INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

R E P O R T
for biennial period, 1990-91
PART II (1991)
English version

MADRID, SPAIN 1992

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

Contracting Parties (as of December 31, 1991)

Angola, Benin, Brazil, Canada, Cape Verde, Côte d'Ivoire, Cuba, Equatorial Guinea, France, Gabon, Ghana, Japan, Korea, Morocco, Portugal, Republic of Guinea, Russia, Sao Tomé & Principe, South Africa, Spain, United States, Uruguay, Venezuela.

Chairman of Commission

Dr. A. RIBEIRO LIMA, Portugal
(from November 15, 1991)

First Vice-Chairman of Commission

Mr. K. SHIMA, Japan
(from November 15, 1991)

Second Vice-Chairman of Commission

Mr. L. G. PAMBO, Gabon
(from November 15, 1991)

Panel Membership (from November 15, 1991)

Panel	Contracting Parties	Chairman
1	Angola, Brazil, Cape Verde, Cuba, France, Gabon, Ghana, Côte d'Ivoire, Japan, Korea, Morocco, Portugal, Russia, Sao Tomé & Principe, Spain, United States, Venezuela.	Côte d'Ivoire
2	Canada, France, Japan, Korea, Morocco, Portugal, Spain, United States.	Morocco
3	Brazil, Japan, South Africa, Spain, United States.	United States
4	Angola, Canada, France, Japan, Korea, Portugal, Russia, Spain, United States, Venezuela.	Russia

Council

No election was conducted for the 1992-93 biennial period.

Standing Committees

Standing Committees:	Chairman
Committee on Finance and Administration (STACFAD)	Mr. D. SILVESTRE, France (from November 15, 1991)
Committee on Research and Statistics (SCRS)	Dr. J. L. CORT, Spain (from November 1, 1989)

Secretariat
Príncipe de Vergara, 17, 28001 Madrid (Spain)
Executive Secretary: Dr. ANTONIO FERNÁNDEZ (from March 1, 1992)
Assistant Executive Secretary: Dr. PETER M. MIYAKE

LETTER OF TRANSMITTAL

The Chairman of the International Commission for the Conservation of Atlantic Tunas presents his compliments to the Contracting Parties to the International Convention for the Conservation of Atlantic Tunas (signed in Rio de Janeiro, May 14, 1966), and to the Delegates and Advisers representing said Contracting Parties, and has the honor to transmit the ***"Report for the Biennial Period, 1990-91, Part II (1991)"***, which describes the activities of the Commission during the second half of said biennial period.

This publication contains the reports of the Twelfth Regular Meeting of the Commission, held in Madrid, in November, 1991, as well as the reports of all its associated meetings of Standing Committees and Sub-Committees. It also contains a summary of the activities of the Secretariat and the National Reports on scientific activities related to tuna fisheries carried out by the various countries.

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

Dr. A. Ribeiro Lima
Chairman of the Commission

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CHAPTER I

SECRETARIAT REPORTS

ADMINISTRATIVE REPORT 1991
COM/91/8 (Revised)*

1. CONTRACTING PARTIES OF THE COMMISSION

As of December 31, 1991, the Commission was comprised of the following Contracting Parties: Angola, Benin, Brazil, Canada, Cape Verde, Côte d'Ivoire, Cuba, Equatorial Guinea, France, Gabon, Ghana, Republic of Guinea, Japan, Republic of Korea, Morocco, Portugal, Russia, Sao Tomé & Principe, South Africa, Spain, Uruguay, U.S.A., and Venezuela.

The Republic of Guinea became a member as of June 5, 1991. Cuba will be withdrawing as of December 31, 1991.

2. RATIFICATION OF THE PROTOCOL TO THE CONVENTION

In 1991, no countries ratified or accepted the Protocol to the Convention, approved at the Conference of Plenipotentiaries (Paris, July, 1984), for accession of the European Community to the Convention. The following list shows the countries which have ratified or accepted and the date of said ratification or acceptance:

France	23	Oct.	1984
S.Tomé & Principe	1	Nov.	1984
Republic of Korea	7	Dec.	1984
South Africa	28	Mar.	1985
Uruguay	10	May	1985
Japan	13	Jun.	1985
Senegal**	14	Jun.	1985
Cape Verde	13	Mar.	1986
Russia	9	Jun.	1986
U.S.A.	10	Nov.	1986
Spain	21	Nov.	1986
Equatorial Guinea	7	Nov.	1987
Portugal	7	Apr.	1988
Brazil	5	Oct.	1988
Ghana	12	Dec.	1988
Cuba**	11	Jan.	1989
Venezuela	7	Mar.	1989
Angola	29	Aug.	1990

3. OFFICERS OF THE COMMISSION

A list of Commission officers is given in the inside cover of this publication. It is noted that the Chairman of the Standing Committee on Finance and Administration, Ms. P. García Doñoro resigned from the position due to the change in her position in the Spanish Government. During the 1991 Committee meeting, the Commission Chairman acted as Chairman until an election was held.

