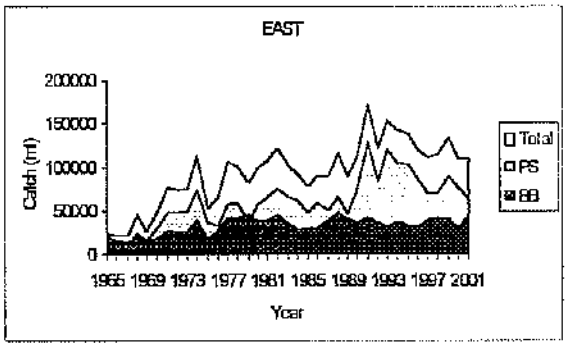
***. This series was not used in the assessment since these catches were reported by another fishery: 1971, 1668, 1658, 2157, 2532.



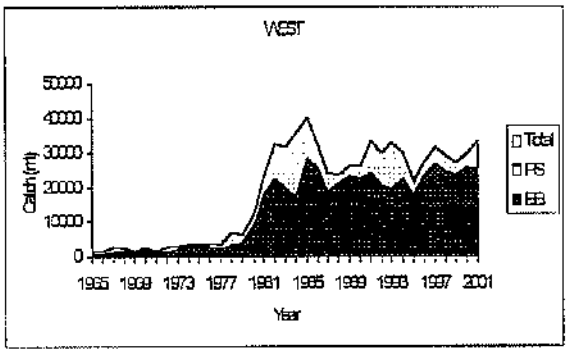
SKJ-Fig. 1. Distribution of reported skipjack surface catches (1950-1997) by 5x5 area and by gear (dark=baitboat; light=purse seine).



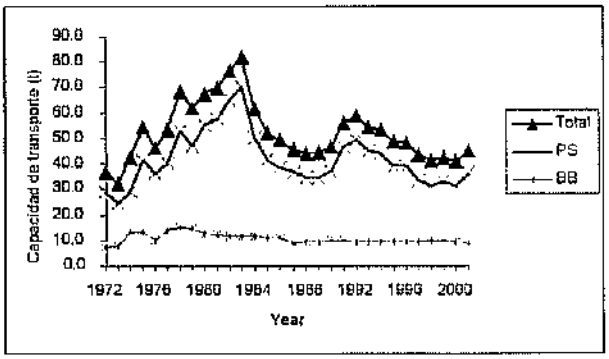
SKJ-Fig. 2. Total eastern and western Atlantic skipjack landings (1965-2001).



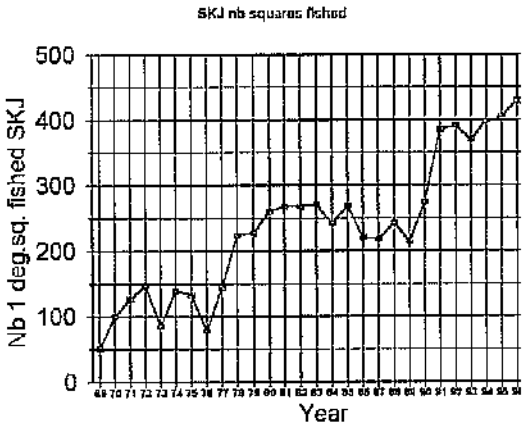
SKJ-Fig. 3. Reported landings of skipjack in the eastern Atlantic, by major gear.



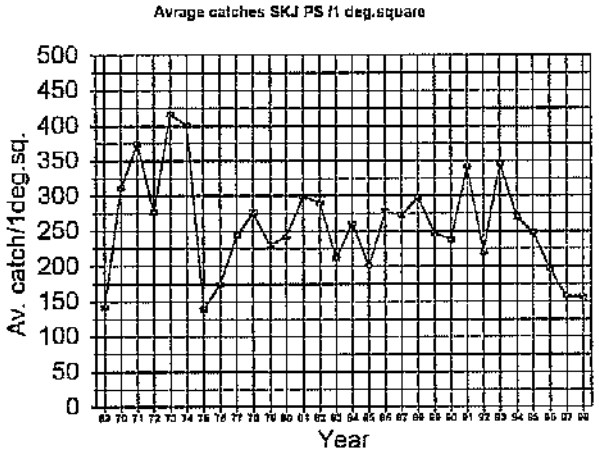
SKJ-Fig. 4. Reported landings of skipjack in the western Atlantic, by major gear.



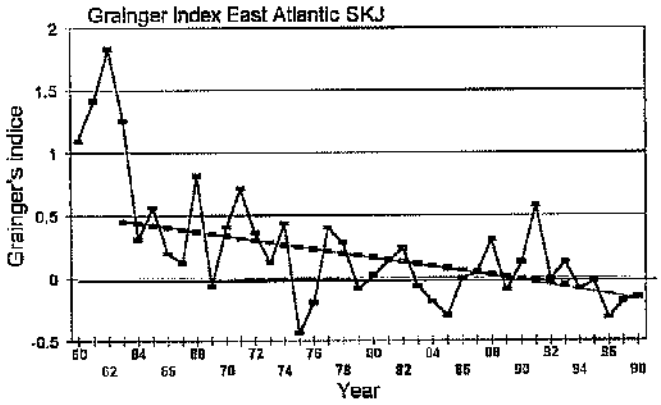
SKJ-Fig. 5. Carrying capacity (in MT) of purse seiners and baitboats in the eastern Atlantic.



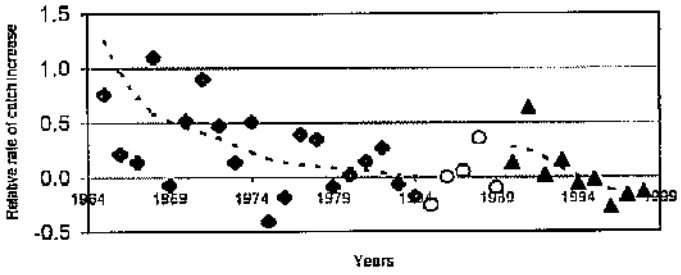
SKJ-Fig. 6 Number of 1x1 degree areas where skipjack catches were reported in the eastern Atlantic purse seine fisheries.



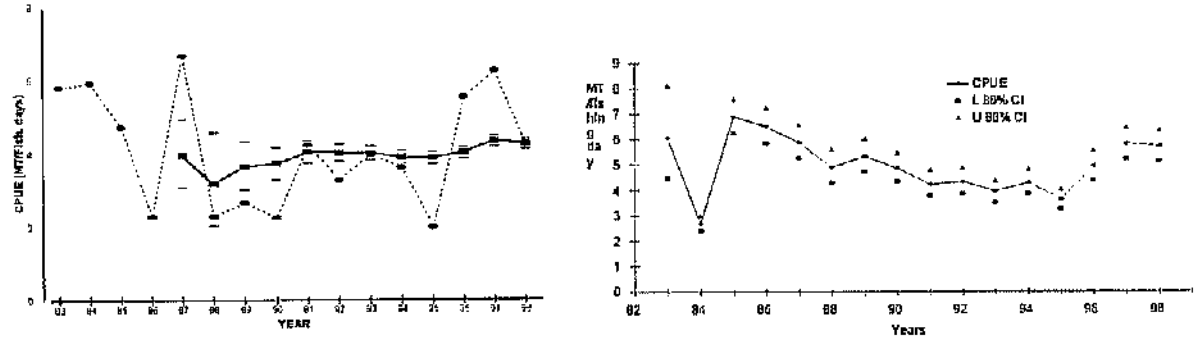
SKJ-Fig. 7. Average skipjack catch per 1x1 degree squares (where catches were reported) by the eastern Atlantic purse seine fishery during 1969-1998.



SKJ-Fig. 8a. Grainger and García index and trend line calculated for Atlantic skipjack.



SKJ-Fig. 8b. Changes over time in the relative rate of catch increase (RRCI) for the eastern Atlantic skipjack for the main two historical periods of the fishery. Years that correspond to major changes in the fishery were not used to estimate the proxy of the maximum yield and are represented by empty circles.



SKJ-Fig. 9. Venezuelan purse seine (left) and Brazilian baitboat (right) CPUE estimated by GLM delta-lognormal standardization. The dotted line on the left figure denotes observed values.

7.4 ALB - ALBACORE

No new stock assessment was conducted in 2002. However, this report updates relevant catch and fishery information where available. Because of a lack of catch and catch-at-size data for several fisheries this update is incomplete (**ALB-Table 1**).

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 5°N) and a Mediterranean stock (**ALB-Figure 1**).

Since the last assessment, carried out in 2000, several documents have been presented to the Committee. These consider the stock structure of albacore in the Atlantic and Mediterranean and are based on tagging and genetic studies, along the lines of the last recommendations of SCRS. The tag release recapture database was updated for the period (1968-1999), including Mediterranean information. An analysis of that database shows no evidence to reject the stock structure assumed in the SCRS at present, although it is shown that albacore are able to cross the north Atlantic-Mediterranean boundary, however the transfer rate estimated is very low. New genetic tools have been applied in order to clarify albacore worldwide stock structure. The results are once again consistent with the stock structure assumed by ICCAT, with the exception of the Gulf of Guinea region (1°N), which is at present included in the southern stock, and yet appears genetically closer to the north Atlantic population.

Albacore spawning areas in the Atlantic are found in subtropical western areas of both hemispheres and throughout the Mediterranean Sea. Spawning takes places during austral and boreal spring-summer. A tuna larval survey was carried out during the summer of 2001 in the Mediterranean, showing the distribution of the larvae around the Balearic Islands. Maturity is considered to occur at about 90cm FL (age 5) in the Atlantic, and somewhat smaller in the Mediterranean. Until this age they are mainly found in surface waters, where they are targeted by surface gears. Some adult albacore are also caught using surface gears but, as a result of their deeper distribution, they are mainly caught using longlines. Young albacore are also caught by longline in temperate waters.

An attempt was also made to estimate mortality rates from tagging data. However, as the study area was limited to the surface fishery and no tag recoveries were reported from the longline fleets in more oceanic waters, it was not possible to separate the natural mortality component from the overall attrition rate (natural mortality and immigration) estimated by the model. In conclusion the Committee noted that the value for natural mortality indicated by this approach is not inconsistent with the value currently used in the assessment of the northern Albacore.

Abiotic variables such as sea surface temperature and global oceanographic and climatic indices play an important role in the distribution of Albacore in both the North and South Atlantic. These factors impact the local availability of fish and consequently affect estimated catch rates thereby causing changes in catch rates that are not linked to changes in abundance.

ALB-2. Description of fisheries (**ALB-Table 1** and **ALB-Figure 2**)

North Atlantic

The northern stock is exploited by surface and longline fisheries. Traditional surface fisheries include EC-Spain trolling and baitboats, used mainly in the Bay of Biscay and adjacent waters, and some EC-Spain and EC-Portugal baitboats around the Azores Islands. New surface fishing gears, driftnets and pair pelagic/mid-water trawling, were introduced in 1987 in the Bay of Biscay and adjacent waters by EC-France. EC-Ireland and EC-United Kingdom joined the driftnet fishery at the beginning of the 1990s. In 1998 EC-Ireland initiated experimental fishing trials using trolling and pelagic trawling. These surface fisheries mainly target juveniles and sub-adults (50 cm to 90 cm FL). A longline fleet from Chinese Taipei targets sub-adult and adult albacore (60-120 cm) in the central and western North Atlantic. Other fleets make minor catches and in most of the cases albacore constitute a component of the by-catch.

In 2002, with the full implementation of the European Union's ban on the use of driftnets, major changes occurred in both the EC-France and EC-Ireland albacore fisheries. The number of vessels licensed to fish albacore using pelagic trawls increased in both countries, while EC-France also conducted an experimental fishery for albacore using surface longlines. In addition, three medium sized (≤25 meters) purse seiners are under construction for the EC-France fleet. In the absence of driftnetters, pelagic trawling commenced earlier than in previous years, however in general catches were poor at the outset but generally improved later in the season.

The total catch in the north Atlantic has shown a downward trend since mid 1960's, largely due to a reduction of fishing effort by the traditional surface and longline fisheries. In contrast, effort and catch in the new surface fisheries increased between 1987 and 1999. However, in 2001 the catch, 25,052 MT, (this figure includes reported catch, provisional catch reported to the Committee and carry-overs) is the lowest recorded in the past 25 years and is 26% less than the reported catch in 2000.

South Atlantic

The major fleets exploiting the southern stock are the surface baitboat fleets of Namibia and South Africa, and the longline fleets of Brazil and Chinese Taipei. There are also some minor catches by the purse seine fleet in the tropical area. Since the mid-1970s, the Chinese Taipei fleet has targeted albacore at a fairly high level of effort. Catches by the baitboat fleets of South Africa and, to a lesser extent, Namibia are strongly influenced by the availability of albacore in near-shore waters which is in turn influenced by environmentally induced changes in fish distribution. Reduced availability of albacore in coastal waters in the southeast Atlantic in 2000 resulted in South Africa recording the lowest annual catch since 1981. In contrast, increased availability in 2001 has enabled Namibia to make her highest catch on record and South Africa her third highest. Both Namibia and South Africa have initiated tuna-directed longline fisheries that take a small by-catch of albacore.

Annual catches were generally below the replacement yield estimated in 2000 (29,200 MT) during the period 1995-2000, in response to the 1994 ICCAT resolution to reduce catches. The recorded catch for 2001 has risen sharply to 34,616 MT, an increase of 22%. However, not all countries have reported their 2001 catches. If the 2000 catches are carried over for those countries, then the estimated 2001 catch could be as high as 35,731 MT (26% increase).

Mediterranean

Albacore fishing is a traditional activity for some fleets in the Mediterranean. Countries that have reported Mediterranean albacore catch to the ICCAT include Cyprus, EC-France, EC-Greece, EC-Italy, EC-Spain, Malta, the former Yugoslavia, and Japan. ICCAT statistics for albacore in the Mediterranean are considered to be quite incomplete due to unreported catches from several countries and to the lack of data in some years from other countries. Statistical data are very incomplete for the year 2001.The albacore fishery in the Mediterranean appears to have had some important changes in the last five to six years, due to several factors. One of the most interesting factors is the availability of albacore in areas where it was not present in the past. This is particularly evident in the Straits of Sicily and in the central-southern Mediterranean, where catches have been reported since 1997 but strongly increased in the last two years, particularly during spring. The opposite case has been reported for the Ligurian Sea and sometimes in the western Mediterranean. The effects of environmental factors (climatic or oceanographic) should be evaluated. The unusual climate and oceanographic situation reported in spring and summer 2002 may have strongly affected the catch. Another factor to be taken into consideration is the driftnet ban adopted by the EC from 1 January 2002 and the progressive reductions in the fleets of some EC countries before the ban. This important change in the fishing patterns automatically implies changes in the catch statistics, particularly in the year 2002.

ALB-3. State of the stocks

In 2002, the Committee did not perform an assessment of the status of the albacore stocks in the ICCAT convention area. Therefore the assessments of the northern and southern stocks completed in 2000 still apply. No attempt was made to analyze the status of the Mediterranean stock in 2000.

The 2000 Committee recognized the important improvement in the basic data for both north and south Atlantic stocks although some uncertainties remain, especially in relation to some elemental biological parameters. In this respect, the Committee notes that the quality of any future assessment is potentially

jeopardized by the absence of data from some of the participating fleets. Of particular importance are length frequency, catch and effort data.

North Atlantic

In 2000, the Committee analyzed the state of the northern stock using a model (VPA) and data that were essentially the same as those used in previous assessments.

The results obtained in 2000 (**ALB-Figure 3**) showed consistency with those from previous assessments. The abundance and biomass of adult fish (ages 5+) appear to have declined from the mid-1970s to the late 1980s, followed by a slight increase between 1988 and 1990. The abundance and biomass of ages 5+ did not show any clear trend after 1990. Abundance of recruits (age 1) and juveniles (ages 2-4) varied from year to year with, perhaps, a similar declining trend from 1975 to 1985. The levels since then have been variable. The Committee noted that global environmental factors might explain some proportion of the recruitment variability during the last two decades. Moreover, previous studies based on historic data, indicate that it is possible that the higher level of recruitment that occurred during the 1960s and 1970s may have been associated with a different environmental regime.

The fishing mortality rate of juveniles (ages 2-4) showed a slight increasing trend during the period analyzed. Fishing mortality rates on adults (ages 5+) increased to a peak in 1986, then declined. Recent rates appear to be relatively high, but not as high as the peak year. The fishing mortality rate on ages 8+ also appears to be increasing, however, the estimation of this is quite variable.

With reference to the results shown in **ALB-Figure 4**, equilibrium yield analyses, made on the basis of an estimated relationship between stock size and recruitment, indicate that current spawning stock biomass is 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 indicate that the northern stock is not being growth-over fished ($F < F_{max}$).

Sensitivity analyses were also conducted to explore the influence of several inputs and assumptions. Results of most sensitivity runs examined were very similar to the base case. However, these analyses suggest a possible conflict between two of the CPUE indices used in the model that needs to be addressed through further research. One of the sensitivity runs examined gave results that were considerably more optimistic than the base case.

South Atlantic

In 2000, the age structured production model and VPA specifications for the south Atlantic albacore assessment were the same as used in 1998. The estimates of MSY from the production model (30,274 MT) and VPA (35,400 MT) models were comparable and both models estimate that the 1999 fishing mortality was about 50% below F_{MSY} (**ALB-Figure 5**). Spawning stock biomass appears to have declined substantially relative to the late 1980s, but the decline may have leveled off in recent years (**ALB-Figure 6**) and the estimates remain above the spawning stock biomass at MSY. However, the models do not fit the data well (**ALB-Figure 6**) and the parameters are very poorly estimated (as indicated by the very wide confidence intervals), as was true for the previous assessments. Therefore, the Committee cannot rule out the possibility that current fishing mortality is being underestimated until the Committee achieves greater certainty that relative abundance and catch are being measured appropriately.

The current assessment (based largely on the age structured production model) indicated that the level of landings recorded for the period 1997 – 2000 could probably be maintained into the near future without causing a substantial decline in spawning stock biomass. However, the Committee is concerned about the dramatic increase (26%) in the estimated catch for 2001. The Committee notes that the 2001 catch (provisional catch plus carry-overs) is well above both the replacement yield (22%) and MSY (18%), and is concerned about the effect such high catches may have on the future of the resource.

Mediterranean

Due to the lack of proper data, an assessment of the Mediterranean stock has never been carried out by the ICCAT. According to the information available, the Mediterranean stock doesn't show any particular trend and the mixing rate with the Atlantic stock appears to be insignificant.

ALB-4. Outlook

Since the Committee did not perform an assessment of the status of the albacore stocks in 2002 the assessments of the northern and southern stocks completed in 2000 remain the most recent available. No attempt was made to analyze the status of the Mediterranean stock in 2000.

North Atlantic

In 2000, the Committee noted that in terms of yield per recruit, the fishing intensity is at, or below, the fully exploited level. Concerning MSY-related quantities, in 2000 the Committee recalled that these are highly dependent on the specific choice of stock-recruitment relationship. The 2000 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 indicate that the spawning stock biomass (B_{1999}) for the northern stock (29,000MT) is about 30% below the biomass associated with MSY (42,300MT) and that current F is 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

In 2000 the assessment indicated that the level of exploitation recorded in 1999 could be maintained. The more optimistic perspective seen in 1998 was again evident in 2000, without the negative aspects shown in the 1996 and 1997 assessments. This change in perception in 1998 can be partially explained by revision of some of the abundance indices adopted at that time. The catch for 2001 (including reported catch, provisional catch reported to the Committee and carry-overs) is 18% above the MSY level, and 22% above the replacement yield. The Committee notes that, in view of the fact that annual catches for 1995-2000 were generally below the replacement yield estimated in 2000, the effect of a single large catch such as that recorded in 2001 may not be severe, especially if the high catch is driven by a temporary increase in availability rather than increased effort. However, if catches are maintained at such a high level the effect on the resource will be serious.

Mediterranean

No new official data for 2001 were submitted. The Committee notes that catches in 2000 were historically the highest reported (5,577 MT) and the catches for the last three years were all over 4,500 MT (including reported catch, provisional catch reported to the Committee and carry-overs).

ALB-5. Effects of current regulations

North Atlantic

In 2000, the Commission recommended a total allowable catch (TAC) of 34,500 MT be established for 2001. In addition the 1998 recommendation concerning the limitation of fishing capacity on northern Albacore remains in force. The Committee is unable to assess whether or not these recommendations have had an effect on the stock. However, the Committee noted that reported catches for 2001 are below the total allowable catch (TAC) established for 2001.

South Atlantic

In 1998 the Commission requested that the four active participants in the fishery report their catches to South Africa (a designated Contracting Party actively fishing for southern albacore) on a bi-monthly basis, within two months of those catches having been made, and that South Africa inform the Secretariat when

predetermined threshold limits are reached. South Africa again reports that this arrangement has failed and that catches are not reported in a timely manner. In 1999 and 2000 this failure did not have an impact, as the catch limit of 28,200 MT was not reached. However, as illustrated by the 2001 catches, the fishing fleets in the South Atlantic have a capacity to exceed the recommended catch limit, with potentially serious consequences for the resource.

Mediterranean

The driftnet ban adopted by the EC from January 1, 2002 will certainly affect the total Mediterranean catch for the year 2002 and for the foreseeable future. An increase in longline effort targeting albacore is expected.

ALB-6. Management recommendations

North stock

In 2000 the Committee recommended that in order to maintain a stable Spawning Stock Biomass in the near future the catch should not exceed 34,500 MT (the 1999 catch level) in the period 2001-2002. The 2000 Committee further noted that should the Commission wish the Spawning Stock Biomass to begin increasing towards the level estimated to support the MSY, then catches in 2001 and 2002 should not exceed 31,000 MT. The 2002 Committee reiterates its previous advice.

South stock

If the Commission wishes to maintain a stable Spawning Stock Biomass in the near future, then the Committee recommends that catch should not exceed the estimated replacement yield (29,200 MT) in 2003.The Committee notes that the 2001 catch (including reported catch, provisional catch reported to the Committee and carry-overs) has exceeded both replacement yield and MSY, and expresses concern about the efficacy of the current management framework. Therefore, the Committee strongly recommends that the Commission review the current management framework.

Mediterranean

There were no management recommendations for the Mediterranean stock. However the Committee recommends to the Commission that reliable data be provided on catch, effort and size for the Mediterranean albacore. The Committee also recommends that an effort be made to recover historic data. Improvements to these basic inputs are essential before a stock assessment of Mediterranean albacore can be attempted.

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY
(MT)

	North Atlantic[1]	South Atlantic[2]	Mediterranean
Current (2001) Yield[6]	24,955 (25,052)[6]	34,616 (35,731)[6]	4,743 (4,753)
Maximum Sustainable Yield	32,600 (32,400-33,100)[6]	30,200 (50 -31,400) [7]	Unknown
Replacement Yield (2000)	Not estimated	29,200 (12,100-31,400) [7]	Not estimated
Relative Biomass			
B_{1999}/B_{MSY}	0.68 (0.52-0.86)	1.60 (0.01-1.98)[7]	Not estimated
Relative Fishing Mortality[3]			
F_{1999}/F_{MSY}	1.10 (0.99 - 1.30)	0.57 (0.34-556)[7]	Not estimated
F_{1999}/F_{MAX}	0.71 (0.66 - 0.78)	0.31 (0.28 – 0.33) [t]	Not estimated
$F_{1999}/F_{0.1}$	1.25 (1.14 - 1.39)	0.84 (0.74 – 0.89) [t]	Not estimated
Management measures in effect	[Ref. 98-8][1]: Limit number of vessels to 1993-1995 average. [Ref. 00-06][5]: TAC.	[Ref. 98-9][4]: Limit catches to 29,200 MT. [Ref. 00-07][5].	None

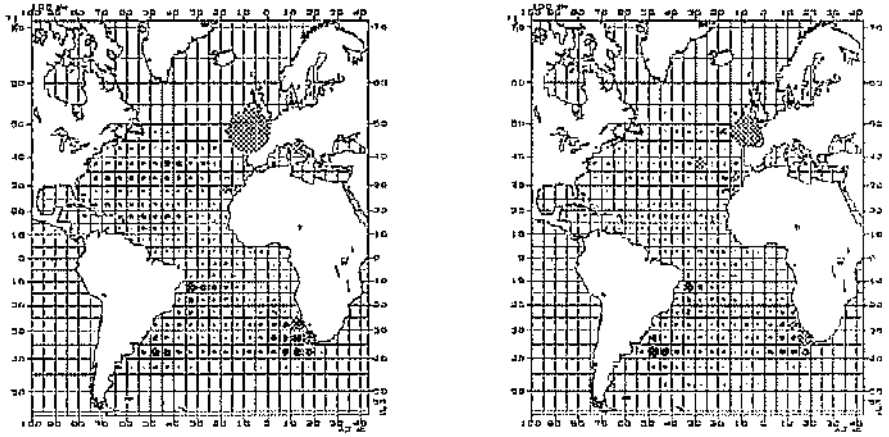
[1] VPA results based on catch data (1975 - 1999). 80% confidence intervals from bootstrap.
[2] ASPM results based on catch data (1956 - 1999). 80% confidence intervals from bootstrap.
[3] F_{1999} = North Atlantic, Geometric Mean 1996-1998. South Atlantic, Geometric Mean 1994-1996.
[4] SCRS/00/10bis.
[5] SCRS/01/010.
[6] This figure includes reported catch, provisional catch reported to the Committee and carry-overs.
[7] These estimates of limits include cases of unsatisfactory convergence in the bootstrap.

ALB-Table 1. Estimated landings (MT) of albacore in 1977-2001, by major area, gear and flag

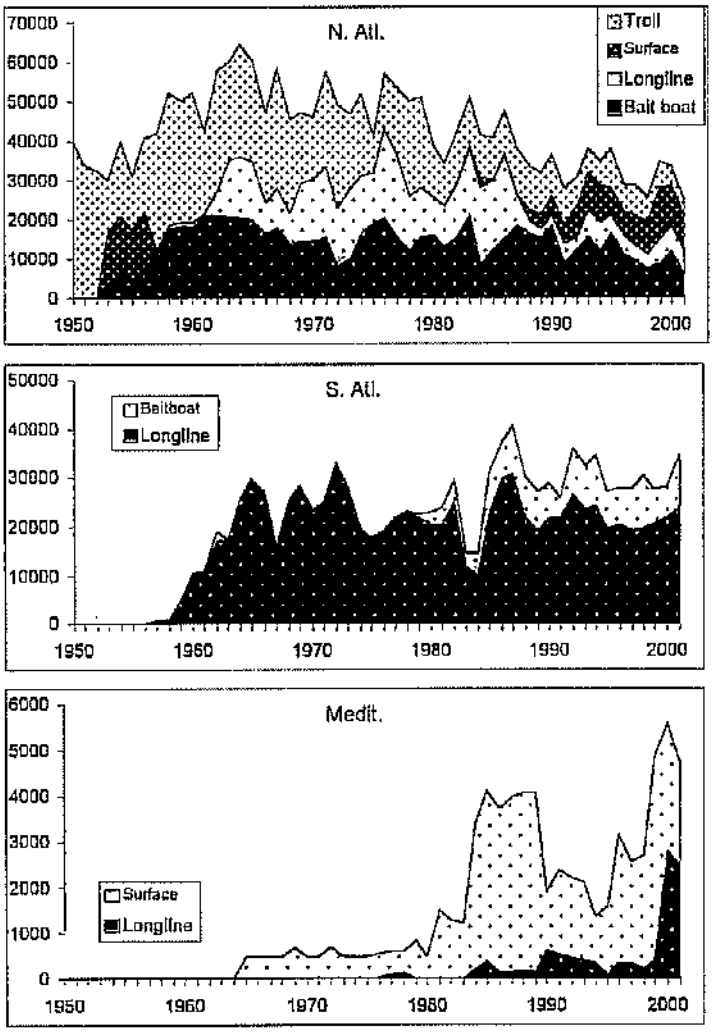
		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL landings		76099	73806	74826	62137	60071	73617	67643	59842	76052	88554	82738	68048	63342	67167	56342	69598	73078	71614	67512	60352	59438	58879	67267	70523	66640
	AT.N	53821	50047	51365	38707	34531	42673	51490	41829	40826	47554	38115	33878	32070	36557	27938	30815	38063	36036	38295	28780	28988	25587	34861	33797	24955
	AT.S	21665	23169	22628	22830	24040	29672	14918	14599	31097	37288	40630	30107	27212	28714	25856	35918	32516	34733	27231	27898	27801	30486	27504	28330	34616
	MEDI	613	590	833	500	1500	1272	1235	3414	4129	3712	3993	4093	4090	1896	2378	2202	3130	1349	1587	3125	2541	2698	4851	5577	4743
	UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	663	369	496	399	549	108	108	50	2819	2325
AT.N	Bait boat	15559	11958	15764	16170	13410	15857	21108	8305	12589	15202	18756	16752	15374	18625	8985	12449	15646	11967	16411	11337	9820	7562	8781	12113	6099
	Longline	20869	14157	12207	9451	9819	13206	16863	19709	17413	21232	7296	3013	2228	2683	5304	3103	7020	7196	4776	4620	4044	3875	6642	6649	5799
	Other Surf.	0	1	62	10	523	694	367	2231	168	213	343	994	1662	3865	3999	5173	7279	7506	3555	3337	4378	6845	7646	6119	3296
	Purse seine	2	0	0	16	0	84	364	555	59	60	1	97	12	1	222	139	229	278	278	263	0	91	55	191	263
	Trawl	0	0	0	0	1	0	0	0	2	0	262	1693	2240	1033	469	2603	1779	2131	3049	2571	2877	1318	4892	3703	5202
	Troll	17391	23931	23332	13059	10778	12831	12788	11029	10654	10847	11457	11329	10554	10350	8959	7348	6109	5959	10226	6652	7870	5894	6845	5023	4297
AT.S	Bait boat	66	43	53	1346	1721	2575	1794	4166	7909	6829	8181	7696	7393	5981	3454	6490	7379	8947	7091	6960	8110	10353	6709	6056	9232
	Longline	21194	22805	21843	20671	20426	25255	11941	9834	22672	29815	30964	21828	19407	21590	21859	26519	23650	24224	19718	20472	19447	19699	20539	22165	23827
	Other Surf.	293	201	544	449	89	493	484	234	334	400	537	398	411	1139	137	393	39	483	10	209	127	0	73	58	1543
	Purse seine	112	119	188	464	1804	1349	699	365	182	244	948	185	0	4	416	2516	1448	1079	412	257	117	434	183	51	15
MEDI	Bait boat	0	0	0	0	900	539	535	1331	243	0	0	0	0	83	499	171	231	81	163	205	0	33	96	88	77
	Longline	130	150	0	0	0	0	0	226	375	150	161	168	165	624	523	442	402	350	87	305	348	194	417	2800	2485
	Other Surf.	483	440	833	500	600	700	700	1716	2973	3562	3782	3879	3879	1098	1198	1533	879	766	1031	2435	1991	2426	1205	2689	395
	Purse seine	0	0	0	0	0	0	0	141	274	10	50	16	16	91	110	6	559	23	0	0	0	0	0	0	1786
	Troll	0	0	0	0	0	33	0	0	264	0	0	0	0	0	48	50	59	129	306	119	202	45	73	0	
UNCL	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	663	369	496	399	549	108	108	50	2819	2325
AT.N	BARBADOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2
	BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
	CANADA	0	0	0	0	0	0	0	0	0	0	0	47	22	6	5	1	9	32	12	24	31	23	38	122	51
	CANADA-JPN	0	0	0	0	0	0	0	0	0	1	21	0	0	0	0	0	0	0	0	0	0	0	0	0	
	CAP-VERT	0	0	0	0	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	CHINA-PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	8	20	0	0	21	16	57
	CHINESE TAIPEI	13723	9324	6973	7090	6584	10500	14254	14923	14899	19646	6636	2117	1294	3005	4318	2209	6300	6409	3977	3905	3330	3098	5785	5299	4399
	CUBA	83	89	0	31	48	82	38	69	20	31	15	4	0	2	0	0	0	0	0	0	0	0	0	0	
	DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	323	121	73	95	
	EC-ESPANA	25155	25404	29630	25202	20819	26478	29557	15685	20672	24387	28206	27557	25424	25792	17233	18176	18380	16998	20197	16323	17294	13285	15364	15965	9177
	EC-FRANCE	7733	10400	9330	3955	2929	2855	2391	2797	1860	1200	1921	2805	4050	3300	4123	6924	6293	5934	5304	4694	4618	3711	7189	6019	6344
	EC-IRELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	40	60	451	1946	2534	918	874	1913	3750	4858	3461	2004
	EC-PORTUGAL	62	85	149	79	442	321	1778	775	657	495	433	184	169	3185	709	1638	3385	974	6470	1634	395	91	324	278	1175
	EC-U.K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	499	613	196	49	33	117	345	15	0
	GRENADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	7	6	12	21
	ICELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	JAPAN	825	531	1219	1086	1740	781	1456	576	844	470	494	723	764	737	691	466	485	505	386	466	414	446	446	723	950
	KOREA	5579	3048	2997	797	938	1326	478	967	390	373	18	16	53	34	1	0	8	0	0	2	1	0	0	0	
	MEXICO	0	0	0	2	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PANAMA	557	768	425	193	177	494	357	2551	901	525	44	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	0	0	0	0	0	0	0	4	0	
	SIERRA LEONE	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	91
	ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	1	3
	ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	0

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	TRINIDAD & TOBAGO	0	0	0	0	0	0	268	194	318	0	0	0	0	4	0	247	0	0	0	0	2	1	1	2	11
	U.S.A	2	1	0	22	472	699	347	2206	98	251	301	288	243	357	479	438	509	741	545	472	577	829	315	406	322
	U.S.S.R	0	0	59	0	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UK-BERMUDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	
	VENEZUELA	102	397	593	300	331	137	823	380	408	168	26	119	41	95	319	205	246	282	279	315	49	107	91	1374	329
	VENEZUELA-FOR	0	0	0	0	0	0	0	496	59	4	0	18	0	0	0	0	0	0	0	0	0	0	0	0	20
AT.S	ARGENTINA	80	8	0	4	2	7	55	209	153	356	469	344	354	151	60	306	0	2	0	0	0	0	0	0	
	BELIZE.SH.OB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	8	2	
	BRASIL	688	494	515	476	276	800	731	732	382	520	395	421	435	514	1113	2710	3613	1227	923	819	652	3418	1872	4411	6862
	CAMBODIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	
	CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	89	26
	CHINESE TAIPEI	16092	20467	20340	18710	18187	22800	9502	7889	19643	27592	28790	20746	18386	21369	19883	23063	19400	22573	18351	18956	18165	16106	17377	17221	16650
	CUBA	17	11	0	27	53	29	36	67	27	21	10	2	1	2	17	5	3	0	0	0	0	0	0	0	
	EC-ESPANA	0	0	0	0	889	106	295	307	155	200	807	185	0	0	280	1943	783	831	457	184	256	193	1027	282	
	EC-FRANCE	112	40	172	457	912	947	372	7	18	35	100	0	0	0	50	449	564	129	82	190	38	40	13	23	16
	EC-PORTUGAL	0	0	0	0	0	0	0	741	1357	1029	899	1153	557	732	81	184	483	1185	655	494	256	124	232	486	41
	HONDURAS-OB.SH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	7	1	6	0	
	JAPAN	107	135	105	333	558	569	188	224	623	739	357	405	450	587	654	583	467	651	389	435	424	418	552	437	351
	KOREA	3829	1413	878	805	682	563	599	348	511	321	383	180	54	19	31	5	20	0	0	18	4	7	0	18	
	MAROC	0	2	0	0	0	113	0	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	915	950	982	1199	1429	1162	2418	3419
	NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	8	122	68	55	63	41	13	218	0	723	
	PANAMA	377	354	125	167	129	210	0	0	0	280	924	0	0	0	240	129	168	213	12	22	0	3	14	0	
	PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	
	SOUTH AFRICA	150	150	480	1850	2320	3180	2760	3540	6697	5930	7275	6570	6890	5280	3410	6360	6881	6931	5214	5634	6708	8412	5101	2072	7236
	U.S.A	0	9	11	0	2	102	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	1	1	2
	U.S.S.R	212	74	0	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	UK-S.HELENA	1	12	2	4	7	11	7	9	0	0	2	1	1	1	5	28	38	5	82	47	18	1	1	58	12
	URUGUAY	0	0	0	0	23	235	373	526	1531	262	178	100	85	55	34	31	28	16	49	75	56	110	90	90	
MEDI	CYPRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	
	EC-ESPANA	0	0	0	0	900	572	535	1331	531	0	0	3	0	84	547	227	290	218	475	404	380	126	284	152	77
	EC-FRANCE	0	0	0	0	0	0	0	141	250	20	60	31	31	121	140	11	64	23	3	0	5	5	0	0	0
	EC-GREECE	0	0	0	0	0	0	0	0	0	484	500	500	500	500	500	500	1	1	0	952	741	1152	2005	1786	1840
	EC-ITALY	613	590	833	500	600	700	700	1942	3348	3208	3433	3529	3529	1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3620	2826
	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	
	MALTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	
	NEI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	
	YUGOSLAVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
UNCL	NEI-134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	3	0	20	7	7	7	11	
	NEI-71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	281	145	130	110	160	43	43	43	11	
	PANAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	382	210	363	289	369	58	58	0	0	
	ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2819	2325

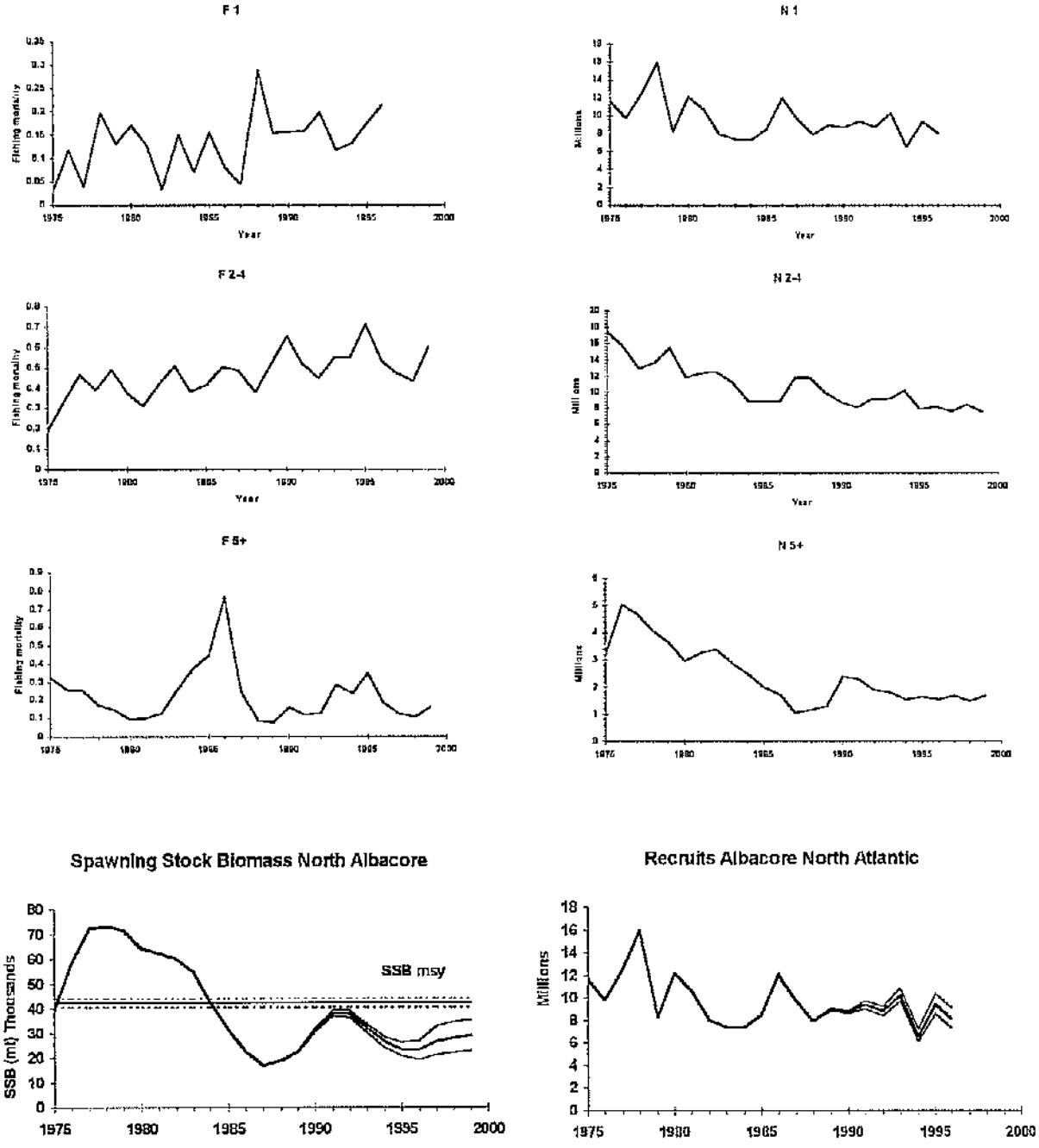
Empty cells for 2001 indicate that catches were not reported to ICCAT.
Note: For 2001, UK-Bermuda reported 2 MT during the SCRS Plenary.



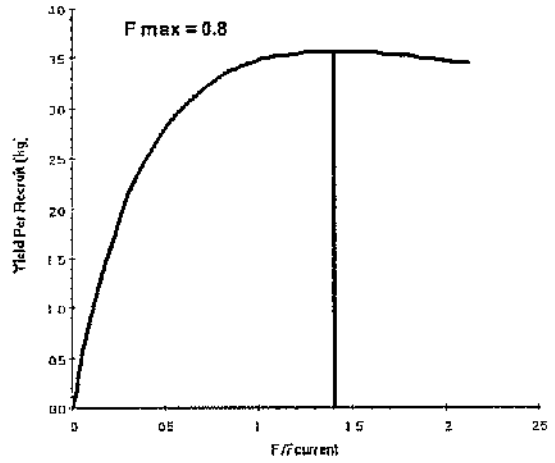
ALB-Fig. 1. Geographical distribution of annual albacore catches in 1980-1989 (left) and 1990-1997 (right). Dark symbols represent longline and lighter symbols represent various surface gears.

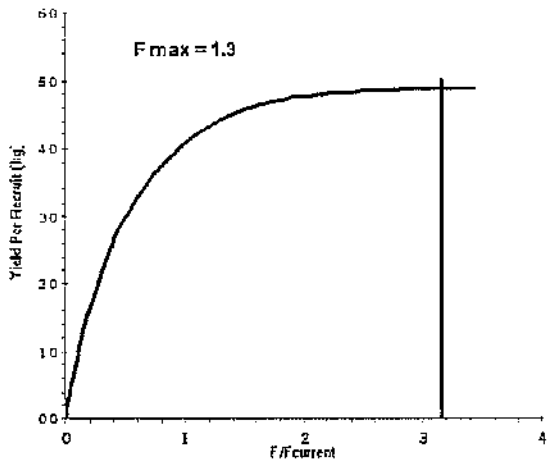


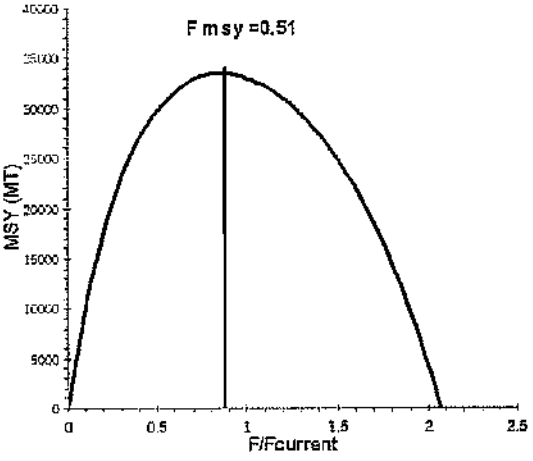
ALB-Fig. 2. Albacore landings (MT) by stock and major gear types for 1950-2001. Data from the Mediterranean Sea are highly uncertain and provisional in recent years.

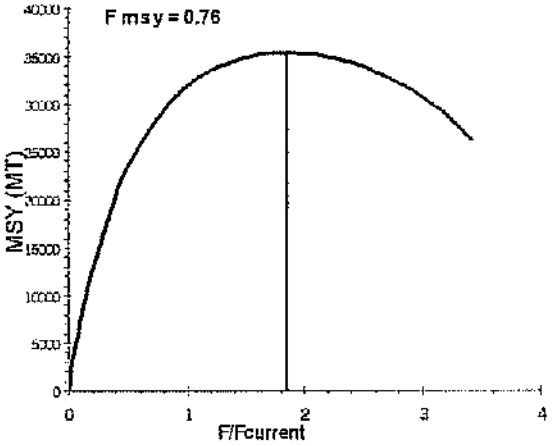


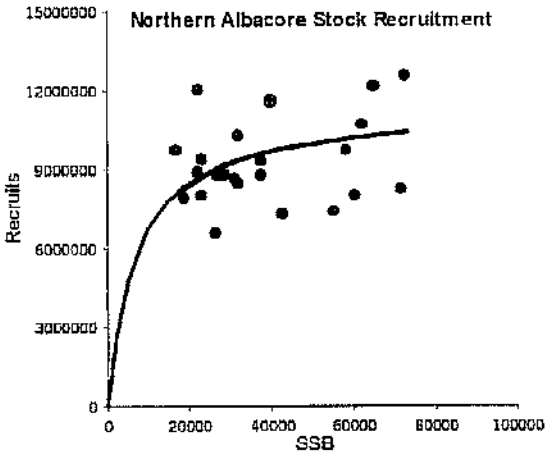
ALB-Fig 3. North albacore base case VPA estimates of fishing mortality (F) and numbers of fish by age-groups (top 6 panels), and Spawning stock biomass and recruits with 80% confidence limits (bottom panels).

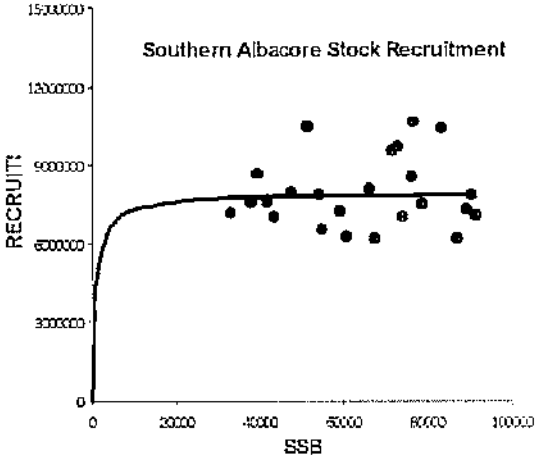






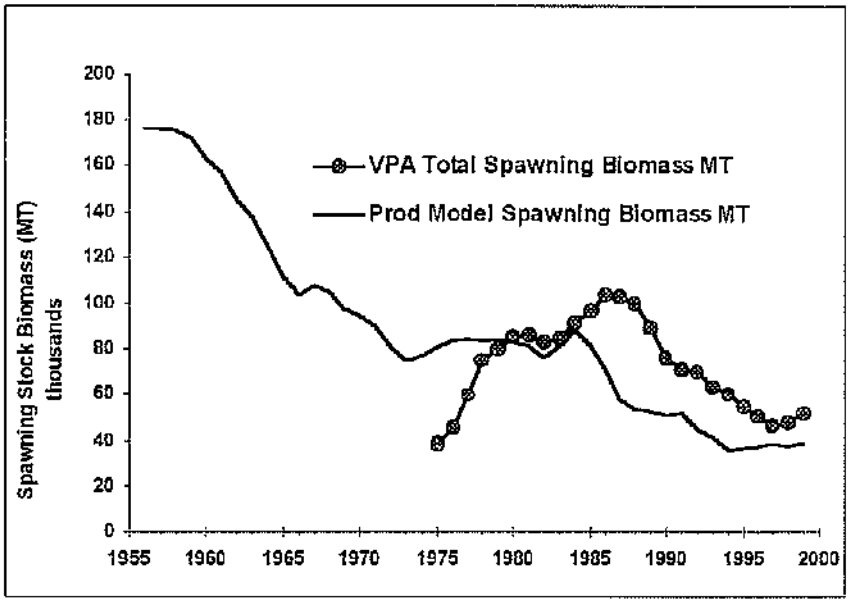






ALB-Fig 4. Yield per recruit (top), equilibrium yield (middle), and stock-recruitment relationship (bottom) estimated by VPA for the northern albacore stock. Fishing mortality axis (x-axis) is relative to current fishing mortality ($F_{1999} = 0.57$).

ALB-Fig 5. Yield per recruit (top), equilibrium yield (middle), and stock-recruitment relationship (bottom) estimated by VPA for the southern albacore stock. Fishing mortality axis (x-axis) is relative to current fishing mortality ($F_{1999} = 0.41$).



ALB-Fig. 6. Spawning stock biomass estimates obtained by VPA (ADAPT) and production modelling (ASPM) for the southern Atlantic albacore stock.

7.5 BFT – ATLANTIC BLUEFIN TUNA

In 1998, the Commission adopted a 20 year Rebuilding Program for the western Atlantic bluefin management area [Ref: 98-7] aimed at rebuilding to the stock size that will produce MSY (B_{MSY}) by 2018 with a 50% or greater probability. The Program states that the TAC for the West would only be adjusted from the 2,500 MT level adopted for 2003-2004 if SCRS advises that (a) a catch of 2,700 MT or more has a 50% or greater probability of rebuilding or (b) a catch of 2,300 MT or less is necessary to have a 50% or greater probability of rebuilding. According to the Program, the MSY rebuilding target can be adjusted according to advice from SCRS.

The Commission also recommended in 1998 that bluefin tuna catches in the East Atlantic Ocean and Mediterranean Sea should be reduced to 32,000 MT in 1999 and 29,500 MT in the year 2000. This recommendation entered into force in August 1999 with exceptions noted for Morocco and Libya. Subsequently, the Commission recommended in 2000 that bluefin tuna catches in the East Atlantic Ocean and Mediterranean Sea in 2001 for China, Croatia, EC, Japan, Korea, Tunisia, Morocco, Libya, Non-contracting parties, Entities and Fishing Entities be limited to specific levels totaling 32,143 MT [Ref. 00-9]. This recommendation entered into force in June, 2001.The Committee conducted assessments on East Atlantic and Mediterranean Bluefin Tuna in 2002 for the first time since 1998. An assessment was not completed in 2000 because of uncertainties in the basic catch data primarily in the Mediterranean. Uncertainties remain in 2002 and are a central issue in the East plus Mediterranean assessment.

There has been an accumulation of evidence on bluefin tuna mixing in the last few years through the collection of tagging data and its examination through the modeling of mixing scenarios for evaluating their effect on management. These results were reviewed in 2001 by the Workshop on Bluefin Tuna Mixing. This research led to a long-term plan for modeling finer scale spatial mixing and to short-term strategies for assessment to assist the advice for management. The data and research were reviewed again in 2002. Progress was made on both fronts and is discussed later in this Executive Summary.

It should be noted that the perception of the importance of mixing differs depending upon whether management advice is being provided for the East (plus Mediterranean) or for the West. This arises quite naturally because the East stock is much larger than the West stock. Because of this, both the nature and extent of mixing could be perceived important in the success of the West Rebuilding Program. However, the most important uncertainty for providing management advice for the East is the uncertainty in the amount of catch that is being taken. Therefore, this Executive Summary balances those two concerns in providing advice.

BFT-1. Biology

Present fisheries for Atlantic bluefin tuna are distributed from the Gulf of Mexico to Newfoundland in the West Atlantic, from roughly the Canary Islands to south of Iceland in the East Atlantic, and throughout the Mediterranean Sea. In 1982, the Commission established a line for separating the eastern and western Atlantic management units based on discontinuities in the distribution of catches at that time in the Atlantic and supported by limited biological knowledge. However, the overall distribution of the catch in the 1990s is much more continuous across the north Atlantic than was seen in previous decades. Tagging evidence indicates that movement of bluefin across the current east/west management boundary in the Atlantic does occur, that movements can be extensive (including transatlantic) and complex, that there are areas of concentration of electronically tagged fish (released in the west) in the north central Atlantic just east of the management boundary, and that fisheries for bluefin tuna have developed in this area in the last decade. At least some of these fish have moved from west of the current boundary. Complementary studies, which might show east to west movement, are less advanced. The composition, and natal origin of these fish in the central north Atlantic area are not known. Nevertheless, it is clear that the current boundary does not depict our present understanding of the biological distribution and biological stock structure of Atlantic bluefin tuna. Note, however, that the current boundary is a *management* boundary and its effectiveness for management is a different issue.

Atlantic bluefin tuna can grow to over 300 cm and reach more than 650 kg. The oldest age considered reliable is 20 years, based on an estimated age at tagging of 2 years and about 18 years at liberty, although it is believed that bluefin tuna may live to older ages. Bluefin tuna are, thus, characterized by a late age at maturity (thus, a large number of juvenile classes) and a long life span, which make it well adapted to variations in recruitment success, but more vulnerable to fishing pressure than rapid growth species such as tropical tuna

species. Bluefin tuna in the West Atlantic generally reach a larger maximum size compared to bluefin caught in the East Atlantic. Bluefin in the west are assumed to first spawn at age 8 compared to ages 4 to 5 in the east. Distribution expands with age; large bluefin are adapted for migration to colder waters. Bluefin tuna are opportunistic feeders, with fish, squid, and crustaceans common in their diet. In the West Atlantic, bluefin tuna are thought to spawn from mid-April into June in the Gulf of Mexico and in the Florida Straits. Juveniles are thought to occur in the summer over the continental shelf, primarily from about 35°N to 41°N and offshore of that area in the winter. In the East Atlantic, bluefin tuna generally spawn from late May to July depending on the spawning area, primarily in the Mediterranean, with highest concentrations around the Balearic Islands, Tyrrhenian Sea, and central Mediterranean where the sea-surface temperature of the water is about 24°C.

BLUEFIN TUNA - WEST

BFTW-2. Description of the fisheries

One of the most noteworthy changes in the fisheries since 1998 was that a substantial amount of additional catch that was not in accordance with Commission's recommended allocation of catch, was recorded through the Bluefin Tuna Statistical Document system. The reported total catches (landings and discards exclusive of estimated unreported catch) of western Atlantic bluefin tuna in 2000 and 2001 are estimated as 2,395 MT and 2,597 MT, respectively (**BFT-Table 1; BFT-Figure 2**). The 2001 catches were the second highest since 1991. The high level of the 2001 catches were partially a result of the estimate of unreported catch based on the Bluefin Tuna Statistical Document. The Japanese longline fishery catches in the West Atlantic in 2001 decreased almost 40% from the 1998 value (691 MT, which was the highest in the 1990s) to 436 MT. The Canadian reported landings (exclusive of discards) decreased slightly from the 1998 level (595 MT) to 524 MT in 2001. The provisional estimates of Canadian dead discards in 2001 were lower than in 2000. Reported catches of U.S. fisheries in 2000 and 2001 were 1,212 MT and 1,589 MT, respectively. The estimates of U.S. dead discards for 2000 were higher than the dead discards presented for 2001. In addition, there were 13 MT reported by Brazil (Equatorial Guinea flagged vessels chartered by Brazil) for 1999, but no catch has been reported in 2000. Mexico reported 14 MT in 1999 and 29 MT in 2000 and 10 MT in 2001, all higher than all other reported catches since the early 1980s.

BFTW-3. State of the stock

The assessment results (**BFT-Figure 3**) 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).

BFTW-4. 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 MT), 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 in **BFTW-Figure 4** for several catch levels, and **BFTW-Figure 5** for 2,500 MT only. The results are summarized in the table below.

The projections for the low recruitment scenario estimated that a constant catch of 3,000 MT per year has an 83% probability of allowing rebuilding to the associated SSB_{MSY} by 2018. A constant catch of 2,500 MT 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 MT 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 MT without violating the Commission's rebuilding plan. If the high recruitment scenario is valid, the TAC should be decreased to less than 1,500 MT to comply with the plan.

Probability of achieving target biomass in 2018

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

BFTW-5. Effects of current regulations

The first regulatory measure for a scientific monitoring level was adopted for western Atlantic bluefin catches in 1981. Since then, monitoring levels have been changed in various years. Until 1987, both estimated catches and landings were below or equal to the level of the catch limits. However, from 1988 to 1997, estimated landings were very close to the level of the limits and, for some years, exceeded the limit by a maximum of 100 MT. Estimated catches (including discards) were higher than the limits every year during this period (by about 200 to 300 MT) with the exceptions of 1992 and 1997. The estimated catches exceeded the 2,500 MT limit in 2000 and 2001, by approximately 150 MT each year. It should be pointed out that for compliance purposes, some countries are using fishing years that do not correspond to calendar years, while the catches discussed here are in calendar years. Also, according to the ICCAT regulatory measure, the amount of catch that exceeded quota or was left over from the quota can be carried over to succeeding years. Hence, the catch limit set for each year could have been adjusted accordingly. It should also be pointed out that the excess of the catch limits in most recent years is due to some new fisheries that operated without a quota (see Section BFTW-2).

For the West Atlantic, a size limit of 6.4 kg with 15 percent allowance, in number of fish, has been in effect since 1975. In addition, a prohibition on the taking and landing bluefin tuna less than 30 kg (or 115 cm) with an 8% tolerance, by weight on a national basis, became effective in 1992. It is noted that, since 1992, the proportion of undersized fish for all catches combined has been below the allowance level (e.g., 1% and 3% <115cm in 2000 and 2001, respectively).

BFTW-6. Management recommendations

The Committee's management recommendation for the western Atlantic bluefin tuna management area is directed at the Rebuilding Program adopted by the Commission in 1998. The essence of the Program is to rebuild with 50% probability by 2018 to the spawning biomass level associated with MSY. In light of the uncertainty in the assessment, the choice between recruitment scenarios and rebuilding targets, and assumptions about mixing, the weight of scientific opinion within the Committee favored no change from the current TAC of 2,500 MT per year.

Projections based on the low recruitment scenario indicate that the TAC could be increased without violating the Rebuilding Program, assuming that relatively large recruitment estimates for some recent year-classes are realistic. The high levels of recruitment estimated for some recent year-classes are consistent with a higher biomass level as a rebuilding target. In previous assessment sessions, the spawning biomass level in 1975 was considered a useful rebuilding target. The 1975 biomass is more than twice the MSY spawning biomass level associated with the low recruitment scenario. The projections indicate a 35-60% probability of rebuilding to the 1975 spawning biomass level for a catch of 2,500 MT per year, depending on the recruitment scenario assumed. It seems likely that a recruitment scenario corresponding to a SSB_{MSY} equal to the level in 1975 would indicate a probability of rebuilding by 2018 for a catch of 2,500 MT per year within the range of 35-60%.

The MSY spawning biomass associated with the high recruitment scenario, which is nearly twice the 1975 level, is unlikely to be reached by 2018 if the recent level of catch (and TAC) is maintained. However, the Committee does not recommend the sharp reduction in TAC that would be necessary to comply with the rebuilding Program based on the high recruitment scenario because of:

a) uncertainty about which recruitment scenario is most appropriate,
b) recognition that for the high recruitment scenario the spawning biomass associated with MSY is not well determined (because estimation leads to extrapolation beyond biomass levels included within the current assessment), and
c) the generally positive outlook for the resource according to the current assessment regardless of the recruitment scenario assumed.

As emphasized in previous assessments, mixing across management unit boundaries of fish of western and eastern origin could be important for management of the resource in both areas. In particular, the condition of the eastern Atlantic stock and fishery could adversely affect recovery in the West Atlantic, which was also noted in the Committee's 1998, 2000, and 2001 reports. Therefore, the Committee stressed the importance of continuing efforts to manage the fisheries in both the East and West Atlantic according to the Commission's objectives. Further recommendations concerning the issue of mixing are included in the SCRS response to the request of the Commission.

WESTERN ATLANTIC BLUEFIN TUNA SUMMARY
(Catches and Biomass in MT)

Current (2001) Catch (discards and estimates of unreported catches included)	2,646 MT	
Short-term Sustainable Yield	Probably >3,000 MT	
Maximum Sustainable Yield (MSY)	3,500 (3,300-3,700)[1]	7,200 (5,900-9,500)[2]
Relative Spawning Stock Biomass		
B_{2001}/B_{1975}	0.13 (0.07-0.20)[1]	0.13 (0.07-0.20)[2]
B_{2001}/B_{MSY}	0.31 (0.20-0.47)[1]	0.06 (0.03-0.10)[2]
Relative Fishing Mortality		
F_{2001}/F_{MSY}	2.35 (1.72-3.24)[1]	4.64 (3.63-6.00)[2]
$F_{2001}/F_{0.1}$	4.87	
F_{2001}/F_{max}	2.35	
Management Measures in Effect:	- No landing of fish <6.4 kg, with a 15% tolerance, in number [74-1, 98-7] - Limit catches <115 cm (30 kg) to no more than 8% by weight [91-1, 98-7] - TAC of 2,500 MT from 1999 to 2018 including dead discards subject to revisions consistent with the Rebuilding Program [98-7].	

[1] Median and approximate 80% confidence interval from bootstrapping; assumes a "low recruitment" scenario at high spawning levels.
[2] Median and approximate 80% confidence interval from bootstrapping; assumes a "high recruitment" scenario at high spawning levels.

BLUEFIN TUNA - EAST

BFTE-2. Description of the fisheries

The East Atlantic bluefin fisheries (including the Mediterranean) are characterized by a variety of vessel types and fishing gears with landing sites located in many countries. Therefore, the landing statistics are difficult to obtain, particularly for the Mediterranean. Historical statistics show there were important catches since more than ten centuries ago, with catches of more than 10,000 MT in the past and an average of about 30,000 MT in the 1950-1965 period. (**BFT-Table 1** and **BFT-Figure 2**). Certain fisheries, such as the traps (which in the long-term caught about 15,000 MT on average), go back to ancient times. Other fisheries, such as the Mediterranean purse seine fishery mainly emerged in the 1960s. Based on estimates of 1995-2000 catches, the most important catches, were from: longline, traps and baitboat for the East Atlantic; and from purse seine and longline for the Mediterranean; the purse seine fleet accounts for 60-80% of the Mediterranean catch. Additionally, it is suspected that large quantities of undersized fish are caught but not reported.

At the time of the 2002 assessment meeting, several important fishing countries had not reported Task I for 2001. Therefore, no attempt was made to include 2001 in the present assessment. In 2000, landings for the East Atlantic and the Mediterranean (including estimates of unreported catch) amounted to 33,754 MT, which is less than 1998 (39,097 MT) and slightly more than 1999 (32,454 MT). The reported 2000 catch is about 60% of the peak catch of 50,762 MT in 1996, but it is probably under-estimated because of increasing uncertainty about catch statistics. The SCRS already raised this point last year.

Economic gains in Atlantic bluefin tuna fattening have led the private sector to invest into this relatively new culture system. The interest over the past few years has increased remarkably as reflected by the increased number of fattening units established throughout the Mediterranean Sea and new license applications being submitted to the relevant national authorities. Fattened bluefin tuna are mostly provided by Mediterranean purse seiners and to a much lesser extent by traps. The transfer of live fish from the seine to the towing cages is done in the open sea (generally where the catch has occurred), simply by joining both nets. There was a general agreement within the Committee to that bluefin tuna fattening operations in the Mediterranean Sea significantly affected bluefin tuna data collection, and consequently the stock assessment procedure. The difficulties to estimate size composition of the catch are, for instance, encountered by all countries having purse seine fleets involved in fattening operations.

The Committee is concerned about the introduction in 2003 of new gears such as purse seines and longlines that are replacing albacore driftnets in the Bay of Biscay that could be targeting or increasing by-catch of juvenile bluefin in this area.

BFTE-3. 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 modeling 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; **BFT-Figure 6**).

The assessment indicates two peaks in spawning biomass and an increase in fishing mortality rates, especially for older fish after 1993 (**BFT-Figure 6**). There appears to have been a general trend of increasing recruitment in the early 1980s followed by a period without trend (**BFT-Figure 6**).

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.

BFTE-4 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
$Yield_{longterm}$	24,649	23,543	24,294
$Yield_{longterm}/Yield_{2000}$	0.69	0.66	0.59
$SSB_{longterm}/SSB_{2000}$	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 MT) 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.

BFTE-5. Effect of current regulations

A regulatory recommendation stating that Contracting Parties should limit the fishing mortality to recent levels came into force in 1975 for one year and was extended indefinitely in 1982 for the East Atlantic. Fishing mortality rates have exceeded that of 1974 levels in most years (**BFT-Figure 6**).

The Commission recommended in 1998 that bluefin tuna catches in the East Atlantic Ocean and Mediterranean Sea should be reduced to 32,000 MT in 1999 and 29,500 MT in the year 2000. This recommendation entered into force in August 1999 with exceptions noted for Morocco and Libya. Catches were 32,454 MT in 1999 and 33,754 MT in 2000 (including SCRS estimates of unreported catches from the Bluefin Statistical Document Program (**BFT-Table 1**).

The Commission recommended in 2000 that bluefin tuna catches in the East Atlantic Ocean and Mediterranean Sea should be reduced to 32,143 MT in 2001 [Recommendation 00-9]. This recommendation

entered into force in June 2001. Reported landings for 2001 were not complete, as of the meeting of the Bluefin Tuna Working Group.

In 1975, a minimum size of 6.4 kg with a 15% tolerance, in number of fish, was recommended for the entire Atlantic (including the Mediterranean). The 6.4 kg size regulation had been poorly enforced for the East Atlantic and Mediterranean fisheries. Subsequently the Commission established a minimum size with no tolerance of 1.8 kg (prohibition of retention, landing and sale). This was amended by the Commission to 3.2 kg in 1998, to be implemented in 1999. The available data indicate that 36% of the number of fish in the Mediterranean catch was less than 3.2 kg in 2000 and 40% less than 6.4 kg. In the East Atlantic it was 2% and 29% respectively. While it is known that catches of age 0 fish are still occurring, the Committee does not have sufficient catch at size data to fully evaluate this. Clearly catches of age 0 fish are under-reported.

Also the recent use of smaller bluefin for tuna fattening/farming is a reason for concern to the Committee. Additionally, compliance with minimum sizes in these situations is difficult to evaluate.

There is a regulation that entered into force on 1 June 1994 that prohibits large pelagic longliners of more than 24 m in length from fishing in the Mediterranean during the months of June and July. The objective of this regulation is to limit fishing mortality. Various measures taken by ICCAT to curb IUU fishing activities (such as market-related measures, monitoring transfer of catches of IUU, etc.) appear to be having some positive effects as seen in the decline in bluefin tuna imports to the Japanese market from IUU fishing vessels.

In 1999 the prohibition of purse seine fishing in the Mediterranean (except for the Adriatic) was amended to include the period from 16 July through 15 August. Additionally, purse seining in the Adriatic was prohibited for the month of May. Both prohibitions were designed to protect juveniles. The Committee is not yet been able to evaluate the effect of these new measures. However, reservations on the effects of this system were expressed. It seems, however, that the previous closure (for the month of mid-July through mid-August in the Mediterranean) was being adhered to. In 1997 the Commission prohibited the use of airplanes or helicopters supporting fishing operations in the Mediterranean in the month of June. It is unclear whether this measure is or could be enforced.

BFTE-6. Management recommendations

The Committee continues to be strongly concerned about the quality of the catch, effort and catch at size data available to conduct quantitative assessments for East Atlantic (and Mediterranean) bluefin tuna now and in the future. Unless this situation improves, the quality of the advice that the Committee can provide will continue to deteriorate. Indeed, the present East Atlantic assessment was limited due to these uncertainties, particularly the uncertainty in catches. For example:

a) The assessment was only conducted using reported landings through the year 2000, due to the lack of reports for 2001;
b) The Committee conducted assessments based on reported landings and upon an alternative catch scenario in which landings were assumed to be both under- and over-reported since 1993 in reaction to management. The Committee has limited confidence that either the reported catches or the alternative scenario represent the true level; and
c) It has been noted that the practice of fish fattening has become increasingly prevalent in the Mediterranean and this practice has probably led to deterioration in the collection of catch statistics.

Because of the above limitations, the Committee is unwilling to make definitive management recommendations.

The Committee noted these same concerns in 2000 and determined that, given these issues, an assessment was not warranted at that time. While an assessment was conducted this year (2002), the Committee does not believe that these data issues have been substantially resolved.

The Committee is concerned about the status of East Atlantic (including Mediterranean) bluefin tuna resources in the light of assessment results; the historically high reported catches made in 1994-1997 (in excess of 46,000 MT 1994-97; and in excess of 50,000 MT in 1996), and possible under-reporting since 1998. Analyses suggest that at current levels of recruitment and the present level of large- and small-fish fisheries, catch levels of 26,000 MT or more are not sustainable over the long-term (see Section BFTE-4 Outlook). Because of the lack of

confidence in the input data and in the assessment results, the Committee is not in a position to give or suggest any strong management recommendations for the short or medium term. The Committee can only offer advice about long-term consequences of maintaining current catches. The Committee thinks that long-term sustainable yield is probably lower than current catches because of high fishing mortality rates.

High catch of small individuals still occurs and the Committee recommends that every effort be made so that the current measures on the size limit of 6.4 kg are adhered to. Reduction of fishing on juveniles could contribute substantially to increases in both biomass and yield (Section BFTE-4 Outlook). The Committee reiterated that effective measures be taken to implement Recommendation [98-4], avoiding catches of age 0 and 1 fish (<3.2 kg).

Because there are big differences between the size of the western and eastern Atlantic bluefin tuna stocks, mixing is likely to influence these two management units differently (see Responses to the Commission section).

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY [1]

Current (2000) Yield [2]	33,754 MT
2001 Replacement Yield	Not estimated
Maximum Sustainable Yield	Not estimated
Relative biomass SSB_{2000}/SSB_{1970}	0.80
Relative numbers $N_{8+,2000}/N_{8+,1970}$	0.70
Relative fishing mortality F_{2000}/F_{max}	2.4
Management Measures in Effect	– No landing of fish <6.4 kg, with a 15% tolerance in # of individuals [Ref. 74-1] – Fishing mortality not to exceed circa 1975 level [Ref. 74-1] – No longlining in Med. in June- July by vessels>24 m [Ref. 93-7] – No purse seining in Adriatic in May [Ref. 98-6] – No purse seining 16 July-15 August, in Med., except in the Adriatic [Ref. 96-2] – No use of spotter helicopter or plane in Med., in June [Ref. 96-2] – 32,000 MT quota in 1999 and 29,500 MT quota in 2000 (with exceptions noted by Morocco and Libya) [Ref. 98-5] – No landing, retaining aboard or selling of fish <3.2 kg [Ref. 98-4]

[1] Summary statistics are based on three runs (Trials 3, 9 and 12 in the 2002 Detailed Report) that represent alternative model formulations examined by the Committee. The Committee notes that the uncertainty in the assessment was not quantified but is believed to be very high.

[2] One of the assessment runs examined used an alternative catch scenario with hypothetical levels of mis-reporting. Under that scenario, the 2000 yield was 40,214 MT.

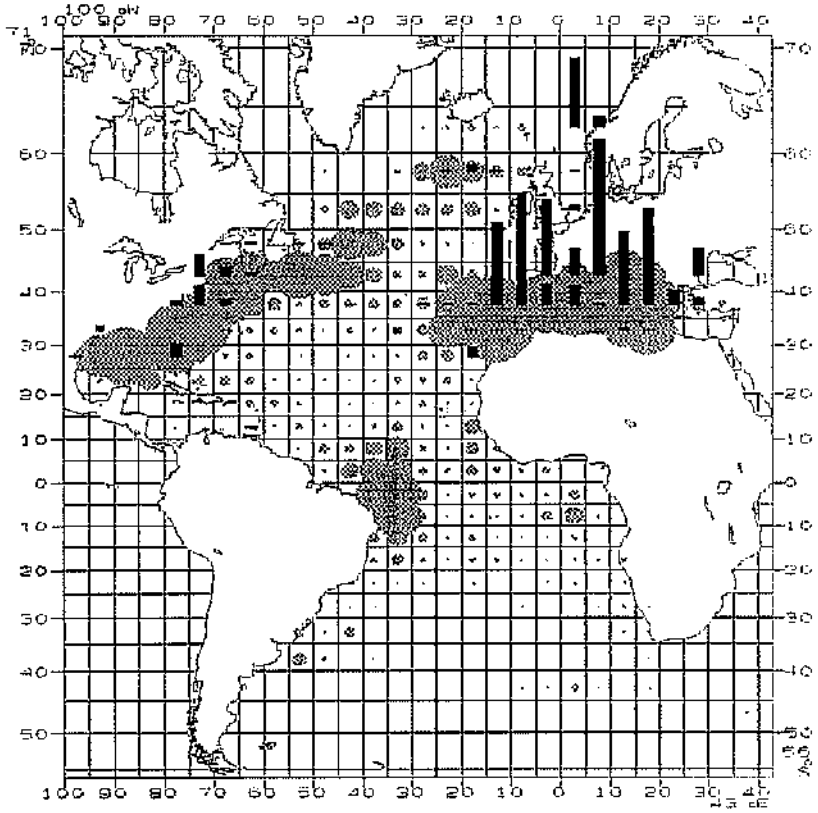
BFT-Table 1: Estimated Catches (landings and discards, MT) of Northern bluefin tuna by Major Area, Gear and Flag*

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL			*25468*	*20408*	*18478*	*19904*	*19016*	*23820*	*24202*	*26717*	*24647*	*21373*	*20789*	*27128*	*23818*	*26045*	*29420*	*34012*	*36579*	*48577*	*49716*	*53163*	*48988*	*41688*	*35116*	*36419*	*17148*
	AT.E+MED		*18774*	*14645*	*12223*	*14103*	*13845*	*22375*	*21660*	*24425*	*21962*	*19051*	*18196*	*24117*	*20951*	*23247*	*26428*	*31897*	*34268*	*46471*	*47290*	*50762*	*46758*	*39097*	*32454*	*33754*	*14501*
	AT.W		*6694*	*5763*	*6255*	*5801*	*5771*	*1445*	*2542*	*2292*	*2685*	*2322*	*2592*	*3011*	*2867*	*2798*	*2992*	*2115*	*2311*	*2106*	*2426*	*2401*	*2230*	*2591*	*2662*	*2665*	*2646*
Landings	AT.E+MED	Bait boat	2881	3904	2128	1874	1653	1010	3032	4647	2644	2253	2128	2682	2683	2018	1796	1624	4048	2285	3299	5362	5542	2787	1591	2014	108
		Longline	3445	912	970	1255	917	4255	3606	2734	1763	1448	1703	2396	1974	2522	6066	6416	5059	9224	12867	12959	10206	7049	6484	7052	4861
		Other Surf.	254	205	230	640	941	551	808	1960	3352	3666	3119	3344	3596	1474	1544	2451	2602	3845	1598	1470	1168	2272	3380	1579	984
		Purse seine	10989	7556	6369	8978	8795	12786	10746	10302	11305	9621	8857	11198	9450	11304	13291	18269	19321	26026	24046	26344	25006	21608	15636	17341	7926
		Sport	488	610	1176	105	93	100	194	275	508	323	436	839	459	1553	738	951	1237	2257	3556	2105	2468	1252	1652	2032	167
		Traps	1717	1458	1350	1251	1446	3673	3274	4507	2390	1740	1953	3658	2789	4376	2993	2186	2001	2834	1924	2522	4367	4129	3711	3735	456
	AT.W	Longline	3752	3217	3691	3972	3879	363	829	835	1245	764	1134	1373	678	739	895	674	696	539	466	528	382	764	914	859	540
		Other Surf.	194	191	196	131	133	323	514	377	293	166	156	425	755	536	578	509	406	307	384	433	295	344	281	283	201
		Purse seine	1502	1230	1381	758	910	232	384	401	377	360	367	383	385	384	237	300	295	301	249	245	250	249	248	275	196
		Sport	874	904	956	893	808	459	808	676	750	518	726	601	786	1004	1083	586	854	804	1114	1028	1179	1106	1124	1120	1656
		Traps	372	221	31	47	41	68	7	3	20	0	17	14	1	2	0	1	29	79	72	90	59	68	44	16	16
Discards	AT.W	Longline	0	0	0	0	0	0	0	0	0	514	192	215	248	133	199	44	31	76	141	73	51	57	50	113	38
		Other Surf.	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	4	0	0	0	0	
		Sport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	3	0	0	
Landings	AT.E+MED	ALGERIE	40	30	150	190	220	250	252	254	260	366	420	677	820	782	800	1104	1097	1560	156	156	157	1947	2142	2330	2012
		CAP-VERT	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		CHINA PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	137	93	49	85	103	80	
		CHINESE TAIPEI	2	0	3	5	6	16	2	0	0	0	0	0	0	0	0	0	334	729	502	472	504	456	249	313	
		CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1418	1076	1058	1410	1220	1360	1105	906	970	930	903
		CYPRUS	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	14	10	10	10	10	21	31	61	90
		EC-DENMARK	1	2	1	0	3	0	0	1	2	1	0	0	0	0	0	0	37	0	0	0	0	1	0	0	
		EC-ESPANA	3072	4190	3656	2468	2601	3813	5257	7547	5090	3577	3654	5995	5210	5379	3664	4532	7096	5878	8426	8762	8047	5809	5363	6246	
		EC-FRANCE	3774	2320	1853	1961	2503	5028	4060	4202	5920	3838	4863	6504	4894	5223	5185	8270	8094	12179	10329	9690	8470	7713	6741	7321	6748
		EC-GER.F.R	0	1	1	0	2	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	5	0	0	11	131	156	159	182	201	175	447	439	886	1004	874	1217	286	248	622	
		EC-IRELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	21	52	24	
		EC-ITALY	6263	4983	4020	6272	6017	6658	5865	7140	7199	7576	4607	4201	4317	4110	3783	5005	5328	6882	7062	10006	9548	4059	3279	3845	
		EC-PORTUGAL	14	56	35	24	17	41	174	34	29	193	163	48	3	27	395	358	208	668	481	473	749	377	487	502	468
		EC-SWEDEN	2	2	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
		EC-U.K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	12	0	
		FAROE-ISLANDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	104	118	
		GUINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330	0	0	0	0	0	0	
		ICELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	27	0	0
		ISRAEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	
		JAPAN	2114	638	729	999	615	3534	3286	2550	1426	1080	1180	1427	965	1636	3066	3473	3277	2611	4784	4106	3090	3556	3071	3031	2221
		KOREA	2	0	1	0	0	0	3	0	77	0	0	0	0	0	0	0	0	688	663	683	613	66	0	6	
		LIBYA	336	677	424	398	271	310	270	274	300	300	300	300	84	328	370	737	635	1422	1540	1388	1029	1331	1195	1549	1940
		MALTA	47	26	23	24	32	40	31	21	21	41	36	24	29	81	105	80	251	572	587	399	393	407	447	376	
		MAROC	891	36	208	161	179	993	366	175	98	344	472	577	746	1557	1456	767	494	1812	1713	1621	2603	2430	2227	2923	
		NEI-1	0	0	0	0	0	1	0	25	3	172	183	638	763	415	1754	1349	0	0	0	0	0	0	0	0	
		NEI-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	42	0	
		NEI-105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	282	240	171	399	428	0	0	
		NEI-118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	20	0	
		NEI-134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	145	399	0	0	0	0	0	
		NEI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	19	49	49	0	0	0	0	0	0	0	0	
		NEI-71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	144	223	68	0	0	0	0	0	0	
		NEI-81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	189	71	867	333	78	17	
		NEI-94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0	0	
		NEI-COMB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	773	211	0	101	1030	1995	109	

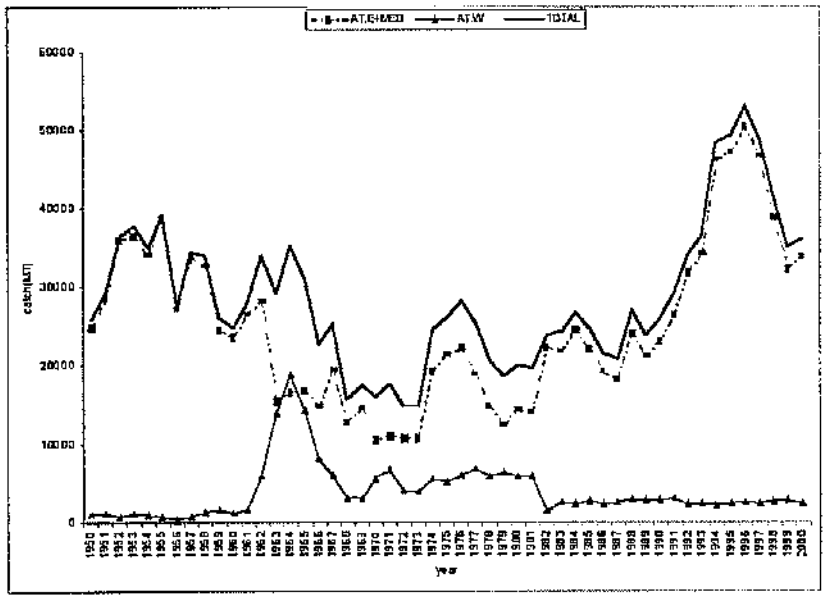
BFT-Table 1 (cont.)

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
		NORWAY	764	221	60	282	161	50	1	243	0	31	0	0	0	0	0	0	0	0	0	0	0	0	5	0	
		PANAMA	212	156	14	117	48	12	0	17	22	11	76	67	0	74	287	484	467	1500	1517	3400	491	0	13	0	
		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	
		SIERRA LEONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	118
		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	
		TUNISIE	131	141	262	328	218	298	293	307	369	315	436	624	661	406	1366	1195	2132	2503	1897	2393	2200	1745	2352	2184	
		TURKEY	177	127	27	391	565	825	557	869	41	69	972	1343	1707	2059	2459	2817	3084	3466	4220	4616	5093	5899	1200	1070	
		U.S.A	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		YUGOSLAVIA	932	1049	756	573	376	486	1222	755	1084	796	648	1523	560	940	0	0	0	0	0	0	0	0	0	0	
		YUGOSLAVIA REP. FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	4	
	AT.W	ARGENTINA	0	0	0	0	0	0	0	0	6	0	2	0	1	2	0	0	0	0	0	0	0	0	0	0	
		BRASIL	0	14	10	2	3	1	1	0	1	0	2	0	2	1	0	0	0	0	0	0	0	0	13	0	
		CANADA	972	670	245	324	425	291	433	264	142	41	50	393	619	438	485	443	459	392	576	597	503	595	576	549	524
		CANADA-JPN	0	0	0	0	0	0	0	0	0	32	33	0	0	0	0	0	0	0	0	0	0	0	0	0	
		CHINESE TAIPEI	1	1	49	15	7	11	2	3	3	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
		CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		FRANCE OT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		JAPAN	3658	3144	3621	3936	3771	292	711	696	1092	584	960	1109	468	550	688	512	581	427	387	436	322	691	365	492	436
		KOREA	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		MÉXICO	14	28	22	10	20	14	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	8	14	29	10
		NEI-1	0	0	0	0	0	14	1	0	0	0	0	0	30	24	23	17	0	0	0	0	0	0	0	0	
		NEI-31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	
		NEI-40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127	49
		NEI-81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	429	143	
		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	92	58	10	9	14	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		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	
		ST LUCIA	0	0	0	0	0	0	0	0	0	0	1	3	2	14	14	14	2	43	9	3	0	0	0	0	
		TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A	1956	1848	2297	1505	1530	807	1394	1320	1424	1142	1352	1289	1485	1636	1582	1085	1237	1163	1311	1285	1334	1235	1213	1212	1589
		UK-BERMUDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1	1	
		URUGUAY	0	0	0	0	1	3	0	9	16	6	0	2	0	0	1	0	1	0	2	0	0	0	0	0	
Discards	AT.W	CANADA	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	6	16	11	46	13
		JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	
		U.S.A	0	0	0	0	0	0	0	0	0	514	192	215	248	133	199	44	31	76	141	77	51	44	39	67	23

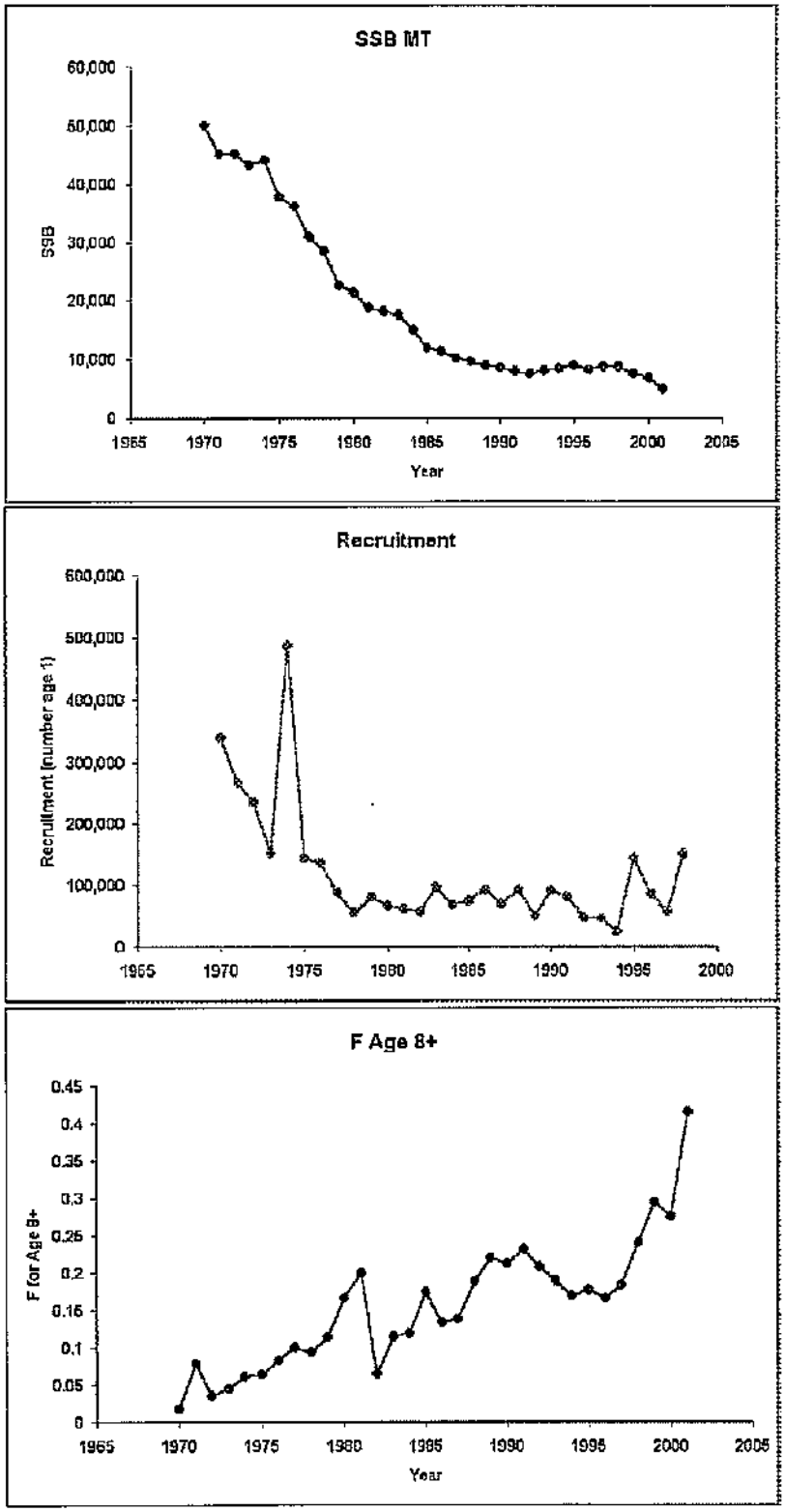
*As of July 22, 2002. Subsequently, the following 2001 catches were reported to ICCAT in West Atlantic: Brazil (0.2 MT), and in the Eastern Atlantic: China P.R. (68,1 MT), Chinese Taipei (633 MT), EC-Greece (361 MT), EC- Italy (4,377.16 MT), Malta (218.60 MT), Morocco (3,008 MT), Tunisia (2,493 MT), Turkey (2,100 MT), and UK-Bermuda (1 MT).



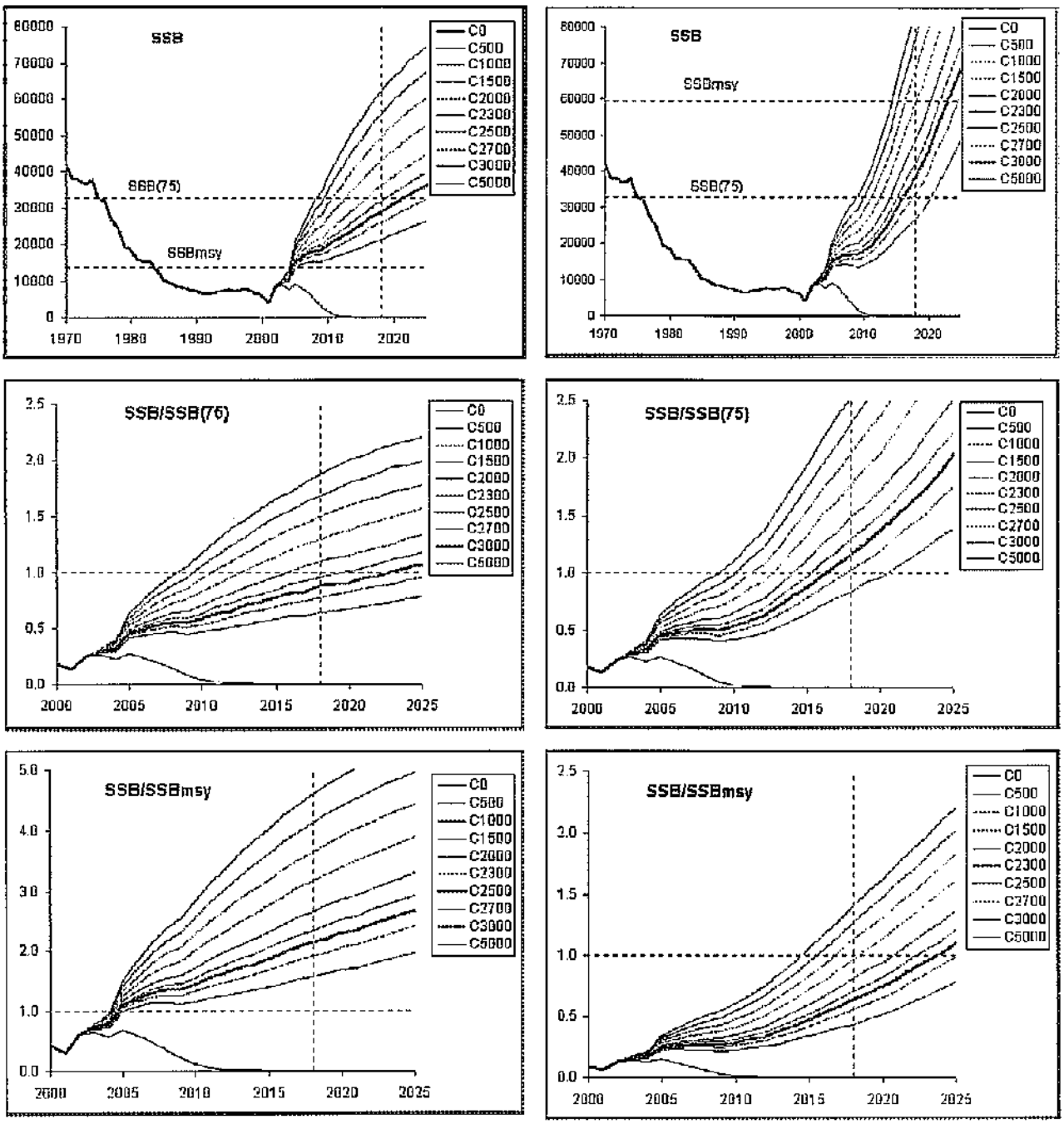
BFT-Fig. 1. Distribution of Atlantic bluefin catches by longline (circles) and surface gears (bars) for the period 1950-1999.



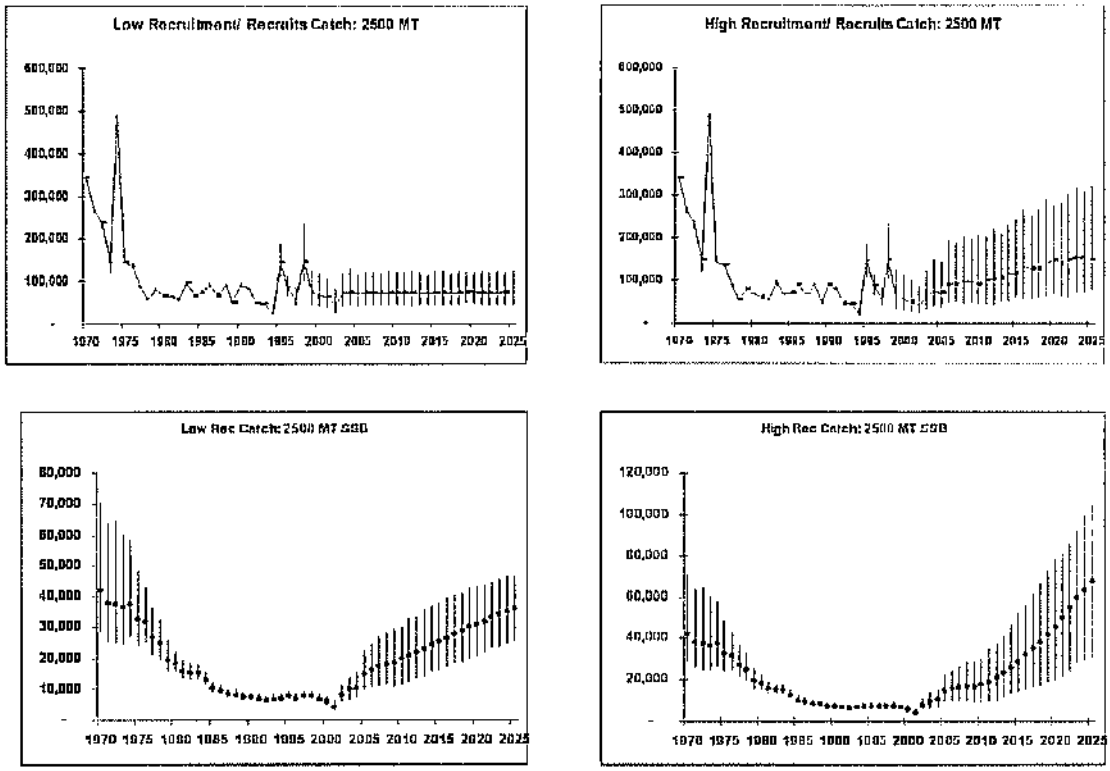
BFT-Fig. 2. Atlantic bluefin catches (in MT, including discards) by region. Reported catches for 2001 are largely incomplete.



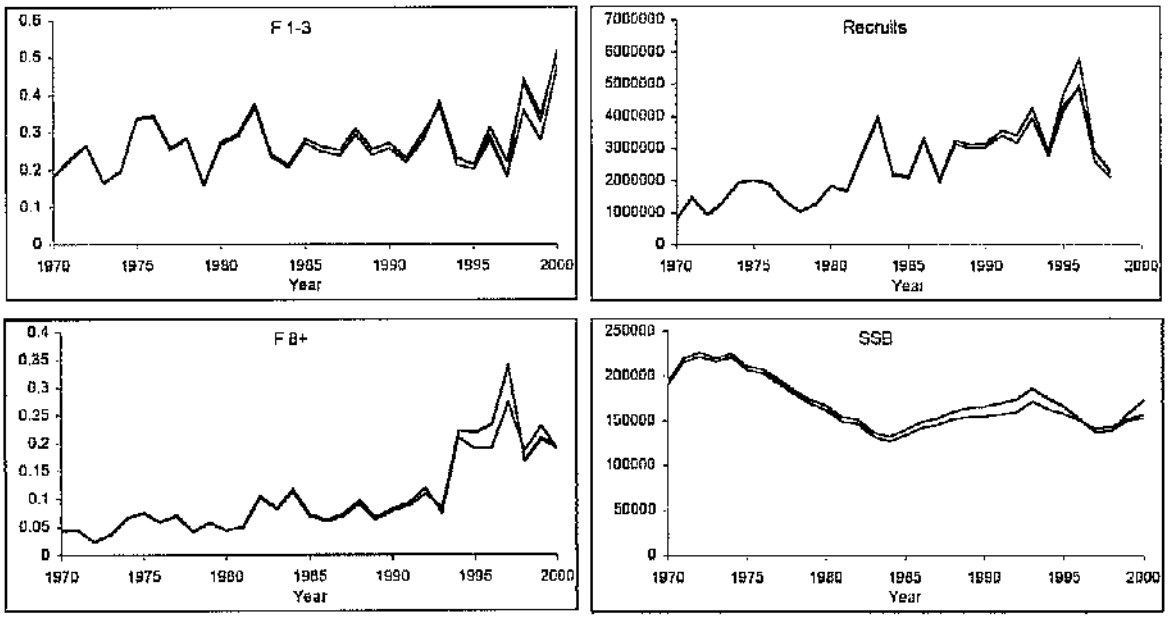
BFT-Fig 3. West Atlantic bluefin tuna spawning biomass (MT), recruitment (numbers) and fishing mortality rates for fish of age 8+, estimated by the base-case VPA run.



BFT-Fig. 4 Western Atlantic bluefin tuna: Median projections of spawning stock biomass (SSB) for the base-case assessment under various levels of constant catch, expressed in absolute terms, relative to 1975 levels and relative to B_{MSY} for the low (left) and high (right) recruitment scenarios.



BFT-Fig. 5. Western Atlantic bluefin tuna: Projection results with 80% confidence intervals for the base-case **Low Recruitment** Scenario (left plates) and **High Recruitment** Scenario (right plates) for west Atlantic bluefin (with 2,500 MT constant annual catches) for recruitment and spawning stock biomass (SSB).



BFT- Fig. 6. Eastern Atlantic and Mediterranean bluefin tuna: Estimates of fishing mortality rates (average for ages 1-3 and 8+), recruitment and spawning stock biomass (SSB) obtained by three models for the eastern stock.

7.6 BUM - BLUE MARLIN

No new blue marlin assessments were conducted in 2001 or 2002 and for this reason only the biology, description of fisheries, effect of recent regulations sections and the species table have been reviewed and updated.

BUM-1. Biology

Blue marlin are found throughout tropical and temperate waters of the Atlantic Ocean and adjacent seas, and range from Canada to Argentina on the western side, and from the Azores to South Africa on the eastern side **(BUM-Figure 1)**. Blue marlin are large apex predators with an average weight of about 100-175 kg. Blue marlin have an extensive geographical range, migratory patterns that include transatlantic as well as trans-Equatorial movements, and are generally considered to be a rare and solitary species relative to the schooling scombrids. Blue marlin are considered sexually mature by ages 2-4, spawn in tropical and subtropical waters in the summer and fall, and are found in the colder temperate waters during the summer. Young blue marlin are one of the fastest, if not the fastest growing of all teleosts, reaching from 30-45 kg by age 1. Females grow faster and reach a much larger maximum size than males.

Blue marlin feed on a wide variety of fish and squid, but show a dietary preference for scombrids. They are found predominately in the open ocean near the upper reaches of the water column although this species can range down to or below the mixed layer. For this reason, they are caught most frequently as a by-catch by the offshore longline fisheries that target tropical or temperate tunas using gears intended to fish shallow. However, significant by-catch landings are also made by offshore longline fisheries that target swordfish and bigeye tuna using gear intended to fish deep.

Prior to 1995, the stock hypothesis for assessment purposes has historically been a North Atlantic and South Atlantic stock (divided at 5°N), and a total Atlantic stock. However, the 1995 SCRS recognized the increased importance of the single Atlantic hypothesis for blue marlin. More recently (1996), the Committee reviewed and discussed new data on genetic mitochondria DNA analysis, as well as tag release-recapture data, and concluded that these data were most consistent with a single (total) Atlantic hypothesis. Additionally, the Committee concluded that the North/South separation is arbitrary for this tropical species (as with white marlin). The Fourth Billfish Workshop reviewed all available data on stock structure and concluded that the single Atlantic hypothesis should be used as the management unit for Atlantic blue marlin.

BUM-2. Description of the fisheries

The fisheries for Atlantic blue marlin are characterized by many different participants. The major landings of blue marlin are incidental to the large offshore longline fisheries that have targeted tuna and swordfish, including Brazil, Cuba, Japan, Korea, Chinese Taipei, and others. Other major fisheries are the directed recreational fisheries of the United States, Venezuela, Bahamas, Brazil, and many other countries and entities in the Caribbean Sea and off the West coast of Africa. Other directed fisheries include artisanal fisheries in the Caribbean Sea and off West Africa. Development and geographical expansion of other longline fisheries that take blue marlin in the West Atlantic, Caribbean Sea, and East and South Atlantic by various countries have been reported (mainly EC-Spain and the United States for the East and West Atlantic, respectively). Tropical purse seine fisheries also have an incidental catch of blue marlin.

Landings for the total Atlantic first developed in the early 1960s, reached a peak of over 9,000 MT in 1963, declined to the range of about 2,000-3,000 MT during the period 1967-1977, and have fluctuated with an increasing trend over the period 1978-1996, and a decreasing trend thereafter **(BUM-Table 1 and BUM-Figure 2)**. In 2001, the United States implemented time area closures that were intended to reduce interactions between longline fishing and unintended catch including blue marlin. The Committee notes that some blue marlin are likely to have been caught by IUU fleets. Unfortunately there is no information on billfish equivalent to that available from market statistics for bigeye tuna or bluefin tuna that can be used to estimate IUU catches of billfish.

Recently some large catches of unclassified billfish have been reported to the Committee. And the Committee recommends that every effort be made to report catches by species. The 2001 reported catches (1,915

MT) are incomplete, if catches from 2000 are carried over the estimated catch is 2,877 MT. The general trends in catches have followed the intensity of the offshore longline fisheries.

BUM-3. 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 3 times F_{MSY}, and that over-fishing had been occurring for about three decades. MSY was estimated to be near 4,500 MT.

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. The new assessment is slightly more optimistic; it suggests that the total Atlantic stock is approximately 40% of B_{MSY} and that over-fishing has taken place in the last 10-15 years (**BUM-Figures 3 and 4**). But this assessment also suggests a less productive stock than previously estimated, with an MSY of about 2,000 MT, 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.

BUM-4. Outlook

Blue marlin landings declined in 1999 by 14% from the 1996 level. 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 of the magnitude contemplated by the 1996 Commission recommendation will continue to result in over-fishing of the stock beyond the MSY level. As of the last assessment (in 2000), information was not available to evaluate the effects of regulations agreed to in 2000. These regulations did not come into effect until mid-2001.

BUM-5. Effect of current regulations

ICCAT recommended at its 1997 meeting to reduce marlin landings by at least 25% from 1996 levels and these regulations extended through 2000. The annual amount of blue marlin that can be harvested in years 2001 and 2002 by pelagic longline and purse seine vessels and retained for landing must be no more than 50% of the 1999 landing levels. In 2000, the Commission also recommended that a blue marlin minimum size be established by recreational fisheries, (e.g. 251 cm LJFL). Also, all blue marlin brought to pelagic longline and purse seine vessels alive shall be released in a manner that maximizes their survival. Some countries already acted on these recommendations. The Committee does not expect to have enough new information to provide an assessment of the effect of the 2000 regulations until at least 2005.

BUM-6. Management recommendations

Management recommendations here are the same made in 2001. No additional assessment information came into 2002 to modify these recommendations. The current assessment indicates that the stock is unlikely to recover if the landings contemplated by the 1996 Commission recommendation continue into the future. While there is additional uncertainty in stock status and replacement yield estimates not reflected in bootstrap results,

these uncertainties can only be addressed through substantial investment in research into habitat requirements of blue marlin and further verification of historical data. The Committee recommends that the Commission take steps to reduce the catch of blue marlin as much as possible. Steps such as release of live fish from fishing gear, reductions in fleet-wide effort, a better estimation of dead discards, and establishment of time area closures, along with scientific observer sampling for verification could be considered.

The Commission should consider that future evaluation of management measures relative to the recovery of the blue marlin stock are unlikely to be productive unless new quantitative information on the biology of blue marlin and additional years of data are available. The Committee therefore recommends the next blue marlin assessment not be held before 2005.

ATLANTIC BLUE MARLIN SUMMARY[1]

	Total Atlantic
Maximum Sustainable Yield (MSY)	~ 2,000 MT (~ 2,000 - 3,000 MT)[2]
Recent (2000) Yield[3]	3,394 MT
1999 Replacement Yield	~ 1,200 MT (~ 840 - 1,600 MT)[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 [Refs. 00-13, 01-10][4]

1 Assessment results are uncertain. Uncertainty in these estimates is not fully quantified by bootstrapping.
2 Approximately 80% CI from bootstrap for ASPIC model.
3 Estimated yield including that carried over from previous years.
4 These measures did not take effect until mid-2001.

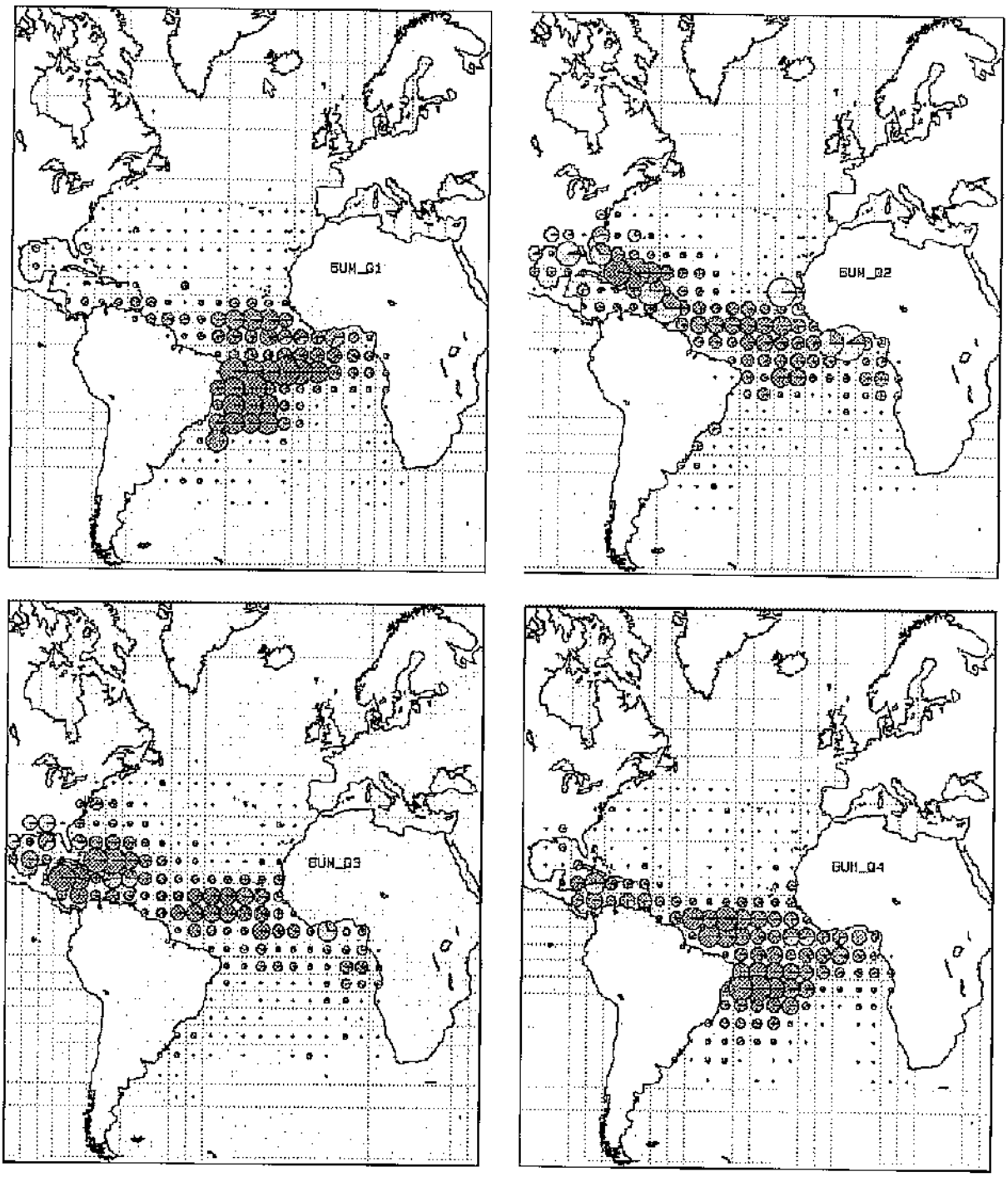
BUM-Table 1. Estimated catches (landings and discards, MT) of Atlantic blue marlin in 1977-2001*, by major area, gear and flag.

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL			2181	1642	1527	1848	2032	2708	2130	2748	3311	1993	2053	2736	4214	4520	4128	2952	3081	3946	3802	4445	4866	3868	3863	3394	1915
	AT.N		1258	976	897	1085	1296	1650	1214	1378	1566	1069	836	909	1540	1943	1411	1086	1057	1510	1446	1742	1713	1489	1310	1012	515
	AT.S		792	530	504	619	567	884	749	1252	1623	789	1085	1690	2530	2378	2580	1750	1798	2303	2230	2607	3073	2299	2470	2303	1399
	UNCL		134	136	126	144	169	174	167	118	122	135	132	137	144	199	137	116	146	133	126	96	82	80	83	79	1
Landings	*AT.N*	*Longline*	876	553	480	643	792	1162	809	920	1223	695	327	415	1009	1597	981	629	600	1065	925	1266	1327	950	814	655	296
		Other Surf.	0	0	0	0	0	1	2	1	0	0	0	22	100	13	29	26	24	59	84	72	189	332	237	77	70
		Sport	298	301	299	301	300	299	199	206	169	214	181	186	143	50	63	83	113	122	77	66	56	56	38	36	21
		Unclass.	81	122	118	140	204	188	304	251	174	160	190	162	97	123	198	202	193	153	208	142	142	100	140	184	104
	AT.S	*Longline*	739	526	490	498	430	822	533	975	1362	661	964	1530	2017	1958	2280	1473	1415	1643	1565	1991	2250	1617	1564	1453	1203
		Other Surf.	52	2	13	119	135	60	216	276	260	127	121	159	512	418	237	308	382	658	663	605	718	634	904	850	196
		Sport	1	2	1	2	2	2	0	1	1	1	0	1	1	2	1	0	1	2	2	10	28	0	0	0	
		Unclass.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	69	0	0	0	0	35	146	0	0	
	UNCL	*Other Surf.*	134	136	126	144	169	174	167	118	122	135	132	137	144	199	137	116	146	133	126	96	82	80	83	79	
Discards	*AT.N*	*Longline*	0	0	0	0	0	0	0	0	0	0	138	124	191	159	142	146	127	111	153	196	97	49	81	60	22
		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	2
		Unclass.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	AT.S	*Longline*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
	UNCL	*Longline*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Landings	AT.N	BARBADOS	81	72	51	73	117	99	126	126	10	14	13	46	3	18	12	18	21	19	31	25	30	25	19	19	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	15	0
		CANADA-JPN	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHINA PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	48	48	51	79	133	9	31
		CHINESE TAIPEI	64	81	51	160	98	100	125	102	148	117	52	26	11	937	716	336	281	272	187	170	355	80	41	64	32
		CUBA	220	97	156	162	178	318	273	214	246	103	68	94	74	112	127	135	69	39	85	43	0	12	0	0	
		DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	71	29	19
		EC-ESPANA	0	0	0	0	0	0	0	3	4	1	0	8	7	2	1	7	7	6	1	22	5	6	3	25	
		EC-PORTUGAL	0	0	0	0	0	1	2	1	8	12	8	2	1	1	4	2	15	11	10	7	3	47	8	15	17
		GRENADA	0	0	0	1	1	12	6	8	11	36	33	34	40	52	64	52	58	52	50	26	47	60	100	87	104
		JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	
		JAPAN	118	54	68	193	332	637	192	351	409	174	78	206	593	250	115	193	207	532	496	798	625	656	489	432	162
		KOREA	307	185	67	48	71	19	43	110	151	36	13	14	252	240	34	11	2	16	18	11	16	0	0	0	
		MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	13	13	13	13	27	35	68	37
		NEI-I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	100	100	100	100	0	0	0	0
		NETHERLAND.ANT	0	50	50	50	50	50	50	50	50	50	50	50	50	50	40	40	40	40	40	40	40	40	40	40	
		PANAMA	87	42	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
		PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	38	38	0
		SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0	5	5	5	0	0	0	0	0
		ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	10	5
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	2	0	1	0	0	0	0
		TRINIDAD & TOBAGO	0	0	0	0	0	0	3	8	3	17	2	0	28	4	0	4	3	27	46	28	81	70	33	55	17

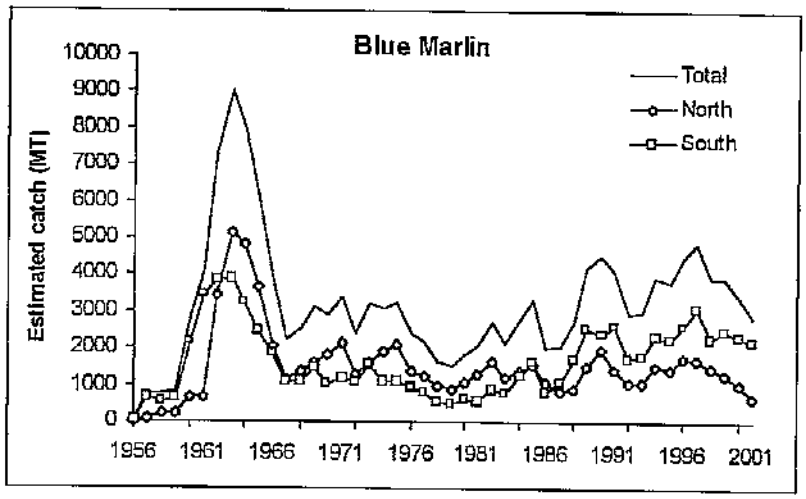
			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
		U.S.A	295	295	312	313	342	329	215	280	295	273	291	221	124	29	33	51	80	88	43	43	46	50	37	24	16
		U.S.S.R	1	1	0	0	0	0	0	0	0	7	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		UK-BERMUDA	2	5	2	4	1	2	7	8	9	11	6	8	15	17	18	19	11	15	15	15	3	5	1	2	2
		UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	5	0	0	0	0	0	0	0	0	
		VENEZUELA	80	94	134	81	106	83	172	117	219	218	60	76	149	70	49	66	74	122	106	137	130	205	220	28	72
	AT.S	BENIN	0	0	0	0	6	8	0	9	10	7	4	12	0	6	6	6	6	5	5	5	5	5	5	5	
		BRASIL	100	49	34	23	28	30	27	32	33	46	51	74	60	52	61	125	147	81	180	331	193	486	509	452	780**
		CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	25	21	27	41	68	15	61
		CHINESE TAIPEI	107	177	139	129	104	150	47	70	165	98	265	266	462	767	956	488	401	391	280	490	1123	498	442	421	208
		COTE D'IVOIRE	0	0	0	0	0	0	0	100	100	100	100	130	82	88	105	79	139	212	177	157	222	182	275	206	196
		CUBA	100	113	180	187	108	118	123	159	205	111	137	191	77	90	62	69	0	0	0	0	0	0	0	0	
		EC-ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	15	0	6	23	18	21	38	88	71	82	109	116	
		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	2	1
		GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	8	0	0	0	0	0	0
		GHANA	0	0	0	119	129	52	216	166	150	16	5	7	430	324	126	123	236	441	472	422	491	447	624	639	
		JAPAN	17	15	66	115	136	495	248	482	691	335	362	617	962	967	755	824	719	991	943	881	724	529	403	409	152
		KOREA	356	140	78	46	55	31	88	234	262	60	139	361	437	84	503	13	11	40	40	103	40	2	0	1	0
		NEI-I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	100	100	100	100	0	0	0	0
		PANAMA	103	32	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	
		PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	33	0	0
		SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	
		U.S.S.R	9	4	0	0	1	0	0	0	7	16	22	32	5	0	0	0	0	0	0	0	0	0	0	0	1
		UK-S.HELENA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		URUGUAY	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
	UNCL	EC-FRA.ESP	134	156	126	141	169	174	167	118	122	135	132	137	144	199	137	116	146	133	126	96	82	80	83	79	
		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	0
Discards	AT.N	U.S.A	0	0	0	0	0	0	0	0	0	0	138	124	191	159	142	146	127	111	153	196	97	50	81	60	24
	AT.S	U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	42	2	2	0	0
	UNCL	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	1

* Empty cells for 2001 indicate that catches were not reported to ICCAT.

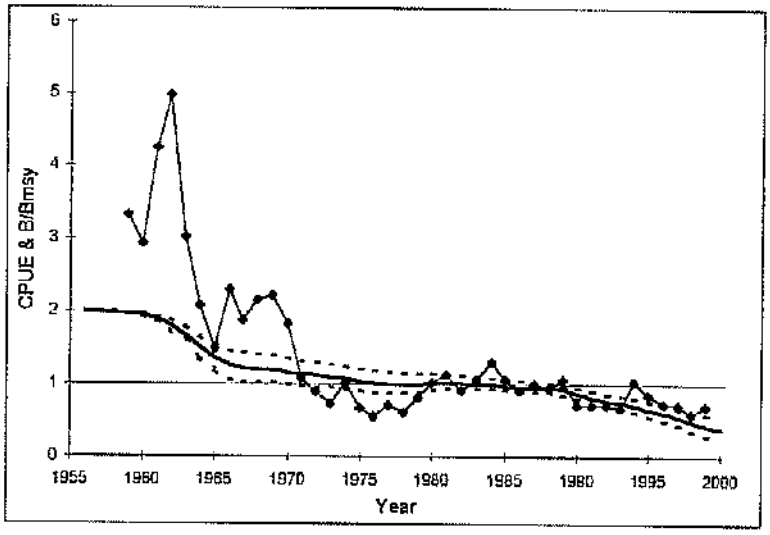
** Reported catches from Brazil for 2001 include some live and dead releases of blue marlin.



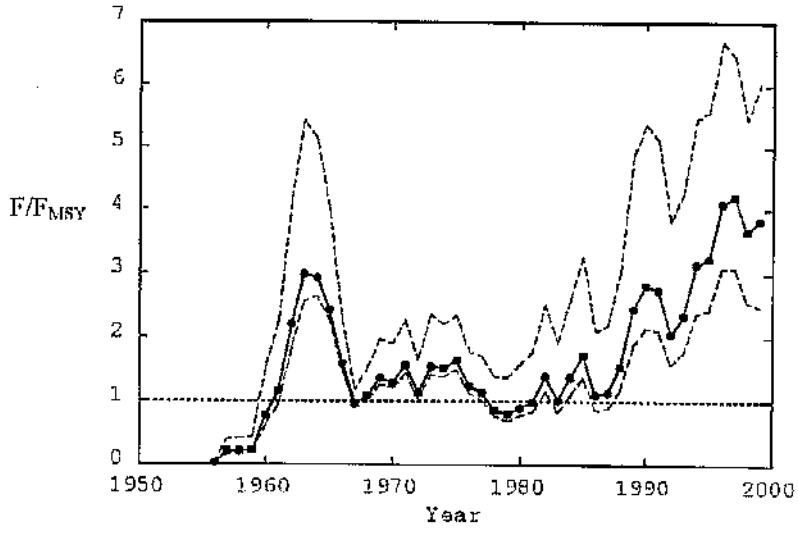
BUM-Fig. 1. Geographical distributions of reported catches (including landings and dead discards) of blue marlin by quarter, combined for all the years from 1950 to 1997. (Heavy-shaded areas represent longline catches and light-shaded areas represent gears other than longline.)



BUM-Fig. 2. Estimated catches (including landings and dead discards in MT) of blue marlin in the Atlantic by region. Catch estimates for 2001 are incomplete so 2000 catch were carried over to 2001 for the purpose of illustration and should be considered provisional.



BUM-Fig. 3. Composite CPUE series (symbols) used in the blue marlin assessment compared to model-estimated median relative biomass (solid lines) from bootstrap results (80% confidence bounds shown by dotted lines).



BUM-Fig. 4. Estimated median relative fishing mortality trajectory for Atlantic blue marlin (center, dark line) with approximate 80% confidence range (light lines) obtained from bootstrapping.

7.7 WHM - WHITE MARLIN

The 2000 assessment for the Atlantic white marlin stock concluded that the stock was over-fished but acknowledged that there was significant uncertainty in the evaluation of stock status. It is difficult that in the space of two years such uncertainty could be reduced, however, at the request of the Commission, an assessment was conducted for the Atlantic stock of white marlin in May 2002. The assessment used the most recent information on the biology and fisheries for white marlin and the data on catch and relative abundance indices up to 2000, the most recent year for which there are estimates.

WHM-1. Biology

White marlin are found throughout tropical and temperate waters of the Atlantic Ocean and adjacent seas **(WHM-Figure 1)**. Unlike blue marlin and sailfish, white marlin occur only in the Atlantic Ocean. Their average size in the catch is about 20-30 kg. And although they are generally considered to be a rare and solitary species relative to the schooling scombrids, they are known to occur in small groups consisting of several individuals. Little is known about the age, growth and reproductive biology of white marlin and, with few exceptions, there are no quantitative estimates of population parameters for this species that can be used in stock assessments. They spawn in tropical and subtropical waters in mid- to late spring, and are found in the colder temperate waters during the summer. They are considered to be very fast growing, and have a lifespan of at least 17 to 18 years. Female white marlin grow faster and reach a larger maximum size than males. White marlin are generally considered piscivorus, but also have been known to consume squid. They are found predominately in the open ocean near the upper reaches of the ocean mixed layer.

As with blue marlin, initially the SCRS considered two stock hypotheses for white marlin assessments, first that there are two stocks, a North and South Atlantic stock (divided at 5°N), and second that there is a single (total) Atlantic stock. More recently (1996), the Committee reviewed and discussed new data on genetic mitochondria DNA analysis, as well as tag release-recapture data, and concluded that these data were most consistent with a total Atlantic hypothesis. A further review in 2000, at the Fourth Billfish Workshop concluded that the single Atlantic hypothesis should be used as the management unit for Atlantic white marlin.

WHM-2. Description of the fisheries

The fisheries for Atlantic white marlin are characterized by the presence of many different participants. The major landings of white marlin are incidental to the large offshore longline fisheries that have targeted tuna and swordfish, including Brazil, Cuba, Japan, Korea, Chinese Taipei, and others. Other major fisheries are the directed recreational fisheries of the United States, Venezuela, Bahamas, Brazil, and many other countries and entities in the Caribbean Sea and off the West coast of Africa. Other directed fisheries include artisanal fisheries in the Caribbean Sea and off West Africa. Development and geographical expansion of other longline fisheries that incidentally take white marlin in the West Atlantic, Caribbean Sea, and east and south Atlantic by various countries have been reported (mainly EC-Spain and the U.S. for East and West Atlantic, respectively). Tropical purse seine fisheries also have an incidental catch of white marlin. Other incidental catches are also expected to occur in other fisheries from which reports are not available.

Landings for the total Atlantic first developed in the early 1960s, reached a peak of almost 5,000 MT in 1965, declined to about 1,000 MT per year during the period 1977-1982, and have fluctuated between about 1,000 to 2,000 MT through 2000 **(WHM-Table 1)**. The 2000 reported catches were 936 MT. Landings for the North Atlantic generally show a trend similar to that of the total Atlantic and have mainly followed those of the offshore longline fisheries **(WHM Figure 2)**. In 2001, the United States implemented time area closures that were intended to reduce interactions between longline fishing and unintended catch including white marlin. The Committee notes that some white marlin are likely to have been caught by IUU fleets. Unfortunately there is no information on billfish equivalent to that available from market statistics for bigeye tuna or bluefin tuna that can be used to estimate IUU catches of billfish.

Recently some large catches of unclassified billfish have been reported to the Committee. The Committee recommends that every effort be made to report catches by species. In the 2002 assessment, significant improvements were made in the historical estimates of catch for the EC purse seine, the U.S. recreational and

Japanese longline catches. These studies, however, have identified that recent catch estimates may be more uncertain than previously thought, because discards are not generally reported in logbooks. Additionally, changes in the economic importance of this species or changes in the fishing gear may have led to change in the reporting of catches by some fleets.

WHM-3. 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 here (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 MT made in 1996 were reduced to 1,300 MT in the 2000 assessment. The assessment results presented are similar to those obtained in 2000 (**WHM-Table 2, WHM-Figure 3**); They suggest that the total Atlantic stock in 2000 remains over-fished and continues to suffer over-fishing (**WHM-Figure 4**).

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 (**WHM-Figure 5**). 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.

WHM-4. Outlook

In 2000 and 2001 [00-13] and [01-10], the Commission recommended that purse seine and long line 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 MT 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.

WHM-5. Effect of current regulations

This section is concerned with the overall effect of current regulations on the status of the white marlin stock. It is not concerned with compliance with regulations by individual countries.

Recommendation [97-09] requires to "Reduce, starting in 1998, blue marlin and white marlin landings by at least 25% for each species from 1996 landings, such reduction to be accomplished by the end of 1999". The following are the Atlantic-wide white marlin reported (Task I) catches for the recent period, excluding small-scale artisanal fisheries (which are exempt from the reduction):

	Reference Year	Landings limit	Reported WHM Landings (MT)		
	1996	(75% of 1996)	1998	1999	2000
Total	1231	923	1025	951	790

However, because 2000 is the last year of data used for the stock assessment, it is too early to evaluate the effect of this recommendation on the stock. Recommendation [00-13], later modified by [01-10], placed additional catch restrictions for white marlin. No data are yet available to evaluate this last recommendation.

WHM-6. Management recommendations

While there is substantial uncertainty in stock status and replacement yield, these uncertainties can only be addressed through research into habitat requirements of white marlins, studies on post-release survival rates of released fish, further verification of historical fishery data and validation; and development of models for abundance estimation and stock assessment. The Committee suggests that the Commission makes substantial investment on these research areas because the stock, although producing relatively stable catches and declining CPUE over the last 20 years, would benefit from a more accurate stock assessment.

The Committee suggests that the Commission take steps to make sure that the reductions in catch contemplated by the Commission are complied with and monitored so that proper evaluation of its benefits can be carried out in the future. The Committee therefore recommends continuing to improve observer programs so that better estimates of catch and dead discards of white marlin are obtained. In the absence of yet observing a population signal resulting from the most recent (implemented in mid-2001) management measures, if the Commission wishes to improve the potential for increasing stock size of white marlin, future catches might be reduced beyond the level apparently intended by its most recent recommendations. However, the Commission should note that more definitive advice should be available after several years of data become available.

The Commission should consider that future evaluation of management measures relative to the recovery of the white marlin stock are unlikely to be productive unless new quantitative information on the biology of white marlin and additional years of data are available. The Committee therefore suggests that the next white marlin assessment not be held before 2005.

ATLANTIC WHITE MARLIN SUMMARY[1]
(Yield figures in MT)

	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 (849-1070)		323-1320
2000 Yield[5]	1,126	--		--
2001 Yield	Unknown	--		--
2001 Replacement Yield	Below 2000 Yield	222 (101-416)	371	102-602
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. [Ref. 00-13] and [Ref. 01-10]			

[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] Estimated yield including that carried over from previous years and data additional to Task I information.

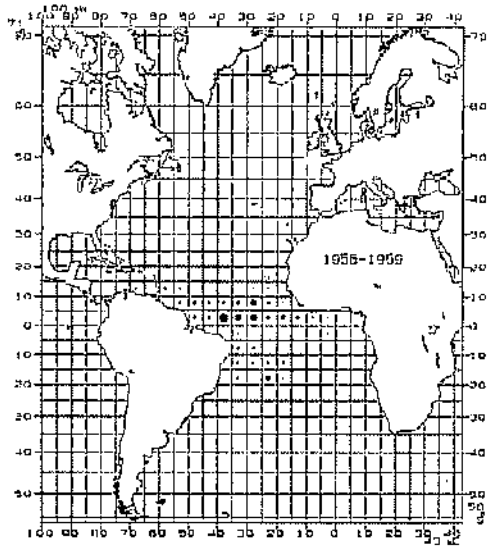
WHM-Table 1. Estimated catches (landings and discards, MT) of Atlantic white marlin by major area, gear and flag.

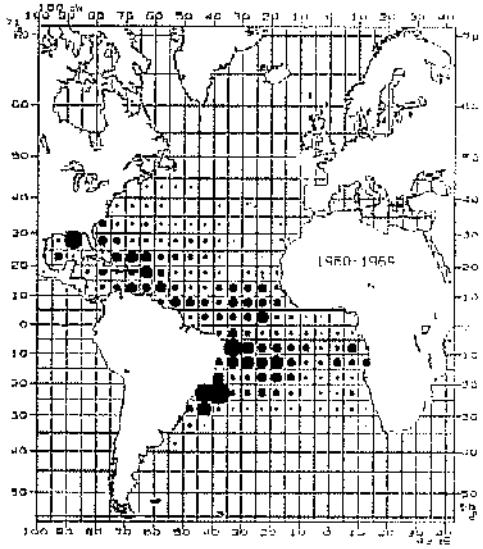
			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001[1]
TOTAL			1150	975	1039	976	1280	1165	1839	1287	1833	1613	1552	1399	1810	1628	1582	1434	1517	1965	1579	1703	1088	1066	1020	936	622
	AT.N		501	428	482	521	789	670	1347	740	966	908	648	453	374	395	227	607	559	657	619	623	402	382	376	355	222
	AT.S		624	522	534	428	460	463	461	525	844	680	879	921	1409	1196	1343	817	946	1297	951	1073	676	676	636	575	400
	UNCL		25	25	23	27	31	32	31	22	23	25	25	25	27	37	11	10	12	11	9	7	10	9	8	7	1
Landings	*AT.N*	*Longline*	390	317	370	403	671	548	1196	570	788	812	433	167	234	251	105	466	436	528	451	514	316	333	298	288	180
		Other Surf.	0	0	0	0	0	0	0	0	0	0	0	24	0	0	4	3	4	12	5	2	3	13	18	0	7
		Sport	111	111	111	112	111	110	146	153	149	35	99	76	22	23	11	18	24	30	20	15	3	3	2	0	3
		Unclass.	0	0	1	6	7	12	5	17	29	61	51	126	11	40	17	32	30	45	43	28	46	0	0	26	15
	AT.S	*Longline*	621	520	530	419	340	442	308	471	825	654	870	832	1333	1152	1320	803	923	1295	945	660	589	552	625	566	377
		Other Surf.	3	2	4	9	120	21	153	54	15	22	9	89	68	31	17	14	22	1	2	3	5	8	11	9	23
		Sport	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	410	0	0	0	0	
		Unclass.	0	0	0	0	0	0	0	0	4	4	0	0	8	9	6	0	0	0	0	0	45	115	0	0	
	UNCL	*Longline*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
		Other Surf.	25	25	23	27	31	32	31	22	23	25	25	25	27	37	11	10	12	11	9	7	7	9	8	7	
Discards	*AT.N*	*Longline*	0	0	0	0	0	0	0	0	0	0	62	60	107	81	90	88	66	42	100	64	33	31	57	41	16
		Other Surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
		Unclass.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
	AT.S	*Longline*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	
	UNCL	*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	1
Landings	AT.N	BARBADOS	0	0	0	0	0	0	0	0	0	0	0	117	11	39	17	24	29	26	43	15	11	33	25	25	
		BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
		CANADA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4	4	8	8	8	0	5	3
		CHINA PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	7	6	7	10	20	1	7
		CHINESE TAIPEI	44	79	62	105	174	134	203	96	128	319	155	0	4	85	13	92	123	270	181	146	62	105	60	59	20
		CUBA	67	45	68	70	189	205	728	241	296	225	30	13	21	14	0	0	0	0	0	0	0	0	0	0	
		EC-ESPANA	0	0	0	0	0	0	0	9	14	0	0	61	12	4	8	18	15	25	10	75	71	65	88	118	
		GRENADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15
		JAPAN	80	27	42	99	118	84	27	52	45	56	60	68	73	34	45	180	33	41	31	80	29	39	27	72	38
		KOREA	71	33	16	18	49	12	6	18	147	37	2	2	82	39	1	9	4	23	3	7	2	0	0	0	
		MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	8	0	5	6	11	10	44
		NEI-I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	50	50	50	50	0	0	0	
		PANAMA	20	8	1	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	0	0	0	0	0	0	0	4	0	
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		TRINIDAD & 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	2
		U.S.A	109	109	110	116	117	122	148	168	181	119	185	89	16	19	5	8	13	13	9	7	2	2	1	0	3
		U.S.S.R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK-BERMUDA	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
		VENEZUELA	110	129	183	113	142	113	234	155	155	151	154	42	47	79	47	187	226	148	171	164	90	80	61	13	72

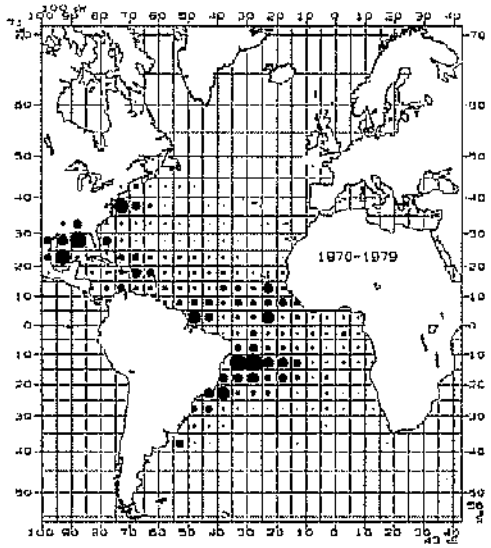
			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001[1]
	ATLS	ARGENTINA	2	0	0	0	0	0	0	0	4	4	0	0	8	9	6	0	0	0	0	0	0	0	0	0	
		BELIZE SH.OB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	
		BRASIL	275	175	133	58	100	76	81	61	87	143	93	149	204	205	377	211	301	91	105	75	106	217	159	105	172[2]
		CAMBODIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		CHINA PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	3	4	5	10	8	13
		CHINESE TAIPEI	119	198	155	145	136	227	87	124	172	196	613	565	979	810	790	506	493	1080	726	430	379	401	385	378	132
		COTE D'IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	5	1	2
		CUBA	57	127	205	212	116	45	112	153	216	192	62	24	22	6	10	10	0	0	0	0	0	0	0	0	
		EC-ESPANA	0	0	0	0	0	0	0	0	0	0	0	1	1	0	9	4	8	0	18	32	3	4	45	68	
		GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	406	0	0	0	0	
		GHANA	0	0	0	6	45	21	142	54	15	22	6	88	68	31	17	14	23	1	2	1	3	7	6	8	21
		HONDURAS-OB.SH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		JAPAN	26	14	15	7	25	27	17	24	81	73	74	76	73	92	77	68	49	51	26	32	29	17	17	13	60
		KOREA	111	5	24	0	36	57	9	40	225	34	25	17	53	42	56	1	4	20	20	52	18	0	0	0	
		NEI-I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	50	50	50	50	0	0	0	
		PANAMA	31	1	2	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	0	0	0	0	0	0	1	8	0	
		SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	0	
		U.S.S.R	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		URUGUAY	0	0	0	0	1	10	13	65	44	16	6	1	1	1	1	3	0	0	0	0	0	22	0	0	
	UNCL	EC-FRA.ESP	25	25	23	27	31	32	31	22	23	25	25	25	27	37	11	10	12	11	9	7	7	9	8	7	
		HONDURAS-OB.SH	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
Discards	ATLN	U.S.A	0	0	0	0	0	0	0	0	0	0	62	60	107	81	50	88	66	42	100	64	33	32	57	41	17
	ATLS	U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	1	0	0	0
	UNCL	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	1

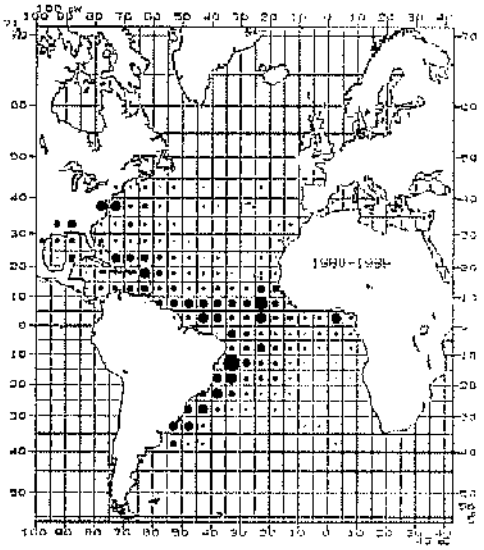
[1] 2001 estimates are preliminary and are incomplete.

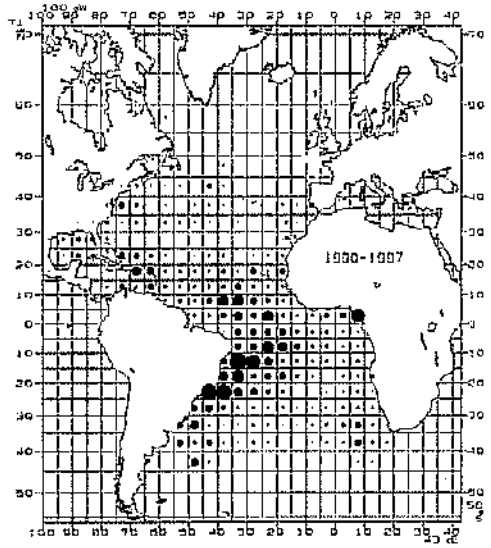
[2] Reported catches from Brazil for 2001 include some live and dead releases of white marlin.



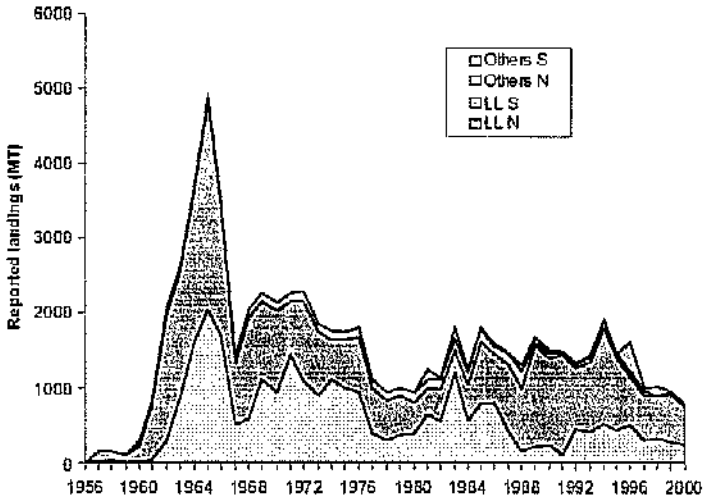




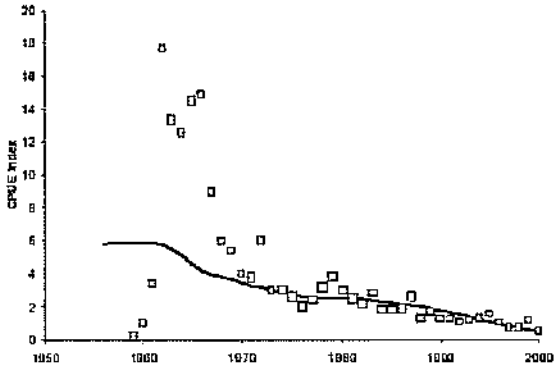




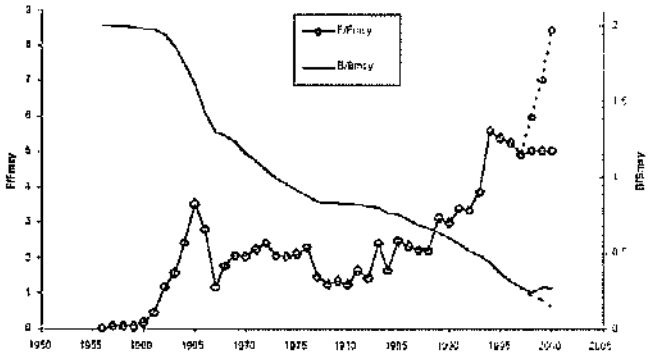
WHM-Figure 1. Average catch (MT) distribution of WHM by decade. Source: ICCAT Task II database.



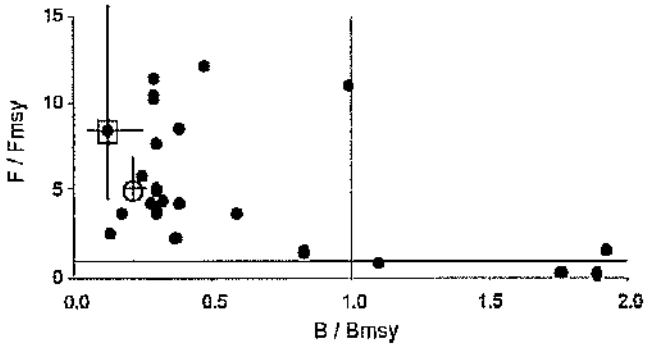
WHM-Figure 2. Landings of white marlin (Task I) for North and South Atlantic for longline (LL) gear and for all other gears (Others) combined for the South (S) and North



WHM-Figure 3. Fit of the ASPIC production model (line) to the continuity case for white marlin. Also shown the combined abundance index (symbols).



WHM-Figure 4. Estimated biomass ratio B_{2000}/B_{MSY} (solid line, no symbols) and fishing mortality ratio F_{2000}/F_{MSY} (solid line with symbols) from the production model fitted to the continuity case for white marlin. Ratios of last three years have been adjusted for retrospective pattern. Broken lines show unadjusted ratios. Note that scales are different for each ratio.



WHM-Figure 5. Summary of assessment results for continuity case and sensitivity runs. Plots of current fishing mortality ratio (F_{2000}/F_{MSY}) as a function of current biomass ratio (B_{2000}/B_{MSY}). Symbols represent continuity case unadjusted (square) and adjusted for retrospective patterns (empty circle). Solid lines represent bootstrap 80% confidence bounds. Broken lines represent ratios of one.

7.8 SAI - SAILFISH/SPEARFISH

No new sailfish or spearfish assessments were conducted in 2001 or 2002.

SAI-1. Biology

Sailfish *(Istiophorus platypterus)* and longbill spearfish *(Tetrapturus pfluegeri)* have a pan-tropical distribution (**SAI-Figure 1**). Although sailfish have highest concentrations in coastal waters (more than any other istiophorid), they are still found in oceanic waters. Spearfish are most abundant in offshore temperate waters. No trans-Atlantic movements have been recorded, suggesting a lack of mixing between east and west. Although sailfish and spearfish are generally considered to be rare and solitary species relative to the schooling scombrids, sailfish are the most common Atlantic istiophorid and are known to occur along tropical coastal waters in small groups consisting of at least a dozen individuals. Spearfish are generally the rarest Atlantic istiophorid. The Mediterranean spearfish (*Tetrapturus belone*) is the most common istiophorid in the Mediterranean and is widely distributed within it, with the exclusion of the northern Adriatic Sea. The biology of this species appears quite similar to the other Atlantic species. Another species, shortbill spearfish (*Tetrapturus angustirostris*) has been recently reported in the Mediterranean, but its presence seems incidental.

Sailfish and spearfish are generally considered piscivorus, but also have been known to consume squid. They are found predominately in the upper reaches of the water column and are caught as a by-catch of the offshore longline fisheries and as a directed catch of coastal fisheries. In coastal waters, artisanal fisheries use many types of shallow water gear to target sailfish.

Sailfish spawn in tropical and subtropical waters in the spring through summer. Due to their relative rare abundance in offshore waters, little is known about spearfish life history. Both sailfish and spearfish are considered to be fast growing species compared to other teleosts. Female sailfish grow faster and reach a larger maximum size than males.

Historically, ICCAT considered Atlantic sailfish/spearfish as separate eastern and western management units (**SAI-Figure 1**). The separation of sailfish into two management units was based on the coastal orientation of the species, tag release/recapture data that suggest a lack of mixing, and morphological data. The Committee re-evaluated the stock structure of Atlantic sailfish based on the results of a genetic investigation submitted to the 2001 SCRS. The study failed to find differences, but this did not necessarily mean a lack of structure, as a very small exchange rate between east and west could produce these results. Therefore, the Committee determined that there was no basis for changing the current stock boundary at this time. However, this issue should be reviewed as more data become available.

SAI-2. Description of the fisheries

The fisheries in the West and East Atlantic for sailfish/spearfish are both characterized by participants from many different countries. For example, the recent major catches (landings plus dead discarded catch) of sailfish in both the West and East Atlantic result from the coastal fisheries. This view was reaffirmed to the committee by a recent study on the catches of billfish made off West Africa. In the West Atlantic, the primary artisanal fisheries are from many countries in the Caribbean Sea, whereas in the eastern Atlantic major artisanal fisheries are off West Africa. Directed recreational fisheries for sailfish occur in the West Atlantic and the Caribbean Sea. Directed recreational fisheries for sailfish in the East Atlantic also exist off West Africa.

Catches of sailfish/spearfish for the total Atlantic which first developed in the early 1960's, are presented in **SAI-Table 1** and **SAI-Figure 2**, respectively. The Committee continues to recognize that uncertainties in the catch data still persist, particularly in the East Atlantic and Caribbean Sea. However, new catch data are becoming available from some of these fisheries. The Committee decided that when the catch data are missing for a fishery, the figures for the last year for which data were available should be carried over. In some cases, this procedure was maintained for about 10 years. In the table, catch values that were carried over are identified by shading. Because the catch data for 2001 are preliminary, no carry overs are shown for 2001 in **SAI-Table 1**. However, if the carry over procedure is used, the estimate of total catch of sailfish/spearfish for 2001 becomes 988 MT for the west and 1,019 for the east. These estimates are used in **SAI-Figure 2** for the purposes of providing a more accurate estimate of the total 2001 catch. The overall trend in Atlantic catches is very much

governed by the large catches from coastal fisheries off West Africa. The Committee notes that some sailfish are likely to have been caught by IUU fleets. Unfortunately there is no information on billfish equivalent to that available from market statistics for bigeye tuna or bluefin tuna that can be used to estimate IUU catches of billfish.

Recently some large catches of unclassified billfish have been reported to the Committee. The Committee recommends that every effort be made to report catches by species.

The 2001 SCRS decided to separate the combined catches of sailfish and spearfish, reported by the pelagic longliners, using the Japanese data (1994-2000), which reported these two species separately. Together with the information of previous studies, the ratio of these two species was calculated by quarter and by 5x5 areas. Using these ratios, pelagic longline combined catch data were separated by two species. The catch of sailfish and spearfish thus estimated are given in **SAI-Table 2, SAI-Figure 3** and **SAI-Table 3, SAI-Figure 4**, respectively. Data for 2001 only include information as reported by national fisheries, and were not estimated by the Committee.

The Committee felt that significant progress was achieved in the last assessment by separating the catches of these two species. The tentative catches of sailfish "only" (**SAI-Tables 2, SAI- Figure 3**) and spearfish "only" (**SAI-Table 3 and SAI- Figure 4**) show different historical trends than the composite catches. However, the work was carried out during the ICCAT species group session under a time constraint and should be considered preliminary until detailed evaluation of this process can be completed. Thus, the Committee felt it was premature to adopt these separated catch figures as official ICCAT estimates (i.e. Task I data).

Little is known about the spearfish fishery in the Mediterranean, because this species is a by-catch of some other fisheries (usually, the longline fishery, the driftnet fishery and, more rarely, the tuna traps) targeting large pelagic species. The traditional harpoon fishery, in the Strait of Messina carries out the only targeted fishery. According to the information available, the catches of Mediterranean spearfish seem to be slowly growing in the last nine years, possibly due to the increasing interest of the markets or better reporting rates and may have reached 100 MT in the year 2000.

SAI-3. State of the stocks

All previous assessments of Atlantic sailfish were done on aggregate data on sailfish and spearfish obtained from the offshore longline fleets. The previous 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 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.

Assessments were conducted in 2001 for the eastern and western Atlantic sailfish stocks based on sailfish/spearfish composite catches (**SAI-Table 1**) and sailfish "only" catches (**SAI-Table 2**). 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 off-shore 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 (**SAI-Figures 2 and 5**). 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 MT over the past two decades and the abundance indices have remained relatively stable for the same period (**SAI-Figures 3 and 5**). 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 (**SAI-Figure 6**) for sailfish "only" from coastal fisheries have decreased over recent times and so have total estimated tentative catches of sailfish "only" (**SAI-Figure 3**). In contrast, abundance indices for the Japanese longline fishery (**SAI-Figure 6**) 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 new 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.

SAI-4. 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 reported catch of western sailfish has averaged about 700 MT 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.

SAI-5. Effect of current regulations

No ICCAT regulations for sailfish or spearfish are in effect.

SAI-6. Management recommendations

The previous management recommendations indicated that the Commission should consider methods for reducing fishing mortality rates. The current western Atlantic assessment leads the Committee to recommend that the West Atlantic sailfish "only" catches should not exceed current levels. For the East Atlantic, sailfish

"only" catches should not exceed current levels and the Commission should consider practical and alternative methods to reduce fishing mortality and assure data collection systems.

The Committee is concerned about the incomplete reporting of catches, particularly for the most recent years, the lack of sufficient reports by species, and evaluations of the new methods used to split the sailfish and spearfish catch and to index abundance. The Committee recommends all countries landing sailfish/spearfish or having dead discards, report these data to the ICCAT Secretariat. The Committee should consider the possibility of a spearfish "only" assessment in the future.

ATLANTIC SAILFISH "ONLY" SUMMARY

	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	Not estimated	Not estimated
Recent Yield (2000)[1]	506 MT[2]	969 MT[2]
2000 Replacement Yield	~600 MT	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 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.

SAI-Table 1. Estimated catches (reported and carried over, in MT) of Atlantic sailfish and spearfish in 1977-2001, by region, gear and flag.

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL SAI + SPF			*2726*	*3596*	*4394*	*3276*	*3278*	*4177*	*4772*	*3751*	*3564*	*3429*	*3805*	*3191*	*2685*	*3676*	*2446*	*2854*	*3914*	*2474*	*2600*	*2954*	*2151*	*2710*	*2347*	*2389*	*988*
TOTAL SAI			*2476*	*3342*	*4159*	*3006*	*2962*	*3851*	*4460*	*3529*	*3336*	*3123*	*3483*	*2925*	*2408*	*3302*	*2339*	*2762*	*3729*	*2337*	*2483*	*2860*	*2050*	*2590*	*2164*	*2221*	*906*
TOTAL SPF			*250*	*254*	*235*	*270*	*316*	*326*	*312*	*222*	*228*	*306*	*322*	*266*	*277*	*374*	*107*	*92*	*185*	*136*	*117*	*93*	*100*	*120*	*183*	*169*	*82*
SAI																											
TOTAL			2476	3342	4159	3006	2962	3851	4460	3529	3336	3123	3483	2925	2408	3302	2339	2762	3729	2337	2483	2860	2050	2590	2164	2221	906
AT.E			1544	2547	3256	2099	2131	2876	3687	2492	2328	2105	2566	2064	1664	2314	1482	1706	2473	1206	1569	1927	1291	995	1210	1002	61
AT.W			932	795	903	907	831	975	773	1037	1008	1018	917	861	743	987	858	1056	1256	1132	924	933	758	1595	954	1219	844
UNCL			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Landings *AT.E*	*Longline*		220	114	83	151	202	309	270	224	148	140	112	126	152	153	57	51	523	178	240	164	213	198	266	167	10
	Other Surf.		1164	2290	3066	1623	1432	1999	2911	2107	1940	1394	1870	1401	1067	1143	734	717	1040	718	657	596	385	535	537	428	50
	Sport		160	143	107	325	497	568	506	161	240	571	584	537	445	1018	507	738	833	227	588	531	555	263	407	407	
	Unclass.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	200	77	83	75	636	139	0	0	0	
AT.W	*Longline*		395	279	378	360	408	471	320	512	506	489	451	558	417	382	241	371	657	552	386	346	226	1031	453	767	521
	Other Surf.		119	90	84	97	0	95	50	53	68	43	45	54	44	224	72	156	131	196	224	362	282	349	245	205	64
	Sport		339	338	350	368	336	331	312	352	228	234	237	38	31	29	32	50	38	83	25	11	12	11	11	13	62
	Unclass.		79	88	91	82	87	78	91	120	206	252	142	154	194	290	449	443	367	272	260	145	182	176	174	189	187
UNCL	*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	2
Discards *AT.E*	*Longline*		0	0	0	0	0	0	0	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11
	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
	Unclass.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
UNCL	*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 AT.E	BELIZE.SH.OB		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		0	0	0	0	36	48	0	53	50	25	32	40	8	21	20	21	20	20	20	19	6	4	5	5	
	CAP-VERT		0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CHINA.PR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	5	9	4	5
	CHINESE TAIPEI		59	7	19	5	12	67	20	8	9	1	0	0	7	13	0	0	420	101	155	65	150	117	178	120	
	COTE D'IVOIRE		0	0	0	0	0	0	0	40	40	40	40	66	55	58	38	69	40	54	66	91	65	35	80	45	47
	CUBA		65	69	40	79	79	158	200	115	19	55	50	22	53	61	184	200	77	83	72	535	0	0	0	0	
	EC-ESPANA		0	0	0	0	0	10	0	4	7	9	0	28	14	0	9	2	30	7	13	25	26	18	19	8	
	EC-FRA.ESP		400	405	375	432	504	521	499	354	364	403	394	408	432	595	174	150	182	160	128	97	110	138	131	98	
	EC-PORTUGAL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	53	6	3
	GABON		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	109	7	0	0	0	1
	GHANA		764	1885	2691	1191	891	1426	2408	1658	1485	925	1392	837	465	395	463	297	693	450	353	303	196	351	305	275	
	HONDURAS-OB.SH		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	11	19	33	50	38	47	63	84	71	37	57	57	63	16	42	58	45	52	47	19	58	17	28	5
	KOREA		46	18	5	34	24	33	3	54	29	2	20	15	17	16	30	3	3	6	6	14	5	0	0	0	
	NEI-1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	15	10	10	10	0	0	0	
	PANAMA		13	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	SAO TOME & PRINCIPE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	0	0	0	
	SENEGAL		160	143	107	325	498	572	510	163	241	572	596	587	552	1092	546	917	936	260	678	610	556	270	412	412	
	U.S.A		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	1	3	1	0	0	0	0	
	U.S.S.R		13	5	0	0	37	0	0	0	0	2	5	4	4	0	0	0	0	0	0	0	0	0	0	0	
AT.W	ARUBA		20	30	30	30	30	30	30	30	30	30	23	20	16	13	9	5	10	10	10	10	10	10	10	10	
	BARBADOS		0	0	0	0	0	0	0	0	0	0	0	0	69	45	29	42	50	46	71	25	71	58	44	44	
	BRASIL		287	246	201	231	64	153	60	121	187	292	174	152	147	301	90	351	243	129	245	310	157	184	356	598	412
	CHINA.PR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	9	4	3

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
		CHINESE TAIPEI	5	10	18	36	81	22	31	45	39	64	31	300	171	83	73	33	223	233	38	37	4	129	33	22	
		CUBA	91	51	151	119	134	181	28	169	130	50	171	78	55	126	83	70	42	46	37	37	0	0	0	0	
		DOMINICAN REP.	0	0	0	0	0	22	50	49	46	18	40	44	44	40	31	98	50	90	40	40	101	89	27	67	
		EC-ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	7	5	3	36	3	15	20	6	14	
		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	7	0
		GRENADA	31	37	40	31	36	27	37	66	164	211	104	114	98	218	316	310	246	151	119	56	83	151	148	164	187
		JAPAN	23	9	20	22	44	135	22	34	38	28	6	22	22	25	73	1	2	8	2	4	17	3	11	9	0
		KOREA	65	14	19	51	41	19	0	52	72	14	1	0	17	25	0	3	0	8	8	22	8	0	0	0	
		MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	19	19	0	9	646	40	118	36
		NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	30	30	30	30	0	0	0	
		NETHERLAND.ANT	28	21	21	21	21	21	21	21	10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15	
		PANAMA	18	3	2	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	0	0	0	0	0	0	0	3	
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	4	4	4	2	1	3	0	1	0	
		TRINIDAD & TOBAGO	0	0	0	0	0	0	64	58	14	25	35	24	11	9	4	4	56	101	101	104	10	0	4	3	7
		U.S.A	308	308	308	308	308	308	311	311	197	199	200	18	2	4	4	11	8	46	13	2	1	1	1	2	62
		VENEZUELA	56	66	93	58	72	57	119	81	81	77	89	22	24	24	65	71	206	162	103	165	185	258	179	93	126
	UNCL	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	
		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
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Discards	AT.W	U.S.A	0	0	0	0	0	0	0	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	72	45	11
	UNCL	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

SPF			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL			250	254	235	270	316	326	312	222	228	306	322	266	277	374	107	92	185	136	117	93	100	120	183	169	82
	AT.E		250	254	235	270	316	326	312	222	228	252	247	256	270	373	107	92	120	134	107	85	99	111	148	98	17
	AT.W		0	0	0	0	0	0	0	0	0	54	75	10	7	1	0	0	65	2	10	8	1	9	35	71	65
Landings	*ATE*	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	36	29	26	31	25	67	38	17
		Other Surf.	250	254	235	270	316	326	312	222	228	252	247	256	270	373	107	92	112	98	78	59	68	86	81	60	0
	ATW	Longline	0	0	0	0	0	0	0	0	0	54	75	10	7	1	0	0	65	2	4	5	1	9	35	71	65
		Sport	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
		Unclass.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Discards	*ATW*	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0
Landings	AT.E	CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
		EC-ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	3	1	1	1	30	14	
		EC-FRA.ESP	250	254	235	270	316	326	312	222	228	252	247	256	270	373	107	92	112	98	78	59	68	86	81	60	
		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	36	26	25	30	22	37	24	17
	AT.W	BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	56
		EC-ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	22	50	
		JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	4	1	8	13	8	4
		MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	54	75	10	7	1	0	0	62	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	2	0	0	0	0	0
		VENEZUELA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	4
Discards	AT.W	U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0

Empty cells for 2001 indicate that catches were not reported to ICCAT.

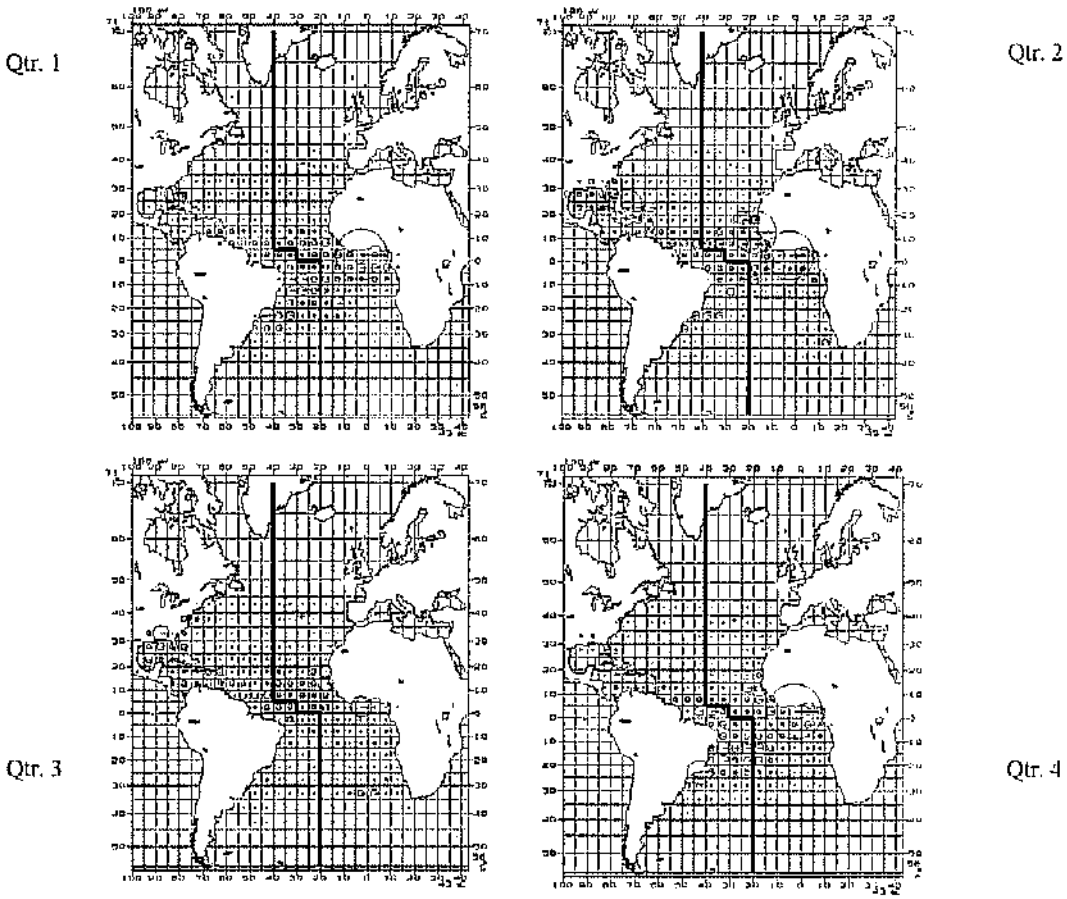
SAI-Table 2. Estimated catches (including landings and dead discards, in MT) of sailfish "only" in the Atlantic Ocean, by fisheries and by gears, 1976-2000 (as modified by the Working Group for use in the 2001 assessment).

			1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
TOTAL CATCH			5632	1780	2927	3720	2548	2716	3296	4405	3133	2964	2810	3227	2712	2263	3092	2307	2837	2786	1739	2065	2494	1814	1510	1651	1475
CATCH	AT. E		5226	1371	2463	3189	1974	2008	2692	3504	2352	2240	2028	2478	2006	1568	2214	1445	1678	2043	1097	1404	1674	1152	933	1123	969
	AT.W		407	419	464	531	574	711	604	902	781	724	782	749	705	695	878	862	1159	743	642	662	819	663	576	527	506
LANDING	AT.E	LL	187	47	30	16	26	79	125	87	84	60	63	24	70	56	53	20	23	93	69	84	111	73	136	179	134
		SURF	4951	1231	2354	3098	1866	1641	2498	3368	2227	2155	1920	2381	1892	1475	2110	1194	1410	1813	895	1211	1075	940	798	944	835
		SPORT	76	93	79	77	82	88	69	49	41	25	45	73	46	37	51	47	45	60	50	34	52	0	0	0	
		UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	184	200	77	83	75	636	139	0	0	
	AT.W	LL	88	25	48	99	75	115	156	103	132	212	106	162	124	147	194	83	304	159	171	173	183	131	224	120	174
		SURF	62	119	90	84	97	0	95	50	53	68	23	45	54	44	224	72	156	131	196	224	355	221	300	256	178
		SPORT	288	311	315	321	398	510	327	667	486	256	405	366	326	256	203	291	245	134	115	175	115	171	143	99	47
		UNCL	48	79	88	91	82	67	78	91	120	206	252	142	154	194	290	387	430	332	232	228	119	182	112	174	173
DISCARD	ATW	LL	0	0	0	0	0	0	0	0	0	0	0	42	57	57	82	64	38	83	28	29	69	57	27	71	45
LANDING	AT.E	BENIN	0	0	0	0	0	36	46	0	53	50	25	32	40	8	21	20	21	20	20	20	19	6	4	5	5
		CAP-VERT	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	5	3
		CHINESE TAIPEI	68	9	2	2	1	2	24	6	2	1	0	0	9	1	3	0	0	31	14	17	26	25	68	97	79
		COTE D'IVOIRE	0	0	0	0	0	0	0	0	40	40	40	40	66	55	56	36	69	40	54	68	91	65	35	80	45
		CUBA	58	10	16	4	8	14	56	55	30	2	2	0	4	8	14	184	200	77	83	72	533	0	0	0	
		EC-ESPANA	0	0	0	0	0	0	10	0	4	7	9	0	23	14	0	9	2	30	7	13	25	26	16	19	8
		EC-FRA ESP	327	400	405	375	432	504	521	499	354	354	403	394	406	432	595	174	150	162	160	128	97	110	136	131	98
		EC-PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	53	6
		GABON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	109	7	0	0	
		GHANA	4517	764	1865	2891	1191	891	1426	2408	1658	1485	925	1392	837	465	395	483	297	693	450	353	303	195	351	305	275
		JAPAN	1	5	2	9	14	22	20	25	39	46	49	19	31	27	33	7	18	30	45	52	47	19	58	17	37
		KOREA	52	7	4	1	3	4	12	1	9	3	0	0	3	2	4	3	0	0	1	1	6	1	0	0	
		NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	4	2	0	0	
		PANAMA	13	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	0	0	
		SENEGAL	189	160	143	107	325	498	572	510	163	241	572	596	557	552	1092	546	917	936	260	678	610	556	270	412	412
		U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	1	3	1	0	0	0	
		U.S.S.R	1	13	5	0	0	37	0	0	0	0	2	5	4	4	0	0	0	0	0	0	0	0	0	0	
	AT.W	ARUBA	20	20	30	30	30	30	30	30	30	30	30	23	20	18	13	9	5	10	10	10	10	10	10	10	10
		BARBADOS	0	0	0	0	0	0	0	0	0	0	0	0	0	69	45	29	42	50	46	74	25	71	58	44	44
		BRASIL	28	14	41	55	51	15	43	7	15	73	46	52	27	48	148	23	286	40	17	34	96	56	28	51	31
		CHINA PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1

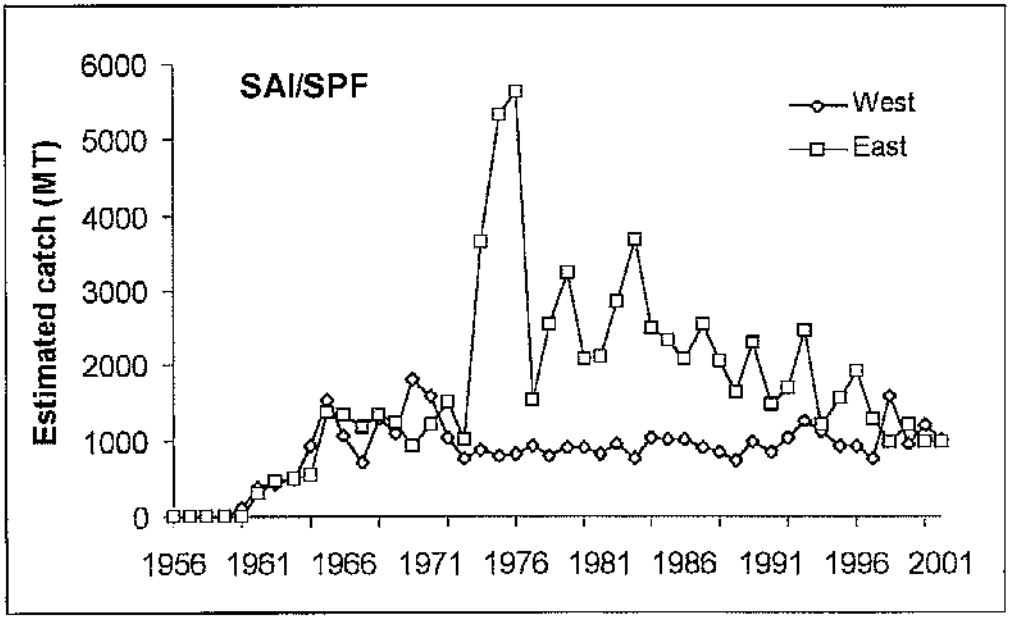
			1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
		CHINESE TAIPEI	19	0	2	5	8	20	6	4	6	15	10	9	54	56	41	18	27	36	31	5	11	2	19	5	6
		CUBA	0	4	9	40	26	33	61	3	22	61	8	52	14	18	52	21	57	7	6	5	11	0	0	0	
		DOMINICAN REP.	0	0	0	0	0	0	22	50	49	49	18	40	44	44	40	31	95	50	90	40	40	40	40	40	40
		EC-ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	7	5	3	36	3	16	20	6	14
		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	7
		GRENADA	0	31	37	40	31	36	27	37	66	164	211	104	114	98	218	316	310	248	151	119	56	83	87	146	146
		JAPAN	42	8	3	4	1	26	63	16	20	20	11	3	9	13	15	33	0	1	8	2	4	17	3	11	3
		KOREA	0	3	2	5	11	10	5	0	7	28	2	0	0	6	12	0	2	0	1	1	7	4	0	0	
		MEXICO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	4	97	6	29
		NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	4	9	14	0	0	
		NETHERLAND.ANT	28	28	21	21	21	21	21	21	21	10	10	10	10	10	10	10	10	15	15	15	15	15	15	15	15
		PANAMA	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	4	4	4	2	1	3	0	1	
		TRINIDAD & TOBAGO	0	0	0	0	0	0	0	64	58	14	25	35	24	11	9	4	4	55	101	101	104	10	0	4	3
		U.S.A	281	308	308	303	392	502	319	656	478	241	399	354	328	243	188	281	213	122	102	108	106	160	193	89	37
		VENEZUELA	9	3	11	25	13	18	16	14	10	32	12	24	4	8	12	16	58	34	21	14	51	89	39	26	23
DISCARD	AT.W	U.S.A	0	0	0	0	0	0	0	0	0	0	0	42	57	57	62	64	36	63	28	29	69	57	27	71	45

SAI-Table 3. Estimated catches (including landings and dead discards, in MT) of spearfish "only" in the Atlantic Ocean, by fisheries and by gears, 1976-2000 (as modified by the Working Group for use in 2001 assessment).

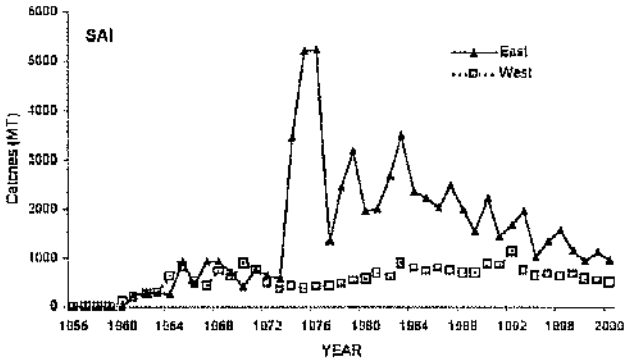
				1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
TOTAL CATCH				966	804	573	581	680	763	823	708	742	611	768	704	760	646	682	383	200	1078	634	485	299	314	951	584	502
LANDING	AT. E			617	434	342	302	395	470	510	495	362	316	331	340	316	370	473	144	120	550	242	262	136	239	171	233	135
	AT.W			349	370	231	279	285	293	313	212	380	294	437	364	444	277	189	220	80	528	391	217	160	75	780	351	367
LANDING	AT.E	LL		412	184	88	67	125	154	184	183	140	86	78	93	60	100	100	37	28	438	144	184	79	171	85	152	75
		SURF		205	250	254	235	270	316	326	312	222	228	252	247	256	270	373	107	92	112	98	78	59	68	86	81	60
	AT.W	LL		349	370	231	279	285	293	313	212	380	294	437	364	444	277	189	158	67	493	352	185	135	75	780	351	367
		UNCL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	13	35	40	32	26	0	0	0	0
DISCARD	ATW	LL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0
	EAST	CHINA.PR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	3	2	4	1
		CHINESE TAIPEI		149	50	5	17	4	10	43	14	6	8	1	0	0	6	10	0	0	389	87	138	37	125	59	81	41
		CUBA		127	55	53	33	71	65	102	145	85	17	53	50	18	45	47	0	0	0	0	0	0	0	0	0	0
		EC-ESPANA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	3	1	1	1	30	14
		EC-FRA.ESP		205	250	254	235	270	316	326	312	222	228	252	247	256	270	373	107	92	112	98	78	59	68	86	81	60
		JAPAN		3	19	9	10	19	28	16	22	24	38	22	16	26	30	30	9	28	26	36	26	25	30	22	37	19
		KOREA		104	39	14	4	31	20	21	2	25	26	2	20	13	15	12	27	3	3	5	5	8	4	0	0	
		NEI-1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	13	9	6	8	0	0	
		PANAMA		28	11	3	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		1	11	4	0	0	31	0	0	0	0	2	5	3	3	0	0	0	0	0	0	0	0	0	0	
	WEST	BRASIL		105	132	107	57	60	29	42	53	70	84	195	93	94	84	50	49	53	168	51	84	53	36	90	238	191
		CHINA.PR		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	2	2	7	3
		CHINESE TAIPEI		107	5	8	13	28	61	16	27	39	24	54	22	246	115	42	55	6	187	202	33	26	2	110	28	17
		CUBA		0	87	42	111	93	101	130	25	147	79	42	119	64	37	64	62	13	35	40	32	26	0	0	0	
		EC-ESPANA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	22	50
		JAPAN		91	15	6	16	21	18	72	6	14	18	17	3	13	9	10	40	1	1	2	3	4	1	6	13	9
		KOREA		0	62	12	14	40	31	14	0	45	44	12	1	0	11	13	0	1	0	7	7	15	4	0	0	
		MEXICO		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	16	16	0	5	549	34	59
		NEI-1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	26	26	21	16	0	0	
		PANAMA		0	17	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		TRINIDAD & TOBAGO		0	0	0	0	0	0	0	0	0	0	54	75	10	7	1	0	0	62	0	0	2	0	0	0	
		VENEZUELA		46	51	53	67	43	53	40	101	55	45	62	52	16	13	10	14	7	45	44	13	12	10	21	6	9
DISCARD	AT.W	Sum U.S.A.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0



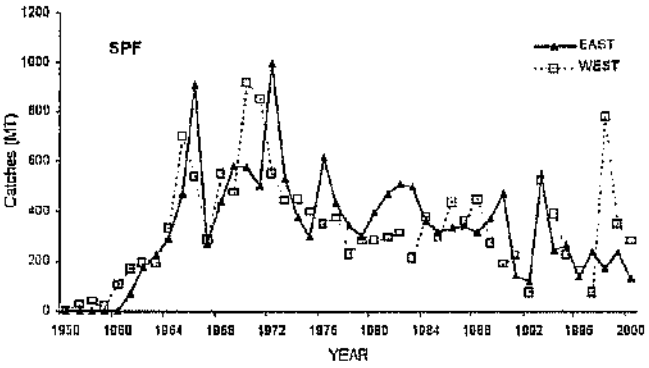
SAI-Fig. 1. Distribution of estimated sailfish/spearfish catches in the Atlantic (landings and dead discards. reported and carried over) during 1956-1997. The east/west boundary is indicated by the bold line.



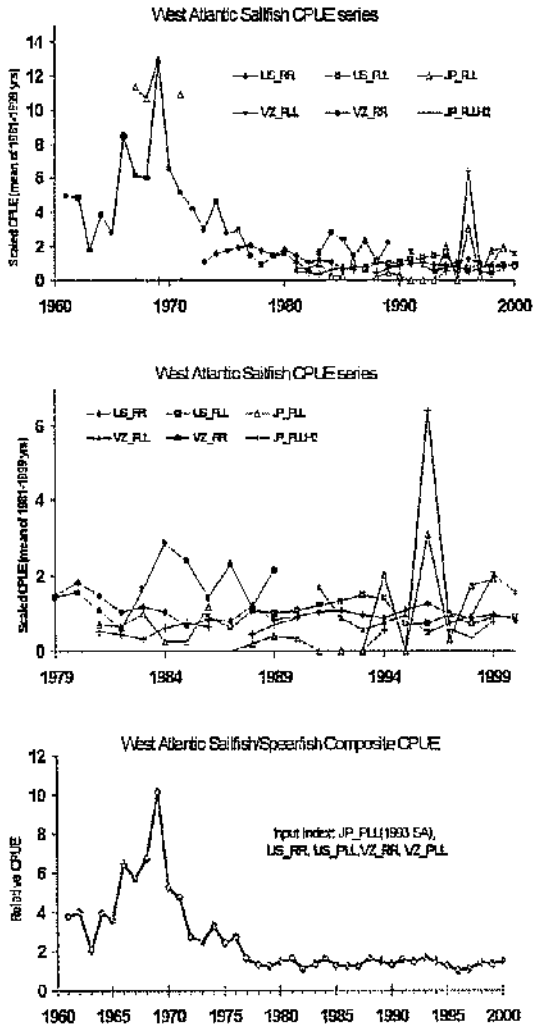
SAI-Fig. 2. Evolution of estimated sailfish/spearfish catches in the Atlantic (landings and dead discards. reported and carried over) in the ICCAT Task I database during 1956-2000 for the east and west stocks. Data for 2000 are not the same that were used for the assessment, but are the data available at the end of 2002, The data for 2001 include carry over estimates for countries that did not report catches as of September 2002 and these values should be considered provisional.



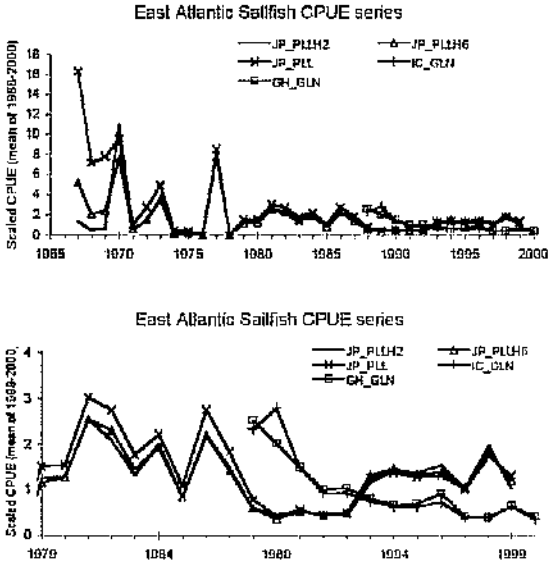
SAI-Fig. 3. Estimated sailfish "only" catches based on the new procedure for splitting combined SAI/SPF catches from 1956-2000.



SAI-Fig. 4. Estimated spearfish "only" catches in the Atlantic based on the new procedure for splitting combined SAI/SPF catches from 1956-2000.



SAI Fig 5. Available standardized CPUE for western Atlantic sailfish for the periods 1967-2000 (upper), and for the period 1979-2000 (middle). The time series represented are from two different standardization treatments for the Japanese longline data (JP_PLL and JP_PLLH2), as well from the Venezuelan recreational (VZ_RR) and longline fisheries (VZ_PLL), and the United States recreational (US_RR) and longline (US_PLL) fisheries. The bottom plate represents a sailfish/spearfish composite CPUE series that included the Japanese, United States and Venezuela time series.



SAI-Fig 6. Available standardized catch rates for eastern Atlantic sailfish for the period 1967-2000 (upper) and for the period 1979-2000 (lower). The time series represented are from three different standardized treatments of the Japanese longline data (JP_PLLH2, JP_PLL, and JP_PLLH6), as well from the Ghanaian gillnet (GH_GLN) and Côte d'Ivoire gillnet (IC_GLN).

7.9 SWO-ATL-ATLANTIC SWORDFISH

SWO-ATL-1. Biology

Swordfish are distributed widely in the Atlantic Ocean and Mediterranean Sea, and range from Canada to Argentina on the western side, and from Norway to South Africa on the eastern side (**SWO-Figure 1**). The management units for assessment purposes are a separate Mediterranean group, and North and South Atlantic groups. These stock units are supported by recent genetic analyses. However, the precise boundaries between stocks are uncertain, and mixing is expected to be high in the boundary zones. Therefore there is uncertainty as to how closely the management units used correspond to the biological stock units. Hence, it is important to have effective management measures throughout the Atlantic and Mediterranean.

Swordfish are characterized by having dimorphic growth, where females show faster growth rates and attain larger sizes than males. Young swordfish grow very rapidly, reaching about 130 cm LJFL (lower jaw-fork length) by age 2. Swordfish are difficult to age, but 53% of females are considered mature by age 5, at a length of about 180 cm. Known spawning areas are located in the warm tropical and subtropical waters, where swordfish spawns throughout the year in different localized areas displaying a regular seasonal pattern.

These large pelagic fishes feed on a wide variety of prey including groundfish, pelagics, deep-water fish and invertebrates. It is believed that swordfish feed throughout the water column and show extensive diel migration. Swordfish are typically caught on pelagic longlines at night when they feed in surface waters. They are found in the colder northern waters during summer months and all year in the subtropical and tropical areas.

SWO-ATL-2. Description of the fisheries

Directed longline fisheries from EC-Spain, the United States and Canada have operated since the late 1950s or early 1960s, and harpoon fisheries have existed 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 in their tuna fisheries.

As a result of ICCAT and domestic regulatory recommendations, there are three recent developments in the fisheries of some nations. (1) Starting in February 2000, Japanese vessels fishing in the North Atlantic were required to discard all swordfish as the Japanese block quota had been reached. (2) In 2001, U.S pelagic longline fishing was prohibited or restricted in five areas and times to reduce incidental catches including juvenile swordfish. (3) The Canadian directed swordfish fishery, which used to continue into October, since 1999 has finished at the end of August due to reduced quota. A further change in the fishery has resulted from changes in technology, i.e., there has been a change in the type or style of longline gear used by many Spanish vessels that have gone from the traditional multifilament to monofilament gear. One concern of all these developments is the effect on the data available, its continuity and complexity and therefore its interpretation.

The SCRS scientists believe that ICCAT Task I landings data provide minimum estimates because of unreported catch of swordfish made in association with illegal, unreported and unregulated (IUU) fishing activities. However, the amount of NEI swordfish catch by IUU vessels has not been estimated.

Total Atlantic. The total Atlantic estimated catch of swordfish (North and South, including discards) reached an historical high of 38,624 MT in 1995, 13% higher than the previous peak catch of 34,098 MT in 1989 (**SWO-Table 1** and **SWO-Figure 2**). The 2001 estimated catch (reported and carried over) was 24,069 MT (reported catch was 22,833 MT). As a substantial number of countries have not yet reported their 2001 catches and because of unknown IUU catches, this value should be considered provisional and subject to revision.

North Atlantic. For the past decade, the North Atlantic estimated catch (landings plus discards) has averaged about 14,200 MT (**SWO-Table 1** and **SWO-Figure 2**), although the 2001 landings (including carry-overs) plus discards were reduced to 9,797 MT (reported catch was 9,433 MT) in response to ICCAT regulatory recommendations. In 2001, there has been a 52% decrease in estimated catches (including discards and carry-overs) since the 1987 peak in North Atlantic landings (20,236 MT), in response to ICCAT recommendations. Reduced landings have also been attributed to shifts in fleet distributions, including movement of some vessels

to the South Atlantic and out of the Atlantic. In addition, some fleets, including 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.

South Atlantic. The South Atlantic estimated catch (landings plus discards) was relatively low (generally less than 5,000 MT) before 1980. Since then, landings have increased continuously through the 1980s and the early 1990s to a peak of 21,884 MT in 1995 (levels that match the peak of North Atlantic harvest). The 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. Then the estimated landings decreased to 13,835 MT by 1998 (37% reduction). The reduction in catch following the peak in 1995 was in response to the regulations, and partly due to a shift to other oceans and to a shift in target species. In 2001, the 14,251 MT estimated catches, including carry-overs (reported catches were 13,379 MT) were about 8% below the 2000 level. The Committee noted that data provided to ICCAT indicated that chartering arrangements have increased in the South Atlantic with a concurrent increase in reported catch.

Discards. Only the U.S. (1991-2001), Canada (1997-2001), and Japan (2000-2001) report positive estimates of dead discards. Japan (2000) also reported live releases. EC-Spain reports zero dead discards. Both the U.S. and Canada used scientific observer data to estimate dead discards. The Japanese estimates in 2000 and 2001 are based on radio reports.

SWO-ATL-3. State of the Stocks

A new assessment of North and South Atlantic swordfish stocks was conducted in 2002. In the assessment, updated CPUE and catch data 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 show similar trends to previous years, and also show 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 show 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 recent improvements in recruitment have 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 show contradictory patterns. Lack of important CPUE information from some fleets fishing in the South Atlantic prevents 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 (**SWO-Table 1**) and CPUE data through 2001.The current base case assessment indicates that the North Atlantic swordfish biomass has 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 (**SWO-Figure 3**). In particular, strong recruitment since 1997 has manifested in several age classes and is evident in the catch rates from several fleets. The strong recruitments of the late 1990's have already 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 is reflected in the CPUEs for several fisheries. An updated estimate of maximum sustainable yield from production model analyses is 14,340 MT (with estimates ranging from 11,500 to 15,500 MT). Since 1997, North Atlantic swordfish catches have been below 14,340 MT (**SWO-Figure 4**); preliminary estimates (reported plus carried over) of catches in 2001 were about 9,800 MT, but this level is probably an underestimate.

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 is 10,400 MT, it is likely that biomass will increase further under current catch levels.

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 (**SWO-Figure 5**). 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 percent of the maximum at equilibrium, largely owing to the very large recruitments estimated for 1997-2000.

South Atlantic

The Committee noted that total catches have been reduced since 1995, as was recommended by the SCRS although some countries have increased their reported catch levels. 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 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 (**SWO-Figure 6**). 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 is 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 Group 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.

SWO-ATL-4. Outlook

North Atlantic

For the North Atlantic swordfish stock, the base case surplus production model showed that the swordfish biomass has 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 (**SWO-Figure 7**).

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 confirmed that a positive effect of this strong recruitment has manifested in older ages and in the biomass indices of several fisheries.

South Atlantic

Given the recent expansion of the fishery, 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 to maintain the stock at about the current abundance.

SWO-ATL-5. Effects of current regulations

This report only takes into account catch data transmitted to the SCRS by the different countries and which were available during the meeting. Total catch was probably under-reported for 2001 because of the lack of information from some countries. However, this year the Group has made an overall estimate of 2001 unreported catches by the carryover of data from previous year (**Table 1**, see footnote).

Canada, Chinese Taipei, Japan, South Africa, EC-Spain, and the United States provide catch-at-size data based on national sampling. Other nations are either partially (e.g., Brazil, EC-Portugal) or completely substituted from these data. The SCRS considers that it is not appropriate to apply these scientific estimates for purposes of evaluating compliance, and therefore only summary data are provided.

Catch limits

The total allowable catch in the North Atlantic in 2001 was 10,500 MT (10,200 MT retained and 300 MT discarded). The reported landings were 8,605 MT and the estimated discards were 828 MT. Total catch was probably under-reported for 2001.

The total allowable catch in the South Atlantic in 2001 was 14,620 MT. The reported landings for 2001 were 13,379 MT and reported discards were less than 1 MT. Total catch was probably under-reported for 2001.

Minimum size limits

There are two minimum size options that are applied to the entire Atlantic: 125 cm LJFL with a 15% tolerance, or 119 cm LJFL with zero tolerance and evaluation of the discards. In the absence of size data, these calculations could not be updated or examined for 2001.

In 2000, the percentage of swordfish reported landed (throughout the Atlantic) less than 125 cm LJFL was about 21% (in number) overall for all nations fishing in the Atlantic. If this calculation is made using reported landings plus estimated discards, then the percentage less than 125 cm LJFL would be about 25%. The Committee noted that this proportion of small fish did not increase very much even though recruitment in the North has been at a high level in recent years.

Other implications

The Committee expressed concern about the uncertainties of the stock structure of Atlantic swordfish and the possibility that these assumed stocks do not exactly reflect the geographical distribution of the respective stocks.

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

In 2001, the United States introduced time and area closures in the North Atlantic to protect small swordfish and other species caught incidentally by longline. These closures have reduced the catches attributed to the United States, and may also have redistributed the fleet. The effects on the CPUE data are unknown, although analyses conducted to examine this impact did not reveal a measurable effect on catch rates in 2001.

SWO-ATL-6. Management recommendations

North Atlantic

Since the last assessment in 1999, the Committee has noted to the Commission that there has been high recruitment since 1997, and the 2001 data are consistent with this observation (1996-2000 cohorts). It should be noted that this high recruitment is now being observed in several fisheries, and has manifested in several age classes. This high recruitment, in combination with the actions the Commission has taken to reduce catch, has resulted in an increase in the North Atlantic stock size. Based on the results of the 2002 assessment taking into account this recent high recruitment, if the Commission desires to rebuild the North Atlantic swordfish stock to biomass levels that would support MSY levels within 10 years (through 2009) with a probability of slightly greater than 50%, then the catch (including discards) could be maintained at 14,000 MT for 2003-2009. At 15,000 MT the stock trajectory declines. The Committee noted that positive signs in recent recruitment may be in part due to environmental influence, and it is unknown if this influence will be positive or negative in the future. Additionally, the current regulations can produce difficulties in estimation of CPUE trends for some

fleets. Noting the uncertainties inherent in the assessment, the Committee warns against large catch increases over the current TAC. Moderate catch increases (e.g., to levels below the estimated MSY) will not only guard against potential biases in the assessment, but would also provide stability for the stock and fisheries.

South Atlantic

There is considerable uncertainty in the data for the south Atlantic assessment. So much so, that the contradictory CPUE trends from the target and by-catch fisheries caused no reliable result from the base case production model and therefore reliable estimates of MSY and biomass trends could not be calculated. On the one hand, the recent trend for the target CPUE is very stable; on the other hand, the signal from the by-catch fisheries shows a sharp decline in recent years. The Committee is unable to determine which is indicative of South Atlantic swordfish stock abundance. Lack of information from some of important South Atlantic fishing fleets prevents the Committee from reconciling these conflicts.

The Committee noted that there has been considerable expansion of the fleets and charter activities targeting swordfish in the South Atlantic since the implementation of catch limit regulatory recommendations, and remains concerned that CPUE data from these new fishing activities were not made available. However, this recent expansion of the fishery is consistent with the stable CPUE for the target fishery considered by the stock assessment session. Given this evolution of the fishery, and the apparent stability in at least one target fishery as a result of recent catch reductions, the Committee recommends that catch should remain at about the same level of the past few years (14-15,000 MT). More quantitative and reliable advice is unlikely to be achieved in the absence of CPUE data from some of the major fleets fishing in the South Atlantic.

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	**South Atlantic**
Maximum Sustainable Yield[1]	14,340 MT (11,580-15,530)[4]	Not estimated
Current (2001) Yield[2]	9,797 MT	14,251 MT
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 quotas [Ref. 99-2]; 125/119 cm LJFL minimum size [Ref. 99-2].	TAC target [Ref. 01-2]; 125/119 cm LJFL minimum size [Refs. 90-2 & 95-10].

1 Base case production model results based on catch data 1950-2001.
2 Includes an estimate of unreported catches, see footnote on SWO-ATL-Table 1.
3 For next fishing year.
4 80% confidence intervals are shown.

SWO-ATL-Table 1. Estimated catches (landings and discards, MT) of swordfish by major area, gear and flag

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total ATL			9264	14601	15231	18881	15155	19662	19929	21930	23969	24380	26266	32469	34098	32796	28647	29027	32659	35104	38624	33524	31432	26031	27060	26920	22833
	AT.N		6409	11835	11937	13558	11180	13215	14527	12791	14383	18486	20236	19513	17250	15672	14934	15394	16644	15389	16740	15040	12957	12196	11713	11459	9433*
	AT.S		2855	2766	3294	5323	3975	6447	5402	9139	9586	5894	6030	12956	16848	17124	13713	13633	16015	19715	21884	18284	18475	13835	15346	15461	13379**
	UNCL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21
AT.N	Landings	Longline	5458	11123	11177	12831	10549	13019	14023	12664	14240	18369	20022	18927	15348	14026	14208	14288	15568	14223	15661	13655	12146	10783	10572	9633	8198
		Other Surf.	951	712	760	727	631	196	504	127	143	217	214	586	1902	1646	511	723	669	458	555	797	360	928	612	659	407
	Discards	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	385	408	708	526	562	439	476	525	1165	822
		Other Surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	12	9	4	1	6
	Landings	BARBADOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	16	16	12	13	19
		BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0
		CANADA	113	2314	2970	1885	561	554	1088	499	585	1059	939	898	1247	911	1026	1547	2234	1676	1610	739	1089	1115	1119	968	1079
		CANADA-JPN	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	337	304	22	102
		CHINESE TAIPEI	246	164	338	134	182	260	272	164	152	157	52	33	17	270	577	441	127	507	489	521	509	286	285	347	281
		CUBA	398	281	128	278	227	254	410	206	162	636	910	832	87	47	23	27	16	50	86	7	7	7	7	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-ESPANA	3309	3622	2582	3810	4014	4554	7100	6315	7441	9719	11135	9799	6648	6386	6633	6672	6598	6185	6933	5547	5140	4079	3993	4595	4047
		EC-FRANCE	0	0	0	5	4	0	0	1	4	4	0	0	0	75	75	75	95	46	84	97	164	110	104	122	
		EC-IRELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15	132	81	36	
		EC-ITALY	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EC-MARTINIQUE	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	38	17	29	15	13	11	9	14	22	468	994	617	300	475	773	542	1961	1599	1617	1703	903	773	777	732	735
		EC-U.K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	5	11	0	2	1	
		FAROE-ISLANDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	
		GRENADA	0	0	0	0	0	0	0	0	0	0	0	56	5	1	2	3	13	0	1	4	15	15	42	84	
		ICELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
		JAPAN	793	946	542	1167	1315	1755	537	665	921	807	413	621	1572	1051	992	1064	1126	933	1043	1494	1218	1391	1212	152	0
		KOREA	541	634	303	284	136	198	53	32	160	68	60	30	320	51	3	3	19	16	16	19	15	0	0	0	
		LIBERIA	0	0	0	5	38	34	53	0	24	16	30	19	35	3	0	7	0	0	0	0	0	0	0	0	
		MAROC	7	11	208	136	124	91	129	81	137	181	197	196	222	91	110	69	39	36	79	452	267	191	119	114	
		MÉXICO	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	14	0	0	14	28	24	37	27
		NEI-1	0	0	0	0	0	0	0	0	0	0	0	76	112	529	0	0	0	0	0	0	0	0	0	0	
		NEI-2	0	0	0	0	12	0	0	0	0	14	3	131	190	185	43	35	111	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	22	76	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	
		PHILIPPINES	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
		POLAND	0	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		RUMANIA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	6	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	0	0	0	0	0	10	
		SIERRA LEONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
		ST. LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	23	0	4	3	1	1	1	0	
		TRINIDAD & TOBAGO	0	0	0	0	0	0	21	26	6	45	151	42	79	66	71	562	11	180	150	158	110	130	138	41	75
		U.S.A	912	3684	4619	5625	4530	5410	4820	4749	4705	5210	5247	6171	6411	5519	4310	3852	3783	3366	4026	3559	2987	3058	2908	2863	2217
		U.S.S.R	15	23	10	21	0	69	0	16	13	18	4	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	1	1	5	5	3	3	
		VENEZUELA	15	46	182	192	24	25	36	23	51	84	86	2	4	9	75	103	73	69	54	85	20	37	30	30	21
	Discards	CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	52	35	50	26
		JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	508
		U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	383	408	708	526	588	446	433	494	490	293

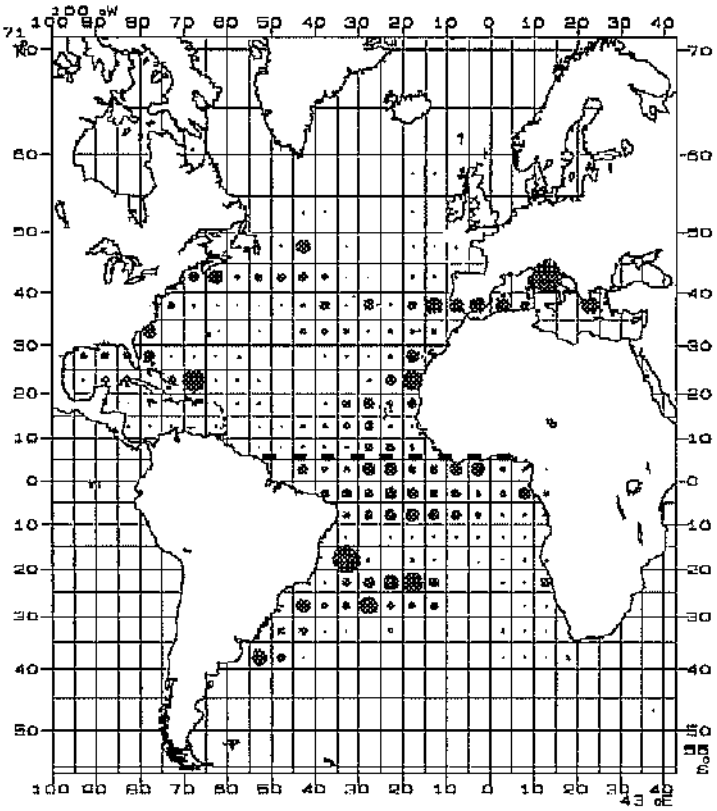
* Where no catch was reported for 2001, previous years' data were carried over for the purpose of the 2002 production model, with the exception of Seychelles. The total amount of catch carried over was 364 MT, making the total estimated catch for the North Atlantic in 2001 of 9,797 MT.

SWO_ATL-Table 1. (Cont.)

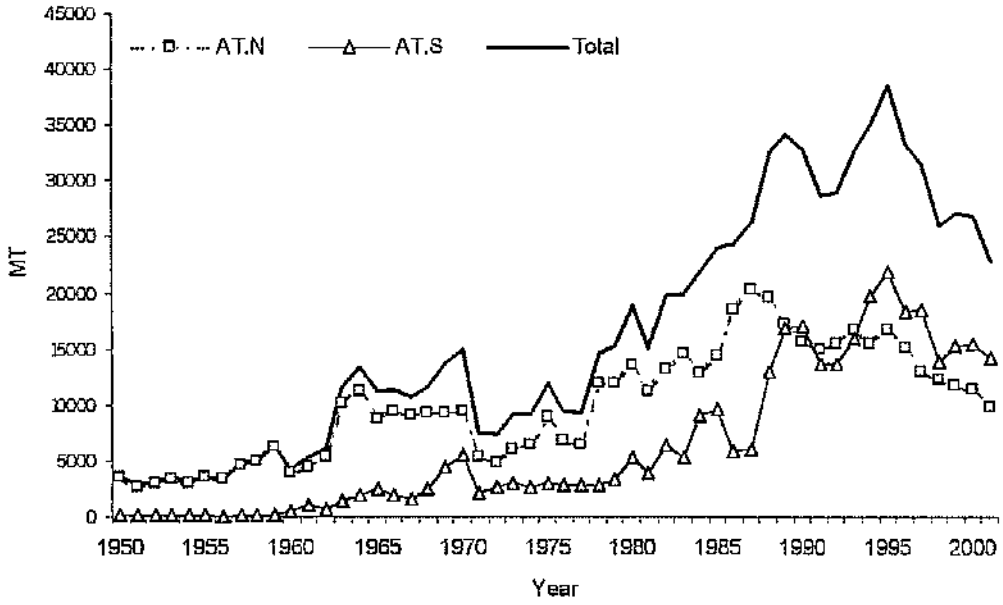
			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
AT.S	Landings	Longline	2840	2749	3265	5179	3938	6344	5307	8920	8863	4951	5446	12404	16398	16705	13287	13173	15620	17451	20910	17931	18279	13649	14792	15301	13222
		Other Surf.	15	17	29	144	37	103	95	219	723	943	584	552	450	419	426	460	395	2264	974	352	175	176	548	158	156
	Discards	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0
		Other Surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Landings	ANGOLA	0	0	0	0	0	0	0	26	228	815	84	84	84	0	0	0	0	0	0	0	0	0	0	0	
		ARGENTINA	132	4	0	0	0	20	0	0	361	31	351	198	175	230	88	88	14	24	0	0	0	0	0	0	5
		BELIZE.SHLOB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	17	8	
		BENIN	0	0	0	0	18	24	0	86	90	39	13	19	26	28	28	26	28	25	24	24	10	0	3	0	
		BRASIL	396	372	521	1582	655	1019	781	468	562	753	947	1162	1168	1696	1312	2609	2013	1571	1975	1892	4100	3847	4721	4579	4082
		BULGARIA	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		CAMBODIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	
		CHINA.PR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	86	104	132	40	29	534	344	200
		CHINESE TAIPEI	675	625	1292	702	528	520	261	199	280	216	338	798	610	900	1453	1686	846	2829	2876	2873	2562	1147	1168	1303	1167
		COTE D'IVOIRE	0	0	0	0	0	0	0	10	10	10	10	12	7	8	18	13	14	20	19	26	18	25	26	20	
		CUBA	302	319	272	316	147	432	818	1161	1301	95	173	159	830	448	209	246	192	452	778	60	60	0	0	0	
		EC-ESPANA	0	0	0	0	0	0	0	0	0	66	0	4393	7725	6166	5760	5651	6974	7937	11290	9622	8461	5832	5758	6388	5848
		EC-FRA.ESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
		EC-PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	380	389	441	384	381	392	393
		G.EQUATORIAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
		GHANA	0	0	0	110	5	55	5	15	25	13	123	235	156	146	73	69	121	51	103	140	44	106	121	117	
		HONDURAS-OB.SH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	5	2	8	0	
		JAPAN	514	503	782	2029	2170	3287	1908	4395	4613	2913	2620	4453	4019	6708	4459	2870	5256	4699	3619	2197	1494	1186	815	741	557
		KOREA	699	699	303	399	311	486	409	625	917	369	666	1012	776	50	147	147	198	164	164	7	18	7	0	10	
		LIBERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	26	28	28	28	28	28	0	
		LITUANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	794	0	0	0	0	0	0	
		NAMIBIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	730	469	751
		NEI-1	0	0	0	0	0	0	0	0	0	0	0	0	856	439	0	0	0	0	0	0	0	0	0	0	
		NIGERIA	0	0	0	0	0	0	83	69	0	0	0	0	0	0	0	3	0	857	0	9	0	0	0	0	
		PANAMA	28	83	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	0	
		PHILIPPINES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
		SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	14	0	
		SOUTH AFRICA	0	0	28	31	9	3	7	0	8	5	5	4	0	0	5	9	4	1	4	1	1	169	76	230	307
		TOGO	0	0	0	0	0	0	0	0	6	32	1	0	2	3	5	5	8	14	14	64	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	171	396	160	179	142	43
		U.S.S.R	106	161	70	154	40	26	46	158	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK-S.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	20
		URUGUAY	0	0	0	0	92	575	1084	1927	1125	537	699	427	414	302	156	210	260	165	499	644	760	889	650	713	
	Discards	U.S.A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0
UNCL	Landings	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
		Other Surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.01	0	0	0	0	0	0	0	0	0	
	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	15
	Landings	SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0.03	0.01	0	0	0	0	0	0	0	0	0	
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
	Discards	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	15

* * Where no catch was reported for 2001, previous years' data were carried over for the purpose of the 2002 production model. Total amount of catch carried over was 872 MT, making new estimated total for the South Atlantic of 14,251 MT.

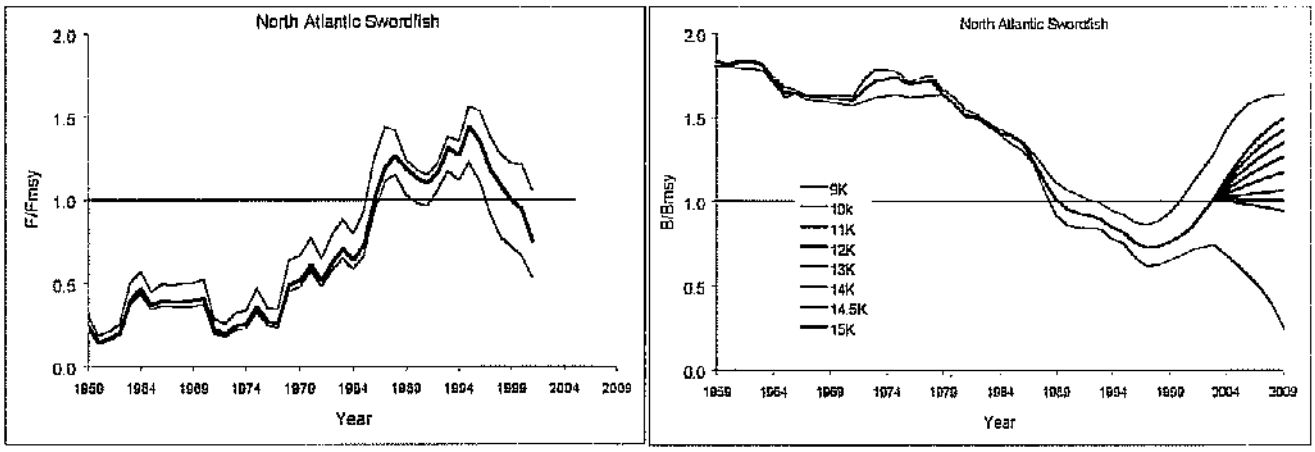
NOTE: Empty cells in 2001 indicate that catches were not reported to ICCAT before September 9, 2002 when the Species Group met. Subsequently, the following catches for 2001 have been reported to ICCAT: South: Côte d'Ivoire (18.90 MT), South Africa (changed to 269.04 MT), and North: Morocco (523.94 MT), UK-Bermuda (2.0 MT).



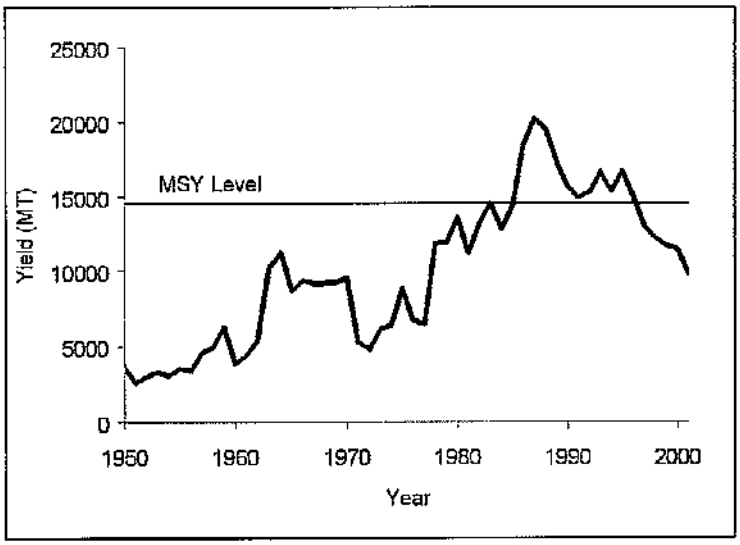
SWO-ATL-Fig. 1. Geographical distribution of swordfish longline catches in 1997. The dashed line at 5° is the assumed boundary between North and South management units.



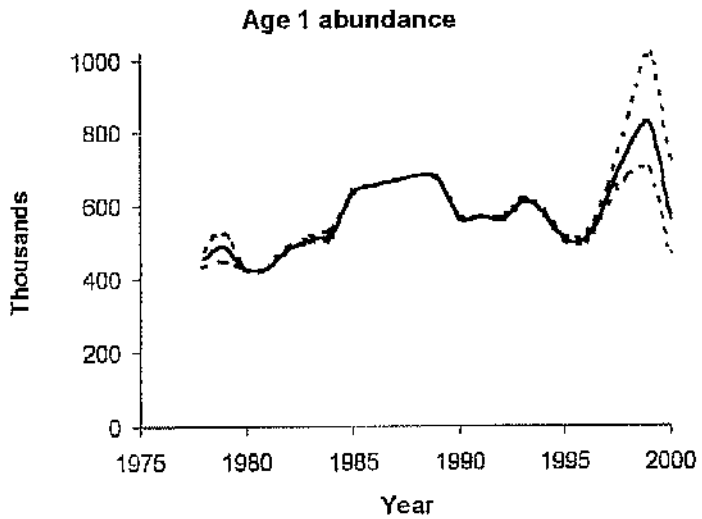
SWO-ATL-Fig. 2. Estimated catches (reported and carried over) of Atlantic swordfish (in MT, including discards) for 1950-2001.



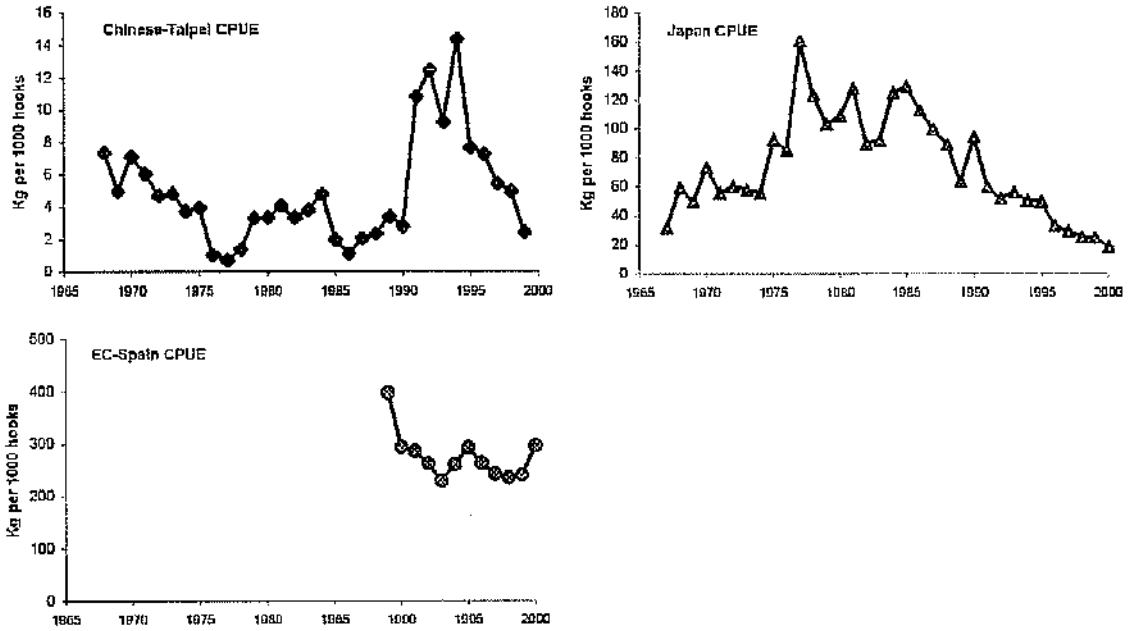
SWO-ATL-Fig 3. North Atlantic swordfish assessment results. Left panel: Estimated fishing mortality rate relative to F_{MSY} (F/F_{MSY}) for the period 1959-2001 (median with 80% confidence bounds based on bootstrapping are shown). Right panel: Estimated biomass relative to biomass at MSY (B/B_{MSY}) for the period 1959-2002, followed by 7-year projected B/B_{MSY} under the constant catch scenarios listed. Upper and lower lines represent approximate 80% confidence ranges. For the catch projection period (2002-2009), the upper line is the upper 80% confidence bound for the 9K (9,000 MT) projection and the lower line is the 80% confidence bound for the 15K (15,000 MT) projection.



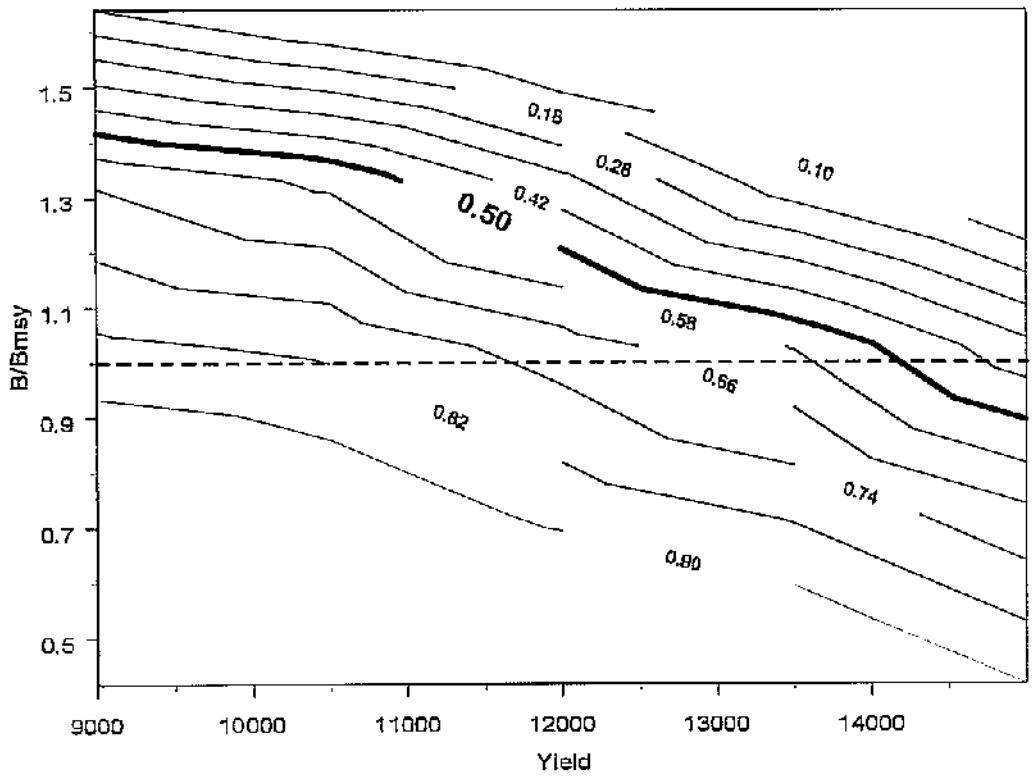
SWO-ATL-Fig 4. Annual yield (MT) for North Atlantic swordfish relative to the estimated MSY level.



SWO-ATL-Fig 5. Sequential population analysis estimates (numbers of fish) of North Atlantic recruitment (using input data from 1978-2000) with 80% bootstrap confidence limits (dashed lines).



SWO-ATL-Fig 6. Standardized biomass catch rates for South Atlantic swordfish presented at the 2002 meeting, showing contradictory patterns.



SWO-ATL-Fig 7. Estimated probability of the North Atlantic stock at or above the indicated Biomass ratio (B/B_{MSY}) by 2009, if yield (landings and discards) were held constant at the tonnages indicated from 2003 to the end of the projection period.

7.10 SWO-MED - MEDITERRANEAN SWORDFISH

In April 2002, the Sixth Meeting of the GFCM/ICCAT Ad Hoc Working Group on Stocks of Large Pelagic Fishes in the Mediterranean Sea attempted to update the Mediterranean swordfish database. The Committee continues to be concerned about the lack of data on catch, effort and size from some important fisheries in the Mediterranean. The absence of these data makes unfeasible the accomplishment of a reliable stock assessment.

SWO-MED-1. Biology

Swordfish is a cosmopolitan species found in the Atlantic Ocean and the Mediterranean Sea. Several recent genetic studies suggest that Mediterranean swordfish form a unique stock that is reproductively isolated from the Atlantic stocks. Several fisheries and biological studies suggest that there is limited movement from the Mediterranean to areas immediately adjacent in the North Atlantic. Genetic studies have confirmed this pattern.

Swordfish feed mainly in the meso-pelagic zone and its prey is comprised mostly of cephalopods and pelagic fish species. Spawning occurs in the central Mediterranean Sea and around the Balearic Islands and probably in other locations. It has been described that in the Mediterranean, swordfish spawn during the spring-summer months and young swordfish grow very rapidly, reaching more than 80 cm by the end of their first year of life. Females grow faster than males and reach a larger maximum size. Female swordfish may first reach sexual maturity in their third year of life at a length of about 130 cm, while males may first reach maturity one year earlier; this is substantially younger than the age of maturity assumed for the Atlantic stocks (age 5).

SWO-MED-2. Description of the fisheries

Mediterranean swordfish fisheries are characterized by high catch levels that are similar to those reported for larger water bodies such as the North Atlantic. Mediterranean total swordfish landings showed an upward trend from 1965-72, stabilized between 1973-1977, and then resumed an upward trend reaching a peak in 1988 (20,339 MT) Since then they fluctuate mostly between 12,000-15,000 MT. **(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. The level of reported swordfish catches in the Mediterranean in 2001 was 14,624 MT.

Swordfish fishing is carried out all over the Mediterranean Sea. However, according to the ICCAT records the most important swordfish producer is EC-Italy accounting in recent years for about 40-50% of the total Mediterranean production. Other important producers are Morocco, EC-Greece and EC-Spain. These countries, together with EC-Italy, account for more than 85% of the total Mediterranean production. A new fishery targeting swordfish in the Mediterranean has been reported by EC-Portugal. Apart from the aforementioned countries, Algeria, Cyprus, Malta, Tunisia, and Turkey also have fisheries targeting swordfish in the Mediterranean. Incidental swordfish catches have also been reported by Croatia, EC-France, Japan and Libya.

Surface longline and driftnet are the main fishing gears used for swordfish fishing. Most countries operate longline fisheries. Large-scale driftnet fisheries seem to be limited to EC-Italy, Morocco and to a lesser extent to Algeria and Turkey, although this information may be incomplete. It should be noted that since the beginning of 2002 driftnet fishing has been banned in EU countries and this will influence the catch data beginning in 2002. Swordfish are also caught with harpoons and incidentally by traps, but such catches are negligible and limited to certain areas.

There is a high demand for swordfish for fresh consumption in most Mediterranean countries and large quantities of swordfish are also imported from distant oceans.

SWO-MED-3. State of the stocks

The Committee is concerned about the large catches of small size swordfish (many of which have probably never spawned) and about the relatively low number of large individuals in the catches, as well as the considerable uncertainties in the estimates of important annual recruitments. Despite the absence of reliable analytical assessments, there are signs in the fishery that the concerns of the Committee are justified. The fact

that the fishery is based on the catch of small sized individuals (**SWO-MED-Figure 2**) makes it more vulnerable to possible changes in recruitment levels. However, compared to the north Atlantic stock, the age of maturity is lower and the fish are smaller at the same age, which suggests a possible biological compensation for high mortalities and/or an adaptation to the environmental conditions characteristic of the Mediterranean, which they have incorporated during their process of evolution. The preliminary VPA carried out in 1995 was not updated, partly due to insufficient improvements in the input data. The results of the 1995 preliminary analysis were unreliable given the uncertainty with respect to biological parameters, catches (those of 1990-1996 have been revised since then) and the standardized CPUE used in the fit. There are doubts about the reliability of the estimated abundance trends, which are aggravated by the lack of information about the current size of the stock compared with the unexploited stock.

A partial stock assessment based on Greek and Italian data was presented at the 2002 GFCM/ICCAT meeting. According to the results, the stock appears to be nearly stable. However, there continues to be concern that the average size of fish in the catch is very low. The Committee recommends that a full assessment be considered before drawing stock-wide conclusions.

SWO-MED-4. Outlook

Although the quality and quantity of the available data have been greatly improved since the 1995 preliminary assessment, there are still several gaps in the available data series. The size frequency distribution caught by several fisheries is not well sampled. Most sampling programs focus on landings instead of catches, so it is not possible to quantify the impact of individual fisheries on juveniles, given the existence of minimum landing size regulations in several countries. The real status of the stock, in terms of exploitation, is not known but the high presence of juveniles in the catches and the rarity of large fish are cause for concern. However, the recent introduction of new longline technology on some vessels in the Mediterranean suggests that larger fish may be distributed in deeper waters.

SWO-MED-5. Effects of current regulations

Although ICCAT has no specific regulatory measures for Mediterranean swordfish fisheries, several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems. The EU introduced a driftnet ban in 2002.

SWO-MED-6. Management recommendations

The Committee strongly recommends reducing the fishing pressure on juvenile swordfish in order to improve yield per recruit and spawning biomass per recruit. Technical measures that would favor protection of juveniles are listed in the 2001 SCRS Report, aimed at responding to the Commission's request regarding Resolution 00-5. Such measures include a closed season during the late autumn-winter months and minimum landing size limitations (see also Ref. 01-4).

In addition, given the uncertainty of the location of the boundary between the Mediterranean and North Atlantic stocks, it is important to identify the biological origin of those catches reported at or near the boundary so that the resulting knowledge can be considered in the management of the North Atlantic and/or Mediterranean stocks. The Committee continues to recommend that the Commission ensure that reliable data be provided on catch, effort and size for Mediterranean swordfish. Improvements to these basic inputs to the stock assessment are essential in order to achieve a robust assessment of the Mediterranean swordfish stock.

MEDITERRANEAN SWORDFISH SUMMARY

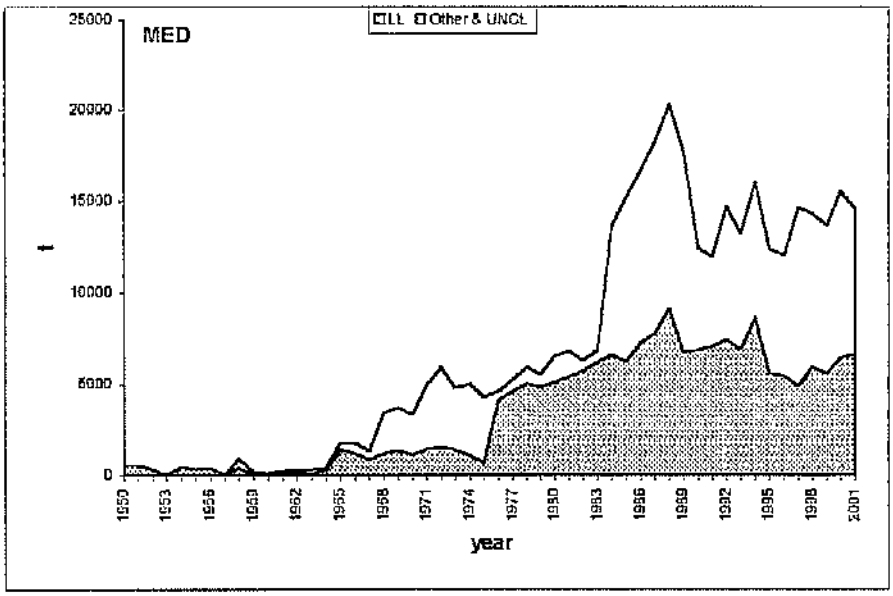
Maximum Sustainable Yield	Not estimated
Current (2001) Yield	14,624 MT
Replacement Yield	Not estimated
Relative Biomass (B_{1994}/B_{MSY})	Not estimated
Relative Fishing Mortality	
F_{1994}/F_{MSY}	Not estimated
F_{1994}/F_{max}	~ 1.1 (0.9 - 1.4)[1]
$F_{1994}/F_{0.1}$	~ 1.9 (1.5 - 2.4)[1]
Relative Recruitment	Not estimated[1]
Management Measures in Effect:	No ICCAT regulations; national closed areas, minimum size and effort controls.

1 Based on stock size weighted average F's for age 2 and 3 fish in 1993 from VPA analysis conducted in 1995. Approximate 80% CI based on estimated CV(F) = 0.2.
~ = approximate value.

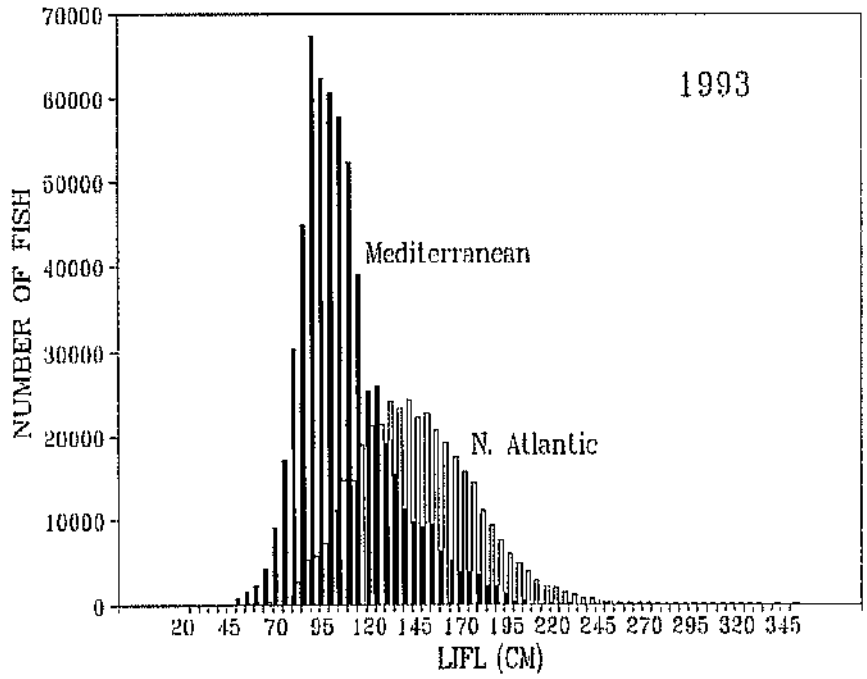
SWO-MED-Table 1. Estimated catches (MT) of Mediterranean swordfish in 1977-2001, by gear and flag.

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
MEDI	TOTAL		5280	5958	5547	6579	6813	6343	6896	13666	15228	16718	18288	20339	17761	12428	11987	14712	13250	16077	12416	12039	14676	14332	13679	15554	14624
	Landings	Longline	4606	5046	4877	5115	5411	5751	6239	6640	6260	7297	7781	9163	6784	6873	7083	7456	6932	8640	5634	5460	4943	5929	5599	6463	6673
		Other Surf.	674	912	670	1464	1402	592	657	7026	8968	9421	10507	11176	10977	5555	4904	7256	6318	7437	6782	6579	9733	8403	8080	9092	7951
		ALBANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	13	13	13	0	
		ALGERIE	370	320	521	650	760	870	877	884	890	847	1820	2621	590	712	562	395	562	600	807	807	807	825	709	816	1081
		CHINESE TAIPEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0
		CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	
		CYPRUS	95	82	98	72	78	103	28	63	71	154	84	121	139	173	162	73	116	159	89	40	51	61	92	82	135
		EC-ESPANA	667	720	800	750	1120	900	1322	1245	1227	1337	1134	1762	1387	1523	1171	822	1358	1503	1379	1186	1264	1443	905	1436	1475
		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	12
		EC-GREECE	0	0	0	0	91	773	772	1081	1036	1714	1303	1008	1120	1344	1904	1456	1568	2520	974	1237	750	1650	1520	1960	1730
		EC-ITALY	3747	4506	3930	4143	3823	2939	3026	9360	10853	11413	12325	13010	13009	5524	4789	7595	6330	7765	6725	5286	6104	6104	6312	7515	6388
		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	13	115
		JAPAN	0	2	3	1	0	5	6	19	14	7	3	4	1	2	1	2	4	2	4	5	5	7	5	0	0
		LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	8	6
		MALTA	223	136	151	222	192	177	59	94	108	97	131	207	121	122	119	71	76	42	58	58	83	116	167	160	89
		MAROC	144	172	0	0	0	0	43	39	38	92	40	62	97	1249	1706	2692	2589	2654	1695	2734	4900	3228	3238	2708	3026
		NEI-2	0	0	0	728	672	517	532	771	730	767	828	875	979	1360	1292	1292	0	0	0	0	0	0	0	0	
		TUNISIE	0	0	0	0	7	19	15	15	61	64	63	80	159	176	181	178	354	298	378	352	346	414	468	483	567
		TURKEY	34	20	44	13	70	40	216	95	190	226	557	589	209	243	100	136	292	533	306	320	350	450	230	373	

Empty cells for 2001 indicate that catches were not reported to ICCAT, before September 26, 2002, when the Species Group met.



SWO-MED-Fig. 1. Cumulative estimates of swordfish catches (reported and carried over 1950-2000, and reported 2001, in MT) in the Mediterranean by major gear, from 1950-2001.



SWO-MED-Fig. 2. Comparison of 1993 size distributions of swordfish catches in the Mediterranean (dark bars) and north Atlantic (lighter bars). It should be noted that the biological parameters (e.g. growth rate, size of maturity, etc.) are different between these areas (see Sections SWO-MED-1 and SWO-ATL-1). (Figure from 1999 Report, and not updated in 2002).

7.11 SBF-SOUTHERN BLUEFIN TUNA

No new information became available to the Committee in 2002. Therefore, this summary is the same as the one presented in 2001.

SBF-1. Biology

Southern bluefin tuna are distributed exclusively in the southern hemisphere of three oceans. The only known spawning ground is located in an area south of Java, Indonesia and off northwest Australia. Juveniles migrate southwards along the Australian west coast and stay in the coastal waters of southwest, south, and southeast Australia. As fish grow, they extend their distribution to cover the circumpolar area throughout the Pacific, Indian and Atlantic Oceans.

Southern bluefin tuna are considered to be mature at age 8 at the length of 155 cm. Though the life span of this species was considered to be about age 20 from the tagging results, recent analysis revealed that a significant number of fish bigger than 160 cm were older than age 25. The maximum age obtained from otolith analysis was age 42. Age-specific natural mortality, higher for young fish and lower for old fish, is supported by tagging experiments and applied for stock assessment. Southern bluefin tuna is a unique example of an acceleration of growth rate observed through 1960s to 1980s, that was supported by tagging experiments in that periods. This acceleration of growth rate is partially due to the fact that the stock has been faced with high fishing pressure in last fifty years.

Preliminary results from recaptured archival tags suggest that young fish migrate seasonally between the south coast of Australia and middle of the Indian Ocean. Archival tagging is noted as a powerful tool to investigate the biology and movement of fish.

SBF-2. Description of fisheries

Historically, the stock has been exploited by Australian and Japanese fishermen for more than 40 years. During this period, the Japanese longline fishery (taking older aged fish) recorded its peak catch of 77,927 MT in 1961 and the Australian catches of young fish by surface fishery peaked at 21,501 MT in 1982. New Zealand, Chinese Taipei and Indonesia have also exploited southern bluefin tuna, and Korea started a fishery in 1991.

The proportion of catch made by surface fishery peaked around the 1980s at the level of close to 50% of total catch, but declined afterward to 13%. The proportion of surface catch has dropped to 13-14% in 1992 and 1993 but has increased again and stayed around 30% since 1997 (**SBF-Table 1** and **SBF-Figure 1**).

The catches of Australia, Japan and New Zealand have been controlled with quota since 1985. The current catch limits are 5,265 MT for Australia, 6,065 MT for Japan, and 420 MT for New Zealand, which has remained at the same level since 1990. However, the catches by nations other than the aforementioned three have increased steadily and stayed at the level around 2,200 MT during 1991-1994 and then doubled to 4,689 MT in 1996. The catch by these nations stayed high as 4,539 MT in 1997, then increased again to 6,318 MT in 1998. Japan caught an additional 1,464 MT in 1998 and 2,198 MT in 1999 for the Experimental Fishing that was conducted to evaluate fish density in an area where no commercial operations have been carried out in recent years.

The Atlantic catch has varied widely between 400 and 6,200 MT since 1978 (**SBF-Table 1** and **SBF-Figure 2**), reflecting the shifts of longline effort between the Atlantic and Indian Oceans. The fishing ground in the Atlantic is located off the southern tip of South Africa (**SBF-Figure 3**).

Japanese longline vessels changed their catch retention practice to release fish less than 25 kg in 1995 and 1996, and a portion of these releases (considered to be dead discards) were incorporated into the total estimate of catch.

SBF-3. State of stock

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) established in 1994 has updated the stock assessment of this species. The information described below is based on the results of the Sixth Scientific Committee of CCSBT held in Tokyo, Japan, from August 19 to 31, 2001.

Nominal CPUE of Japanese longline CPUE for ages 4-7 and 8-11, CPUE in the New Zealand zone, and Taiwanese longline CPUE, indicated an increase since 1988 but the Japanese longline CPUE for age 12+ declined in the same period. Trends in CPUE by cohort suggested that the reduced quotas after 1988 had resulted in lower fishing mortality rates, leading better survival to age 8. Tagging estimates of fishing mortality rates showed an increasing trend in mortality at age 3 and 4 for 1993 and 1994 cohorts.

The Japanese longline CPUE are standardized based on interim approaches representing two hypotheses on fish density in cells without fishing effort (**SBF-Figure 4**). The CPUE for the parental stock (age 8 and older) continued to decline to the early 1990s and then stayed at about the same level except the last year. Juvenile CPUE declined through the 1970s to the mid 1980s but increased in 1993 to the different levels according to the hypotheses and then stayed about the same level afterward. The sequential increases in the global CPUE by age for fish born in the late 1980s can be followed from 3 year-olds in 1990 to 8 year-olds in 1995.

Various assessment procedures were utilized in 2001 including the ADAPT-type VPA using various model structures, hypotheses on biological parameters, and different interpretations of Japanese CPUE series, forward VPA incorporating errors in data, forward VPA based on catch at size data, and production models (**SBF-Figure 5**). The results consistently indicated a decline in recruitment with recruitments in the 1990s less than half of those in earlier years.

The estimated parental biomass showed substantial differences in absolute levels as well as relative trends according to assessment procedures and model hypotheses but models were much more consistent regarding trends in abundance during the last decade. The parental biomass is notably lower than the 1980 level, the management target level for stock recovery. Overall, parental biomass has been roughly stable since the mid-1990s or early 1990s depending on the models, then it was considered the recent removals as being close to recent surplus production. The recent trend in parental biomass varied from a continuous gradual decline to a slight upturn.

SBF-4. Outlook

Future projections were performed to examine the medium to long-term consequences of the current global catch on parental biomass. In general, assessments that resulted in low historical abundance/high fishing mortality scenarios indicated higher productivity and thus higher probability of stock recovery. The opposite was true for trajectories with high historical abundance and low fishing mortality. Projection under the current global catches resulted in either increasing or decreasing biomass trends depending on model assumptions and input data. The current global catch levels appeared to be roughly close to replacement yield. Consequently, projections showed divergent trends under the current catch level ranging from recovery to continued decline. Overall, few of the scenarios resulted in recovery to the 1980 parental biomass level by 2020 under the current global catches.

SBF-5. Effects of current regulations

Southern bluefin tuna has been managed through quota among Australia, Japan and New Zealand since 1985. The global quota was reduced several times from 38,650 MT in 1984-1985 season and the current quota has been maintained at 11,750 MT since the 1989-1990 season. These quota reductions and subsequent changes in the selectivity pattern for the surface fishery has resulted in increase in abundance of younger fish. At the current catch level, the probability of the parental biomass being larger in 2020 than it is today is about 50%, with an equal probability the stock will be smaller in 2020. There is little chance that the stock will be rebuilt to the 1980 levels by 2020, and substantial quota reductions would be required to achieve this goal.

Regarding the choice of quota levels over the next few years, the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) made the following comments: Any growth in non-party catches would be of

very serious concern and every effort should be made to decrease total removals or at least keep them at their current level. The low level of parental biomass in relation to historical level is recognized and there is an associated risk of further recruitment declines. This risk is not felt to be particularly high, thus an immediate reduction in total removals is not recommended as a necessary action to prevent stock collapse. It is believed that as the stock has changed relatively slowly under current catches, a policy of maintaining current removals would most likely enable it to react in a timely fashion to future stock trends. This ability would be enhanced if more certain monitoring of recruitment and parental biomass could be developed. There is a risk of stock declines if current removals are maintained, and depending upon members' aversion to this risk, differing the level of catch reductions would be appropriate forms of insurance for the sustainability of the current fishing industries.

SBF-6. Management recommendations

The Committee noted that the ICCAT statistical system will continue to be important for monitoring the fishery for this species in the Atlantic Ocean. While the CCSBT established in May 1994 has competence on the management of this species as a whole in the three oceans, ICCAT is responsible for the management of southern bluefin tuna in the Atlantic Ocean. Therefore, close collaboration should be maintained between the two organizations as regards stock assessments and management measures.

No recommendation was made for the management of southern bluefin tuna in the Atlantic.

SOUTHERN BLUEFIN TUNA SUMMARY
(for global stock)

Maximum Sustainable Yield	Not estimated
Current (2000) Yield	15,579 MT (preliminary)
Current Replacement Yield	Around 16,000 MT
Relative Biomass SSB (2000)/SSB (1980)	0.17 - 0.76
Current Management Measures in Effect:	- Global quota at 11,750 MT (applicable only to Australia, Japan and New Zealand).

SBF-Table 1. Atlantic and world southern bluefin catch (MT) by gear, area and country.

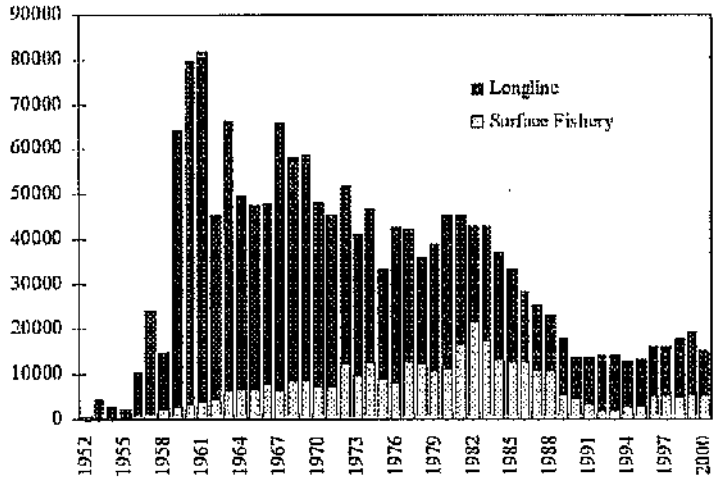
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999*	2000*
ATLANTIC TOTAL	753	3168	4685	6205	2827	2578	1138	525	1636	1497	432	1204	622	711	1266	1346	539	2160	767	1612	1376	358	1020	934	1800
-CATCH BY GEAR																									
Longline	753	3168	4685	6205	2814	2572	1138	525	1636	1497	432	1200	620	705	1266	1346	539	2160	767	1612	1376	358	1020	934	1799
Baitboat	0	0	0	0	13	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Sport	0	0	0	0	0	0	++	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	4	2	5	0	0	0	0	0	0	0	0	0	0	0
-CATCH BY FLAGS																									
Chinese-Taipei	61	0	34	13	26	66	3	20	0	29	43	80	72	80	64	15	14	472	172	168	157	47	137	71	215
Japan	692	3168	4651	6192	2788	2506	1135	505	1636	1468	389	1120	548	625	1202	1331	525	1688	595	1444	1219	301	882	835	1538
Korea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	28	62
Poland	0	0	0	0	0	0	0	0	0	0	0	4	2	5	0	0	0	0	0	0	0	0	0	0	0
South Africa LL	0	0	0	0	13	6	++	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
South Africa BB																									1
World Catches (all oceans)	*42509*	*42178*	*35908*	*38673*	*45054*	*45104*	*42788*	*42881*	*37090*	*33325*	*28319*	*25575*	*23145*	*17842*	*13869*	*13638*	*13445*	*13686*	*12962*	*12982*	*16298*	*15915*	*17725*	*19589*	*15579*
Longline	*34099*	*29609*	*23718*	*27890*	*33859*	*28261*	*21287*	*25186*	*23679*	*20736*	*15788*	*14754*	*12554*	*11724*	*9283*	*9149*	*8197*	*8313*	*8262*	*8474*	*11170*	*10599*	*13829*	*14037*	*10448*
Surface Fishery	*8383*	*12569*	*12190*	*10783*	*11195*	*16843*	*21501*	*17695*	*13411*	*12589*	*12531*	*10821*	*10591*	*6118*	*4586*	*4489*	*5248*	*5373*	*4700*	*4508*	*5128*	*5316*	*4896*	*5552*	*5131*

* Preliminary

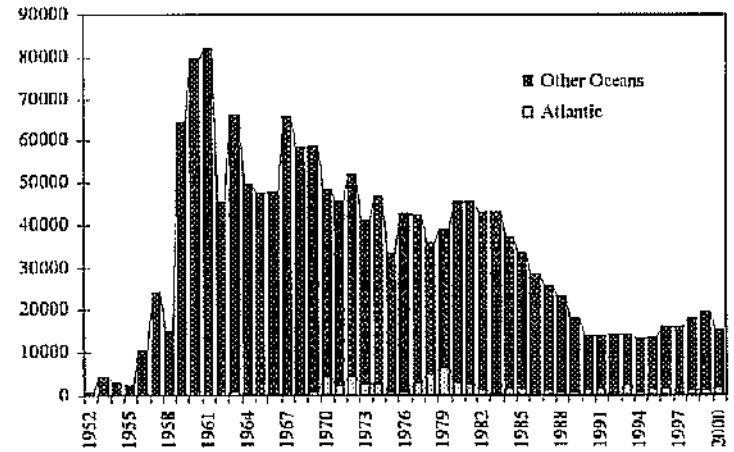
++ Catch < 0.5 MT.

Source : Catch by Japan – ICCAT Japanese National Report

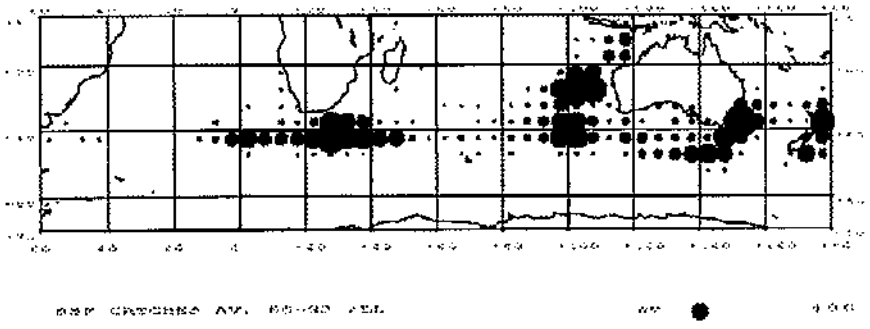
World catches – Reports of the Sixth Meeting of the Scientific Committee of CCSBT (Tokyo, August 2001).
Australian domestic catch was considered to be made by the surface fishery, unless the catch estimate by Australian domestic vessels available.
Catches by the other nations except those taken by Chinese Taipei gillnets were assigned to longline fishery.



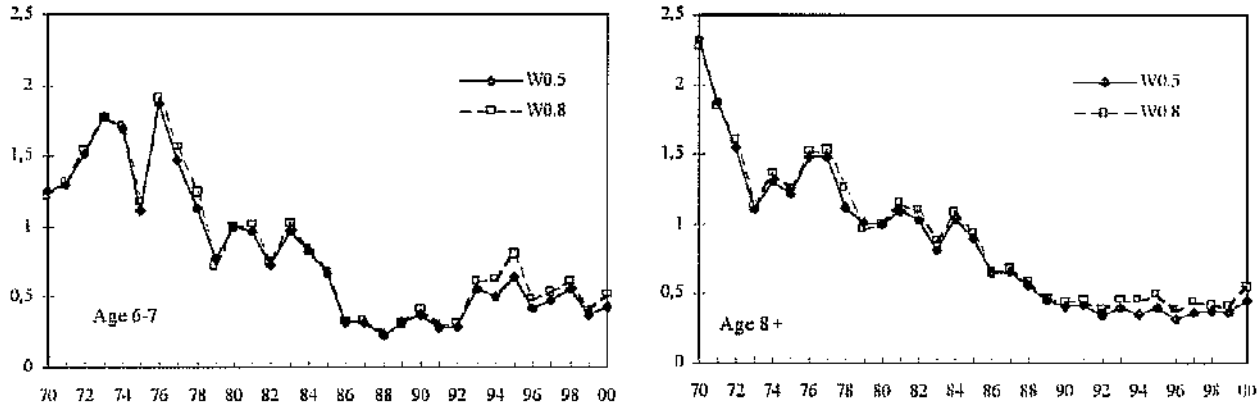
SBF-Fig.1 Southern bluefin tuna global catch, by fishery.



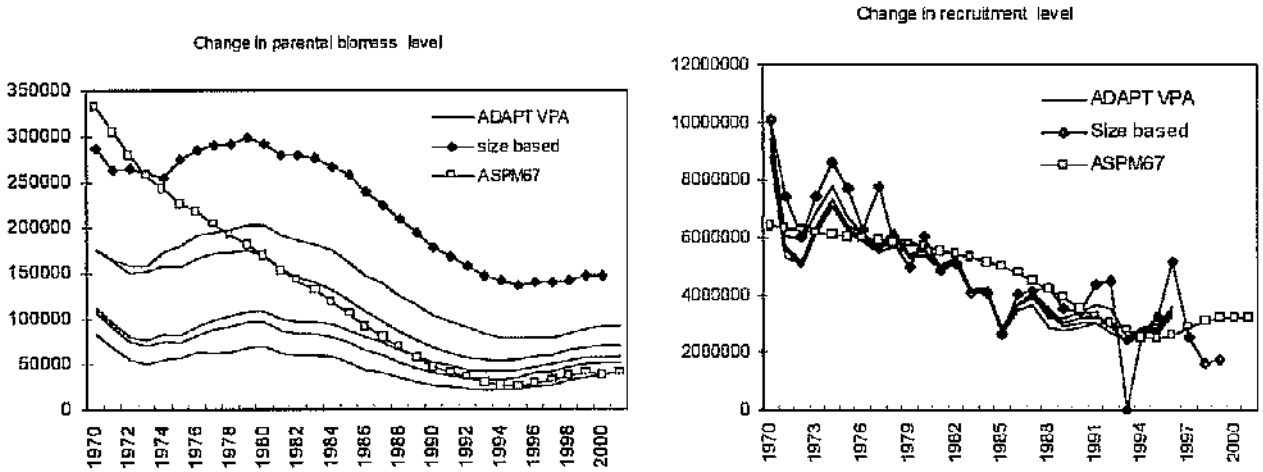
SBF-Fig. 2 Global and Atlantic catch of southern bluefin tuna.



SBF-Fig. 3 Geographical distribution of southern bluefin tuna catch by longline, 1960-1993



SBF-Fig. 4 Standardized CPUE of Japanese longline relative to 1980 for juvenile (age 6-7) and parental (age 8+) southern bluefin tuna. Different lines corresponded to different hypotheses on fish abundance within time-area strata without fishing effort.



SBF-Fig. 5 Estimated trends of parental biomass and recruitments by various assessment procedures by Japan. (Reference: Report of the Second Stock Assessment Group Meeting of the CCSBT.)

7.12 SMT - SMALL TUNAS

SMT-1. Biology

Very little is currently known about the biology of small tunas. In fact, scientific studies on these species are rarely undertaken. This is largely because many of these species are considered to have little economic importance to the Atlantic tuna fleets, and because of difficulties in sampling landings from artisanal fisheries, which constitute a high proportion of the fisheries exploiting small tuna resources. The exceptions are some stocks of Spanish and king mackerel, such as those found in U.S. and Brazilian waters. The large industrial fleets often discard small tuna catches at sea or sell them in local markets, especially in Africa. The amount caught is rarely reported in logbooks.

These species are widely distributed in the tropical and subtropical waters of the Atlantic Ocean, the Mediterranean Sea, and the Black Sea. They are often found in large schools with other small sized tunas or related species in coastal and offshore waters. They have a varied diet with a preference for small pelagics (e.g. clupeids, mullets, carangids and ammodytes), crustaceans, mollusks and cephalopods. The reproduction period varies according to species and spawning generally takes place near the coast, where the waters are warm.

A recent study presents some preliminary results of the 2nd TUNIBAL survey carried out around the Balearic archipelago during June 5-30, 2002. The results of this survey determined the abundance and spatial distribution and size frequencies of bluefin tuna larvae together with some tuna species, such as *Auxis rochei* and albacore off the Balearic Islands. The spawning strategy of these tuna species showed rather clear relations with the Balearic circulation pattern and some mesoscale hydrographic features, such as, frontal structures and anticylonic gyres.

Another study on bullet tuna (*Auxis rochei*) and bonito (*Sarda sarda*) try to determine the occurrence of possible migrations by both species in relation to spawning area in the Catalan coast (NW Mediterranean). According to the results, the occurrence of both species showed a highly seasonal variability in the area, attributed to a reproductive migration. These two small tunas exhibit different spawning behaviors in the western Mediterranean, which may be a strategy to avoid competition between two similar species which, moreover, spawn at the same time of the year.

In the eastern tropical Atlantic, the size-at-first-maturity is about 42 cm for Atlantic black skipjack (*Euthynnus alletteratus*), 30 cm for *Auxis* spp., 38 cm for Atlantic bonito (*Sarda sarda*), and 45 cm for mackerel (*Scomberomorus* spp.). 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.

Recent studies indicate that some species of small tunas, ex. *Auxis* spp., could have an important role in large yellowfin diet. This was observed in the Pacific Ocean but also in the Atlantic tropical waters, where large quantities of frigate tuna were found in large yellowfin stomach contents.

SMT-2. Description of the fisheries

Small tunas are exploited mainly by coastal fisheries and often by artisanal fisheries, although substantial catches are also made, either as target species or as by-catch, by purse seiners, mid-water trawlers (i.e. pelagic fisheries of West Africa-Mauritania), handlines and small scale gillnets. Unknown quantities of small tuna also comprise the incidental catches of some longline fisheries. Some U.S. sport fisheries target Spanish and king mackerels on a seasonal basis.

There are over ten species of small tunas, but only five of these accounts for 84% of the total reported catch by weight each year. These five species are: Atlantic bonito (*Sarda sarda*), frigate tuna (*Auxis thazard*), Atlantic black skipjack (*Euthynnus alletteratus*), king mackerel (*Scomberomorus cavalla*), and Atlantic Spanish mackerel (*Scomberomorus maculatus*) (**SMT-Figure 2**). Historical landings of small tunas for the period 1977 to 2001 are shown in **SMT-Table 1**. The total reported landings of all species combined during the period 1977 to 1979, reached 80,697 MT. In 1980, there was a marked increase in reported landings, reaching a peak at about 143,845 MT in 1988 (**SMT-Figure 1**). Landings reported for the period 1989-1995 decreased to about 88,617 MT, and then an oscillation in the values in the following years up to 2000 is observed, when the catch reached 80,299

MT. This decrease seems to be related to unreported catches, as these species usually comprise part of the by-catch, and are often discarded, and do not reflect the real catch.

A preliminary estimate for the total nominal landings of small tunas in 2001 is 85,622 MT. The Committee noted the relative importance of small tuna fisheries in the Mediterranean Sea, which account for 26% of the total reported catch in the period 1977-2001.

During the Sixth GFCM/ICCAT Meeting on Stocks of Large Pelagic Fishes in the Mediterranean Sea, held in Malta, April 15 to 19, 2002, FAO provided the Secretariat with a table showing the discrepancies between the FAO database and the ICCAT databases for the Mediterranean area. Most of discrepancies referred to small tunas and countries that did not normally report to ICCAT. Data for Gaza-Strip, Bulgaria, Syria, Malta, Turkey, and Yugoslavia Federal Republic, for the 1996-2000 period were incorporated in the ICCAT database.

Since 1991, tropical purse-seiners operating around artificial flotsam (fish aggregating devices) may have led to an increase in fishing mortality of small tropical tuna species. These species usually comprise part of the by-catch, sometimes discarded, but the majority of these catches are now being monitored and a species composition breakdown has now become available (**SMT-Figure 3; SMT-Figure 4**).

The large purse seiners based in Abidjan sell commonly at the local market various species of tunas and some associated species, unsuitable for canning. This practice, minor by the beginning in the mid 1970's, increased in the 1980's and became important in the 1990's with the generalization of drifting FADs and sustained demand. The species and size composition of these fish were monitored in 1993 and 1998-1999 period (**SMT-Figure 5; SMT-Figure 6**). The main species observed were frigate tuna (*Auxis thazard*), Atlantic black skipjack (*Euthynnus alletteratus)*, bigeye, yellowfin and skipjack and the proportion of fish are variable from year to the other, due to several factors among them the price of skipjack. The change in the relative proportion of *Auxis* (20,7% in 1993, 48,7% in 1998 and 48,1% in 1999) and *Euthynnus alletteratus* (7,9%, 18,5% and 19,6%) reflect probably their availability to purse seiners.

Despite recent improvements in statistical reporting by some countries, the Committee also noted that uncertainties remain regarding the accuracy and completeness of reported landings in all areas, including the Mediterranean, and that there is a general lack of information on the mortality of these species as by-catch.

SMT-3. State of the stocks

There is little information available to determine the stock structure of many small tunas species. It was noted that some size data for small tunas from tropical tuna fleets were available, but these had not been submitted to the Secretariat. The Committee suggests that countries be requested to submit all available data to ICCAT as soon as it is possible, in order to be used in future Committee meetings.

Age-structured stock assessments of Spanish mackerel and king mackerel are carried out for the coastal areas of the southeastern United States and the Gulf of Mexico. These assessments indicated that the stocks of Atlantic Spanish mackerel and king mackerel in the Gulf of Mexico were over-exploited. Reductions in fishing mortality were considered necessary, and hence a number of regulations (commercial trip limits, seasonal and area quotas, and recreational bag limits) have been implemented in order to allow the stocks to recover to levels that could provide high average long-term yields and to provide adequate safeguards against recruitment failure. Improvement in stock status has been observed in the Gulf of Mexico Spanish mackerel and king mackerels and these stocks are no longer considered over-fished mainly due to the management actions taken.

Current information does not generally allow for an evaluation of stock status by the Committee for most of the coastal pelagic species. Most stocks, however, probably do not have an ocean-wide distribution. For this reason, the majority of the stocks can be managed at the regional or sub-regional level.

SMT-4. Outlook

The results of an ICCAT questionnaire circulated in 1996 indicate that small tuna fisheries are very diverse and complex, involving both artisanal and industrial fisheries using a variety of gears, as well as different types and sizes of vessels. The results also indicate that data collection and research including size sampling, age and

growth research, maturity studies and tagging, are being conducted by several countries but the results of such studies are not often reported to ICCAT.

It was noted from some scientific documents that frigate tuna (*Auxis thazard*) may include bullet tuna (*Auxis rochei*) catches, as some countries confused these species and report *Auxis rochei* as frigate tuna.

Catch and effort statistics for small tunas remain incomplete for many of the coastal and industrial fishing countries. There is also a general lack of available biological information needed to assess the stocks of most of these species. On the other hand, many of these species are of importance to coastal fishermen, especially to some developing countries, both economically and as a source of protein. The Committee therefore reiterates its previous recommendation that studies should be conducted to determine the state of these stocks and the best way to manage them. Such studies are probably best carried out at the local or sub-regional level.

SMT-5. Effects of current regulations

There are no ICCAT regulations in effect for these small tuna species.

SMT-6. Management recommendations

No recommendations were presented due to the lack of data and analyses.

SMT-Table 1. Estimated landings (reported and carried over, in MT) for small tuna species in 1977-2001, by region and flag.

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
TOTAL			78950	75631	80697	115299	115795	133655	127809	111486	93303	91961	113747	143847	126346	116479	109877	84977	103999	87868	88617	112311	107304	98987	91496	80299	85622
	ATL		64208	59997	60606	89408	81378	93614	83731	87843	67527	68639	84700	110760	105621	83368	75133	63033	73457	65682	67110	86956	88331	63933	58640	52282	57960
	MED		14742	15634	20091	25891	34417	40041	43078	23643	25776	23322	29047	33087	20725	33111	34744	21944	30542	22186	21507	25355	18973	35054	32856	28096	27662
BLF	*TOTAL ATL*		*1251*	*1341*	*1205*	*1175*	*1973*	*1941*	*1738*	*1908*	*1403*	*2822*	*3462*	*3323*	*2834*	*3686*	*4262*	*4353*	*3535*	*2719*	*4051*	*4488*	*3027*	*3238*	*3185*	*2350*	*6953*
	BRASIL		1524	1536	1378	1356	2058	2030	1795	2111	1537	2994	3716	3551	2954	4223	4332	4102	3557	2757	4204	5137	3445	3293	3240	2396	3039
	CUBA		0	0	0	0	721	622	558	487	157	486	634	332	318	487	318	196	54	223	156	287	287	0	0	0	
	DOMINICA		0	0	0	0	0	0	0	0	0	0	0	1	4	19	10	14	15	19	30	0	0	0	79	83	83
	DOMINICAN REP.		68	78	105	125	124	144	144	106	90	123	199	4	564	520	536	110	133	239	892	892	0	0	0	0	
	EC-ESPANA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	307	46	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-GUADELOUPE		530	530	470	440	460	490	482	490	460	470	470	450	460	470	460	470	440	440	480	500	500	500	500	500	500
	EC-MARTINIQUE		300	400	300	300	301	352	327	331	295	259	199	366	395	395	750	700	700	890	890	540	540	540	540	540	540
	GRENADA		71	76	95	68	84	143	102	232	193	256	141	220	134	293	195	146	253	189	123	164	126	233	94	164	223
	JAMAICA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	148	0	0	0	0	
	LIBERIA		0	0	0	0	0	0	0	0	0	0	0	229	0	0	0	0	0	0	0	0	0	0	0	0	
	MEXICO		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
	NETHERLAND.ANT		0	55	55	55	55	55	55	55	55	60	60	70	70	70	60	60	65	60	50	45	45	45	45	45	45
	ST.LUCIA		0	0	0	0	0	0	0	0	0	0	2	1	1	17	14	13	16	82	47	35	40	100	41	45	108
	ST.VINCENT		0	0	0	0	0	0	0	0	0	0	0	19	15	38	11	7	53	19	20	18	22	17	15	23	24
	U.S.A.		0	0	0	0	139	41	7	0	11	32	44	154	87	81	112	127	508	492	582	447	547	707	617	326	474
	UK-BERMUDA		9	7	7	6	4	5	6	4	9	17	11	7	14	13	8	6	5	7	4	5	4	6	6	5	4
	VENEZUELA		0	0	0	0	0	0	0	0	0	947	1448	1240	652	1150	1598	2148	1224	21	624	758	498	1034	1192	589	1902
BLT	*TOTAL ATL*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*357*	*723*	*3634*	*2206*	*814*	*494*	*177*	*100*	*0*	*0*	*28*	*579*	*1230*	*1577*
	EC-PORTUGAL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	263	494	208
	RUSSIA FED.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2171	814	70	100	100	0	0	0	0	420	1053
	ST.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
	TURKEY		0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	324	77	0	0	0	0	316	316	316
	U.S.A.		0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	U.S.S.R.		0	0	0	0	0	0	0	0	0	0	0	357	723	3634	0	0	0	0	0	0	0	0	0	0	0
BON	*TOTAL*		*20676*	*17273*	*19971*	*31733*	*40053*	*43687*	*42837*	*22505*	*25433*	*21990*	*30252*	*46902*	*30062*	*28941*	*34055*	*22025*	*30584*	*21505*	*20841*	*24585*	*24511*	*38293*	*33797*	*26986*	*25649*
	ATL		*11977*	*7854*	*6485*	*12565*	*10760*	*12169*	*6840*	*6849*	*6946*	*5892*	*7395*	*22354*	*17766*	*6544*	*8306*	*6914*	*4557*	*5823*	*5652*	*7390*	*10433*	*5563*	*6096*	*5014*	*4879*
	MEDI		*5699*	*9419*	*13486*	*19165*	*29293*	*31518*	*35997*	*15656*	*18487*	*16098*	*22857*	*24548*	*12296*	*22397*	*25749*	*15111*	*25997*	*15682*	*15189*	*17195*	*14078*	*29730*	*27701*	*21972*	*20770*
	ATL	ANGOLA	938	531	251	377	196	253	124	225	120	101	144	180	168	128	102	4	49	20	9	39	32	0	2	118	118
		ARGENTINA	2026	1746	1288	2600	816	1775	310	2058	1399	699	1607	2794	1327	1207	1794	1559	434	4	138	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	1
		BENIN	0	0	13	19	32	36	16	25	30	6	3	4	7	0	0	0	0	0	0	0	0	0	0	0	
		BRASIL	0	0	0	0	0	0	0	187	179	523	345	314	273	226	78	86	142	142	137	0	0	0	0	0	0
		BULGARIA	37	22	0	75	8	23	46	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
		CUBA	0	0	0	0	0	0	0	0	0	0	25	173	26	28	0	0	0	0	0	0	0	230	0	0	
		EC-ESPANA	1978	1919	717	220	589	434	414	173	398	145	41	91	57	18	8	39	5	3	2	2	1	0	12	12	17
		EC-FRANCE	0	0	0	8	0	0	2	17	1	0	0	0	0	0	0	0	52	0	0	0	0	0	34	32	0
		EC-GERMANY	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	0	0	0	0	0	0	0	0	
		EC-GREECE	0	30	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EC-GUADELOUPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
EC-MARTINIQUE	510	400	500	500	502	587	545	552	491	431	331	395	427	430	810	770	1000	990	990	610	610	610	0	0	
EC-PORTUGAL	0	0	6	13	31	55	86	56	50	168	371	377	80	202	315	133	145	56	78	83	49	98	98	162	47
EC-U.K.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	287	0	0	0	0	
ESTONIA	0	0	0	0	0	0	0	0	0	0	0	668	859	187	8	0	0	0	0	0	0	0	0	0	
GEORGIA	0	0	0	0	0	0	0	0	0	0	0	39	54	0	0	0	0	0	0	0	0	0	0	0	
GERMANY D.R.	0	0	0	288	440	146	274	26	40	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
GHANA	9	9	0	77	5	71	13	8	10	0	943	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRENADA	136	157	53	52	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	6	14	16	7	10
JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	
LATVIA	0	0	0	0	0	0	0	0	0	0	0	1191	1164	221	7	4	0	3	19	301	887	318	0	416	396
LITUANIA	0	0	0	0	0	0	0	0	0	0	0	1041	762	162	11	10	0	0	0	0	0	0	0	0	
MAROC	131	171	196	312	477	535	561	310	268	251	241	589	566	492	794	1068	1246	584	699	894	1259	1557	1390	2163	1700
MEXICO	81	59	174	271	408	395	567	744	212	241	391	356	338	215	200	657	779	674	1144	1312	1312	0	0	0	0
NETHERLAND.ANT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
PANAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
POLAND	177	44	32	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	225	0	0	0	0	
RUMANIA	139	19	0	64	81	249	192	8	32	71	3	255	111	8	212	84	0	0	0	0	0	0	0	0	
RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	948	29	0	0	0	0	0	0	0	0	574
SENEGAL	614	523	159	140	1327	202	497	200	495	510	463	2066	869	558	824	378	227	600	354	570	1513	1857	1441	1441	1441
SIERRA LEONE	0	0	0	57	30	5	5	5	10	10	10	10	10	10	4	6	0	0	0	0	0	0	0	0	
SOUTH AFRICA	2	16	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	1	0	3	3	3	4	1	1	1	0	0	0	0	0
TOGO	0	0	0	0	0	0	0	0	254	138	245	400	256	177	172	107	311	254	145	197	197	197	197	0	
TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	703	169	266	220	30	117	117	56
U.S.A	368	224	502	198	333	209	253	217	110	84	130	90	278	299	469	498	171	128	116	156	182	76	83	142	120
U.S.S.R	4164	1602	2125	6433	4559	6329	2375	1290	2073	1085	1083	8882	7363	706	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	1385	985	0	0	25	0	0	0	342	2786	1918	1114	399	399
URUGUAY	0	0	16	3	1	0	1	0	0	3	0	0	0	0	26	0	0	0	0	0	0	0	0	0	
VENEZUELA	767	382	443	861	833	864	554	748	774	1401	1020	1153	1783	1514	1518	1454	5	1661	1651	1359	1379	1659	1602	2	0
MEDI ALBANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	
ALGERIE	206	196	515	640	740	860	867	874	880	459	203	625	1528	1307	261	315	471	418	506	277	357	511	475	405	350
BULGARIA	44	11	1	13	191	4	24	1	1	0	13	0	0	17	17	20	8	0	25	33	16	51	20	35	35
CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	128	6	70	0	0	0	25	120	0	
CYPRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	
EC-ESPANA	610	711	713	480	710	990	1225	984	1045	729	51	962	609	712	686	238	200	344	632	690	628	333	433	343	343
EC-FRANCE	0	0	0	0	0	0	33	16	0	0	0	10	0	1	10	5	6	0	0	0	0	0	0	0	0
EC-GREECE	550	610	712	809	1251	1405	1367	1732	1321	1027	1848	1254	2534	2534	2690	2690	2690	1581	2116	1752	1559	915	2135	1914	1550
EC-ITALY	1533	1378	1403	1180	1096	1102	1806	2777	1437	1437	2148	2242	1369	1244	1087	1288	1238	1828	1512	2233	2233	2233	4159	4159	4159
EGYPT	1	17	10	3	2	23	14	48	62	68	35	17	358	598	574	518	640	648	697	985	725	724	1442	1442	1128
LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	70	0	0	0	0	0	0	0	
MALTA	2	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	7	2	2	1	0
MAROC	456	128	155	62	309	71	92	75	57	31	127	108	28	69	69	31	25	93	37	67	45	39	120	115	5
NEI-2	0	0	0	295	274	276	452	694	359	359	537	561	342	311	311	311	300	300	300	300	75	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	
TUNISIE	768	791	865	700	381	748	600	600	482	504	500	600	422	488	305	445	792	305	413	560	611	855	1350	1528	1183

			1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
		TURKEY	4503	5536	9082	14910	24300	25978	29485	7818	12809	11426	17333	18133	5008	14737	19645	8863	19548	10093	8943	10284	7810	24000	17900	12000	12000
		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
		YUGOSLAVIA	26	39	29	72	39	61	31	37	34	38	62	36	98	79	0	0	0	0	0	0	0	0	0	0	0
		YUGOSLAVIA REP. FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	3	2	6	10	12	12	14	17	17
BOP		*TOTAL*	*456*	*970*	*492*	*698*	*1448*	*584*	*38*	*49*	*133*	*87*	*564*	*1482*	*1116*	*457*	*568*	*600*	*601*	*775*	*640*	*2136*	*476*	*159*	*844*	*1193*	*984*
		ATL	*321*	*817*	*464*	*698*	*1449*	*584*	*35*	*49*	*124*	*86*	*535*	*1474*	*1109*	*420*	*487*	*424*	*349*	*599*	*525*	*2004*	*249*	*29*	*627*	*1048*	*830*
		MEDI	*135*	*153*	*28*	*0*	*0*	*0*	*0*	*0*	*9*	*1*	*26*	*8*	*7*	*37*	*101*	*176*	*252*	*176*	*115*	*132*	*227*	*130*	*217*	*145*	*154*
	ATL	BENIN	0	0	1	1	2	2	1	1	1	3	1	2	1	1	1	1	1	1	1	1	3	1	1	0	
		EC-PORTUGAL	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		MAROC	231	727	373	596	968	483	0	0	83	33	487	1422	1058	369	486	423	348	598	524	2003	246	28	626	1048	830
		MAURITANIE	90	90	90	101	478	99	37	40	40	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0
	MEDI	ALGERIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	135	198	153	92	119	224	128	216	135	145
		LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	0	0	0	0	0	0	0	0
		MAROC	135	153	28	0	0	0	0	0	9	1	26	8	7	37	14	1	14	23	23	13	3	2	1	10	9
BRS		*TOTAL ATL*	*3188*	*3484*	*3722*	*5617*	*5841*	*6019*	*6632*	*8129*	*3591*	*6549*	*6212*	*9510*	*10778*	*7698*	*8856*	*6051*	*8049*	*7161*	*7006*	*9435*	*8004*	*7923*	*5754*	*4785*	*4553*
		BRASIL	986	1523	1191	2826	3466	4342	4511	6259	1504	5011	4741	5063	5927	2767	8437	1149	842	1149	1308	3047	2125	1516	1516	988	251
		GRENADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
		GUYANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	211	571	625	1143	308	329
		TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	2704	2864	2471	2749	2130	2130	2130	1816	1568	1699	2130	1328	1722	2207
		VENEZUELA	2202	1962	2531	2791	2375	1677	2121	1870	1997	1538	1471	1743	1987	2160	4670	2772	5077	3882	3882	3609	3609	3651	1766	1766	1766
CER		*TOTAL ATL*	*629*	*698*	*586*	*694*	*628*	*687*	*677*	*680*	*574*	*500*	*392*	*219*	*254*	*225*	*373*	*390*	*450*	*490*	*429*	*279*	*250*	*250*	*0*	*3*	*5*
		DOMINICAN REP.	119	98	86	104	106	76	110	106	63	52	48	57	59	50	45	79	50	90	29	29	0	0	0	0	
		EC-GUADELOUPE	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-MARTINIQUE	510	600	500	590	522	611	567	574	511	448	344	162	175	175	330	310	400	400	400	250	250	250	0	0	
		ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5
		ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
FRI		*TOTAL*	*20020*	*8343*	*12575*	*20912*	*15943*	*25240*	*21690*	*25903*	*22876*	*20306*	*23407*	*25151*	*21416*	*23333*	*15670*	*8083*	*11328*	*10818*	*10242*	*17932*	*15936*	*15595*	*11445*	*11752*	*11862*
		ATL	*16611*	*4776*	*8565*	*16960*	*12255*	*19197*	*15970*	*19566*	*17636*	*15249*	*19667*	*19025*	*15029*	*14973*	*9099*	*3182*	*6301*	*5695*	*5941*	*12023*	*12872*	*11315*	*9355*	*9066*	*7967*
		MEDI	*3409*	*3567*	*3707*	*3952*	*3678*	*6043*	*5820*	*6337*	*5240*	*5057*	*3740*	*6126*	*6387*	*8360*	*6571*	*4901*	*5027*	*5123*	*4301*	*5909*	*3064*	*2250*	*2090*	*2686*	*3595*
	ATL	ANGOLA	197	357	357	256	351	515	212	256	90	21	115	20	70	28	1	0	4	6	21	29	12	31	2	38	38
		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	0
		BENIN	0	0	25	37	64	72	32	49	50	1	3	6	3	0	0	0	0	0	0	0	0	0	0	0	
		BRASIL	0	0	0	0	0	72	11	634	623	941	1260	1904	700	592	746	291	608	906	558	527	215	162	166	106	98
		BULGARIA	0	0	0	3	3	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		CAP-VERT	0	0	0	0	0	0	0	0	0	0	2	86	105	75	135	82	115	86	13	6	22	191	154	81	171
		COTE D'IVOIRE*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5174	0	0	5269	-1158	-1502	5772	6768	4800
		EC-ESPANA	574	1249	1211	6260	5295	3128	2691	5716	3702	3164	4538	3938	1877	2240	541	228	362	297	386	947	581	570	23	17	713
		EC-FRANCE	0	0	0	0	0	0	0	610	416	1904	3392	3392	3008	3872	0	121	63	105	136	161	147	146	0	91	127
		EC-PORTUGAL	0	0	0	0	0	0	0	14	30	32	2	2	4	26	3	0	0	0	0	0	1	31	5	9	28
		ESTONIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	198	0	0	0	0	0	0	0	0	0	
		F.I.S	0	0	0	0	1856	1984	2800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GERMANY D.R	0	0	0	0	0	106	55	40	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		GHANA	13914	1047	4286	7566	2048	6062	5632	4530	4500	3256	4689	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GRENADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
		JAPAN	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

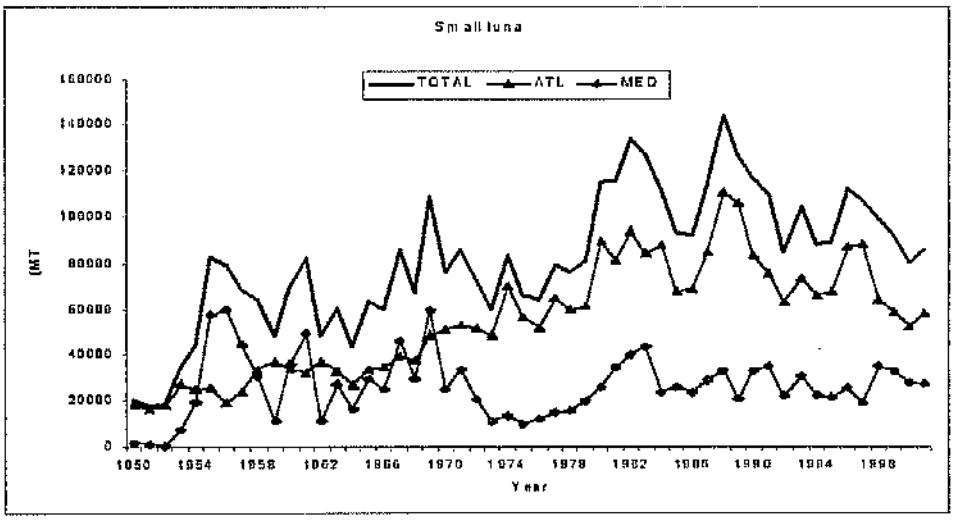
		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	LATVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243	0	0	0	0	0	0	0	0	0	
	LITUANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	
	MAROC	688	770	694	968	1267	1126	1271	198	424	302	465	194	599	1045	1131	332	274	122	645	513	2614	2137	494	582	418
	NEI-I	0	0	0	0	0	0	333	46	0	0	17	381	155	237	246	61	150	409	443	894	700	493	488	281	1130
	NETHERLAND.ANT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215	
	PANAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243	57	118	341	327	240	91	0	0	0	
	RUMANIA	0	0	0	0	0	0	0	0	0	51	15	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3249	1441	220	505	456	46	500	761	477	477	0
	SAO TOME & PRINCIPE	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	79	323	0	0	0	
	SENEGAL	0	0	0	0	0	0	0	0	0	0	0	850	784	1082	311	201	309	309	309	0	0	0	0	0	0
	TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	56	199	368	127	138	138	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	242	803	450	694	407	5623	1655	5903	6055	3465	2905	5638	5054	2739	0	0	0	0	0	0	0	0	0	0	0
	UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	48	
	VENEZUELA	907	550	1845	1176	944	509	1171	1478	1746	2109	2264	2654	2670	3037	1762	368	886	2609	2601	3083	2839	2164	1631	215	444
MEDI	ALGERIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174	270	348	306	230	237	179	299	173	225	230
	CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	24	52	22	28	26	26	26	26	0	0
	EC-ESPANA	1184	1676	1771	2120	1700	1935	2136	2301	2047	1555	631	2669	2581	2985	2226	1210	648	1124	1472	2296	604	487	669	1024	522
	EC-FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	4	0	0	1	0	0	0	0	0	0
	EC-GREECE	0	0	0	0	516	2192	1887	3060	1419	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1426	1426	0	0	196	125
	EC-ITALY	1147	1177	1342	1376	1193	1299	1494	1610	1344	1344	906	609	589	494	432	305	379	531	531	229	229	229	462	462	462
	MALTA	9	33	11	18	4	9	11	4	1	13	5	8	18	21	20	11	10	1	2	3	6	6	3	1	0
	MAROC	234	69	73	10	14	77	57	52	48	175	178	811	1177	2452	1289	1644	170	1226	621	1673	562	1140	682	763	256
	TUNISIE	811	589	493	409	237	517	218	294	367	538	606	588	660	985	985	35	20	13	14	13	26	87	38	7	2292
	YUGOSLAVIA	24	23	17	19	14	14	18	16	14	32	14	41	42	23	0	0	0	0	0	0	0	0	0	0	0
	YUGOSLAVIA REP. FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	1	0	0	2	6	6	6	7	8	8
XGM	*TOTAL ATL*	*8732*	*6769*	*11450*	*15656*	*18513*	*18149*	*14607*	*13182*	*9964*	*12187*	*11890*	*13038*	*10835*	*12252*	*11530*	*12439*	*14462*	*13868*	*14916*	*17775*	*19712*	*12861*	*14567*	*10070*	*11624*
	ANTIGUA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	ARGENTINA	988	379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRASIL	790	845	848	1598	1612	1929	2695	2588	806	2890	2173	2029	2102	2070	962	979	1380	1365	1328	2890	2398	3595	3595	2344	1251
	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	0
	DOMINICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	35	35
	DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	20	29	33	34	47	52	0	0	0	589	288	230	226	226
	GRENADA	162	175	73	25	30	43	40	19	0	0	0	0	0	0	0	0	0	0	0	2	4	28	14	9	4
	GUYANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	270	440	398	264	239
	MEXICO	1331	1535	2249	1946	2740	4409	2874	2164	2303	2643	3067	3100	2300	2689	2147	3014	3289	3097	3214	4661	4661	0	0	0	0
	ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	9	1
	TRINIDAD & TOBAGO	0	0	0	0	0	0	20	43	11	38	82	752	541	432	657	0	1192	0	171	1029	875	746	447	432	410
	U.S.A	3837	2507	6292	10726	12565	9863	7068	7414	6013	5683	5628	5807	4363	5939	6502	7091	7747	6922	7345	7031	8772	7423	7423	4377	7034
	VENEZUELA	1624	1328	1988	1361	1566	1905	1910	924	833	933	910	1330	1500	1069	1228	1308	801	2484	2558	2140	2139	340	2424	2424	2424
XGV	*TOTAL ATL*	*471*	*424*	*197*	*214*	*339*	*283*	*20*	*485*	*22*	*149*	*261*	*491*	*105*	*131*	*225*	*356*	*301*	*508*	*512*	*824*	*156*	*251*	*1*	*229*	*48*
	BARBADOS	135	157	0	0	0	0	0	0	0	138	159	332	68	51	45	51	55	36	42	49	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	0
	COLOMBIA	108	92	54	73	160	80	20	485	22	11	102	159	37	25	7	12	21	148	111	539	0	0	0	0	
	CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236	0	0	

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	EC-GUADELOUPE	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-MARTINIQUE	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	140	145	79	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	0	0	0	0	0	0	0	155	0	0	44	48
	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-TR.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	84	86	134	106	0	0	0	0	0
	RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0
	ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	55	79	150	141	98	80	50	0	0	0	48	0
	ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	130	0
	TRINIDAD & TOBAGO	228	175	143	141	179	203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	90	0	0	0	0	0	0	0	0	
LTI	*TOTAL*	*8344*	*17633*	*14673*	*19214*	*13847*	*15839*	*22214*	*20625*	*12896*	*8809*	*19741*	*25135*	*29855*	*14359*	*10911*	*10255*	*13407*	*11587*	*12026*	*14786*	*14147*	*14510*	*13345*	*13730*	*12562*
	ATL	*5845*	*15138*	*11803*	*16440*	*12401*	*13359*	*20653*	*18975*	*10856*	*6643*	*17317*	*22730*	*27820*	*11742*	*8558*	*8499*	*12341*	*10352*	*10124*	*12667*	*12543*	*11596*	*10467*	*10426*	*9719*
	MEDI	*2499*	*2495*	*2870*	*2774*	*1446*	*2480*	*1561*	*1650*	*2040*	*2166*	*2424*	*2405*	*2035*	*2617*	*2323*	*1756*	*1266*	*1235*	*1902*	*2119*	*1604*	*2914*	*2878*	*3294*	*2843*
ATL	ANGOLA	1326	826	616	1328	1171	1734	1632	1632	1433	1167	1345	1148	1225	285	306	84	175	121	117	235	75	406	118	132	132
	ARGENTINA	0	0	0	0	0	36	0	0	11	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0
	BENIN	0	0	16	24	40	45	20	31	30	90	14	7	43	66	61	40	53	60	58	58	196	83	69	69	69
	BRASIL	0	0	0	0	45	10	0	765	785	479	187	108	74	685	779	935	985	1225	1059	834	507	920	930	615	615
	BULGARIA	1	9	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CAP-VERT	0	0	0	128	236	258	34	16	160	29	14	1	18	65	74	148	17	23	72	63	86	110	776	491	178
	COTE D'IVOIRE"	431	38	57	177	0	0	0	0	0	20	5300	38	4900	2800	100	142	1975	251	253	2337	1880	1818	2352	2789	1900
	CUBA	0	0	0	131	53	77	6	15	16	24	55	53	113	88	63	35	13	15	27	23	23	0	0	0	
	EC-ESPANA	33	56	4	485	7	3	2	27	34	12	11	7	11	55	81	1	0	0	10	55	27	110	6	2	392
	EC-FRANCE	0	0	0	0	1098	1120	0	0	0	0	0	0	195	0	74	13	8	51	59	22	215	21	88	3	0
	EC-GERMANY	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	
	EC-ITALY	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	EC-MARTINIQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	610	610	610
	EC-PORTUGAL	0	0	5	121	8	0	0	0	0	80	21	86	91	2	61	75	45	72	72	218	320	171	14	50	
	ESTONIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	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	0	182	0	18	159	301	213
	GERMANY D R	0	0	0	0	0	397	543	99	10	10	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	GHANA	1185	6049	5547	4134	3287	2141	5009	5966	901	649	5551	11588	12511	323	201	309	359	994	513	113	2025	359	305	708	729
	ISRAEL	0	0	0	227	203	640	282	271	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	LATVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	
	LITUANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	
	MAROC	15	21	289	16	19	26	19	15	417	47	108	49	14	367	57	370	44	43	230	588	195	189	67	101	87
	MAURITANIE	50	50	50	31	86	77	54	60	60	50	50	50	50	50	4	0	0	0	0	0	0	0	0	0	
	NEI-I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	72	0	53	0	0	3	2	3	0
	PANAMA	0	3	2	58	36	0	0	0	0	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	
	POLAND	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RUMANIA	86	2	17	9	12	291	216	266	126	81	7	88	0	0	0	0	0	0	0	0	0	0	0	0	
	RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	617	306	265	189	96	49	0	88	0	0	0
	SAO TOME & PRINCIPE	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0	0	0	0	0	40	159	0	0	0	0

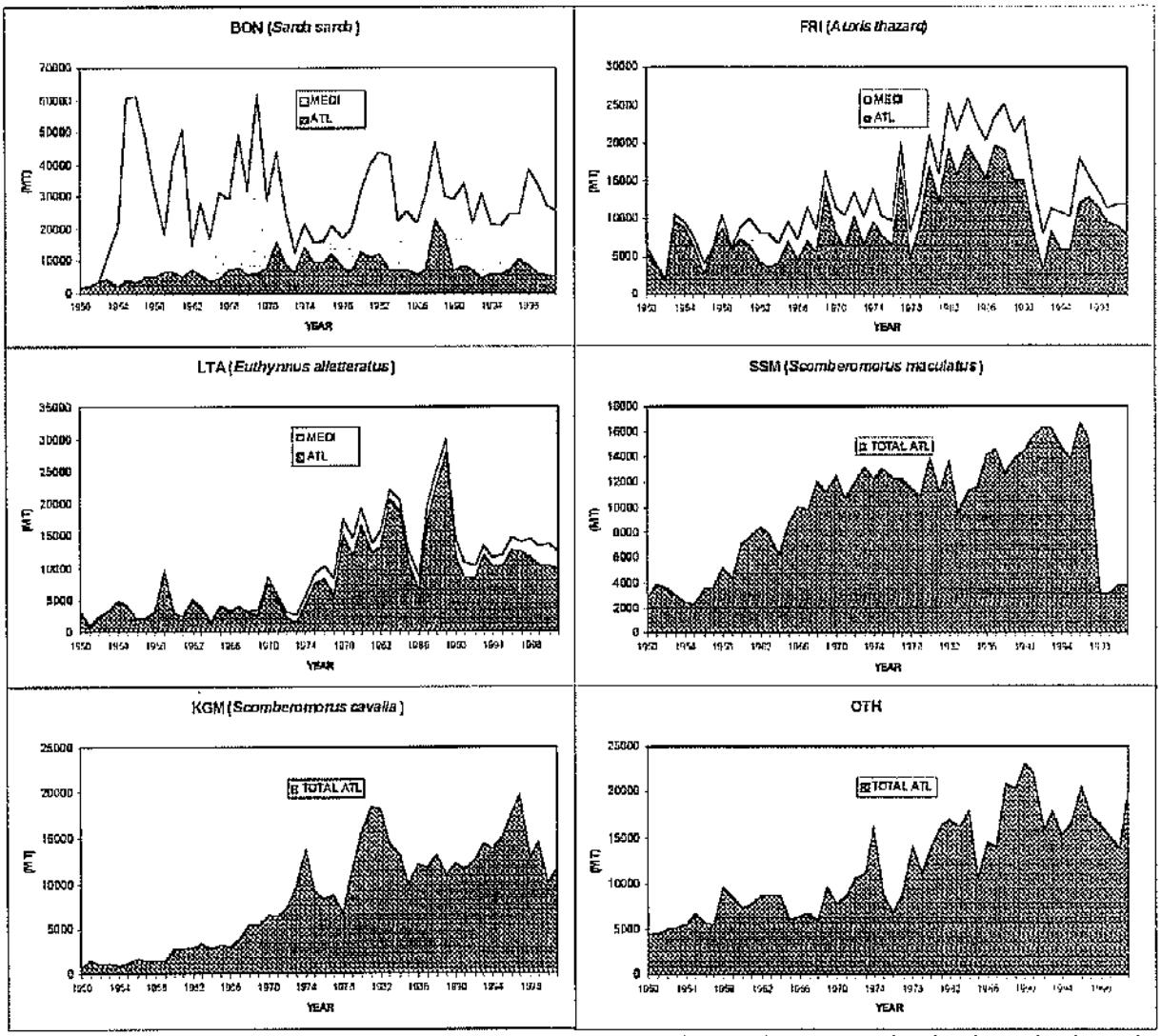
		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	SENEGAL	1540	1446	1697	2444	1586	5017	5623	8408	4566	2392	2985	6343	6512	4775	3767	4088	4883	4072	4072	3773	2972	2933	1094	1094	1094
	ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0	1
	ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	U.S.A	53	113	12	88	97	87	107	41	74	104	118	204	129	173	228	597	1286	1142	1312	2230	2015	1546	1623	1209	1451
	U.S.S.R	690	6127	2184	6307	3615	1085	6528	613	1040	271	61	1707	543	667	0	0	0	0	0	0	0	0	0	0	0
	UK-BERMUDA	9	7	7	11	11	4	5	5	7	13	13	17	14	8	10	11	5	6	6	7	6	5	4	2	1
	VENEZUELA	426	390	1270	721	791	311	573	641	1050	1123	1467	1236	1374	1294	1963	1409	1889	2115	2115	1840	1840	2815	2247	2247	2247
MEDI	ALGERIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	522	585	495	459	552	554	448	384	562	494	407
	CROATIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	15	15	0	0	0	0	0	0
	CYPRUS	18	11	17	17	22	33	17	31	32	13	25	41	20	23	25	21	11	23	10	19	19	19	19	19	19
	EC-ESPANA	1059	1192	993	800	6	705	0	32	12	5	0	5	0	0	0	0	0	0	15	18	9	15	0	8	62
	GAZA-STRIP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	59	61	60	60	60
	ISRAEL	300	200	170	105	35	110	35	60	259	284	273	135	124	129	108	126	119	119	215	119	119	119	119	119	119
	LIBYA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	52	0	5	4
	MALTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	8	8	8	3	3	0	0	0	0
	MAROC	4	0	6	0	61	12	0	1	0	0	0	12	0	16	0	0	0	0	1	0	1	14	8	0	0
	NEI-2	0	0	0	0	0	200	200	200	200	200	300	200	200	200	200	200	200	200	200	200	300	200	200	0	
	SYRIA	105	109	89	80	73	90	80	96	95	73	121	99	121	127	110	156	161	156	155	270	350	417	300	370	370
	TUNISIE	1009	983	1595	1772	1249	1330	1228	1224	1441	1590	1803	1908	1566	2113	1313	664	242	204	696	824	333	1113	752	1453	1036
	TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	750	750	750
	YUGOSLAVIA	4	0	0	0	0	0	1	6	1	1	2	5	4	9	0	0	0	0	0	0	0	0	0	0	0
	YUGOSLAVIA REP. FED.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	28	21	35	12	18	20	18	16	16
MAW	*TOTAL ATL*	*2572*	*6716*	*4167*	*3921*	*3156*	*5512*	*4716*	*4498*	*3989*	*3292*	*1799*	*3915*	*2934*	*5610*	*3025*	*1437*	*1775*	*1270*	*1264*	*1316*	*871*	*1108*	*727*	*738*	*727*
	ANGOLA	20	81	24	70	68	138	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	BENIN	0	0	23	35	60	68	30	46	50	104	17	13	334	211	214	202	214	194	188	188	362	511	205	205	205
	ESTONIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	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	0	0	0	85	0	0	0
	GERMANY D.R	0	0	0	0	0	851	537	33	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GHANA	720	771	1569	4412	1983	2982	2225	3022	3000	1453	0	1457	1457	1500	2778	899	466	0	0	0	0	0	0	0	0
	LATVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	208	34	0	0	0	0	0	0	0	0	0	
	LITUANIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	4	0	0	0	0	0	0	0	0	
	RUSSIA FED.	0	0	0	0	0	0	0	0	0	0	0	143	195	1032	242	0	19	0	0	44	0	0	0	0	0
	SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	
	SENEGAL	1188	1054	1112	404	1045	671	754	1174	732	1516	1754	2159	753	1419	656	332	1076	1076	1076	1076	509	512	522	522	522
	U.S.S.R	644	4818	1439	0	0	602	1170	223	206	219	28	143	195	1240	0	0	0	0	0	0	0	0	0	0	0
	UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	
SSM	*TOTAL ATL*	*12218*	*11528*	*10899*	*13945*	*11164*	*13633*	*9574*	*11362*	*11590*	*14117*	*14531*	*12712*	*13946*	*14500*	*15546*	*16346*	*16231*	*14777*	*13857*	*16525*	*15499*	*3236*	*3170*	*3904*	*3828*
	COLOMBIA	283	228	199	213	408	8	10	77	101	81	72	151	112	76	37	95	58	69	69	0	0	0	0	0	
	CUBA	400	600	400	578	657	476	689	541	443	621	1606	803	746	665	538	611	310	409	548	613	613	0	0	0	
	DOMINICAN REP.	174	317	415	479	503	384	168	1058	1267	1271	1321	1415	1401	1298	728	735	739	1330	2042	2042	231	191	125	158	158
	GRENADA	10	2	0	1	1	1	1	1	4	17	0	0	1	3	0	0	1	2	2	0	0	0	0	0	0
	MEXICO	4814	5138	5751	5908	5908	5799	5922	5777	5789	6170	6161	5246	7242	8194	8360	9181	10066	8300	7673	11050	11050	0	0	0	0
	ST.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	1
	TRINIDAD & TOBAGO	1484	1933	1208	1337	939	1218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	U.S.A	5453	3310	2926	5129	2748	3747	2781	3905	3986	5957	5071	5097	4443	4272	5883	5724	5057	4667	3523	3020	3604	3045	3045	3746	3670

		1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
BAH	*TOTAL ATL*	*393*	*452*	*760*	*610*	*2920*	*2280*	*2366*	*2159*	*920*	*1151*	*1235*	*1612*	*1507*	*1470*	*1687*	*1807*	*2571*	*2104*	*2362*	*2515*	*3085*	*2483*	*2913*	*2020*	*3670*
	ANTIGUA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	ARUBA	100	115	115	115	115	115	115	115	115	120	90	80	80	70	60	50	50	125	40	50	50	50	50	50	50
	BARBADOS	0	0	189	116	144	219	222	219	120	138	159	332	51	51	60	51	91	82	42	35	52	52	41	41	0
	BENIN	0	0	1	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	BRASIL	3	6	69	1	1	0	0	0	21	141	133	58	92	52	64	71	33	26	1	16	58	41	0	0	0
	CAP-VERT	0	0	0	24	2307	1464	1588	1365	142	205	306	340	631	458	351	350	326	361	408	503	603	429	587	487	578
	DOMINICA	0	0	0	0	0	0	0	0	0	0	0	0	0	38	43	59	59	59	58	58	58	58	50	46	46
	DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	1	3	6	9	13	7	0	0	0	325	112	31	35	35
	EC-ESPANA	0	0	0	0	0	0	0	0	4	9	9	32	18	23	28	32	22	20	15	25	25	29	28	32	38
	GRENADA	0	35	31	25	23	41	94	50	51	82	54	137	57	54	77	104	96	46	49	56	56	59	82	51	71
	NETHERLAND.ANT	178	215	215	215	215	215	215	215	245	250	260	280	280	280	250	260	270	250	230	230	230	230	230	230	230
	SAO TOME & PRINCIPE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	52	52	52	52	52
	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	0
	ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	77	79	150	141	98	80	221	223	223	310	243	213
	ST.VINCENT	0	0	0	0	0	0	0	0	0	0	0	4	4	28	33	33	41	28	16	23	10	65	52	46	56
	TRINIDAD & TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118	1	0	0	0	0	1	1	1	2	1
	U.S.A	0	0	0	0	0	0	0	0	13	13	57	128	110	82	134	203	827	391	764	608	750	614	858	640	633
	UK-BERMUDA	35	23	33	46	24	40	49	46	46	65	43	61	63	74	67	80	58	50	93	99	105	108	104	61	56
	UK-S.HELENA	6	4	7	10	12	9	16	23	15	15	18	18	17	18	12	17	35	26	25	23	0	0	0	0	0
	VENEZUELA	71	54	100	57	77	175	66	125	147	113	106	141	101	159	302	333	514	542	540	487	488	360	467	4	17
MIX	*TOTAL ATL*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*21*	*312*	*169*	*371*	*517*	*1629*	*1052*	*1138*	*1300*	*1578*
	CANADA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	DOMINICAN REP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	624	196	174	208	
	EC-PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	252	164	289	0	0	122
	GAZA-STRIP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	102	92	100	100	
	JAMAICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	35	38
	LATVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	147	27	0	0
	NEVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	15	31	19
	SAINT KITTS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	10	9	3	4
	SOUTH AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0
	TRINIDAD & 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	405
	TUNISIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	309	105	115	215	657	6	814	905	989
	UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	0	0	0	303	0	26	

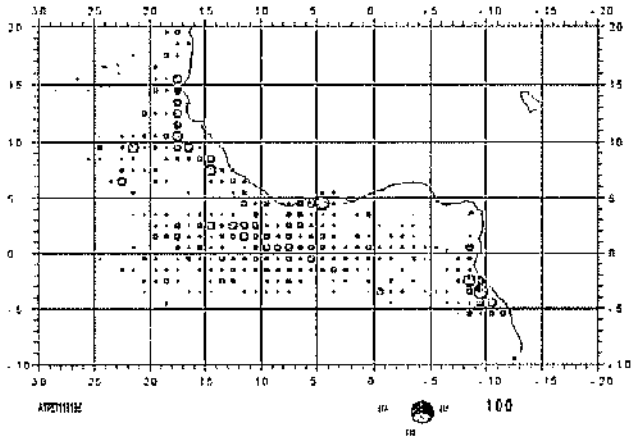
* Catches attributed to Côte d'Ivoire on this table are Abidjan landings by other flag vessels.



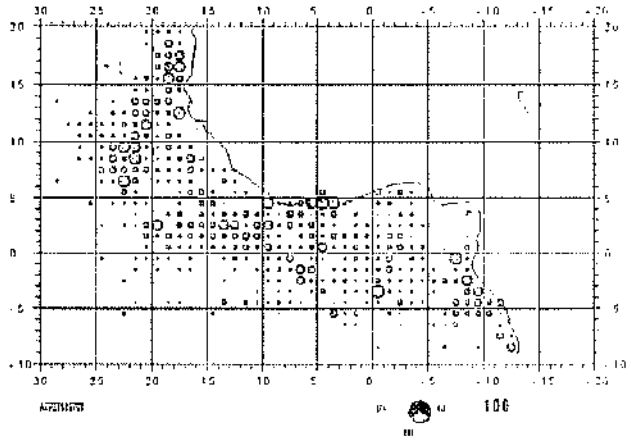
SMT-Fig.1. Estimated landings (MT) of small tunas, all species combined, in the Atlantic and Mediterranean, 1950-2001. Data for recent years are incomplete.



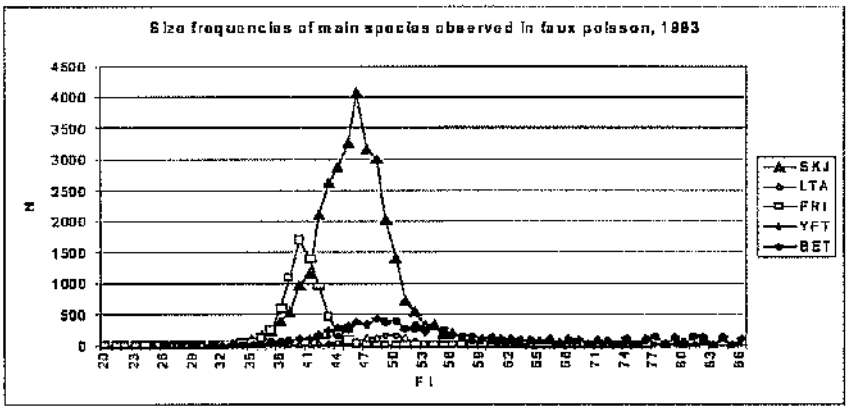
SMT-Fig.2. Estimated landings (MT) of small tunas, of major small tuna species in the Atlantic and Mediterranean, 1950-2001. Data for recent years are very incomplete.



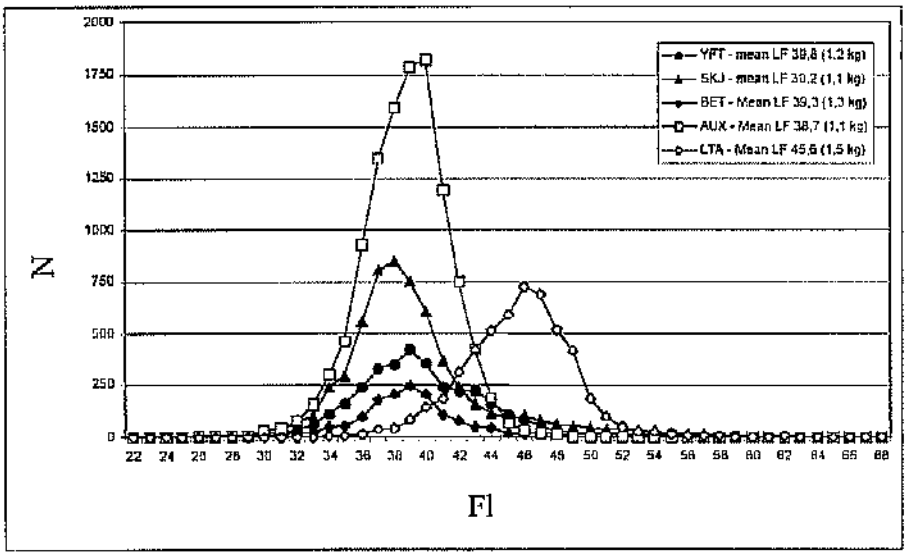
SMT – Fig. 3 Catches of small tunas (FRI, LTA) from the European and associated purse seine fishery, 1991-1996 average.



SMT – Fig. 4. Catches of small tunas catches (FRI, LTA) from the European and associated purse seine fishery, 1997-2001 average.



SMT – Fig. 5. Size of main species observed in "faux poisson" (false tuna) monitored in Abidjan in 1993.



SMT – Fig. 6. Size of main species observed in "faux poisson" (false tuna) monitored in Abidjan in 1998-1999.

8. Report of 6th GFCM-ICCAT Meeting on Large Pelagic Fishes in the Mediterranean Sea

Dr. Victor Restrepo, GFCM/ICCAT meeting Chairman, presented the report of the 6th GFCM/ICCAT Meeting on Stocks of Large Pelagic Fishes in the Mediterranean Sea held in Sliema, Malta, April 15 to 19, 2002 (SCRS/2002/010). The primary focus of the session was to update the databases, particularly for Mediterranean bluefin tuna, but also for Mediterranean swordfish and albacore. The meeting also focused on the problems of tuna farming practices including the effects of statistics, biology, management, and the environment.

The joint session developed an explicit formula and protocol for calculating unreported catches using the Bluefin Tuna Statistical Document (BFTSD) that will be used by the Secretariat.

While Dr. Restrepo encouraged the Committee to endorse all of the recommendations of the joint session, he singled out one on the need to collect tuna farming statistics as being especially important.

Dr. Restrepo noted that following the joint session, the Scientific Advisory Committee of the GFCM met (June 2002) and based on the recommendations of the April joint session, proposed that a working group meet starting next year to develop guidelines for developing sustainable tuna farming practices. The GFCM encouraged interested ICCAT scientists to participate in this working group, and Dr. Restrepo indicated to this Committee that the Secretariat would keep the SCRS informed on these activities, especially about the schedule of up-coming meetings.

The Committee endorsed the recommendations of the GFCM/ICCAT joint session and has included a recommendation in Section 16 that stresses the importance of having better data on tuna farming practices.

9. Report of *ad hoc* Working Groups

9.1 SCRS Organization

Dr. Gerald Scott, Convener of the A*d Hoc* Working Group on SCRS Organization, presented the report of the meeting that was held during the previous week, and which is attached as **Appendix 4**. The report presents the Working Group's recommendations related to further implementation of peer review for quality assurance purposes, the timing of data reporting, late submission of scientific papers, work plans, and the assessment schedule for 2003-2005. The Committee generally endorsed the recommendations of the Working Group with some clarifications and additions to the meeting schedule.

In particular, the Committee endorsed the Working Group's proposal to have a small group (consisting of the SCRS Chairman, the Species Group Rapporteur for the concerned species and the Secretariat) select the reviewers for the peer review process. It was clarified by the Chairman of the Assessment Methods Working Group (who originally proposed the peer review system), that peer review is only one element of many steps that can be implemented to improve ICCAT's stock assessment quality control. It is not a magical solution and will, of course, not replace the SCRS. It was further clarified by the Committee that this proposal should in no way be seen as showing a lack of confidence in the SCRS scientists, but simply allows for new points of view in our assessments.

There were the following additions to the anticipated meeting schedule for 2003-2005 proposed by the Working Group: add East Atlantic bluefin data review and analyses meeting, and a multi-species stock definition meeting to February 2004, and to include a comment that experts from other oceans should be included in the BETYP Symposium. The revised proposal for 2003-2005 SCRS assessment, data-preparatory and research-coordination meetings appears in Section 18.1.

9.2 Assessment Methods

Dr. Victor Restrepo reported on the Working Group on Assessment Methods. Though no meeting was held in 2002, progress was reported on two items. Consistent with the recommendations, two new entries were completed for the stock assessment catalogue (related to the VPA 2-box model). In addition, the Secretariat and the BETYP will join funds to hire a consultant to assist in increasing ICCAT's expertise in integrated statistical methods (specifically MULTIFAN-CL). It is proposed that this take place in early 2003, and initially BET and ALB-S will be considered.

10. Report of special research programs

10.1 Bigeye Tuna Year Program (BETYP)

The Report on BETYP activities from October 2001 to September 2002 (**Appendix 5**) was presented by the Program Coordinator, Guillermo Fisch, who described the status of the activities of the program and the plan for 2003. The proposed date of the final BETYP meeting, which will be in the form of a symposium, was announced as March 8 to 11, 2004.

The Committee continues to strongly endorse this program and accepted the report and plan for 2003/2004 with minor modifications.

10.2 Bluefin Year Program (BYP)

The summary report of the BYP for the previous year was presented to the Committee by the West Atlantic BYP Coordinator, Dr. Gerald Scott (**Appendix 6**). The Committee noted that substantial progress has been made under BYP and that the goals outlined for 2001-2002 had been met. In particular the research undertaken through the FAO-COPEMED program has resulted in large gains in our understanding of the Mediterranean and eastern Atlantic bluefin tuna fisheries that will substantially improve the Committee's ability to advise the Commission on the status of bluefin in the region. The Committee noted also that the FAO-COPEMED program has been extended for another year. The Committee reviewed and endorsed the 2002 planned research expenditures of the BYP.

There was discussion about the future exploratory research in the central North Atlantic. Concern was expressed that the lack of bluefin captured must be interpreted in the context of the constraints of the program (including the limited effort, and exclusion from a large part of the central North Atlantic in 2002 because of a time/area closure for one part of the exploratory fishing). It is not known if there will be funding for further exploratory longlining, but the BYP Working Group reiterated its recommendation (with a financial endorsement) that a discussion and planning meeting should take place in the near future (including scientists working both in the central North Atlantic and the Mediterranean). It was noted that it was not surprising that no bluefin were caught during the exploratory fishing cruises given the history of low longline catches in this area. It was emphasized by the Central North Atlantic Bluefin Tuna Research Steering Committee that considerable knowledge has been gained from the exploratory longline cruises, and that several manuscripts are in preparation. The Committee was reminded that scientific longlining cruises have not taken place in the area since the 1960s, and that the information from the 2001 and 2002 cruises is valuable.

Section 16 of this report contains the relevant recommendations of this program to the Commission.

10.3 Enhanced Research Program for Billfish

The Committee reviewed the progress made by the program, the report of which is attached as **Appendix 7**. The Committee also reviewed and endorsed the 2002 planned expenditures of the program.

There was some discussion about the imbalance both in the research costs and in the proposed budgets between the East and West Atlantic. The Coordinator, Dr. Eric Prince, responded that the Program Plan indicates expanded work in the east in 2003.

Recommendations relevant to this program are the same as for the Species Groups, and can be found in Section 16.2.

11. Sub-Committee on Environment

The Report of the Sub-Committee on Environment was presented by the Convener, Dr. Jean-Marc Fromentin (**Appendix 8**). New information concerning tunas and the environment, and future plans and recommendations were discussed. The Committee reviewed and adopted the report of this Sub-Committee.

Section 16 of this report contains the relevant recommendations of this Sub-Committee to the Commission.

12. Sub-Committee on By-Catch

The Report of the Sub-Committee on By-Catch was presented by the Convener, Dr. Hideki Nakano (**Appendix 9**). New information concerning by-catches, the current shark statistics available in the Secretariat, several national and international activities, and future plans and recommendations concerning by-catches were reviewed. The Committee adopted the report of the Sub-Committee on By-catch.

Section 16 of this report contains the relevant recommendations of this Sub-Committee to the Commission.

13. Report of the Meeting of the Sub-Committee on Statistics

In 2002, for the first time, the Sub-Committee on Statistics met during the week prior to the SCRS Plenary. Dr. Pilar Pallarés presented the report of that meeting (**Appendix 10**). The Sub-Committee reported on issues regarding the submission of data (Task I & II, tagging, historical, sharks, and trade information), the status of the relational database system, the survey of fishery reporting systems, the Working Groups on observer data and archival tags, national and international activities concerning statistics, the review of publications (including the report of the Working Group on the ICCAT Atlas), future plans and recommendations, update of hardware and software at the Secretariat, endorsement of the development of a biological data catalogue by the Methods Working Group, and problems related to vessel identification as related to Task I statistics. The Committee endorsed the report of the Sub-Committee, with no modifications. Section 16 of this report contains the relevant recommendations of this Sub-Committee to the Commission.

The Committee strongly supported that in the future, the Sub-Committee on Statistics should again meet prior to the Plenary, as was done this year, but ensure more discussion and a detailed presentation of the report during the Plenary (see also Section 19). It was felt that this allowed for more comprehensive debate on a number of issues.

The Committee complimented the Secretariat on the excellent progress that has been made in all data related issues.

14. Reports of scientific meetings where ICCAT was represented

The Secretariat's Report on Statistics and Coordination of Research in 2001-2002 was tabled. Appendix 1 of that document contains a summary of meetings at which ICCAT was represented between November 2001 and October 2002. The document presents information on the meeting venue, the person representing ICCAT, relevant agenda items, comments on the meeting, relevant action items for the SCRS or the Commission, and information needed to obtain the actual meeting report.

15. Collaboration with other fisheries organizations

15.1 Analysis of potential partnership with FAO's FIRMS-FIGIS

Document SCRS/2002/055 was presented by the Secretariat. Dr. Restrepo explained that the Fisheries Resources Monitoring System (FIRMS) is a project for the global dissemination of information on fisheries coordinated by FAO. This document provides information of the current and potential collaboration between ICCAT and FAO in this project. FIGIS (Fisheries Global Information System) is a distributed web-based network encompassing fisheries resources, biology, technology, aquaculture and trade. ICCAT together with other regional fisheries organizations has collaborated with FAO in the development of a prototype of FIRMS. The Coordinated Working Party of Fisheries Statistics will be used as a vehicle for establishing a FIRMS Steering Committee who will decide on the details of the partnership agreement.

The Secretariat proposes to put the Executive Summaries in FIRMS. This would enable ICCAT to globally distribute its assessment results in a standard and state-of-the-art format, while still keeping closer control of

such worldwide dissemination than currently. The costs would include one week of travel when the Steering Committee meets, one week of training, and about two weeks of editing each year.

The Committee endorsed the Secretariat's proposal and recommends that ICCAT continue collaboration with the FIRMS-FIGIS project.

15.2 Other

The SCRS Chairman noted the Sub-Committee on Environment's intended collaboration with other tuna bodies on the environmental database.

16. General recommendations to the Commission

Most of the recommendations made by the Committee require an increase in the workload of national scientists, and can only be carried out with the corresponding support through human resources and access to the fisheries. The Committee notes increasing difficulties in the access to the necessary fishery information and funding, and therefore recommends that the required steps be taken by Contracting Parties to facilitate and provide the resources needed to carry out the work that is mandated.

16.1 Albacore

The Committee recommends that the Albacore Working Group meet in 2003 to update the northern and southern stock assessments.

16.2 Billfish

The Committee notes that in order to properly quantify and reduce uncertainty in the assessment of billfish, a substantial research investment should be made in research related to the estimation of relative indices of abundance for longline-caught fish. Specifically, the Committee recommends that biological research on the habitat requirements of billfish (and by extension tunas) species be coupled with the development of models that can properly incorporate habitat information in the process of relative abundance estimation. There is also a need to develop experimental designs to test the appropriateness of various assumptions made in relative abundance indexing methods. The Committee recommends that this model development and experimental design guidance should be discussed at a meeting of the ICCAT Working Group on Assessment Methods during 2003. The Committee recommends that the Commission continue to support the involvement of the ICCAT Enhanced Research Program for Billfish on this type of research.

The Commission should consider that future evaluation of management measures relative to the recovery of blue and white marlin stocks are unlikely to be productive unless new quantitative information on the biology of marlins and additional years of data are available. The Committee therefore recommends that the next marlin assessments not be held before 2005.

16. 3 Tropical species

Meetings

- The Committee recommends that a Working Group on the Stock Assessment of Yellowfin Tuna take place in July 2003 (one week).

- The Committee recommends that part of the meeting time (2-3 days in the middle of the week) of the Working Group on Tropical Tuna Species during the week preceding the SCRS be dedicated to an analysis of the impact that the moratorium on floating objects has on the stocks of tropical tuna species.

- The Committee recommends that a Symposium be organized at the end of the BETYP (early 2004). Bigeye tuna experts from other bigeye tuna regional bodies should be invited to participate.

- The Committee recognized that many problems identified in bigeye research are common to all oceans. These include catches by non-target fisheries and IUU fleets, lack of indices of juvenile fish abundance.

uncertainty in biological parameters, and assessment modeling. Also, many fleets move easily between oceans. Therefore, the Committee recommends that a world bigeye tuna meeting be held, possibly in conjunction with the BETYP Symposium. ICCAT should take the initiative to begin coordination of this meeting.

Statistics

- Given the importance of the Ghanaian tuna fisheries in the estimates of the total catches of tropical tunas by species and considering difficulties encountered in its fisheries data collection system due to the varying interactions (sharing of catch at sea) of the various fleets, thus rendering the present sampling scheme inappropriate, the Committee recommends that a group of experts from the SCRS, together with the Ghanaian fisheries authorities, study measures that can be taken to assist this country in the work of the collection and transmission of the data.

- The Committee recommends that the size data that are lacking or insufficient for some fisheries be improved, through appropriate sampling programs.

Research

- The Committee recommends that tagging activities be undertaken with specific objectives (such as studies of tuna behavior or stock structure using pop-up or archival tags).

- The Committee recommends continuing the development and implementation of statistically integrated models in the stock evaluations.

16.4 Bluefin tuna

The considerable uncertainty about the eastern bluefin tuna catches, has become greater due to (1) a probable increase in the level of unreported catches following the imposition of quotas, and (2) the development of bluefin tuna farming. The Committee continues to be especially concerned with the lack of ability to accurately track catches, catch at size origin of catches and fishing effort expended on fish that are farmed in cages.

1. The Committee recommends that efforts be made to implement the suggestions for improvement made by the Sixth GFCM/ICCAT meeting (SCRS/2002/010), such as observers on board and on cages, extension and modifications of the BFTSD to alive fish, modification of logbooks to report details on fish transferred to cages.

2. Prior to any new stock assessment session for East Atlantic and Mediterranean bluefin tuna, the Committee should consider scheduling a special data exploratory session to analyze and further check the high levels of substitution of size data and extrapolations, as well as possible problems related to the ageing procedure.

16.5 Swordfish

Atlantic

It is recommended that the next Atlantic swordfish assessments be conducted in at least three years' time (not sooner than 2005) in order to advance basic research and assessment methods. It should be noted that the data required for the session should be up to and including the year prior to the meeting, if possible. The Committee reiterated the need for catch, size and effort data from all fleets.

The Committee recommended that a comprehensive workshop on the topic of swordfish stock structure should be held in 2004.

Mediterranean

It is recommended that the next Mediterranean swordfish assessment be conducted in May 2003. This session would include a review of Mediterranean swordfish biology, and catch, size and effort data. It should be

noted that it is necessary to include data from as many fisheries as possible, particularly from the main swordfish producing countries that report swordfish catches, such as EC-Italy, Morocco, EC-Greece and EC-Spain.

16.6 Small tunas

Statistics

Catch and effort statistics as well as biological information for small tuna are incomplete or lacking for many of the coastal and industrial fishing countries. The Committee strongly recommends that these data be provided.

The Committee also recommends that a Working Group on Small Tunas be held in the near future.

16.7 Sub-Committee on Statistics

The Sub-committee recognizes and supports the work carried out by the Secretariat in the collection and management of data within the new relational database and, consequently, recommends:

1. That copies of the individual BFT, BET and SWO Statistical Documents as well as the bi-annual reports be submitted.

2. That collaboration with FAO be continued concerning the exchange of data as well as specific projects (FIGIS-FIRM).

3. That a working group be created to develop a standard protocol for the presentation of data to ICCAT. The group should meet in early 2003.

4. That the Secretariat computer equipment that is 4 years old or older be replaced and two computers for use by visiting scientists, two printers, and the necessary software to develop GIS be purchased.

16.8 Sub-Committee on Environment

The SCRS endorsed the proposal of the Sub-Committee on Environment and recommends that contacts be established in 2003 between ICCAT scientists/Secretariat and the scientists/Secretariats of other international tuna commissions to plan a meeting in early 2004. The objectives of the meeting would be to decide on the best way to collect environmental data of interest and to start this collection, so that this information can be easily accessible and easy to use by all tuna scientists with the minimum delay.

16.9 Sub-Committee on By-Catch

Given that the Commission has decided that the SCRS shall conduct assessments of Atlantic pelagic sharks focusing on blue and shortfin mako sharks, in 2004:

1. The Committee recommended that Contracting Parties, Entities and Fishing Entities establish and/or maintain scientific research programs on pelagic sharks.

2. For assessment purposes, the Committee encourages Contracting Parties, Entities and Fishing Entities catching sharks in the Atlantic and Mediterranean, or having caught sharks in the past in these waters, to submit species-specific shark catch statistics including estimation of shark catch, dead discards and size data and conversion factors for estimating whole weight from product weight for various species. Emphasis should be on porbeagle, blue and shortfin mako sharks.

3. The Committee recommends further coordination and collaboration with other international organizations, especially ICES and GFCM, for the assessment of the Atlantic and Mediterranean stocks of porbeagle, blue and shortfin mako sharks.

4. The Committee encouraged wider participation in the assessment session by Contracting Parties, entities and fishing entities and experts in general. For this purpose, financial aid for travel may be required from the Commission or from member nations.

16.10 GFCM/ICCAT

The Committee endorsed all the recommendations made by the joint Working Group at its last meeting in Malta (see SCRS/2002/010).

The Committee stresses to the Commission that it is very important for ICCAT to obtain tuna farming data in order to compile more complete tuna catch statistics and thus to conduct adequate stock assessments. The Committee recommends that the Commission take immediate action to establish reporting procedures for all countries involved, either in the capture of tunas destined for farming or in the practice of farming itself. Relevant data would include the quantity (tonnage) of input and output to farming operations, statistics on the sizes of the fish caught in the wild, and the source (area, time and fishing method) of the catches. It is recommended that the Commission collaborate with the SCRS to develop a form specific to tuna farming that includes the important components described above.

16.11 Bluefin Year Program (BYP)

As highest priority for the BYP in 2002-2003, the Committee recommends expenditures of €32.000 to cover expenses associated with stock structure and maturity sampling during the upcoming year as described in the BYP sampling plan.

As next priority for the BYP in 2003, the Committee recommends expenditures of €35,000 to contribute to the expenses for planning, conduct, and coordination of 4 research activities viewed as important to the future of BYP and in support of providing scientific advice to the Commission on bluefin tuna. These research topics are:

- Croatian bluefin farming research (year 2)
- Larval sampling coordination and future research planning
- Mediterranean electronic tagging coordination
- Direct ageing coordination

16.12 Further quality assurance steps

As part of a continuing effort to enhance quality assurance of the scientific advice the Committee provides to the Commission, it is recommended that *in situ* peer reviews proceed as detailed in the Report of the *Ad Hoc* Working Group on SCRS Organization (**Appendix 4**).

17. Responses to the Commission

17.1 Bluefin tuna mixing

[Resolution 00-11: regarding the effects of mixing for stock assessment and management and consideration of the appropriateness of the current boundary between the western and eastern management units]

Mixing between bluefin tuna of western and eastern Atlantic origin contributes to uncertainty in assessments and about the effectiveness of management, especially for the western area. The Committee considered this issue, with emphasis on the relationship between the western Atlantic management area and the central Atlantic portion of the eastern Atlantic management area (**Figure BFT-Mix 1**)

The Committee examined information relevant to the status of the fishery in the Central Atlantic. Catches in the central Atlantic (between 45° and 30°W, north of 10°N in area 3 **Figure BFT-Mix 1**) increased from 70 MT in 1985 to a peak of 1,942 MT in 1991 and they have averaged 1,272 MT recently (1999-2001, based on mean weights at age applied to age composition of the catch). In addition to the catch history, the Committee considered changes in size composition of the catch and in catch per unit of effort. It concluded that the available information does not indicate that the expansion of the central Atlantic fishery since about 1990 has adversely affected the bluefin tuna resource in that area so far. The Committee notes that the available information is limited.

The Committee explored the implications of mixing by extending the western Atlantic area by moving the boundary eastward to include the fishery in the central Atlantic. In recent years, this increased the catch included

in the assessment by about 50%. The implicit assumption of this extended western Atlantic bluefin tuna assessment is that all of the catch included in the assessment is of fish of western Atlantic origin. An analogous assumption is made for the assessment based on the current management boundary. The assumption that all of the catch included in the assessment is of western origin is almost certainly violated for both assessments, but probably to a greater extent for the extended western Atlantic assessment.

The results of the extended western Atlantic assessment (see **Figure BFT-Mix 2**) are similar to the results from the assessment based on the current management unit boundary, except they indicate that the spawning biomass has declined somewhat less and that the current fishing mortality rate on age 8+ fish (that make up the spawning stock) is substantially higher. Estimates of recent recruitment are also higher. The extended western Atlantic assessment gives lower estimates of the 1975 spawning biomass level, and MSY spawning biomasses for both recruitment scenarios. It is generally more optimistic about rebuilding to these levels of spawning biomass than the assessment with the current boundary. However, if the higher catch levels indicated by the rebuilding scenario under the extended assessment results in a higher fishing mortality on fish of western origin, then rebuilding of the western-origin population could be impeded or prevented.

To further explore the implications of mixing between the eastern and western management units, the committee also conducted assessments that explicitly take account of the overlapping distributions between western and eastern Atlantic origin bluefin tuna (i.e., some of the catch in the west is analyzed as if the fish resulted from spawning in the east, and vice versa). For these assessments, natal and spawning site fidelity are assumed. While this approach is conceptually more realistic (since it is clear that there is mixing), it is difficult to judge the realism of specific results since the degree of overlap in distributions is very uncertain. Therefore, results of mixing models should be viewed as illustrative, not predictive.

The Committee explored mixing models based on an examination of tagging data under three broad scenarios:

Equal mixing rates- Under this scenario, all fish have the same probability of not being in the management area of their origin.

Increasing mixing with age- Under this scenario, the probability of fish not being in the management area of their origin increases with age, but it remains the same regardless of the origin of the fish.

More mixing by western fish- Under this scenario, the probability of each fish of western origin being in the east is greater than the probability of each eastern origin fish being in the west.

The results of the mixing scenarios are generally consistent with previous results from mixing models. They indicate that with mixing, estimates of the spawning biomass of western origin fish are higher, (under the "increasing mixing with age" scenario considerably so), and that the decline from the 1970s has not been as great. Without mixing, the assessment indicates that the 2000 SSB is 9% of the 1970 SSB, whereas with mixing it ranges from 15 to 18%. With respect to recruitment, the mixing models indicate that recruitment of western origin fish is lower for the "equal mixing scenario", but it is higher for the "more mixing by western fish" scenario. For the latter, the results indicate that recent western recruitment could be comparable to the high recruitment levels estimated for the 1970s. With the "increasing mixing with age" scenario, recruitment estimates of western origin fish are intermediate between the other two scenarios.

There is clear evidence that a substantial portion of fish present in the western management area, cross the boundary and become vulnerable to the fishery in the eastern management area, particularly for the central Atlantic between 45 and 30°W, North of 10°N. However, the origin of fish that move from the western management area across the boundary into the central is unknown. Even if these fish were of western origin, their abundance in the central Atlantic relative to fish of eastern origin would be unknown. Thus, the Committee lacked a quantitative basis for recommending a change in the management area boundary or the implications of the change.

The Committee noted that the Commission's rebuilding plan for the western Atlantic should be robust to uncertainty about mixing of fish from the west to the east (regardless of their origin) so long as the fishing mortality rate these fish are exposed to in the east is no higher than the rates required by the rebuilding plan. Since the rebuilding plan is based on a constant catch strategy, implicitly, the fishing mortality rate must decrease as rebuilding occurs. In fact, the rebuilding plan implies a decrease by a factor of at least three. To the

extent that western origin fish are subjected to higher fishing mortality rate in the central Atlantic than is implicit in the western Atlantic Rebuilding Plan, the Plan will be jeopardized. Therefore, the Committee recommends:

a) A monitoring program for the central Atlantic aimed at following trends in the status of the resource in this area.
b) Controlling the catch in the central Atlantic if there is evidence that it is jeopardizing the rebuilding plan.
c) Conducting research to better quantify the origin of fish, mixing and its implications.

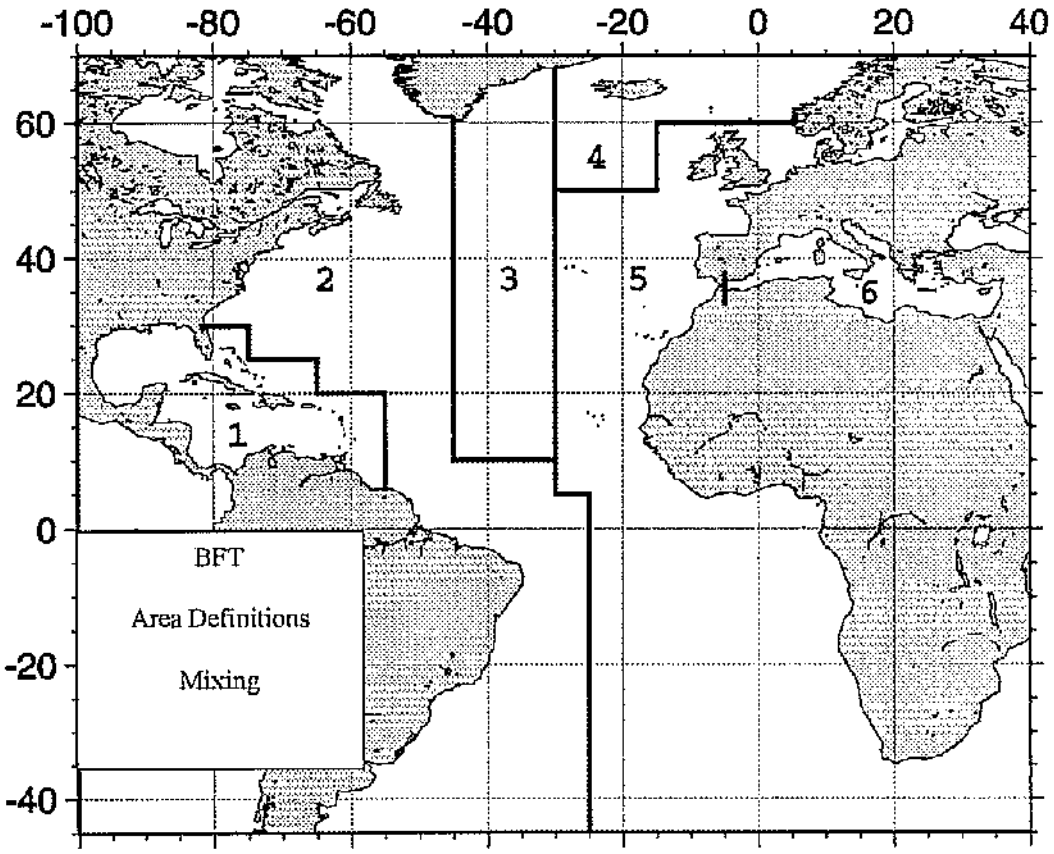


Figure BFT-Mix 1. Spatial structure identified at the 2001 ICCAT Workshop on Bluefin Mixing (SCRS/01/20) and used by the 2002 Committee as a starting point for preliminary model development towards incorporating greater biological realism into future assessments.

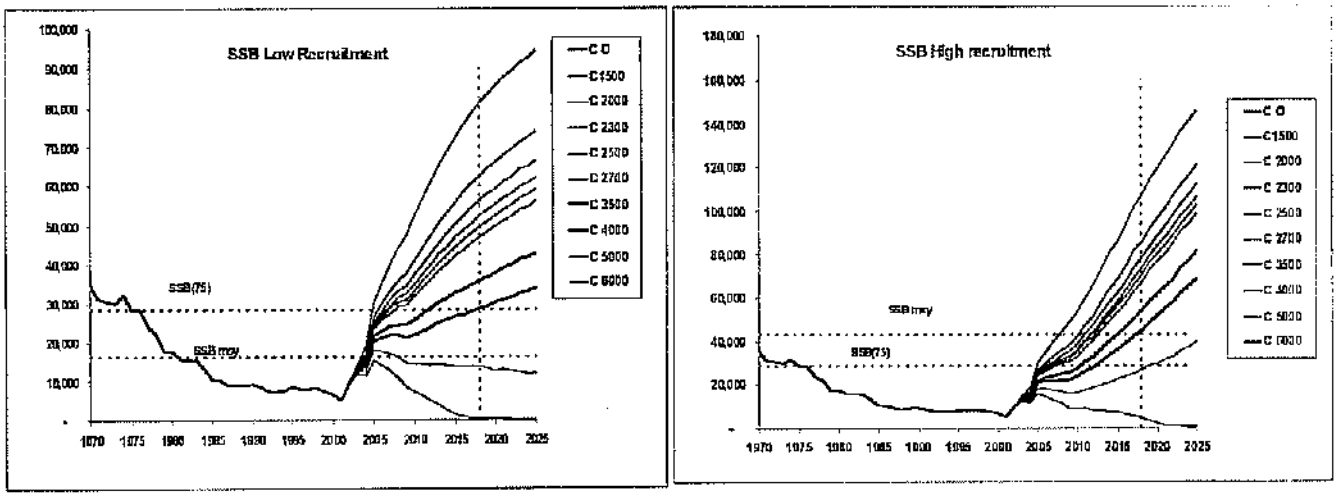


Figure BFT-Mix 2 Median projections of spawning stock biomass (SSB) for the extended-case (areas 1, 2, and 3 in Figure BFT-Mix 1) assessment, which assumes all fish in these areas are of western origin, under various levels of constant catch, expressed in absolute terms for the low (right/upper) and high (left/lower) recruitment scenarios. Recent catches are about 3800 MT and are between the two bolded catches of 3,500 and 4,000 MT.

17.2 SWO time/area closures

[Resolution 99-4: regarding the time/area closures and gear modifications for reducing the catches of small swordfish; and Resolution 01-4: evaluation of alternatives to reduce catches of juveniles or dead discards of swordfish]

The Commission requested SCRS to analyze and identify times and areas for possible closure in the Atlantic that would contribute to the protection of undersized swordfish. In accordance with the Swordfish Species Group work plan for 2002, two analyses of the geographic distributions of juvenile swordfish in the Atlantic Ocean were presented to the Committee. Neither analysis represented a full view of the density distribution of catch of small fish. Data to support analysis across all fleets are generally unavailable since only a few fleets provide data to ICCAT of sufficient geographical resolution to conduct such an analysis. Nonetheless, the analyses presented indicated some coastal regions in both the eastern and western Atlantic have had relatively higher densities of catches of small fish during some or all quarters examined, including areas along the southeastern U.S. Atlantic and Gulf of Mexico coasts, along the coast of the southern Caribbean Basin, along the northern African and Iberian Peninsula coasts and occasionally along the coast of southern Africa. Other coastal concentrations likely exist, but data of sufficient geographical and temporal resolution are not yet available, especially from the South Atlantic region. At times (notably during the 2nd and 3rd quarters), high concentrations of catch of small fish were noted from high-seas regions in the central North Atlantic (**Figure 17.2**). Similar concentrations in the high seas of the South Atlantic are also likely to occur. Analysis of multiple years of data from the Spanish fleet indicated considerable variability in the degree of concentration of catch of small fish by the Spanish fleet. This analysis noted variability in concentrations of catch of small fish is likely due to variation in oceanographic conditions as well as variation in year-class strengths and, as such, the degree of protection of juvenile swordfish may vary considerably from year to year unless protection areas are large enough to compensate for this variability. It was noted that the larger the size of the protection areas, the greater the potential for socio-economic impacts (including the loss of target species catch) that would likely need to be weighed against the benefits to the swordfish resource potentially accrued through closed areas. The Committee is unable to advise on the relative socio-economic costs of establishing area closures.

A preliminary analysis of the potential reduction of catch of juvenile swordfish due to time-area closures implemented by the U.S. in 2001 was presented to the Committee. The analysis indicated that while some fishing effort appeared to redistribute to areas outside of the closed areas, mitigating to some degree the reduction of effort and therefore savings of juvenile swordfish catch, the estimated catch of juvenile swordfish in year 2001 significantly decreased compared to the levels estimated for prior years when no closures were in effect. Additional years of observation may result in different estimates of these savings. A population dynamics model was used to evaluate the effects of the U.S. time/area closures and the effects of hypothetical closures more widely distributed in the Atlantic. The model drew attention to the importance of swordfish migration patterns to the success of time/area closures. Under the scenario where juvenile swordfish left the closed area quickly, very little benefit was realized since these fish were then subject to capture by fleets operating outside of the closed areas. In this analysis, if the juvenile swordfish remained protected for six months, the closures were beneficial. At this time relatively little is known about the migratory patterns of juvenile swordfish on the time scales important to evaluation of the impact of time-area closures, but incorporation of the available tag-recapture data into the analysis may permit refinement of the advice that can be offered. The Committee noted that the analytical framework used also offers the potential to incorporate socio-economic cost benefit analysis and a more formal statistical basis for guiding decisions on time-area closures.

ICCAT and domestic regulations have resulted in increased discarding of swordfish and changes in targeting in some fleets. The impact of the regulations may create problems in maintaining the quality and consistency of data series. It is important to attempt to minimize regulatory effects on data collection while maximizing the benefits to the stock.

The Committee noted that some research into gear modifications to reduce the mortality of unintended catch in the U.S. long line fleet was underway. An experimental design testing different hook, bait, and gear configuration modifications for reduction of unintended catch was reported by the United States. Field experimentation was expected to continue through 2003, after which, the full results of this research will be presented to the Committee.

The current assessment of North Atlantic swordfish indicates that on average, recent (1996-1998) year-classes of swordfish from the North Atlantic stock have been about 150% of the overall average of year-classes

spawned since 1977. There is evidence that the 1999 year-class is also strong. In spite of this recent increase in year-class strengths, the percentage of juveniles in the catch has remained at about the same level in recent years. and the estimated fishing mortality rates on juvenile swordfish (<3 years old) have been reduced considerably. indicating that current regulatory regimes have had positive benefit regarding survival of juveniles. The strength of these recent year-classes, in combination with the current regulatory regimes is expected to permit recovery of the North Atlantic swordfish resource to levels that could support MSY within the Commission's target recovery time frame.

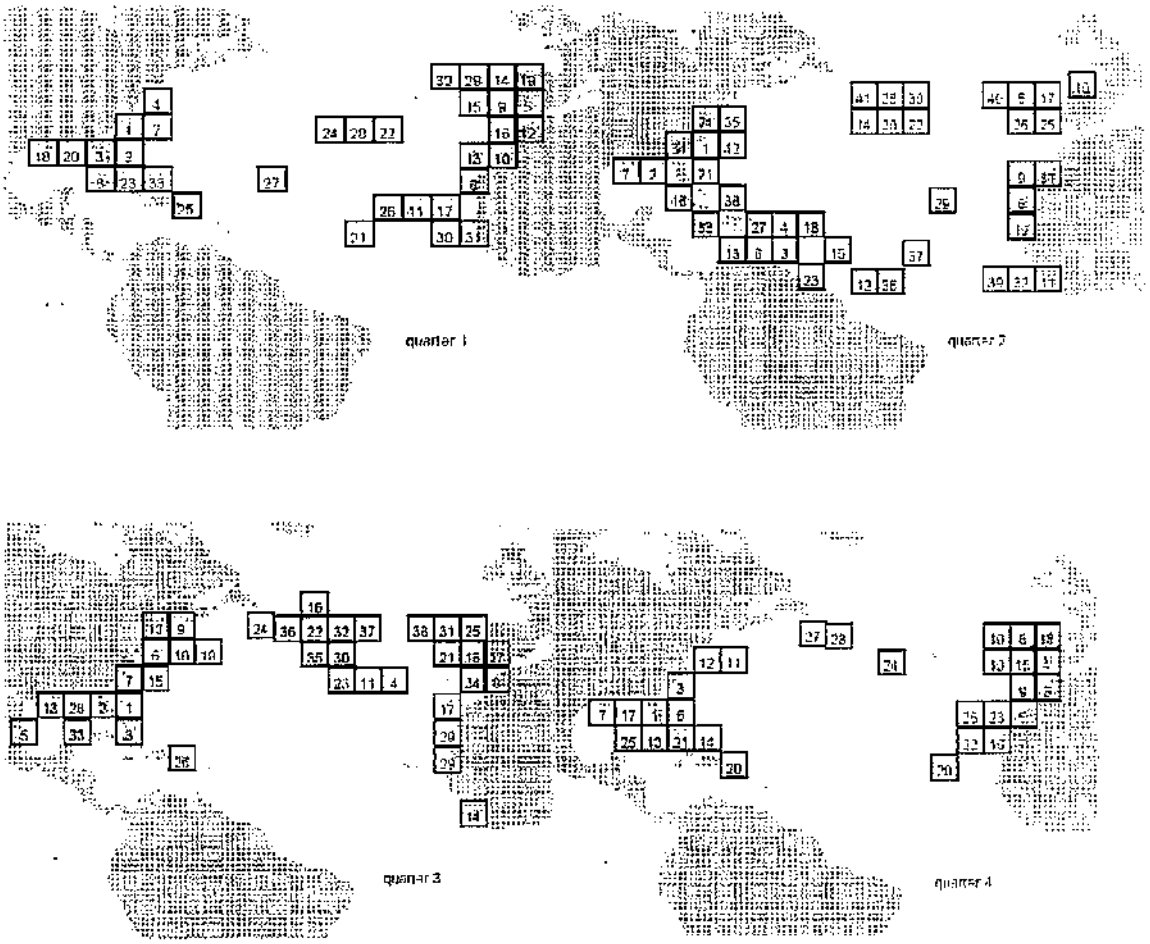


Figure 17.2. In this example, 1998 North Atlantic catch at size data from U.S. and Spanish longline fisheries were used to identify quarter/areas where closures could protect juvenile swordfish. Five degree squares defined by latitude and longitude ranked based on a combination of proportion of swordfish <125 cm caught, number of swordfish <125 cm caught, and nominal CPUE of swordfish <125 cm. The lowest numbers indicate the highest combination of proportion, number, and nominal CPUE of small swordfish in the five-degree square and quarter. These results are an incomplete picture of the distribution of high concentration areas and times of juvenile swordfish since not all fleets are represented in the analysis. Additionally, inter-annual variability is not taken into account, thus analyses with more complete data could identify different times and areas as more consistent areas of high concentrations of juvenile swordfish catch. The results of this exercise should not be generalized or extrapolated to other years or to other possible methodological frameworks.

17.3 Swordfish stock structure

[Resolution 99-3: regarding stock structure and boundaries of Atlantic swordfish stocks]

In 1999, the Commission resolved that Contracting Parties, Entities and Fishing Entities should report national and international research programs in order to reduce the current uncertainties about stock structure, mixing and boundaries of the swordfish stocks. Several countries have established research programs related to this topic that are currently in progress. The preliminary results of some of these programs were presented and discussed at the 2002 assessment meeting, and it was decided to defer the Committee's response to the Commission until more conclusive results are available. The SCRS recommends that a comprehensive workshop on the topic of swordfish stock structure should be held in 2004.

18. Future SCRS activities

18.1 Inter-sessional meetings proposed for 2003-2005

Proposed assessment, data-preparatory, or research-coordination meetings for 2003-2005

Year	*Month*	*Assessment/Data Meeting*	*Previous assessment*	*Comments/ Recommendations*	*Other Meetings Potentially Conflicting*
2003	Jan				
	Feb	Ghana Statistics		Small group, in Ghana	
	Mar	Data Exchange and Ageing Protocols		Sub Com Stat, small group	
	Apr	Methods		Habitat and experimental design - Japan	IATTC
	May	SWO-Med (with GFCM?)	1995	Only use data to end of 2001	IATTC
	Jun				IOTC
	Jul	YFT assessment	2000	Early July, 1 week, possibly Mexico	SCTB/SPC
	Aug				SCTB/SPC
	Sep	ALB N & S assessments	2000	Early Sept., possibly Cape Town	ICES
		Pre-Plenary week		Will include Species Groups, Tropical Moratorium and Sub-Com Stat.	
	Oct	SCRS (6-10 October)			
	Nov				9-24 Nov. window for
	Dec				IOTC Com
2004	Jan				
	Feb	BFT-E data review/ analyses		Determine if BFT-E assessment warranted	
		Stock definition		Multi-species	
	Mar	BETYP Symposium		Include experts from other oceans	
	Apr?	Environment Workshop			IATTC
	May	Shark – blue and mako assessments	never		IATTC
	Jun				IOTC

	Jul			SCTB
	Aug			SCTB
	Sep?	BFT E & W assessment	2002	ICES
	Oct			
	Nov			Commission meeting
	Dec			IOTC Com
2005	?	BUM/WHM assessment	2000/2002	
	?	SWO-Atl. assessment	2002	
	?	BET assessment	2002	

18.2 Date and place of the next meeting of the SCRS

It is anticipated that the next SCRS meeting will be held from October 6 to 10, 2003, in Madrid.

19. Other matters

The delegate from Croatia again referred to Document SCRS/01/091 which provided analyses of catches in the Adriatic Sea, and that suggested the current closed season for the bluefin tuna purse seine fishery in the area [Rec. 98-6] may be ineffective in its aim to protect juveniles. The SCRS Chairman and the Rapporteur of the Bluefin Species Group indicated that it would have been helpful if the Croatian scientists had attended the bluefin tuna stock assessment session where some discussions on Mediterranean closed areas took place. The Committee was reminded that the original closed area in Rec. 98-6 was established by the Commission itself without any SCRS recommendation. It was concluded that if Croatia wishes to pursue this issue further this year, it should be taken up directly at the Commission meeting.

The importance of the Sub-Committee on Statistics to the SCRS was emphasized. While the benefits of meeting prior to the Plenary were recognized, concern was expressed that there should be more opportunity for additional input during the Plenary and that sufficient detail of the discussion should be provided in the report. The SCRS Chairman commented that the new streamlined procedure implemented this year allowed more input from individual scientists (as well as head delegates), and he noted that while opportunity was provided during the Plenary presentation of the Sub-Committee report, there was little discussion. Thought will be given to this important issue for next year, so as to maintain the balance of increased participation of individual scientists (outside the SCRS Plenary), a full record of the discussions, and to encourage debate at the Plenary. In case a more extensive Detailed Report is required, it may be impossible for the Secretariat to translate it in time for the SCRS meeting. In this case, the Detailed Report would be kept in its original language(s), and a short Executive Summary would be prepared for translation and presentation to the SCRS, as is done for the Species Groups.

No other matters were discussed.

20. Adoption of report and adjournment

The Report was adopted by the Committee.

The SCRS Chairman thanked the participants, noting that 2002 was a very busy year with many meetings. He noted that because of the hard work during the inter-sessional period, the level of preparedness for the SCRS was excellent, thus making the Plenary a relatively easy session.

Dr. Pereira thanked both the Secretariat and the interpreters for their important contributions to the meeting.

The SCRS meeting was adjourned.

Appendix 1

SCRS AGENDA

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of Contracting Party delegations
4. Introduction and admission of observers
5. Admission of scientific documents
6. Review of national fisheries and research programs
7. Executive Summaries on species:
   YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack, ALB-Albacore, BFT-Bluefin, BIL-Billfishes, SWO-Swordfish, SBF-Southern bluefin, SMT-Small tunas
8. Report of 6th GFCM/ICCAT Meeting on Large Pelagic Fishes in the Mediterranean
9. Report of *ad hoc* Working Groups,
   SCRS Organization
   Assessment Methods
10. Report of Special Research Programs
    Bigeye Tuna Year Program (BETYP)
    Bluefin Year Program (BYP)
    Enhanced Research Program for Billfish
11. Sub-Committee on Environment
12. Sub-Committee on By-catches
13. Report of the Meeting of the Sub-Committee on Statistics
14. Reports of scientific meetings where ICCAT was represented
15. Collaboration with other fisheries organizations
    Analysis of potential partnership with FAO's FIRMS-FIGIS
    Other
16. General recommendations to the Commission
17. Responses to the Commission's requests
    BFT Mixing [Ref. 00-11]
    SWO Time/Area Closures [Ref. 99-04]; [Ref. 01-04]
    SWO Stock Structure
18. Future SCRS Activities
    Inter-sessional meetings proposed for 2003
    Date and place of the next meeting of the SCRS
19. Other matters
20. Adoption of report and adjournment

Appendix 2

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Appendix 3

LIST OF SCRS DOCUMENTS

SCRS/2002/010 GFCM-ICCAT Meeting Report. (BFT, SWO, ALB)
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Appendix 4

REPORT OF THE *AD HOC* WORKING GROUP ON SCRS ORGANIZATION

1. Introduction

At the 1997 meeting of SCRS, discussions were held and recommendations made about the need to review and develop alternative options for organization of the SCRS and annual meetings. In 1998, an *Ad Hoc* Working Group[1] on SCRS Organization was formed "to consider procedures for more effective analysis and reporting, aimed at enhancing the credibility of the Commission's scientific work. The Group should consider an effective system of peer reviewing of reports and develop a plausible format for drafting reports (particularly for the reporting of full assessment results and for updating previous years' work)."

The *Ad Hoc* Working Group on SCRS Organization[2] met during the Species Group Sessions at ICCAT headquarters, September 26, 2002, to review progress on recommendations made since its last meeting in 2001, and to further discuss issues related organization of SCRS. Among the issues taken up at the 2002 meeting, were further implementation of peer review for quality assurance purposes, the timing of data reporting, late submission of scientific papers, work plans, and the assessment schedule for 2003-2005.

2. Peer review

Peer review is an important component in the recommended overall quality assurance procedures for ICCAT. In order to ensure that management advice derived from assessments is sound, in 2001, the SCRS agreed to two *in situ* reviews. The purpose of the reviews is to provide additional scientific peer advice to the SCRS and its species groups for improvements in their conduct of stock assessments. Conduct of *in situ* review, wherein the reviewer may provide working papers in advance of the session, actively participates in analysis and in report drafting, permits an immediate feedback to the working group and SCRS and permits suggestions for future research, and thus, in the short-run, is the method of peer review viewed most practical by the Working Group. It was further suggested that these reviews be conducted for species groups implementing new assessment methods as a first priority. Species group conveners should plan to hold a review of this nature within the next five-year period and additional reviews at intervals of about every 2-3 assessments, thereafter. In 2001, the SCRS decided that the SCRS Chairman, the Species Group Rapporteur and a scientist from the Secretariat act as coordinators in the selection process and that the selections be made in open consultation (by e-mail) with SCRS head scientists.

This system was initiated for white marlin in 2002 (to be followed by bigeye tuna), however no consensus could be reached in selecting a reviewer in time for the meeting, and therefore there were no reviewers. The Working Group discussed the process established in 2001 and its shortcomings, and recommended that the selection of reviewers be simplified and handled by a smaller group (consisting of the SCRS Chairman, the Species Group Rapporteur for the concerned species and the Secretariat). The Group continues to recommend that SCRS proceed with the conduct of at least 2 *in situ* reviews per year, starting in year 2003. The participation of a reviewer should be identified in the Species Group Work Plan. The Group estimates that the amount of $10K budgeted for two reviewers is probably conservative, and that an honorarium in addition to travel expenses may be necessary. The Group recommended that the unused funds from 2001 be added to the funds for 2002 (a total of $20K).

The process of selection in 2003 will be as follows: (1) two stocks will be identified for reviews; (2) a pool of potential reviewers will be identified (an excellent list was already compiled from the 2002 exercise); (3) the Secretariat will determine the availability of reviewers; (4) from the available pool, the SCRS Chairman, the Species Group Rapporteur and the Secretariat will select the reviewers; (5) heads of national scientific delegations and Species Group Rapporteurs will be advised of the outcome of this process. The qualifications of the reviewers will be evaluated by the small selection group, and a brief *curriculum vitae* made available for information. The final selections will be made on the basis of both the availability and qualifications of candidates.

3. Timing of data reporting

As discussed in 2001, the new database management system was put in place by the Secretariat as one element of the quality control procedures recommended by SCRS and adopted by the Secretariat. In order to assure quality data for

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1 This report was discussed by the SCRS, who modified some of the recommendations presented here. See Sections 9.1 and 18.1.

2 G. Scott (U.S.A.), Convener; J. Mejuto (EC-Spain), R. Pianet (EC-France), J. Porter (Secretariat), Z. Suzuki (Japan), V. Restrepo (Secretariat), J. Pereira (SCRS Chair)

assessments, it is critical that sufficient time (at least one week for Task I data) is available between data submission and the time of a scheduled assessment due to the steps needed in entering and quality assuring data into the database. In 2001, the data reporting deadlines were revised in order to be more realistic for National Scientists. Despite this, and the 2001 Resolution of the Commission [Ref: 01-16], data continues to be submitted late or not at all. Late submission of data could be a result of a number of factors, among them being insufficient effort by member countries, the time lags in national data reporting and data collection mechanisms, or simply because of the increased complexity of the data demands to ICCAT and other international commissions with no increased resources to National Scientists. Regardless of the cause for late reports, it is a responsibility of member nations to ensure that there is adequate support for data collection and reporting so that the ICCAT reporting time-lines can be adhered to. The Working Group discussed the need to reemphasize that in order to conduct assessments in a timely manner with the most recent data, it is necessary that ICCAT receive Task I and Task II data well in advance of the scheduled assessments.

The Group decided that it wishes to maintain some flexibility in the data reporting, but recommended the following: (1) deadlines be clearly indicated in the Work Plans, and that they be adhered to; and (2) that the SCRS Chairman emphasize the importance of data submission to the Commission with the aid of the table annually prepared by the Secretariat. The Secretariat emphasized that it will maintain the current flexibility to the best of its abilities, but cautioned that there is a serious risk associated with rushed updates to the database (mistakes can easily be made). The Group agreed that the Secretariat is very accommodating and recognized their efforts.

It was agreed in 2002 (as in 2001), that there will be no additions of data to the body of the Task I tables during the SCRS Plenary, but that if late Task I data are received on Monday of the Plenary, they can be included in a footnote to the Task I tables.

4. Late scientific papers

The Working Group discussed the current SCRS policies with respect to submission of scientific papers to the various working groups. It was recommended that these policies be reemphasized to all participating scientists and remain posted on the ICCAT web site. In general, the Secretariat will require titles and abstracts of intended contributions, 25 days in advance of the scheduled meeting during which the contribution will be discussed. In addition, it is the responsibility of the author to deliver the appropriate number of copies of each manuscript at the beginning of each meeting. Typically, 80 copies are required for the SCRS Plenary and associated species group meetings, and normally, 30 copies for inter-sessional meetings. For 2003, the Group proposes that electronic copies also try to be submitted in advance of the meeting and these will be posted on the ICCAT web site for consultation and downloading in advance of the meetings. This would be moving one step closer to having all documents submitted electronically and the elimination of some paper copies.

The Working Group also discussed the current SCRS situation regarding the regularly-late submission of National Reports. The possibility of separating these reports into scientific (for SCRS) and management (for the Commission) parts was again discussed as a possible means of reducing the number of late submissions. The Working Group recommended that this be proposed to the Commission in 2003.

5. Work plans

In 2002, Work Plans were prepared and posted on the ICCAT web site for all major stocks except albacore. The Group agreed that the use of the Work Plan helps everyone, and facilitates both the efficient preparation of data by the Secretariat and national scientists, as well as the general functioning of the assessment meeting. For 2003, the Group recommended that the Work Plans clearly indicate deadlines and tasks, and that these be adhered to by the contributors and the Rapporteur, and that the participation of a reviewer be identified in the Work Plan.

6. Assessment schedule for 2003-2005

Using the guideline (established in 2001) of no more than 5 species stock assessments scheduled in any year, and that 4 be the norm, **Table 1** lists the anticipated assessments and a tentative schedule for their conduct in 2003-2005.

7. Adoption

The Report was adopted by the *Ad Hoc* Working Group.

Table 1. Anticipated assessment, data-preparatory, or research-coordination meetings for 2003-2005

Year	*Month*	*Assessment/Data Meeting*	*Previous assessment*	*Comments/ Recommendations*	*Other Meetings Potentially Conflicting*
2003	Jan				
	Feb	Ghana Statistics		Small group	
	Mar	Data Exchange and ageing protocols		Sub Com Stat, small group	
	Apr	Methods		Habitat and experimental design – Japan ?	IATTC
	May	SWO-Med (with GFCM?)	1995	Only use data to end of 2001, or hold in 2005	IATTC
	Jun				IOTC
	Jul	YFT assessment and moratorium	2000	Early July, 2 wks between IOTC and ICCAT	SCTB/SPC
	Aug				SCTB/SPC
	Sep	ALB N & S assessments	2000	Early Sept., possibly Cape Town	ICES
	Oct	SCRS (6-10 October)			
	Nov				9-24 Nov. window for Commission Meeting
	Dec				IOTC Com
2004	Jan				
	Feb				
	Mar	BETYP Symposium			
	Apr?	Environment Workshop			IATTC
	May	Shark – blue and mako assessments	never		IATTC
	Jun				IOTC
	Jul				SCTB
	Aug				SCTB
	Sep?	BFT E & W assessment	2002		ICES
	Oct				
	Nov				Commission meeting
	Dec				IOTC Com
2005	?	BUM/WHM assessment	2000/2002		
	?	SWO-Atl assessment	2002		
	?	BET assessment	2002		

Appendix 5

REPORT ON THE BETYP ACTIVITIES FROM OCTOBER 2001 TO SEPTEMBER 2002[1]

The Bigeye Tuna Year Program (BETYP) was proposed by the SCRS to the Commission in 1966 due to its concern about the increase in catches and the uncertainties on the status of the stock. The Commission approved the recommendation but activities started only in 1999 when funds were made available. The BETYP is an ambitious program including conventional and pop-up tagging, improvement of bigeye statistics, studies on genetics, growth and natural mortality, the development of a comprehensive integrated modeling program and, at the same time, encouraging the national laboratories of the Contracting Parties to undertake expanded research on reproductive biology, ethology and technology.

From October 2001 up to September 2002, conventional tagging was carried out only in the Gulf of Guinea and Canary Islands, pop-up tagging was conducted in Azores, improvement in fisheries statistics in Ghana, genetic and hard parts studies as well as development of the integrated modeling program continued during this period.

1. Contributions

The contributions requested and/or received from January to September 2002 are shown on **Table 1**, totaling US$ 547,210.

2. Expenditures (Table 2)

2.1 Salaries

The salary of the Coordinator and the accounting assistant are included in this line item in **Table 2**.

2.2 Coordination

This line item includes office supplies, telephone, eventual secretarial and translation services and the external auditing services.

2.3 Travel

The Coordinator traveled a total of 146 days: 11 days to Azores, 8 to the Basque Region, 28 to Ghana, 92 to Sao Tomé and 7 to Chinese Taipei to visit the national laboratories in order to coordinate and carry out BETYP activities.

2.4 Meetings

The Coordinator and Dr. François Xavier Bard met personnel of the MFRD in Ghana from January 21 to 25, 2002 in order to propose a solution to the improvement of sampling methods in Tema. The resulting document, "BETYP Suggested Methodology for Actualization of sampling of Tunas in Tema, Ghana" (see SCRS/2002/174), was delivered to the Director of Fisheries on January 25.

On September 18, 2002, Drs. Pilar Pallares, Naozumi Miyabe and João Gil Pereira (Joseph Powers was not in Madrid at the time), members of the BETYP Committee, met in Madrid with the ICCAT Executive Secretary, Dr. Victor Restrepo and the BETYP Coordinator to define the date and format of the BETYP Symposium, (see **Annex 2**). The selected dates were March 8, 9, 10 and 11, 2004, and it was decided to select the main themes to be covered at the Symposium and to appoint a scientist from the national laboratories to be responsible for each theme. It was also decided to invite special guests with expertise in the themes and to encourage members of other tuna commissions to attend the Symposium. It was recommended to continue, subject to the availability of

[1] Initially presented to the 2002 meetings by G. Fisch as document SEC/2002/013.

funds, with genetic studies, conventional tagging in Azores, Canary Islands and Madeira, and other activities of the BETYP.

The conclusions were presented to the Bigeye Tuna Assessment Group on September 19, 2002 and were accepted without comments regarding the date and general guidelines for the organization of the Symposium. A proposal was made to expand the Symposium to become a World Bigeye Tuna Meeting with the participation of the tuna Commissions of the Pacific and Indian Oceans. The Chairman of the SCRS reminded that the BETYP Symposium should be an independent event as closing of the program. It was suggested that during each appropriate session of the Symposium, other regional organizations present a synthesis of their comparable activities in their area of responsibility. In the final Symposium Plenary the basis for future joint work would be established.

2.5 Conventional tagging operations

The total tuna tagged from October 2001 to September 2002 was 7,615 as is shown in **Table 3.**

The summary of BETYP conventional tagging activities from June 1999 to September 2002 is shown in **Table 4.** The recapture results are encouraging as 14.6% of all tagged species were recaptured and in particular, 30% of bigeye. Most of the bigeye were recaptured near the tagging sites; however two recaptures of bigeye tagged in Senegal in 1999 should be noted: one was recovered 80 miles north of the Island of Faial, Azores and one in the Windward Passage between Cuba and Haiti.

Document SCRS/2002/113 by Daniel Gaertner and Jean-Pierre Hallier was presented during the Bigeye Tuna Assessment Group. This document was used by the Group to estimate natural mortality of bigeye based on tagging results from BETYP and conventional "spaghetti" tags applied during a tuna tagging program conducted on board Dakar baitboats in 1999.

Azores

Due to the lack of fish, no conventional tagging activities were carried out in Azores during 2002. One conventional tag was applied during the electronic tagging cruise in June 2002.

Madeira

Due to the lack of fish, no conventional tagging activities were carried out in Madeira in 2002.

Canary Islands

During the months of June and July 2002, two opportunistic tagging cruises were carried out, tagging a total of 716 tunas of which 711 were bigeye, 1 yellowfin and 4 skipjack.

Gulf of Guinea, São Tomé

A dedicated tagging cruise took place between June 1 and August 31, 2002 on board the Portuguese flagged chartered vessel *Agião*. The tagging team, headed by Paul Bannerman, included personnel from the MFRD, Tema Ghana. The Head of cruise was Guillermo Fisch. The chartering cost was €275,000. During this trip, 492 bigeye, 1,761 yellowfin and 4,545 skipjack were tagged (see SCRS/2002/156).

2.6 Pilot study using electronic tags

As a follow-up to the one conducted in the 2001 project, with the collaboration of AZTI, DOP, Dr. M. Lutcavage from the New England Aquarium and the financial assistance of the Basque Government, a project was established for tagging large bigeye from Azores with electronic tags during the 2002 fishing season. This project was carried out between May and June 2002. During this project, 7 pop-up tags were deployed out of Faial Island, Azores. One tag was not deployed due to bad weather (see SCRS/2002/174).

The tags were scheduled to pop-up in August and November 2002. The information obtained up to September 15 indicating local movements of about 450 miles, vertical movement to 1,250 feet and water temperature for a bigeye followed for 30 days, is included in SCRS/2002/174.

2.7 Statistics improvement, Tema, Ghana

Extensive work has been carried out at the MFRD regarding support to improve the sampling, statistics and tagging operations. This work was done by Paul Bannerman with the assistance of Dr. François Xavier Bard who is stationed at IRD. (See also meetings and SCRS/2002/174.

2.8 Otoliths and hard parts

As a result of the agreement signed between the BETYP and IRD, for the purpose of carrying out a program to study the growth of bigeye, Drs. Jean-Pierre Hallier, Bernard Stequert and François Xavier Bard presented document SCRS/2002/157 that indicates that otolith readings show a faster growth than tag-recapture data.

2.9 Genetic studies

The Final Report presented by Rafael Zardoya San Sebastian of the *Museo Nacional de Ciencias Naturales*, Madrid, Spain, (See document SCRS/2002/159) based on the analysis of 177 samples collected in Côte d'Ivoire. Canary Islands, Azores and Canada, indicate that three clades are present in the Atlantic bigeye stock. Further sampling and studies are recommended.

2.10 Printing and publications

There has been no activity regarding this item, as publication of the final report will occur at the termination of the project.

3. Proposed BETYP activities for 2003

3.1 Conventional tagging

Continue conventional tagging activities as in the four previous years in Azores, Canary Islands, Ghana and Madeira, as well as opportunistic tagging in Venezuela, subject to the availability of funds.

3.2 Archival and pop-up tagging

Deploy one remaining pop-up tag from 2002 in Azores during the 2003 fishing season.

3.3 Otoliths and hard parts

Continue the program in collaboration with IRD.

3.4 Genetic studies

Subject to the availability of funds, continue the program in collaboration with the *Museo Nacional de Ciencias Naturales.*

3.5 Tema statistics improvements

Continue assisting MFRD.

3.6 Integrated model

Continue development of the model.

4. Budget

The proposed budget for 2003-2004 is shown in **Table 5**. In accordance with section 7 of the Report of the Coordinating meeting of the ICCAT Bigeye Year Program (SCRS/99/22), the funds for this budget, including the costs associated with the Symposium and publication of the final report, will be from the 2002 funds.

Table 1. Contributions received and requested from January to September 2002

Source	*Amount*
European Commission (20% from 2001)	US$ 38,900
European Commission (80% from 2002)	US$ 155,470
Japan (requested)	US$ 230,945
Azores	US$ 4,895
People's Republic of China	US$ 25,000
AZTI	US$ 20,000
Chinese Taipei (committed)	US$ 72,000
Total income	**US$ 547,210**

Note: The exchange rate of the month when the contribution was received was used for the Euro/Dollar conversion.

Table 2. BETYP Budget and situation on September 19, 2002

Item	*2002 Budget*	*Expenses to 9/19/02**
Salaries	$115,000	$78,564
Coordination	$15,000	$11,675
Travel	$15,000	$12,148
Meetings	$25,000	$1,749
Tagging activities, conventional tags		
Azores	$20,000	0
Madeira	$20,000	0
Canary Islands	$20,000	$19,067
Tema/ Gulf of Guinea	$250,000	$232,711
Tagging strategy research		0
Tag materials	$5,000	0
Tag rewards	$10,000	0
Various	$15,000	0
Pilot study, electronic tags	$50,000	$6,456
Tema statistics improvement	$5,000	0
Sampling for growth hard parts	$5,000	0
Printing and publications	$0	0
Contingencies	$15,000	0
Total expenses	**$585,000**	**$362,370**

*Some expenses are best estimates.

Table 3. Total tagged tuna from October 2001 to September 2002

Species	*Fish tagged*
Bigeye	1,204
Yellowfin	1,762
Skipjack	4,549
Total	**7,515**

Table 4. Summary of BETYP tagging activities, June 1999-September 2002

Total tagging

Location	*Bigeye tuna*	*Skipjack tuna*	*Yellowfin tuna*	*Totals*
Azores	45	217		262
Madeira				
Canarias	2313	49	65	2427
Senegal	946	1404	105	2455
Ghana	1024	2056	1419	4499
São Tomé	824	8197	3645	12666
Total	**5152**	**11923**	**5234**	**22309**

Total recuptures

Year	*Bigeye tuna*	*Skipjack tuna*	*Yellowfin tuna*	*Totals*
1999	1035	507	110	1652
2000	496	65	10	571
2001	11	141	27	179
2002	45	621	190	856
Unknown	4	3	4	11
Total	**1591**	**1337**	**341**	**3269**
Percentages	**30.88%**	**11.21%**	**6.52%**	**14.65%**

Table 5. Proposed budget for 2003-2004

Concept	*Amount*
Salaries	$115,000
Coordination	$15,000
Travel	$20,000
Meetings, including Symposium	$50,000
Publications	
Tagging	$105,000
Azores	$20,000
Madeira	$20,000
Ghana/Gulf of Guinea	$20,000
Canary Islands	$20,000
Rewards	$10,000
Various	$15,000
Tag materials	0
Archival and pop-up tags continuing study	0
Tema statistics improvement	$5,000
Hard parts	$1,000
Contingencies	$15,000
Total expenses	**$326,000**

Appendix 6

BLUEFIN YEAR PROGRAM (BYP)
EXECUTIVE SUMMARY

The Bluefin Tuna Year Program Working Group reviewed the progress made under the Bluefin Year Program, concluding that most of the research goals outlined for 2001-2002 had been met.

The current financial status is reviewed below and recommendations for direct BYP-funded research for the year 2003 in particular, and for the future in general, are made. The two primary areas of research considered important by the Working Group are stock structure and maturity, and the particular expenditures needed to accomplish the Working Group objectives in year 2003 are outlined. While sampling for stock structure and maturity remains the highest immediate priority of the BYP, the Committee also recommends support of several additional research activities, which are also itemized below.

Financial report

The financial status of the BYP funds through 30 September 2002, with anticipated expenditures through December 31, 2002 was reviewed. At the end of 2002, there should be a balance of approximately €37,800. With the expected 2003 Commission contribution of €13,600, the 2003 BYP operating budget should be on the order of €51,400.

Progress made on 2002 BYP Research Plan

Biological sampling

The Committee reviewed the progress to date in late 2001 and 2002 with respect to the sampling plan detailed in the 2000 BYP report to evaluate progress in accomplishing the plan. It was noted that expenses to date had been lower than anticipated, though a number of the objectives from the research plan described in the 2000 BYP report have yet to be fully met, largely due to the multi-year nature of the sampling plan. Much of the planned sampling in 1999, 2000, 2001 and 2002, to date, was conducted at lower direct cost to the BYP than originally anticipated, due in large part to the existence of the FAO's COPEMED program and due to national contributions to the BYP. Notable contributions from the Icelandic sampling of bluefin harvested largely within its EEZ were described in SCRS/2002/142 and SCRS/2002/143. In total, samples from nearly 2,500 bluefin were obtained by Icelandic scientists. Stock structure sampling targets for 2000 and 2001 were generally met. Stock structure sampling targets for 2002 were met or partially met in the western Mediterranean and eastern Mediterranean. Sampling targets for the most part in the west Atlantic were not met due to budgetary constraints which impacted sampling of summer fisheries; limited sampling success was achieved from the winter and spring fisheries. Consistent with the 2000 BYP research plan, several planned activities are expected to come to completion in the months remaining in the calendar year (or early in 2003, see **Table 1**).

Research on maturity

The BYP noted the progress made on maturity research, reported in documents SCRS/01/127 and SCRS/01/128 dealing with the histological analysis and corresponding sexual maturity of bluefin tuna caught in the traps of Tunisia and Libya. The aforementioned research, coordinated by Project FAO-COPEMED, stressed that all the analyzed bluefin tuna belonging to age-class 4 were mature and showed spawning and/or post spawning characteristics. For the current year, the EU project REPRODOT, aimed at studying the reproduction processes of bluefin tuna in captivity, was approved. The Project REPRODOT will start in January 2003.

Research on tuna farming impacts

In 2001, the BYP Working Group endorsed the proposed research activities on tuna farming in the Adriatic Sea submitted by Croatian scientists at the 2001 SCRS meeting and provided partial support to initiate this research in year 2002 (which could take two or more years to complete). A progress report on this research was provided in SCRS/2002/171. The research has progressed as proposed. Fish purchased for this research in 2002 will also also be used to obtain the appropriate biological specimens identified in the BYP research plan for

stock structure and maturity sampling (according to the sampling protocol provided to Croatian scientists at the 2002 BYP meeting).

Research on spawning areas

At the 2000 SCRS meeting, SCRS/00/125 presented a plan to attempt to catch adult and larval bluefin in an hypothesized spawning area in the central North Atlantic, and Spanish scientists reported that the Spanish government was planning a study of spawners and larvae in the Balearic Islands area. The Working Group endorsed these proposals and recommended that a coordination meeting be held in early 2001. That meeting was held and was reported on in SCRS/01/022. Data collection protocols were standardized for fishing effort and fishing strategies, hydrographic sampling and biological sampling and were developed to the extent possible given that the Spanish sampling would be conducted aboard both research and commercial vessels while the central Atlantic sampling would be conducted aboard only commercial vessels.

The Balearic area research conducted in 2001 (the TUNIBAL project by the *Instituto Español de Oceanografía* resulted in the capture of 124 bluefin larvae (SCRS/01/129). Further analysis of the 2001 TUNIBAL survey data relative to the oceanographic characterization of the bluefin spawning grounds revealed association of larval concentrations in the area with anticyclonic gyres and frontal features (SCRS/2002/041). In 2002, this research continued (the second TUNIBAL survey) and preliminary results of sampling revealed contrasting hydro/climatic differences for 2002 compared to the bluefin spawning season in 2001 (SCRS/02/165).

The central North Atlantic longline fishing conducted in 2001caught no bluefin, though other large pelagic species were caught (SCRS/01/31 Rev.); results from the larval sampling in 2001did not reveal bluefin tuna. Results from the 2002 central North Atlantic longline fishing were also reported at the 2002 SCRS in the form of an "Information Release" from the central North Atlantic Steering Committee, in September, 2002 (see Detailed Report), which indicated no catch of bluefin, but catches of other large pelagic species. No long line catch of bluefin was made on the Japanese R/V *Shoyo-Maru* cruise in the central North Atlantic study area in 2002 (SCRS/2002/170). In combination, the fishing effort expended in the central North Atlantic research area in 2002 (59 fishing days, ~51,000 hooks) was larger than that expended in 2001. Results from larval sampling from the 2002 cruises in the central North Atlantic are not yet available. Ichthyoplankton samples are being examined by U.S. scientists and these results should be available next year.

Research on genetics

The BYP Working Group endorsed the research for genetic analysis of available samples proposed during the 2001 SCRS by scientists from several Mediterranean countries involved in the COPEMED project and noted the progress made and reported upon in SCRS/2002/172. It is expected that additional results from genetics research will become available in ensuing years.

Electronic tagging

Electronic tagging in the eastern Atlantic and Mediterranean has lagged behind similar efforts in the western Atlantic. Although the BYP Working Group endorsed the proposed research for electronic tagging in the eastern Atlantic and Mediterranean submitted by EC scientists at the 2001 SCRS meeting, progress has been limited due to the high cost of the research and thus far, limited research funding for this activity. The BYP Working Group noted that the Committee has previously recommended research into bluefin stock structure making use of high-technology electronic tags. The recent report on bluefin tuna mixing recommended increasing effort on electronic tagging, especially in the Mediterranean as well as the central Atlantic, and encouraged cooperation between scientists/organizations of coastal countries through the current organizational structures (*e.g.* COPEMED, European Union, United States, or others), with technical collaboration by scientists from the west involved in these research applications.

Research Plan for 2003

There has been considerable progress to date on the sampling plan developed by the BYP in 1999 and continued through 2002, but at a lower cost than originally anticipated. While there is a need to maintain sampling to achieve the plan outlined in the BYP sampling plan (see BYP Detailed Report), the BYP research funds in 2002 and 2003 permits further broadening of the research plan in 2003 to include additional high

priority research. The Committee notes that the COPEMED program has been extended for another year and again highly endorses the objectives of this program.

As highest priority for the BYP in 2002-2003, the BYP Working Group recommends expenditures of €32,000 to cover expenses associated with stock structure and maturity sampling during the upcoming year as described in the BYP sampling plan.

As next priority for the BYP in 2003, the BYP Working Group recommends expenditures of €35.000 to contribute to the expenses for planning, conduct, and coordination of four research activities viewed as important to the future of BYP and in support of providing scientific advice to the Commission on bluefin tuna.

i) The BYP Working Group previously endorsed the proposed research activities on tuna farming in the Adriatic Sea submitted by Croatian scientists (see proposal in 2002 BYP Detailed Report). The Committee recognizes that full conduct of this research as proposed would require more resources than the current BYP could contribute and that the results will be useful for addressing the growth of fish farmed in the Adriatic, but probably not generalizable to other farming areas. Progress along the lines identified in the Croatian proposal has been made and the BYP Working Group recommends that €10,000 be contributed in partial support to continue this research in year 2003 (year 2 of a three-year proposal) and that fish purchased for this research also continue to be used to obtain the appropriate biological specimens identified in the BYP research plan for stock structure and maturity sampling.

ii) The Committee endorsed the proposed research sampling of larvae and spawning-sized bluefin tuna and the associated oceanographic conditions in and around the Balearic Islands and in the Central North Atlantic. After two years of field sampling, there is a need to review and revise, as necessary, sampling plans associated with these studies. The BYP Working Group recognizes that this research is very expensive and is beyond the current capability of the BYP, but recommends that €5,000 be contributed to support larval sampling coordination and future research planning of these research projects.

iii) The Committee endorsed the concept of the proposed program of investigation into intensive satellite tagging of large bluefin tuna in the Mediterranean and eastern Atlantic. This research addresses the Committee's recommendation to conduct research to better quantify the origin of fish, mixing and its implications for assessment and management of bluefin fisheries. The BYP Working Group recognizes that this research is very expensive and is beyond the current capability of the BYP, but recommends that in 2003, €15,000 be contributed to support further planning, coordination, and further implementation of this research. It is recognized that the actual cost of this research is much higher than can be supported by BYP funding alone. Increasing effort on electronic tagging, especially in the Mediterranean, is strongly encouraged and cooperation between scientists/organizations of coastal countries through the current organizational structures (*e.g.* COPEMED, European Union, United States, or others), with technical collaboration by scientists from the west involved in these research applications is required for success of this research.

iv) Direct ageing of bluefin catch has been recommended as a superior means of estimating catch at age for the purposes of stock assessment. Document SCRS/2002/143 demonstrated the feasibility of obtaining hard parts for ageing from certain fisheries. However, a procedure of age determination of bluefin catch has not been implemented in many fisheries. Whereas ageing of young bluefin is usually not difficult, the age determination of medium sized and giant tuna may often be quite problematic. An apparent deviation in the estimated age derived by various methods ads further to the confusion of age determination of the fish. If age determination of bluefin catch is to be implemented as a routine procedure, as recommended, a standardized protocol of procedure is urgently needed. It is therefore recommended that a bluefin ageing network of people who have worked on age determination of bluefin will be initiated. The aim of the network will be to compare and evaluate various ageing methods for various ages and from different seasons in order to develop a standardized protocol for age determination for bluefin tuna. To this end, the BYP Working Group recommends that coordination of such a network be established, making use of the expertise in Iceland as a focal point for this activity. The BYP Working Group recommends that €5,000 be contributed to support the coordination activities needed for initiating such a network.

Table 1. Recommended 2002/2003 BYP contributions to bluefin research (Euros)

Project description	*2002-2003 Request*	*BYP Fund Balance*
Planned expenditures in 2002		53,971
Ship Croatian tissue samples to Girona	(500)	53,471
Ship Croatian otoliths to USA	(200)	53,271
Ship Icelandic tissues to USA	(10,000)	43,271
Ship Sicilian tissue samples to Girona	(1,000)	42,271
Genetic analysis	(500)	41,771
Collect samples from Cantabrian Sea (Spain)	(4,000)	37,771
Anticipated 2003 Commission contribution	**13,600**	51,371
Planned expenditures in 2003		
Croatian Bluefin farming research (year 2)	(10,000)	41,371
Larval sampling coordination and future research planning	(5,000)	36,371
Mediterranean Electronic Tagging Coordination	(15,000)	21,371
Direct Ageing Coordination	(5,000)	16,371
Tissue sampling in Turkey (1,500 Coordination; 6,000 sample contract)	(7,500)	8,871
Tissue sampling in Spain	(7,500)	1,371
Shipping 2003 Samples Collected	(1,371)	0

Appendix 7

ENHANCED RESEARCH PROGRAM FOR BILLFISH - EXECUTIVE SUMMARY

(Expenditures/Contributions 2002 & Program Plan for 2003)

Program objectives

The original plan for the ICCAT Enhanced Research Program for Billfish (IERPBF, SCRS 1986) included the following specific objectives: (1) to provide more detailed catch and effort statistics, and particularly size frequency data; (2) to initiate the ICCAT tagging program for billfish; and (3) to assist in collecting data for age and growth studies. The plan was initially formulated in 1986 and implemented in 1987 with the intention of developing the data necessary to assess the status of the billfish stocks. Efforts to meet this goal have continued through 2002 and are highlighted below. During the 2002 Billfish Working Group meeting, the Working Group requested that the IERPBF re-focus its objectives to accomplish age and growth estimates for adult marlin. The Working Group believes that these data will facilitate use of more sophisticated models for billfish assessments.

The ICCAT Enhanced Research Program for Billfish, which began in 1987, continued in 2002. The Secretariat coordinates the transfer of funds and the distribution of tags, information, and data. The General Coordinator of the Program is Dr. Joseph Powers (United States); the East Atlantic Coordinator is Dr. Nestor N'Goran Ya (Côte d'Ivoire), while the West Atlantic Coordinator is Dr. Eric Prince (United States). The billfish database is maintained at the NMFS Southeast Fisheries Science Center (Miami, Florida) and at the ICCAT Secretariat.

2002: Contributions and Expenditures

This report presents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 2002. In 2002, funding for the ICCAT Enhanced Research Program for Billfish operated under the financial arrangement established by the 1997 SCRS (see 1997 STACFAD Report, item 9.3). The STACFAD specified that the Commission should make at least a symbolic contribution (US$ 10,000) to the Enhanced Research Program for Billfish and this was continued in 2002 (1997 STACFAD Report, items 9.5 and 9.9). As a result of this development, the Program in 2002 was fully coordinated by the Secretariat in consultation with area coordinators and member countries.

Table 1 shows the status of funds available towards Billfish Program activities, expenses for 2002, and the current balance of Billfish Program funds (€30,020.49 or US$ 29,576 as of September 23, 2002). It should be noted that accounting of all income and expenses is carried out in Euros, and U.S. Dollar amounts are converted to Euros at the official monthly U.N. exchange rate in effect when the accounting entry is made.

Prior to the end of Fiscal Year 2001 but after the 2001 IERPBF report, a contribution of US$2,500 was received by the ICCAT Secretariat from the Billfish Tournament Network (United States). This contribution was included in the balance at the start of Fiscal Year 2002, which was 33,218.08 Euros (US$ 32,727) and these funds were carried over for 2002 Program activities (**Table 1**). Contributions in 2002 included an allocation of €10,523.72 (US$ 10,368) from the regular Commission budget. Thus, the total funds available for the 2002 Billfish Program (**Table 1**) amounted to €43,741.80 (US$ 43,095). Other funds that are normally contributed to the Billfish Program were not made available in 2002 therefore it was again necessary (as in 2001) to reduce major expenditures for 2002 Billfish research activities by about 50%.

Starting in 1996, the FONAIAP (Venezuela) and in 1997, the *Instituto Oceanográfico* (University de Oriente) has provided personnel and other resources as in-kind contributions to the at-sea sampling program, thereby reducing the amount of funds needed for this activity from the ICCAT billfish funds. Also, the ICCAT Billfish Rapporteur (Dr. David Die) assisted in overseeing shore-based sampling work and standardization of recreational CPUEs in Venezuela in 2002 and this cost was absorbed by the U.S. National Marine Fisheries Service and the University of Miami Center for Sustainable Fisheries--as such represented an in-kind contribution to the Billfish Program for 2002. The Department of Environmental Protection of Bermuda also contributed in-kind contributions by providing personnel and other resources, used for assessing post-release survival of Atlantic blue marlin in the recreational fishery.

Parts of the Program Plan for 2002 were successfully carried out in a timely manner, although reductions and uncertainties in contributions did affect expenditures and the amount of research that could be accomplished during 2002. For example, only 19 observer trips on Venezuelan longline vessels were accomplished in 2002, about the same reduction accomplished in the previous year but about half the number of trips budgeted in 2002.

Table 2 shows the 2002 Billfish Budget and Expenditures (as of September 23, 2002). Several additional expenditures are expected to be incurred before the end of 2002 and into the first quarter of 2003, such as payment of observer coverage in Venezuela and Program coordination travel. Therefore, there is a need to carry over the 2002 balance in Billfish Program funds to the 2003 Budget, as has been the practice for this and other special programs in previous years. A number of budgetary items show a zero expenditure and this is due to the fact that authorization of some 2002 budgetary expenditures was dependent on the sufficiency of funds, while in other cases no request for funding by Program participants was submitted. The Working Group requests that the Commission again provide at least the same level of research funding in 2003 as it did in 2002. In addition, voluntary contributions, including those from The Billfish Foundation and Chinese Taipei will also be necessary to carry out the entire Program Plan in 2003.

Research carried out during 2002 is summarized by area coordinators in SCRS/2002/127 and SCRS/2002/112. An additional three working documents on billfish were submitted to the 2002 SCRS, including: SCRS/2002/117, SCRS/2002/125, and SCRS/2002/161.

2003: Coordination, Protocols, and Program Plan

It was confirmed that Drs. Powers and Prince (United States) will continue to function as the General Coordinator and West Atlantic Coordinator, respectively. Dr. N'Goran Ya (Côte d'Ivoire) will act as Co-Coordinator for the East Atlantic Ocean.

The summary of the 2003 proposed budget, totaling US$ 54,350, is attached as **Table 3**. Highlight reports of research activities will be provided to interested parties annually. In addition, names and addresses of individuals receiving the reports and those involved or interested in the research program will continue to be made available upon request. Projected funds for future research activities will be available in subsequent annual plans.

All agencies and/or personnel receiving funding from the special Billfish Program account are required to summarize annual expenditures of funds to the Commission and research activities, either in the form of a working document to the SCRS or a report to the Program Coordinators. Due to changes in the financial structure of the ICCAT billfish account, all participating cooperators in this Program are now required to request the release of funds (via fax or email) directly from the ICCAT Secretariat, as well as General Program Coordinator and area Coordinators. In other words, the release of Program funds is not automatic, even if expenditures are described in the Program Plan-- release of funds is contingent upon requests being received by the ICCAT Secretariat and Program Coordinators. In addition, program participants are required to submit data collected in previous years to area Coordinators or directly to the ICCAT Secretariat.

Statistics and sampling

Shore-based sampling

West Atlantic

Bermuda. Shore-based sampling of the annual billfish tournaments will be conducted in Bermuda in 2003. Dr. Brian Luckhurst of the Department of Environmental Protection of Bermuda will coordinate this activity, and no funds will be required. Bermuda will continue to conduct research involving pop-up satellite tags to evaluate the post-release survival, habitat use, and critical habitat identification of billfish. This work may also require some travel from Bermuda to various locations in the western Atlantic to facilitate this research (see section on pop-up satellite tags).

Brazil. Shore-based sampling of selected billfish tournaments will be continued in Brazil for 2003 in the general vicinity of Santos, as well as other locations off southeastern Brazil. Dr. Alberto Amorin, *Instituto de Pesca*, will coordinate tournament-sampling activities. Shore-based sampling will begin in Fernando de Noronha

Island and other locations of northeastern Brazil and this activity will be coordinated by UFRPE. It is not anticipated that this activity will require funds in 2003.

Cumaná, Playa Verde, Punto Fijo, and Margarita Island, Venezuela. Shore-based sampling of size frequency data for billfish carcasses off-loaded from industrialized longline boats at the port of Cumaná will be continued in 2003. Funding will be $300 since some of this activity occurs on weekends and after normal working hours. Likewise, sampling artisanal fisheries in Playa Verde will be accomplished by contracting a technician on a part-time basis. Funding for this activity in 2003 is $700. Sampling artisanal longline boats and artisanal fisheries in Punto Fijo and Margarita Island will be conducted in 2003 and the requested funding for these segments is as follows: Punto Fijo $200, and Margarita Island $300. Trips by the West Atlantic Coordinator or his designee may be necessary to organize sampling, collect data, and transport biological samples to Miami in 2003. In addition, the amount of $900 will be required for tag rewards in Venezuela for 2003 that are made by the *Instituto Nacional de Investigaciones Agrícolas* (INIA) staff (this budget item is identified in the Section on Tagging).

La Guaira, Venezuela. Shore-based sampling and detailed analysis of the recreational fishery (centered in La Guaira, Venezuela) will be continued in 2003. This sampling includes coverage of up to ten recreational billfish tournaments held in Puerto Cabello, La Guaira, Falcon, and Puerto La Cruz. Requested funding for this activity in 2003 is $500 since much of this sampling is conducted on weekends and some travel expenses are incurred while attending these events. Also, shore-based sampling, including documentation of the catch and effort statistics for the important recreational fishery at Playa Grande Marina, will be accomplished by contracting a technician on a part-time basis. Funding for this activity in 2003 is $2,000. Shore-based sampling in all Venezuelan locations, as well as at-sea sampling (see next section) in Venezuela will be coordinated by Mr. Luis Marcano of INIA.

Grenada. It is uncertain if shore-based sampling of size frequency and total landings from the artisanal and recreational fishery for billfish will be continued by the Ministry of Agriculture, Lands, Forestry, and Fisheries (coordinated by Mr. Crofton Isaac and Mr. Paul Phillip) in 2003. If this activity does occur, it will start in early November 2003, to coincide with the start of the pelagic fishery at this location. This activity may also include sampling of the Spice Island Billfish tournament. Requested funding for 2003 is $1,000.

Jamaica. Shore-based sampling of the size frequency, total landings, and catch and effort statistics from the recreational fishery can not be continued in 2003 until a new contact can be made in this location. Dr. Guy Harvey has since moved to the Cayman Islands and can no longer continue this work. Requested potential funding, should contacts be made, will be $1,000 for 2003.

St. Maarten, Netherlands Antilles. It is uncertain if shore-based sampling of size frequency data for off-loaded billfish carcasses from longline vessels will be continued in 2003 through the Nichirei Carib Corporation. If this activity does occur, the requested funding in 2003 is $1,500. Shore-based sampling of the annual recreational billfish tournament, initiated in 1992, may be continued in 2003 by the West Atlantic Coordinator or his designee (if time permits). Since this tournament normally contributes travel expenses for the week of the tournament, the West Atlantic Coordinator may also assist Nichirei Carib employees in sampling during his stay on the island. Thus, funds for this latter activity will not be required from the Program.

Uruguay. An evaluation of the historical billfish landings and CPUE data base from Uruguay may be conducted by the *Instituto Nacional de Pesca* (INAPE) in order to assess the possibility of recovering historical landing statistics in the necessary formats required for Task I and Task II reporting. This activity has been planned for several years but thus far has not taken place. A report maybe be submitted to the 2003 SCRS concerning this activity but will not require funding in 2003.

U.S. Virgin Islands. Shore-based sampling of recreational billfish tournament in the U.S. Virgin Islands maybe continued in 2003 if staff from the Virgin Islands Big Game Fishing Club in St. Thomas are agreeable. Requested funding for 2003 is $2,000.

Trinidad and Tobago. Shore-based sampling of size frequency data for off-loaded billfish carcasses from Chinese-Taipei and longline vessels from Trinidad may be re-initiated in 2003. This work, if conducted, will be supervised by Ms. C. Chan A Shing of the Ministry of Food Production and Marine Exploitation (Fisheries Division). At least one trip by the West Atlantic Coordinator, or his designee, will be necessary to review the research plan and organize field research activities. Requested funding for 2003 is $1,000.

East Atlantic

The Coordinator for the East Atlantic will need to travel to West African countries to check on data collections. An ambitious plan (about $15,000) for coordination travel was submitted to the General Program Coordinator/Secretariat in 2002 but due to lack of funds could not be funded in 2002. We anticipate that this work will be initiated in 2003 but budgetary constraints maybe prevent full implementation.

Dakar, Senegal. Shore-based sampling of the Senegalese artisanal, recreational and industrial fisheries for billfish size frequency, sex determination, and catch and effort data may be continued in 2003 by Dr. Taib Diouf. Requested funding for 2003 is $1,500.

Côte d'Ivoire. Abidjan shore-based sampling of the artisanal and recreational fisheries for billfish will be continued and directed by the East Atlantic Coordinator, Dr N. N'goran of CRO in 2003. Funding for 2003 will be $1,500.

Gabon. A sampling plan for the artisanal fisheries of Gabon that catch billfish may be developed by Mr. O. Rue Robert, Director of Artisanal Fisheries (Ministry of Fisheries), in consultation with the Eastern Atlantic Coordinator. No program funds will be required for 2003.

Ghana. Shore-based sampling of size frequency and sex determination, and catch and effort of the artisanal gillnet fisheries for billfish will be continued in 2003 by Mr. Paul Bannerman. Funding for 2003 will be $1,500. Some travel by the East Atlantic Coordinator may be required to accomplish this task in 2003.

Canary Islands. Shore-based sampling of size frequency of off-loaded billfish carcasses from Chinese Taipei longline vessels may be accomplished in 2003. Requested funding for 2003 is $400.

Morocco. Inquires may be made by Dr. Abdallah Srour, of the *Institut National de Recherche Halieutique*, to improve the knowledge of the recreational fishery for billfish in Morocco and for establishing a sampling program in 2003. Funding for this activity in 2003 is not anticipated.

At-sea sampling

West Atlantic

Venezuela. At-sea sampling out of the ports of Cumaná, Puerto La Cruz, and Margarita Island will be continued in 2003. A total of about 10 tuna trips and 7 swordfish trips on mid-sized industrial longline vessels will be made in 2003, and the cost will be $8,000. In addition, two long-range trips on large Korean-type vessels ($1,500), and two trips on smaller longline vessels ($400) will be made in 2003. Therefore, the total West Atlantic at-sea sampling for 2003 will be $9,900. In addition, insurance for at-sea sampling for 2003 will be $1,200.

Brazil. At-sea sampling on Brazilian longliners will be continued in 2003 and Dr. Fabio Hazin from the UFRPE will direct these research activities. However, it is not certain whether this activity will require funding at this time.

Bermuda. At-sea sampling of home based longline vessels targeting pelagic species maybe initiated in 2003 by the Department of Environmental Protection, provided this fishing activity takes place. Possible biological sampling opportunities on home based longline vessels will also be assessed. ICCAT funding of this research activity is not required in 2003. In addition, the Department of Environmental Protection will continue to facilitate deployment of pop-up satellite tags on billfish in the West Atlantic. This proposed work represents a continuation of a commitment to study the post release survival, habitat use, and critical habitat of billfish. Some travel costs for Dr. Luckhurst may be required for his participation relative to deployment of pop-up satellite tags in various Atlantic locations. Travel costs for this activity in 2003 are shown in the next section.

Mexico. At-sea sampling of Mexican longline vessels has been ongoing for several years. A plan may be submitted next year to expand on-going work but no funds are needed for 2003.

Uruguay. At-sea sampling aboard home based longline vessels was initiated in 1998 by the *Instituto Nacional de Pesca* (INAPE) of Uruguay, but no detailed data are collected on billfish, except for measuring

length. However, it is uncertain if this activity will take place in 2003 and funding of this project will not be required.

Post-release survival, habitat use, and critical habitat identification of billfish using pop-up satellite tags

Several projects to evaluate post release survival, habitat use, and critical habitat needs of blue and white marlin using pop-up satellite tag technology are planned by scientists from several scientific entities in the west Atlantic Ocean in 2003. These projects are independently funded but may require funding of airfare for research associates to travel to various Atlantic locations for the deployment of tags in 2003 in the amount of $5,000.

Tagging

The following conventional tagging activities and expenditures are proposed. The purchase of tags and tagging equipment (distributed to participants by the ICCAT Secretariat) for East Atlantic billfish tagging is not anticipated in 2003 as substantial tagging equipment was purchased previously. The total for tag rewards (including the $900 needed in Venezuela) will amount to $1,500 for 2003. A lottery reward of $500 will also be necessary for 2003.

Age and growth

Requested funding for biological sampling of billfish for age and growth studies, as well as tag-recaptured billfish, is $500 for 2003. As the 2002 Billfish Working Group identified this work during the 2002 SCRS as critical, it is possible that a research proposal and request for additional funds may be submitted to the ICCAT Secretariat during 2003. Implementation of any newly submitted work will be contingent on the availability of funds.

Coordination

- *Training and sample collection*

Experience in the West Atlantic continues to indicate that it will be necessary to make a series of trips to specific Caribbean island locations, and occasionally to West Africa, Madeira (Portugal), Bermuda, and Brazil, to maintain quality control of on-going research. The purpose of this travel will be to train samplers in data collection, pick up data, assist in pop-up tagging and data analysis, hand-carry frozen biological samples back to Miami, monitor the rapidly changing pelagic fisheries, and maintain contacts with project cooperatives. The travel to West Africa will be to assist the East Atlantic Coordinators in refining sampling programs, particularly to encourage tag release and recapture activities. Travel by the East Atlantic Coordinator will be to establish sampling programs and oversee sampling activities. Funding for West and East Atlantic Coordinators in 2003 will be $20,000, subject to the availability of funds. Travel may include the following areas:

West Atlantic
Cumaná, Margarita Island, Caracas, and La Guaira (Venezuela)
Grenada
Santos and Recife (Brazil)
St. Maarten (Netherlands Antilles)
St. Vincent
Trinidad and Tobago
Cancún and Cozumel (Mexico)
Bermuda
Other Caribbean countries
Ascension Island

East Atlantic
Dakar (Senegal)
Abidjan (Côte d'Ivoire)
Ghana
Madeira (Portugal)
Gabon
Other West African countries

- *Miscellaneous/Mailing*
  The requested funding for 2003 for east Atlantic miscellaneous and mailing is $100. Similar needs for the West Atlantic Coordinator are covered by the U.S. domestic budget.

- *Data base management*
  During the 1999 SCRS meeting, a problem surfaced relative to data base quality control and data entry for the at-sea and shore-based sampling components of this program. Given quality control and data entry is still lagging behind due to shortage of NMFS staff to accomplish these duties, it may be necessary to have a work study student from the University of Miami again be contracted for these data entry functions. However, there are no anticipated costs for quality control and data entry for 2003 at this time.

- *Bank charges*
  Charges by the bank for the transfer of funds and bank checks in 2003 are estimated to be $250.

Because of unforeseen changes in the fisheries and opportunities for sampling, it may be necessary for the ICCAT Secretariat and the General Coordinator to make adjustments in budgeted program priorities. These changes, if any, will be duly transmitted to the area Coordinators. Also, the proposed budget for regular Program activities in 2003 is attached as **(Table 3)**. The expansion or reduction of expenses will depend, to a large degree, on the available funds. It should be noted that regular Program activities will be implemented based on receipt of sufficient funds and the carry-over of unused funds from 2002.

2002 Working Group Research Recommendations

In its executive summary for white marlin, the Billfish Working Group recommended that:

"...in order to properly quantify and reduce this uncertainty improvements must be made in the development of robust models for estimation of benchmarks on data-limited situation, estimates of historical and recent catch, abundance indices and on the biology of white marlin. Such improvements will require a substantial research investment in methodological research, estimation of effective fishing effort, historical data validation, and biological investigations of the age, growth, reproduction and habitat requirements of white marlin..."

"Given the range of results obtained in the sensitivity runs, however, the group believes that priority should be given to research that will improve either the abundance indices, knowledge of biology or, sex-related age and size composition of white marlin catches. The latter two would allow for the use of more realistic age and/or size structured models that may be able to better explain the evolution of the estimated indices of abundance."

Although the above recommendations were made in reference to the white marlin stock, they also apply to the blue marlin, sailfish, and spearfish. These recommendations are directly relevant to the objectives of the IERPB and therefore highlight the need to increase the resources devoted to support the work pursued by the IERPB.

Concurrently, the NMFS Southeast Fisheries Science Center has developed an "Atlantic Billfish Research Plan" and virtually all of the above research needs (and others) are covered in this plan as well. (Copies can be obtained upon request to E.D. Prince, Western Atlantic Coordinator.)

Table 1. Funds available for 2003 for the Billfish Program

Source	*In US $*	*In Euros*
Balance at start of Fiscal Year 2002	32,727	33,218.08
Allocation from ICCAT Regular Budget	+ 10,368	+ 10,523.72
Funds available	43,095	43,741.80
Expenditures (see **Table 2**)	- 13,519	- 13,721.31
BALANCE as of September 23, 2002	**± 29,576**	**30,020.49**

Table 2. 2002 Budget & Expenditures of the Enhanced Research Program for Billfish (as of September 23, 2002) (in US$)

Chapters	*Amount budgeted*	*Expenditures*
STATISTICS & SAMPLING		
West Atlantic shore-based sampling:		
Bermuda tournaments	0	0
Barbados	0	0
Brazil tournaments	0	0
Venezuela:		
Cumaná	720	300
Margarita Island	720	300
Punto Fijo	360	150
Playa Verde	1,680	700
Playa Grande Marina	480	425
Tournaments in Puerto Cabal and Falcon	1,000	443
Grenada	1,000	0
Jamaica	1,000	0
St. Maarten Netherlands Antilles	1,500	0
Uruguay	0	0
U.S. Virgin Islands	2,000	0
Trinidad & Tobago	1,000	0
West Atlantic at-sea sampling:		
Venezuela (Cumaná, Puerta la Cruz, Margarita Island)	18,408	9,054
Insurance for Venezuelan Observers	1,200	1,200
Brazil	4,000	0
Insurance for Brazilian Observers	350	0
Uruguay	500	0
Bermuda	5,000	0
East Atlantic shore-based sampling:		
Dakar, Senegal	1,500	0
Côte d'Ivoire	1,500	0
Ghana	1,500	0
Morocco	0	0
Canary Islands	400	0
TAGGING		
Tag rewards	1,500	900
Lottery rewards	500	0
Hard part rewards	500	0
Printing posters and recapture cards in Japanese/Chinese/Portuguese	0	0
Tags and tagging equipment	0	0
Pop-up satellite study	5,000	0
AGE AND GROWTH: Purchase of hard parts	500	0
COORDINATION		
Travel by Coordinators	14,000	0
Mailing & miscellaneous--East Atlantic	100	0
Data base management	4,000	0
Bank charges on Billfish account	250	43
GRAND TOTAL	**72,168**	**13,519**

Note: The Billfish Program Budget for 2002 was prepared in US$ and all the 2002 expenditures were made in that currency.

Table 3. ICCAT Enhanced Research Program for Billfish Budget for 2003 (in US$)
(The release of funds is contingent upon conditions described in the text.)

Budget Chapters	*Amount*
STATISTICS & SAMPLING	
West Atlantic shore-based sampling:	
Bermuda tournaments	0
Brazil tournaments	0
Venezuela	
Cumaná	300
Punto Fijo	200
Playa Verde	700
Margarita Island	300
Playa Grande Marina	2,000
Tournaments in Puerto Cabello, La Guaira, Puerto La Cruz, and Falcon	500
Grenada	1,000*
Jamaica	1,000*
St. Maarten, Netherlands Antilles	1,500*
Uruguay	0
U.S. Virgin Islands	2,000*
Trinidad & Tobago	1,000*
West Atlantic at-sea sampling:	
Venezuela (Cumaná, Puerta la Cruz, and Margarita Island)	9,900
Insurance for Venezuelan Observers	1,200
Brazil	0
Insurance for Brazilian Observers	0
Uruguay	0
Mexico	0
East Atlantic shore-based sampling:	
Dakar, Senegal	1,500
Côte d'Ivoire	1,500
Gabon	0
Ghana	1,500
Canary Islands	400*
Morocco	0
TAGGING	
Tag rewards	1,500
Lottery rewards	500
Tags and tagging equipment	0
Pop-up Satellite Study (Bermuda)	5,000*
AGE AND GROWTH	
Purchase of hard parts	500*
COORDINATION	
Coordination travel (on site training of samplers, collection of statistical and biological samples)	20,000*
Mailing & miscellaneous-East Atlantic	100
Data base management	0
Bank charges	250
GRAND TOTAL:	**54,350**

*Authorization of these expenditures depends, in part, on additional funds being available.

Appendix 8

REPORT OF THE SUB-COMMITTEE ON ENVIRONMENT

1. Opening, adoption of the agenda and meeting arrangements

The meeting of the Sub-Committee on Environment was held on October 2, 2002 at the Hotel Reina Victoria, Madrid. Dr. J.M. Fromentin (EC-France) convened the session, and Dr. H. Arrizabalaga served as Rapporteur. Following the decision by the SCRS in 2001, the Sub-Committee did not meet in 2002, and the Agenda (**Addendum 1 to Appendix 8**) was therefore aimed at presenting new information regarding the environment and to plan the work of the Sub-Committee for 2003 and 2004.

2. Review of new information concerning environment

Six documents dealing specifically with the influence of the environment were presented on tuna population dynamics, catches or catchability of various fishing gears. These were documents SCRS/2002/041 (included in SCRS/2002/165), 100, 104, 105 and 133.

Documents SCRS/2002/041 and SCRS/2002/165 reported some very interesting results on the sampling survey TUNABAL which was carried out in June 2002 around the Balearic Islands. This survey began in 2001, aimed at studying the oceanographic conditions and the distribution of tuna larvae, particularly those of bluefin tuna, in the area. The 2002 survey revealed very different results from that of 2001. The total number of larvae sampled was greater in 2002 than in 2001, but the larvae were smaller. The spatial distribution of the larvae had changed, being more spatially restricted in 2002 than in 2001. The larvae were only distributed in waters with a surface temperature of less than 24°C. The authors concluded that this high spatial concentration is partly explained by the oceanographic conditions peculiar to 2002, which are typical of cold years with temperatures of 3 to 4 degrees centigrade lower than in 2001 (it is noted that 2001 was a warm year) and a lesser influence of the water masses of Atlantic origin in the area. This concentration could also have been influenced by the exceptional blooms of medusae and salps.

These results are particularly interesting with regard to document SCRS/2002/104, which also suggests a link between bluefin tuna and temperature. This deals with a significant relationship between long-term fluctuations of east Atlantic and Mediterranean bluefin tuna, such as those described by traditional trap catches and long-term fluctuations in temperature. The authors put forward the hypothesis that long-term fluctuations in temperature could change bluefin tuna migration routes.

Document SCRS/2002/100 deals with the question of inter-annual variations in skipjack and bigeye catches around Madeira in relation to environmental changes. This question had been raised by the Working Group of the Sub-Committee on Environment and at the 2001 SCRS plenary session. After a description of the hydro-climatic changes in the area, especially of surface temperatures and the position of the Gulf Stream, the authors hypothesize that the migratory patterns and the seasonal availability of these two species have changed in relation to the environmental changes described. The climatic variations also seem to affect differently the age-classes of bigeye tuna likely to be caught.

Document SCRS/2002/105 follows up on several SCRS documents presented over the last few years in relation to the possible effect of the North Atlantic Oscillation on recruitment of swordfish in the North Atlantic. Aside from this update, the document also mentions a possible relationship with the latidudinal position of the Gulf Stream.

The last document, SCRS/2002/133, also follows on from various SCRS documents presented in recent years, and relates to the impact of environmental changes on the recruitment and migration patterns of North Atlantic albacore. The main interest of this document compared with earlier papers is that it summarizes all the available historic and recent information on this species.

From a general point of view, it is noted that the winter NAO index was highly negative (-1.89) in 2001, all the more remarkable as the last fifteen years have generally shown highly positive indices, except for 1996. On the other hand, 2002 seems to be an average year with no peculiarity, with a slightly positive NAO index of 0.76.

In the research recently published by climatologists, one can note the emphasis on the strong relationship between temperature anomalies and precipitation in the tropical Atlantic and the North Atlantic Oscillation, as well as between the heating of tropical waters in the Indian and Pacific Oceans and climatic changes in the north Atlantic since 1950. This is even more interesting as a new El Niño episode began in March 2002.

3. Future plans and recommendations

At the SCRS plenary in 2001, two recommendations were made:

The Sub-Committee on Environment recommended that the Working Group meet in 2003 to examine the issue of the scarcity of temperate and tropical tunas around the Azores, Madeira and the Canary Islands, and to test whether this phenomenon could be of environmental origin.

To do this, the Sub-Committee recommended that the ICCAT Secretariat could, in the near future, host an environmental database, which would be accessible to all ICCAT scientists.

Meanwhile, the Sub-Committee on Statistics has proposed the preparation of an ICCAT Atlas, which would comprise not only catch and effort statistics, but also environmental data, especially variables known to influence tuna population dynamics or the geographic distribution of tuna. However, defining these variables or the most appropriate indices with relevant time-area strata is not an easy exercise and needs to be discussed in depth. Given the lack of time during the plenary session, the Sub-Committee considers that this discussion should take place outside the plenary. It was noted that the discussion is linked to the second of the 2001 recommendations regarding the environmental database that would be hosted by the Secretariat.

Actually, the prerequisite to any atlas including environmental information, as well as to any Working Group on environmental issues (see recommendation 1 in 2001) is, on the one hand, to make a list of the available data on environmental indices and, on the other, to make them accessible to all. For this reason the Sub-Committee proposes a meeting of the Working Group be held in 2003 or 2004 to carry out this work, which is a priority of the Sub-Committee on Environment. It is noted that it would be appropriate to carry out this task jointly with the IOTC, which shares the same concerns and which has already begun an environmental data base (i.e. the GAO base relating to the Indian and Atlantic Oceans developed by Dr. F. Marsac, IRD).

This proposal was debated by the SCRS. The idea of opening such a meeting to scientists from other regional management bodies was supported by the SCRS, noting that this would give a wider overview of the problem we are facing. Moreover, it was suggested that not only IOTC, but also other organizations, such as IATTC, CCSBT, and the SPC be contacted for a joint discussion on the design of the future environmental database. The Secretariat also suggested that in addition to building an environmental database, the Group could also provide a list of the web sites where environmental data are available. However, it was noted that these data may not be in standard and compatible formats and may also include errors, so that data need to be validated previously to facilitate future studies by SCRS scientists. It was thus endorsed that the Convener of the Sub-Committee on Environment will, with the assistance of the ICCAT Secretariat, contact scientists from other tuna commissions and arrange a meeting in early 2004 to decide on the best way to create such a database, the objective being that environmental data of interest be available for ICCAT scientists as soon as possible.

4. Other matters

No other matters were discussed.

5. Adoption of the report and closure

The report was adopted.

Addendum 1 to Appendix 8

Agenda of the Sub-Committee on Environment

1. Opening, adoption of agenda and meeting arrangements
2. Review of new information concerning environment
3. Future plans and recommendations
4. Other matters
5. Adoption of report and adjournment

Appendix 9

REPORT OF THE SUB-COMMITTEE ON BY-CATCH

1. Opening of the meeting, adoption of Agenda, and arrangements for the meeting

At the request of the Chairman of the SCRS, the Convener of the Sub-Committee on By-Catch, Dr. H. Nakano (Japan) opened the meeting. The Agenda, which was circulated before the meeting, was reviewed, modified and adopted and is attached to this report as **Addendum 1 to Appendix 9**. Dr. G. Scott (United States) agreed to serve as Rapporteur.

2. Review of new information concerning by-catches

New information concerning by-catch species submitted to the 2002 ICCAT SCRS was reviewed.

Documents NAT/2002/01, NAT/2002/05, NAT/2002/06, NAT/2002/08, and SCRS/2002/166, the reports of Canada, South Africa, United States, Japan and Chinese Taipei respectively, provided shark catch statistics and other information related to the Sub-Committee. The Canadian and U.S. reports described fishery regulation for sharks in Canada and the United States

Documents SCRS/2002/126, SCRS/2002/140 and SCRS/2002/150 introduced the results of National Observer Programs, including lists of species observed for the U.S., Japanese and Spanish fleets, respectively. Document SCRS/2002/117 reported on estimation of dead discards for swordfish, billfish, and pelagic sharks using mandatory logbook reports and observer program data collected from U.S. longline vessels.

Document SCRS/2002/112 described the multi-species canoe fishery using large meshed drift gill nets off the coast of Côte d'Ivoire and evaluated various CPUE patterns of the species caught. The main targets of the fishery are billfishes, sharks and tunas. Sharks taken are mainly mako (*Isurus oxyrhinchus*), silky shark (*Carcharhinus falciformis*), spinner shark (*C. brevipinna*) and hammerhead (*Sphyrna spp*). By-catches are mainly manta ray (*Manta birostris*), dolphin fish (*Coryphaena hippurus*), Gempylids and Triuchurids. Accidental catches of turtles, green turtle (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) and dolphins, occur sometimes and are recorded since 1990. Sharks sizes and catch rates are available since 1991. For mako and spinner sharks, sizes and catch rate decreased. Size of hammerhead sharks remained constant but catch rate decreased.

Document SCRS/2002/150 reported upon the species composition observed for the purse seine fishery in the Eastern Atlantic Ocean. Several teleost species were newly reported, however the committee agreed with authors that these results were provisional. Species composition will be validated after detailed examination of data recorded by observers. Possible changes to the by-catch species list await this re-examination. The Sub-Committee reiterated that the by-catch species list does not provide quantitative information. The revised species list will continue to be maintained on the ICCAT Web site.

Document SCRS/2002/123 reported some experimental results on sea turtle mitigation measures conducted by the United States in the pelagic longline fishery. Treatments of longline gear, the use of blue dyed squid as bait, positioning of hooks (no hooks under float line), haul order, soak time and hook positions were tested. Several prototype line cutters and de-hookers were evaluated to determine their efficiency in removing longline gear from turtles. A pilot post hooking study was conducted in conjunction with the sea turtle mitigation experiments to determine the effectiveness of pop up archival transmitting tags for estimating sea turtle post hooking survival rates. Preliminary results indicated that neither blue dyed squid nor the positioning of hooks (no hooks under float lines) offered opportunities for significant decreases in pelagic longline interactions with sea turtles. Further testing of mitigation methods will include evaluation of mackerel bait, stiff buoy lines and gangions and offset circle hooks. It was noted that because the U.S. longline gear is fished at relatively shallower depths than some fleets, the results examining the effect of depths of hooks fished might not be transferable to all fleets.

Document SCRS/2002/124 explained in detail an experimental design and research plan to estimate post-hooking survival of sea turtles captured in pelagic longline fisheries including result of a pilot study to evaluate tag performance as well as sources of error and to determine sample size. The pilot study used Pop-off Archival Transmitting (PAT) tags attached to sea turtles encountered and injured during longlining that were designed to release if the depth of the tag did not change more that two meters for a continuous 96 hours (premature release). The goal of this study is to use PAT tags with premature release criteria programmed into the tag software to indicate when a turtle suffers mortality subsequent to that injury. Preliminary results from 8 PAT tags are being used to refine the premature release criteria.

3. Summary of current ICCAT shark statistics

The Sub-Committee on Statistics discussed the current situation on submission of shark statistics. The Secretariat currently receives various types of data, collected with different levels of detail. Additionally, the data thus far entered into the shark database is incomplete for 2001. Furthermore, since they are often considered as by-catch, these shark data are very difficult to integrate into the traditional ICCAT catch/effort files. The Sub-Committee on Statistics recommended the creation of new reporting forms for by-catch species other than sharks.

The Sub-Committee on By-Catch, recognizing that the current reporting format was developed by consensus and in view of the more limited data for sharks taken by tuna fleets, recommended consultation between Sub-Committees on changes in reporting formats should be carried out before finalizing changes.

It was further discussed that estimation of total catches would be needed for a more accurate assessment of total removals. Estimation of landings using ratios of fin weight to whole fish weight and the application of scientific observer sampling of catch rates to total effort were identified as methods that could be applied. While these approaches might not be useful for all fleets, the methods should be investigated.

4. Review of other national or international activities concerning by-catches

The Secretariat summarized the results of North Atlantic Blue Shark Discussion Meeting held on January 24-25, 2002, in Dublin, Ireland (see Secretariat's Report on Statistics and Coordination of Research in 2001 and 2002, in this volume). Drs J. Pereira (SCRS Chair), H. Nakano (Coordinator of Sub-Committee on By-Catch), and V. Restrepo (Secretariat) attended the meeting. Several other SCRS scientists also attended these discussions. The impetus for this meeting came from "DELASS", a EU-funded project that aims to develop appropriate methods for shark assessments and to carry out preliminary analyses for nine stocks (including blue sharks in the North Atlantic). The meeting participants agreed that it would be worthwhile for ICES to include tentative analyses of blue shark stock status as part of the meeting of the ICES Study Group on Elasmobranchs (May 6-10, 2002), and that the ICCAT Secretariat would forward information to ICES regarding the shark assessments to be carried out by SCRS in 2004.

At the FAO COFI meeting to be held in February 2003, FAO activities on sharks will be discussed, i.e. IPOA shark (International Plan of Action on the conservation and management of sharks). Although ICCAT has already conducted several activities on sharks, which is consistent with or exceeds the actions called for under the IPOA for Regional Fisheries Agencies, ICCAT apparently has not formally submitted a Plan of Action to FAO. While ICCAT has transmitted information on its shark related research activities to FAO, it was suggested that the Secretariat investigate the need for submission of a formal response to FAO on an IPOA and report the results of this investigation to the Commission. It is recommended that ICCAT's activity on sharks, including its data collection system and workshops held on shark stock assessment continue to be communicated to FAO and other international fishery organizations, as has been past practice.

The following activities by other international organizations related to by-catch were noted:

1) A North Atlantic Blue Shark Discussion Meeting was held on January 24-25, 2002, in Dublin, Ireland.

2) The 3rd Meeting of IATTC Working Group on By-Catch was held on March 5-6, 2002, in La Jolla, California. The by-catch problem of juvenile tunas caught by the purse seine and baitboat fisheries was the focus of the meeting. However, by-catch of sea turtles, billfish, sharks, rays and other species were

also discussed. It was noted that IATTC has achieved some recommendations on handling and live release of by-catch of turtles intended to promote reduction of mortality of sea turtles incidentally taken in these fisheries.

3) A shark conference entitled "2002 Shark Conference – Sustainable Utilization and Conservation of Sharks " was held in Taipei, May 13-16, 2002. The Committee noted that the Symposium, attended by more than 100 participants, focused on research that could allow provision of advice to fishery managers and the fishing industry on sustainable use of shark resources. The Symposium participants placed emphasis on data collection and additional research to form an objective basis for provision of fishery management advice.

4) A NAFO symposium "Elasmobranch Fisheries: Managing for Sustainable Use and Biodiversity Conservation" was held September 11-13, 2002, in Spain. As this meeting overlapped with the ICCAT swordfish stock assessment session, no information on the results of this meeting were immediately available to the Committee.

5) CITES Twelfth Meeting of the Conference of the Parties (COP12) will be held from November 3 to 15, 2002, in Santiago, Chile. Proposals for inclusion of *Rhincodon typus* (whale shark) into Appendix II of CITES were submitted independently by India, the Philippines, and Madagascar, which will be considered at COP12. Proposals for inclusion of *Cetorhinus maximus* (Basking shark) into CITES Appendix II were submitted by England and the EC, which will also be considered at COP12.

6) A FAO COFI meeting will be held in February 2003. FAO has encouraged member nations to submit and update NPOA (National Plans of Action) for sharks and sea birds to COFI.

The Secretariat reported that it had received a letter from CCAMLR requesting cooperation with ICCAT on issues relating to reduction of by-catch of southern ocean seabirds. Specifically, CCAMLR requested information on the existing data on levels of seabird by-catch in Atlantic tuna fisheries; the nature of measures to mitigate seabird by-catch currently in use and if they are voluntary of mandatory; and the nature and coverage of observer programs and whether these include observation of seabird by-catch. It was pointed out that ICCAT has not collected quantitative data on seabird by-catch, but that this information might be available from the observer programs conducted by various member nations, cooperating parties, and fishing entities.

An observer from Birdlife International provided some additional information to the Sub-Committee on the issue of seabird by-catch in longline fisheries and drew the attention of the Sub-Committee to conservation issues related to seabirds. The Sub-Committee thanked the observer for this information. It was noted that the Sub-Committee has previously recommended that observer sampling on the Atlantic tuna fleets collect sufficient information to characterize the total catch and the disposition of this catch; this recommendation would include seabirds, should they occur. It was further noted that the Sub-Committee has focused its energy on pelagic sharks mainly due to the direction of the Commission. It was further noted that provision of scientific advice on bird or other species by-catches would likely require additional resources for the Secretariat and the various national scientific delegations attending SCRS meetings.

The observer from the IWC entered into the discussion by asking if information on the by-catch of marine mammals was collected. The Sub-Committee noted that it has recommended collection of this information through observer programs and that some nations have reported on by-catch level of marine mammals to the Sub-Committee. It was also pointed out that the Sub-Committee has recommended that the Secretariat develop a database management system to accommodate scientific observer data and that progress is being made on this topic. It was further indicated that the ICCAT web site contained the available scientific observer data with information on by-catches of mammals, birds, turtles and other species.

5. Future plans and recommendations

Given that the Commission has decided that the SCRS shall conduct assessments of Atlantic pelagic sharks focusing on blue and shortfin mako sharks, in 2004,

1) The Sub-Committee recommended that Contracting Parties, Entities and Fishing Entities establish and/or maintain scientific research programs on pelagic sharks.

2) For assessment purposes, the Sub-Committee encourages Contracting Parties, Entities and Fishing Entities catching sharks in the Atlantic and Mediterranean, or having caught sharks in the past in these waters, to submit species-specific shark catch statistics including estimation of shark catch, dead discards and size data and conversion factors for estimating whole weight from product weight for various species. Emphasis should be on porbeagle, blue and shortfin mako sharks.

3) The Sub-Committee recommends further coordination and collaboration with other international organizations, especially ICES and GFCM, for the assessment of the Atlantic and Mediterranean stocks of porbeagle, blue and shortfin mako sharks.

4) The Sub-Committee encouraged wider participation in the stock assessment session by Contracting Parties, entities and fishing entities and experts in general. For this purpose, financial aid for travel may be required from the Commission or from member nations.

5) It is recommended that all conversion factors related to sharks be provided to the Secretariat by national scientists, so that the ICCAT database can incorporate these conversion factors.

6) It is recommended that Contracting Parties, Entities and Fishing Entities develop and conduct observer programs for their own fleets to collect accurate data on shark catches by species (including discards).

7) The Sub-Committee recommends the use of several models such as non-equilibrium production models and statistical age/length-structured models for the assessments.

8) Use of tag-recapture data should be made in the stock assessments.

9) The Sub-Committee recommended that scientists undertake to expand and update Table 4 to summarize the available biological and fishery information on porbeagle, blue and shortfin mako sharks in the Atlantic and Mediterranean.

10) Scientists should investigate the use of the ratio of the catch of sharks to the catch of target species as a tool for the estimation of historical shark catches by fleet.

6. Other matters

This question was raised by the Secretariat: what should be the standard product in terms of catch information? The Committee considered that at least basic catch tables should be revised every year for future stock assessment and other needs.

7. Date and place of the next meeting

It is anticipated that the Sub-Committee on By-catch will reconvene at the 2003 SCRS meeting.

8. Adoption of the report and closure

After review, the Report was adopted and the 2002 Meeting of the Sub-Committee on By-catch was closed.

Addendum 1 to Appendix 9

Agenda of the Sub-Committee on By-catch

1. Opening, adoption of agenda and meeting arrangements
2. Review of new information concerning by-catches
3. Summary of current ICCAT Shark Statistics
4. Review of other national and international activities concerning by-catches.
5. Future plans and recommendations
6. Other matters
7. Date and place of the next meeting
8. Adoption of the report and closure

Appendix 10

REPORT OF THE SUB-COMMITTEE ON STATISTICS

1. Opening, adoption of agenda and meeting arrangements

The meeting of the Sub-Committee on Statistics was opened by its Convener, Dr. Pilar Pallarés. After designating the Rapporteur (Dr. Daniel Gaertner), the Agenda was adopted, and is attached as **Addendum 1 to Appendix 10.**

2. Issues regarding the submission of catch data

2.1 Task I and Task II data

The Secretariat presented Documents SEC/2002/012 and SCRS/2002/110 which describe the progress made in the collection and management of fishery statistics and in the development of the relational data base during the last year. The Sub-Committee noted with regret that many ICCAT Contracting Parties, that traditionally make large catches of tunas, did not provide their Task I and II statistics to the Secretariat (see **Table 1**). This table is only shown as an indication, being a simplified and non-qualitative view of reality. This list may vary from one year to the next according to the deadline for data submission (which depends on the date of the Working Group), whether or not the data for the last year are used by the Working Group, and the record of submission of data in the past by each country. It was recalled that the deadline date for the submission of the statistics from the Contracting Parties to the Secretariat was established as July 31 of each year, but the data relative to the stock assessments should be transmitted two weeks before the Working Groups. Taking into account the new relational database, this period of 15 days should be sufficient unless there is an overlap in the dates of various stock assessment groups (the risk being poorer quality in the validation of statistics). It was recognized that some flexibility in the deadline could be accepted according to the importance that the Working Group assigns to these new data.

The Secretariat informed the participants of the Sub-Committee on Statistics of the many difficulties encountered due to the heterogeneity of the data structures and the diversity of file formats used by each country. The Secretariat will make some proposals to standardize the formats before entering the statistics to the ICCAT database. Document SCRS/2002/110 summarizes the current status of the database and makes proposals to improve the automation of the relational database. An important point concerns the traceability of the historical changes to Task I made during the course of the years based on the revisions carried out by the scientists of the Contracting Parties.

The Sub-Committee discussed the problem of the degradation of the Task I data (e.g., the case of east Atlantic bluefin tuna, swordfish, etc.). While the scientists are encouraged to use the models that take into account uncertainty in the input data, the Sub-Committee alerted the Commission to the dangers inherent in the degradation of data which adversely affects the quality of the stock assessments, and increases uncertainty about the management advice.

2.2 Tagging data

The Secretariat explained to the Sub-Committee that some parties do not always report their tagging activities carried out within the framework of programs outside ICCAT. This causes some confusion, particularly in the case of the recovery of archival or electronic tags, when identifying the organization at the source of the tagging program and the payment of the rewards. Furthermore, taking into account that the scientists involved in these research programs wish to maintain the confidentiality of the information during the period of time necessary for the statistical analyses, the Sub-Committee reiterated to the institutes concerned its request for a minimum of information on these tagging activities (e.g., date and location of tagging and recovery). More generally, the Sub-Committee recommended that the Contracting Parties regularly submit updated versions of their tagging databases to the Secretariat.

The Sub-Committee proposes that the Secretariat carry out a detailed revision of the historical tagging data. It seems that the transmission to the Secretariat of information concerning recoveries is sometimes difficult due to the poor dissemination of information about the ICCAT tagging programmes (which has resulted in the non-recovery of electronic tags on bluefin tuna). Proposals were made to improve the distribution of information through the ICCAT Internet web site as well as through tagging posters. The choice of a "generic" poster, representative of the overall tagging operations on tunas, instead of various specific posters on each species, was briefly discussed. The dissemination of posters and other information electronically should be considered.

2.3 Revisions to historical data

The list of historical revisions carried out in 2001-2002 is provided in Document SEC/2002/012. The United States informed the Sub-Committee that the historic data on discards was currently being revised. The Representative from FAO suggested that for some African and Latin American countries, the FAO database could prove useful to complete the ICCAT Task I. The Secretariat showed interest in this proposal. It will, nonetheless, have to be ascertained that there are no problems of identification among the species and that the reported catches do not include catches made by foreign vessels landing in those countries. The Sub-Committee recommends that this beneficial collaboration between FAO and the Secretariat to compare the tuna catches reported in the Task I data be carried out regularly, and that it be done during the course of the year, in advance of the SCRS.

In order to assure the traceability of the historic changes to Task I, a standard form has been proposed by the Secretariat (Appendix I of Document SCRS/2002/110), in order to collect all the changes made by the Species Groups. Some changes were suggested by the members of the Sub-Committee, such as the addition on the form of the reference to the document, which may be the detailed report, in which the changes are presented. An additional note should be included to indicate whether the change is provisional, only for use in the assessment, or whether it is a Task I change. Some proposals have been made to try to reassign the catches of the unclassified categories (areas, gears, species) into well-identified categories. This problem of unclassified catches particularly affects the catches of small tunas. It was recalled, however, that the Species Groups should try to solve this problem by searching in local publications for information that might lead to diminishing this uncertainty. A code now exists to label the origin of data for the NEI fleet statistics.

2.4 Shark statistics

The Secretariat currently receives various types of data, collected with different levels of detail. Furthermore, since they are often considered as by-catch, these data are very difficult to integrate into the traditional ICCAT catch/effort files. Given that the new relational database allows the integration of by-catch other than sharks, the Sub-Committee is considering the development of new reporting forms for the submission of data in the future, which would take this into account.

2.5 Tuna Statistical Documents and other trade information

This agenda item essentially refers to bluefin tuna, bigeye tuna and swordfish. The Sub-Committee reiterated the request made by the SCRS in 2000, that not only the bi-annual reports on imports be submitted, but also the individual documents, in order to be able to identify the fishing gear and the area of the catch. Other types of trade data are available for other species, but the level of information was less detailed.

On the issue of bluefin tuna farming, it was restated that data (inputs and outputs of the farming operations) should not be obtained only through the bluefin tuna statistical document, but submitted by countries to ICCAT, as recommended at the last session of the GFCM/ICCAT meeting in Malta. (For further details see SCRS/2002/010.)

3. Updated report on relational database system

3.1 Current situation

Document SCRS/2002/110 provides a description of the progress made, and proposals aimed at improving the quality of statistics in the ICCAT relational database (ICCAT-RDB). During the course of this year, some tests were carried out to see if it is feasible to establish a system of queries of the database via Intranet. In the

light of this, part of the database will be prepared to respond to an appropriate query procedure. In order to optimize cross-operations between the data bases, the ICCAT-RDB was restructured into two database groups: the "statistical" group, which contains Task I, catch and effort, size, catch-at-size, catch-at-age, trade, fishing vessels, and tagging, and a general purpose group (bibliographic, recommendations, etc.).

The Secretariat informed the Sub-Committee that it was now possible, in the Task II database, to associate dynamically the origin of the data submission, reception dates, etc. with the actual data.

To eliminate the possible duplicate reporting of fishing effort, the catch/effort information should be oriented towards the effort component, where one record will contain all the catch by species, as well as all the effort relevant to that strata. The inclusion of several types of effort and several types of catch (in weight and number of fish) is envisaged.

The Sub-Committee proposes that the Secretariat identify the fleets for which duplicate effort may be reported, and that based on the results of this analyses, the Secretariat should request the countries involved to submit revised data.

The Sub-Committee recalled the importance of the transmission of information based on sufficiently fine stratification (in case of statistical areas that cover two stocks, fine strata areas could then be aggregated). The Secretariat pointed out that the size data should always be accompanied by the corresponding catch data and the weight of the sample, where available.

3.2 Standardization of codes

For use with the relational database, codes need to be standardized, which was also recommended by the CWP to regional fisheries organizations. There are four categories proposed: gear, fleet, fishing area and type of catch. In light of the proposal presented by the Secretariat (Table 1 of Document SCRS/2002/110), the Sub-Committee recommends that this new coding be as clear as possible to avoid any source of confusion (e.g. replacement of "flag" for "reporting flag", of "country" for "contracting country", etc.), and that some examples be provided to explain clearly the meaning of each column.

3.3 Terminology

The Sub-Committee was informed that following a recommendation of GFCM/ICCAT meeting in Malta, a proposal for using a common term and definition for the tuna farming practice among FAO, GFCM and ICCAT was discussed at the last session of the GFCM Scientific Advisory Committee. It was agreed that the term "tuna farming" should be used.

3.4 Incorporation of a Geographic Information System GIS

The Secretariat pointed out to the Sub-Committee the interest in the availability of a GIS. The recommended software needs would have an approximate cost of €15,000.

3.5 Standardization of a protocol for data submission to ICCAT

Due to the various formats currently transmitted by the Contracting Parties to ICCAT, data processing and validation of fishery statistics take up a lot of work time. To improve this protocol, the Secretariat proposes formalizing this process with the help of a working document that will be submitted to the SCRS. The Sub-Committee supports this procedure that is aimed at optimizing the data acquisition phase of the ICCAT database, and recommends that a specific working group be held in early 2003 on this matter with the active participation of scientists working on the various species. The Representative of FAO informed the Sub-Committee of FAO's experience in this area and specifically the implementation, for the benefit of countries, of a system of electronic forms, downloadable via the FAO Internet page or available upon request by e-mail, and facilitating the operation of transmission of fishery statistics.

4. Updated report on survey of fishery reporting systems

The progress made on this matter was presented to the Sub-Committee. However, as is the case with the transmission of Task I and Task II data, the Sub-Committee regrets that certain Contracting Parties, some of

which are the most important, have not completed this questionnaire. It is highly recommended that the Contracting Parties complete this questionnaire. The information collected through this survey could assist in the analyses of the effects of uncertainty in the data, and on management advice.

5. Review of the work of the groups on observer data and archive tags

The purpose of these two groups was to establish data reporting forms for observer data and archival tagging data. The SCRS Chairman informed the Sub-Committee that although these Groups had been formed and the conveners nominated, to his knowledge no progress has been made during the year on these two points. The Sub-Committee regrets this delay and reiterated its request.

6. National and international activities concerning statistics

The Secretariat informed the Sub-Committee about the various meetings in which a member of the Secretariat participated. One of these, presented in Document SCRS/2002/055, concerns cooperation with FAO (author of the creation of a platform for the distribution of knowledge on the fisheries resources through the Internet, FIGIS-FIRMS project). The Sub-Committee recommended that this collaboration continue.

The Secretariat informed the FAO Representative that the CATDIS database will be updated as soon as possible so that FAO can update its world atlas on tuna catches.

There was no meeting this year to discuss matters relating to national statistics and sampling schemes, but in view of the recurring problems posed by the Ghanaian statistics, the Sub-Committee strongly supported the recommendation made by the Tropical Tunas Working Group on sending a mission of SCRS experts, to meet with the authorities of this country to try to solve these problems.

7. Review of publications

7.1 Data Record

There was no publication of the Data Record this year, but a publication of the totality of Task II catch and effort data and size frequency data is envisioned for early 2003, so that the scientists of the Contracting Parties can compare with their own databases.

7.2 Statistical Bulletin

This will be published in two versions (FishSTAT+ and Excel) to be accessible to the maximum number of possible users.

7.3 Web files and distribution of data

An FTP sever was made available to users this year to download the species detailed report or to transmit large data sets to ICCAT. For reasons of security and confidentiality, a password to access the server will be given by ICCAT to interested scientists for the use of this means of communication. The project of a database accessed directly via Internet is a long-term task.

7.4 ICCAT Atlas

The preliminary report of the Working Group on the ICCAT Atlas, (attached as **Addendum 2 to Appendix 10**) which was created at the 2001 SCRS meeting, reported several proposals. As proposed, this Atlas would not only include fishery statistics (including by-catches) but also information on vessels, gears utilized, fishing areas, etc. One of the items discussed by the Sub-Committee concerns the budget that will be allocated for the development of the Atlas. It is clear that the quantity of the information to be incorporated and the quality of the presentation will depend on the financing decided by the Commission. The periodicity of the successive updates of this Atlas was discussed. Depending on the financial costs and personnel, revisions could be envisaged every 10 years for the publication on paper, but annually for the information distributed via Internet. One of the

priorities proposed by the scientists is the development of maps showing distribution of the catches, distribution of effort, etc. which are extremely useful at the time of the stock assessment groups, and to the Commission. However, the Species Working Groups should specify the type of cartographic representation to which they give priority. These will form part of an appendix attached to this report. Some products of this atlas have less priority (historical and purely descriptive aspects) or need to be carefully revised before being distributed (as in the case of tagging data).

8. Future plans and recommendations

8.1 Updating of posters on tag returns

The Sub-Committee discussed this under Item 2.

8.2 Updating of the ICCAT Field Manual

A more ambitious proposal would consist in extending the scope of this manual (centered mainly on the collection of fishery statistics) to biological sampling (e.g. for studies on reproduction, etc.). If this extension is approved, it would however involve the active participation of SCRS scientists to write the different chapters of this new manual. Coordination would be handled by the Secretariat, which will draft an outline of the manual and circulate this by e-mail for discussion by the scientists.

8.3 Procedure for the creation of catch at size

Every possible means will be deployed to standardize the procedures used for the creation of catch-at-size. Given that it has been recommended again that substitution rules be established for catch at size, discussion was held on the use of an expert system, (once the rules have been established by the scientists) which has already been proposed by the Working Group on Tropical Tunas. The Secretariat will provide the species groups with the historical series of substitution tables used in previous assessments. These tables will be reviewed by each species group to elaborate a standard set of rules of procedure, which would be applied by the Secretariat, unless otherwise instructed.

8.4 Recommendations

The Sub-committee recognizes and supports the work carried out by the Secretariat in the collection and management of data within the new relational database and, consequently, recommends that:

1. In relation to Tasks I and II

1.1 Task I and Task II data be submitted within the established deadline dates and formats.
1.2 The questionnaires sent by the Secretariat to obtain information on the data collection systems be completed.
1.3 Copies of the individual BFT, BET and SWO Statistical Documents as well as the bi-annual reports be submitted.
1.4 The form for the documentation of changes that are made to the catch tables be rigorously completed.
1.5 Collaboration with FAO in the exchange of statistics as well as in specific projects (FIGIS-FIRM) be continued.
1.6 The proposal presented by the Secretariat for coding standardization be accepted.
1.7 A working group be created to develop a standard protocol for the presentation of data to ICCAT. The group should meet in early 2003.

2. In relation to other information

2.1 Facilitate the Secretariat with basic information (type of tag, date tagged, etc.) on the tagging programs that are carried out and that the Secretariat revise the historical tagging database.
2.2 Intensify the distribution of information on tagging programs through various means (updating of the posters, web page, electronic format, etc.).
2.3 Working groups on electronic tagging and observers develop the forms and organize the collection of information available on these subjects.

2.4 Work continue on the specific forms necessary to develop a catalog of information not available to ICCAT, as proposed by the Assessment Methods Group.

3. Other matters

3.1 The *Field Manual* be re-published, and its current scope be extended to also include new aspects of sampling (biological, etc.).
3.2 The Secretariat computer equipment that is 4 years old or older be replaced and two computers for use by visiting scientists, two printers, and the necessary software to develop GIS be purchased.
3.3 The special working group begin work on the definition of the contents and formats of an Atlas that will be published within ICCAT.

9. Update of hardware and software

Following the recommendations of SCRS made in 2001, a new computer for the database was purchased by the Secretariat (Compac ML580). This year, the Sub-Committee recommends the partial renovation of the computer equipment at the Secretariat, in accordance with the previous recommendation of the SCRS to replace computers more than four years old. The Sub-Committee recommends the purchase of two computers which will be available to visiting scientists, a printer for the working groups and a high performance printer for the editorial work carried out by the Secretariat. The updating of some licenses is also foreseen, in particular the purchase of multi-post licenses. It was noted that the change to standard Windows XP should be studied by the Secretariat, bearing in mind the need to continue with older versions of Windows to avoid problems of compatibility. The Sub-Committee recommends the acquisition of specialized software to develop a Geographic Information System.

10. Other matters

Following the Working Group on Assessment Methods, the development of a catalogue compiling data other than the "classical" statistics traditionally submitted to ICCAT was recommended. These biological data (reproduction, feeding, growth, biometry, etc.) that could come from tuna caught in other oceans are of primary interest for the analyses carried out by the SCRS (comparative approach, meta-analysis, Bayesian approach, etc.). With the aim of collecting this information, the Assessment Methods Group nominated a person responsible for designing specific forms. The Sub-Committee strongly recommends that this work continue.

Vessel identification poses problems for the Task I statistics (non-reporting, double-counting of catches, etc., especially in the case of NEI fleets). However, the difficulty in compiling a list of all vessels operating in the Atlantic has been noted. The Secretariat should verify case by case whether or not NEI entities reporting their catches have not already been included in data submissions made by other parties.

11. Adoption of the report and adjournment

The Report was adopted by the Sub-Committee.

Table 1. Data for 2001 that were not submitted or were submitted after the deadline the ICCAT BFT, BET & SWO assessments in 2002

BFT DEADLINE DATE 7 JULY 2002

FLAG	DATA	RECEIVED
ALGERIE	TASK I	YES
	C&E	NO
	SIZE	NO
CHINA, P. REP	TASK I	LATE
	C&E	LATE
	SIZE	NO
CROATIA	TASK I	YES
	C&E	YES
	SIZE	NO
EC-ESPAÑA	TASK I	NO
	C&E	PARTIAL
	SIZE	PARTIAL
EC-GREECE	TASKI	LATE
	C&E	NO
	SIZE	NO
EC-IRELAND	TASK I	NO
	C&E	NO
	SIZE	NO
EC-ITALY	TASK I	LATE
	C&E	NO
	SIZE	NO
EC-UK	TASK I	NO
	C&E	NO
	SIZE	NO
GUINEA EQU.	TASK I	NO
	C&E	NO
	SIZE	NO
GUINEA REP.	TASK I	NO
	C&E	NO
	SIZE	NO
HONDURAS	TASK I	NO
	C&E	NO
	SIZE	NO
JAPAN	TASK I	LATE
	C&E	LATE
	SIZE	LATE
KOREA	TASK I	NO
	C&E	NO
	SIZE	NO
MAROC	TASK I	LATE
	C&E	YES
	SIZE	YES
MEXICO	TASKI	LATE
	C&E	LATE
	SIZE	LATE
PANAMA	TASK I	NO
	C&E	NO
	SIZE	NO
TUNISIE	TASK I	LATE
	C&E	YES
	SIZE	NO
UK_BERMUDA	TASK I	LATE
	C&E	NO
	SIZE	NO
U.S.A.	TASK I	LATE
	C&E	LATE
	SIZE	LATE
CHINESE TAIPEI	TASK I	LATE
	C&E	NO
	SIZE	NO
CYPRUS	TASK I	YES
	C&E	YES
	SIZE	NO
SIERRA LEONE	TASK I	YES
	C&E	NO
	SIZE	NO
TURKEY	TASKI	LATE
	C&E	NO
	SIZE	NO
ICELAND	TASK I	NO
	C&E	NO
	SIZE	NO
YUGOSLAVIA RF	TASK I	NO
	C&E	NO
	SIZE	NO
BELIZE	TASK I	NO
	C&E	NO
	SIZE	NO

SWO DEADLINE DATE 23 AUGUST 2002

FLAG	DATA	RECEIVED
ALGERIE	TASK I	YES
		NO
		NO
BARBADOS	TASK I	YES
	C&E	NO
	SIZE	NO
CHINA, P. REP	TASK I	YES
	C&E	YES
	SIZE	NO
COTE DIVOIRE	TASK I	LATE
	C&E	NO
	SIZE	NO
EC-ESPAÑA	TASK I	LATE
	C&E	NO
	SIZE	NO
EC-FRANCE	TASK I	YES
	C&E	NO
	SIZE	NO
EC-GREECE	TASKI	YES
	C&E	NO
	SIZE	NO
EC-IRELAND	TASK I	NO
	C&E	NO
	SIZE	NO
EC-ITALY	TASK I	LATE
	C&E	NO
	SIZE	NO
EC-UK	TASK I	NO
	C&E	NO
	SIZE	NO
GHANA	TASK I	NO
	C&E	NO
	SIZE	NO
GUINEA EQU.	TASK I	NO
	C&E	NO
	SIZE	NO
GUINEA REP.	TASK I	NO
	C&E	NO
	SIZE	NO
HONDURAS	TASK I	NO
	C&E	NO
	SIZE	NO
JAPAN	TASK I	LATE
	C&E	LATE
	SIZE	LATE
KOREA	TASK I	NO
	C&E	NO
	SIZE	NO
LIBYA	TASK I	YES
	C&E	YES
	SIZE	NO
MAROC	TASK I	LATE
	C&E	YES
	SIZE	YES
TUNISIE	TASK I	LATE
	C&E	YES
	SIZE	NO
TRINID. & TOB.	TASK I	YES
	C&E	NO
	SIZE	NO
UK - OT *BERMUDA*	TASK I	LATE
	C&E	NO
	SIZE	NO
UK - OT *ST. HELENA*	TASKI	YES
	C&E	YES
	SIZE	NO
URUGUAY	TASK I	NO
	C&E	NO
	SIZE	NO
CHINESE TAIPEI	TASK I	YES
	C&E	NO
	SIZE	NO
PHILIPPINES	TASK I	YES
	C&E	YES
	SIZE	NO
ARGENTINA	TASK I	YES
	C&E	NO
	SIZE	NO
CARICOM*	TASK I	LATE
	C&E	NO
	SIZE	NO
CYPRUS	TASK I	YES
	C&E	YES
	SIZE	NO
SEYCHELLES	TASKI	YES
	C&E	NO
	SIZE	NO
ST. VINCENT	TASKI	YES
	C&E	NO
	SIZE	NO
TURKEY	TASKI	NO
	C&E	NO
	SIZE	NO

BET DEADLINE DATE 31 AUGUST 2002

FLAG	DATA	RECEIVED
BARBADOS	TASK I	YES
	C&E	NO
	SIZE	NO
CHINA, P. REP	TASK I	YES
	C&E	YES
	SIZE	NO
EC-ESPAÑA	TASK I	NO
	C&E	YES (PARTIAL LATE)
	SIZE	YES (PARTIAL LATE)
EC-FRANCE	TASK I	LATE
	C&E	LATE
	SIZE	LATE
GABON	TASK I	YES
	C&E	NO
	SIZE	NO
GUINEA EQU.	TASK I	NO
	C&E	NO
	SIZE	NO
GUINEA REP.	TASK I	NO
	C&E	NO
	SIZE	NO
HONDURAS	TASK I	NO
	C&E	NO
	SIZE	NO
JAPAN	TASK I	LATE
	TASK I	LATE
	SIZE	YES
KOREA	TASK I	NO
	C&E	NO
	SIZE	NO
LIBYA	TASK I	YES
	C&E	NO
	SIZE	NO
MAROC	TASK I	LATE
	C&E	NO
	SIZE	NO
PANAMA	TASK I	NO
	C&E	NO
	SIZE	NO
TRINID. & TOB.	TASK I	YES
	C&E	NO
	SIZE	NO
UK - OT *STA HELENA*	TASKI	YES
	C&E	YES
	SIZE	NO
URUGUAY	TASK I	NO
	C&E	NO
	SIZE	NO
CHINESE TAIPEI	TASK I	YES
	C&E	NO
	SIZE	NO
PHILIPPINES	TASK I	YES
	C&E	YES
	SIZE	NO
CARICOM*	TASK I	LATE
	C&E	NO
	SIZE	NO
SENEGAL	TASKI	YES
	C&E	YES
	SIZE	NO
SEYCHELLES	TASKI	YES
	C&E	NO
	SIZE	NO
SIERRA LEONE	TASK I	YES
	C&E	NO
	SIZE	NO
ST. VINCENT	TASKI	YES
	C&E	NO
	SIZE	NO
NETHERLANDS ANT	TASKI	NO
	C&E	NO
	SIZE	NO
BELIZE	TASKI	NO
	C&E	NO
	SIZE	NO

* CARICOM = Dominica, Dominican Republic, Granada, Guayana, Jamaica, Santa Lucia, San Vicente, St. Kitts and Nevis
Note: LATE means that the data were submitted after the established deadline date for the receipt of data for use in the assessment.
PARTIAL means that the data were submitted, but not for all the pertinent fisheries corresponding to that flag.

Addendum 1 to Appendix 10

Agenda of the Sub-Committee on Statistics

1. Opening, adoption of agenda and meeting arrangements
2. Issues regarding the submission of catch data
    2.1 Task I and Task II data
    2.2 Tagging data
    2.3 Revisions to historical data
    2.4 Shark statistics
    2.5 Tuna Statistical Documents and other trade information
3. Updated report on relational database system
    3.1 Current situation
    3.2 Standardization of codes
    3.3 Terminology
    3.4 Incorporation of a Geographic Information System (GIS)
    3.5 Standardization of a protocol for data submission to ICCAT
4. Updated report on survey of fishery reporting systems
5. Review of the work of the groups on observers and archive tags
6. National and international activities concerning statistics
7. Review of publications
    7.1 Data Record
    7.2 Statistical Bulletin
    7.3 Web files and distribution of data
    7.4 ICCAT Atlas
8. Future plans and recommendations
    8.1 Updating of posters on tag returns
    8.2 Update of Field Manual
    8.3 Procedure for the creation of catch at size
    8.4 Recommendations
9. Update of hardware and software
10. Other matters
11. Adoption of the report and adjournment

Proposal for the development of an ICCAT Atlas

Background

At the 2001 SCRS a document (SCRS/01/137) was presented in which it was proposed that ICCAT create and publish an Atlas that would encompass in a graphic manner the relevant information in its database. Based on this document, the SCRS recommended the creation of a discussion group to define the characteristics of the Atlas and its viability. This proposal responds to that recommendation and summarizes the discussions held within the group.

The proposal is open to discussion within the Committee.

General observations

First of all, we understand that the focus of the Atlas should be extensive, such that different treatments and formats can be done simultaneously, based on the objectives. In no case should we associate the idea of an Atlas with only one format in printed or electronic format or any other form.

Another fundamental issue is to consider the Atlas within the framework of the current situation in which a new ICCAT database is being created. The development of the Atlas and the new database should be in parallel and perfectly coordinated, such that the management of the new database encompasses the requirements of the Atlas. In the same way, the entries in the Atlas should proceed from the new database once they have passed the established validation criteria. This point is essential, in particular, as concerns the historical data.

Objectives

A common objective is to show in a clear and immediate manner the maximum amount of relevant information on the fisheries for tunas and tuna-like fisheries of the Atlantic Ocean. Graphic representation will be the principal format, but clear and precise explanatory notes will be necessary. The ICCAT database will be the major source of information, but not the only one, and other information of interest will be sought in the corresponding sources.

The public to whom the Atlas is directed present a wide range of characteristics, for which clear and direct formulas should be sought.

At the specific level, we would define the following objectives:

1. Provide a general overview of the tuna fisheries of the Atlantic Ocean and its environment, not limited to a representation of statistics, but embracing the maximum information possible, including descriptions of the gears, types of vessels, fishing methods, etc.
2. Provide an historical overview of the development of these fisheries through the establishment of reference periods.
3. Provide an updated overview of the state of the fisheries.

The first two objectives could have a permanent nature, regardless of the decided format (paper, CD, etc.), to be re-edited periodically. On the contrary, the third objective would require annual updates that could be distributed via the web or in a similar way.

The periods that are established to calculate averages are approximate. At the general level, discussions should be held to decide if fixed or flexible periods should be established for all the species and fisheries. In either case, the Species Groups will be in charge of identifying the major changes that have taken place and defining the periods to be considered, based on their homogeneity.

The structure of the proposed Atlas could consider a process, in stages, based on partial objectives. The overall or partial development will be decided depending on the budget available. In the latter case, the SCRS will define the priority objectives and establish the calendar for the development of the various stages.

Content

As we have indicated in the section on objectives, the contents of the Atlas should exceed the scope of statistics, including the maximum amount of information relative to the Atlantic tuna fisheries. The manner of representation of the maps will be through the use of pie graphs with a diameter proportional to the size of the variable that is being represented. In this context, information will be included on:

Fleet

This information will be descriptive, including a description of the type of vessels (longline, purse seine, baitboat, etc.) and their historical development, considering the most relevant changes. Photos and/or drawings can be incorporated.

Gears

This information will also be descriptive, as regards the gears as well as the fishing activity, and will include the major changes that have been introduced. The various fishing methods that have been developing (FADs, spots, etc.) will be included in this chapter.

Catches

All tuna and tuna-like species under ICCAT mandate will be included, as well as a section on by-catches. This should be the final objective, although the availability of data could limit this objective. Likewise, the level of representation will depend on the data available.

With regard to the period, the starting year will be established based on the data available, always with the intention of a maximum extension of the series.

Graphics and maps will represent the catches. As a sample of the type of figure, reference is made to those in document SCRS/01/137.

- Graphics. – Development of the catches by species, gear, fishing method, when available, and area (east-west). Annual level.
- Maps:

1. Average catches (10 years) by species and gear (pie graph with gears) by the smallest strata possible (1°x1° or 5°x5°). These will be done at an annual and quarterly level (five maps per species and period) and will be updated every 10 years.

2. Average catches (10 years) by gear and species (pie graph by species) by the smallest strata possible (1°x1° or 5°x5°). These will be done at an annual and quarterly level (five maps by gear and period) and will be updated every 10 years.

3. Average catches (10 years) by fishing meted and species (pie graph by species) by the smallest strata possible (1°x1° or 5°x5°). These will be done at an annual and quarterly level (five maps by fishing meted and period) and will be updated every 10 years.

4. Average catches (10 years) by species and fishing meted (pie graph by fishing method) by the smallest strata possible (1°x1° or 5°x5°). These will be done at an annual and quarterly level (five maps by fishing method and period) and will be updated every 10 years.

5. Average catches by gear, country and species (pie graph by species) by the smallest strata possible (1°x1° or 5°x5°). In the case of fleets that are not currently operative (USA PS, France TROL, etc.) the entire period of activity will be considered. For the operative fleets, periods of 10-15 years will be considered.

6. Combined graphics on average catches (5-10 years) by area, month, gear, fishing method and species (Figure 3 of SCRS/01/137). These will be updated every 5-10 years.

7. Annual catches by species and 5°x5° square. Only for the species and gears for which it is considered that there have been important shifts in effort (Figure 5 of SCRS/01/137). These will be updated every 5 years.

8. The representation by countries could also be considered in cases in which strategies and developments can be clearly differentiated and which may have had an important impact. Clear criteria will have to be defined in order to identify the countries, which, presumably, will be difficult.

Effort

As concerns effort, the available data have to be analyzed before defining a format of representation. In principle, maps on average annual effort (10 years) by gear and 5°x5° square would be desirable: these will be updated every 10 years.

CPUE

Average CPUEs (10 years) by species and 5°x5° square. However, the representation of the catch rates will be limited, considering the availability and quality of the data and the interest in the information that they provide.

Sizes

- Graphics:

  1. Average histograms (10 years) by species. These will be updated every 10 years.

  2. Average histograms (10 years) by species, gear and fishing method. These will be updated every 10 years.

  3. Average accumulated frequencies (10 years) by species. These will be updated every 10 years.

  4. Average accumulated frequencies (10 years) by species, gear and fishing meted. These will be updated every 10 years.

  5. Average annual weights by species, gear, area and fishing meted. These will be updated every year.

- Maps:

  1. Distributions of average sizes (20 years) by species, gear and area. These will be updated every 20 years.

  2. Average accumulated frequencies (10 years) by species, gear and area. These will be updated every 10 years.

Tagging

The decision on whether or not to include tagging data in the Atlas will be made after analyzing the available data and the expectations of information on tagging in the future.

Environmental data

The information to be included in this section and the representation form would require more development that that corresponding to the previous sections. On the one hand, this is new information that is not currently in the ICCAT database. On the other hand, it requires advice of experts outside of the SCRS. This section could be developed within the Sub-Committee on Environment.