4. ICCAT REGULATIONS / PORT INSPECTION

At the 1990 Commission Meeting, recommendations for regulatory measures on swordfish were proposed and voted upon. However, since the number of Contracting Parties in attendance at the time of voting did not constitute a quorum, a mail vote was taken on the recommendations. A total of 16 countries voted in favor; six countries did not respond to the mail vote. The proposed measures were adopted.

The Secretariat transmitted the recommended regulatory measures on swordfish to all the Contracting Parties on January 30, 1991. Since no objections were presented, the recommendation went into effect six months afterwards, i.e. July 30, 1991, and this fact was immediately notified to the governments of all the Contracting Parties.

*The Administrative Report presented at the Commission Meeting was revised.
**Senegal's withdrawal from the Commission was effective December 31, 1988; Cuba's withdrawal was effective December 31, 1991.

The recommendations for 1991 on west Atlantic bluefin regulations (actually the same as in previous years) were also transmitted to all the ICCAT Contracting Parties.

In addition to the recommendations on bluefin and swordfish, the Secretariat also notified the Contracting Parties of the regulatory measures in effect on yellowfin and bigeye, and reminded them of the importance of abiding by them. The Secretariat also forwarded all the regulatory measures (new and previous) to those non-Contracting Parties that fish tuna and tuna-like fishes in the Atlantic, and solicited their collaboration.

Information on the ICCAT Port Inspection Scheme, including a list of authorized inspectors and correspondents is prepared by the Secretariat and submitted to the Commission.

5. MEETINGS ORGANIZED BY ICCAT

5.1 Working Group on Western Atlantic Tropical Tunas

The Working Group on Western Atlantic Tropical Tunas held its first meeting at the NMFS Southeast Fisheries Science Center (Miami, April 17-24, 1991) at the invitation of the U.S. Government. Three members of the Secretariat staff participated in the meeting. The Working Group created the catch-at-size base for the western Atlantic for the years 1980 to 1988. Biological information, such as growth, spawning areas and time, stock structure, and stock abundance indices were reviewed and some agreements were reached on the parameters to be used.

The Group recommended several short-term research items and decided to meet again at the time of the 1991 SCRS meeting in November. The Group's adopted report is published in the "Collective Volume of Scientific Papers, Vol. XXXVIII.

5.2 Swordfish Stock Assessment Session

The SCRS Stock Assessment Session on Swordfish was held from September 10 to 17, 1991, at the Biological Station of the Department of Fisheries and Oceans of Canada, at St. Andrews, New Brunswick, at the invitation of the Canadian Government. Two members of the Secretariat staff participated in the meeting. The Group conducted extensive analyses and drafted the swordfish stock assessment section of the 1991 SCRS Report.

5.3 Pre-Selection Committee to Select a new ICCAT Executive Secretary

The Pre-Selection Committee, comprised of a representative from France, Gabon, Japan, Portugal, Spain, United States, and Venezuela, held its first meeting in Madrid in February. At that time, the Committee prepared the "Post Vacancy Announcement" for distribution among the ICCAT Contracting Parties. The Committee held its second meeting in October in Madrid and thoroughly reviewed all the applications received. The voting procedures to be followed by the Commission were also discussed.

At a closed session attended only by the Head Delegates of the Contracting Parties, the election of the new Executive Secretary was held, and Dr. Antonio Fernández was selected.

6. MEETINGS AT WHICH ICCAT WAS INVOLVED

6.1 FAO Committee on Fisheries (COFI)

Ms. C. Soto (Spain) represented ICCAT at this meeting. She informed the COFI of resolution passed by ICCAT concerning large-scale driftnets.

6.2 Inter-Agency meeting of the Coordinating Working Party on Atlantic Statistics (CWP)

The CWP meeting was held in conjunction with the meeting of International Council for the Exploration of the Sea (ICES) at La Rochelle, France, in late September. ICCAT was not represented at this year's meeting, although it is a member of the CWP.

7. COORDINATION OF RESEARCH

The Secretariat Report on Statistics and Coordination of Research summarizes all activities relating to coordination of research and biostatistics.

8. COLLABORATION WITH OTHER ORGANIZATIONS

8.1 Collaboration with FAO

As in other years, a close working relationship was maintained with various departments of FAO, which

--as depository of the ICCAT Convention-- has assisted the Commission in many administrative aspects, as well as in the collection of statistics, etc.

8.2 General Fisheries Council for the Mediterranean (GFCM)

The Management Committee of the General Fisheries Council for the Mediterranean (GFCM) held its meeting at the same time as the ICCAT SCRS stock assessment sessions. Since FAO had made these meeting arrangements with very short notice, we could not avoid the overlapping with our meeting dates. Unfortunately, this situation prevented ICCAT's participation at the GFCM meetings. Hopefully, the close collaboration with GFCM on tuna stock assessments, initiated in 1990 with the joint meeting held in Bari, Italy, will continue.

8.3 Other organizations and non-Contracting Parties

The Commission maintained contact with various other international organizations and non-Contracting Parties regarding administrative and scientific matters. The Inter-American Tropical Tuna Commission (IATTC) provided us with data from biological sampling carried out at Cumaná, from Venezuelan boats fishing in the Atlantic. The data were collected by an IATTC sampler stationed at this port.

9. PUBLICATIONS

The following publications were issued in 1991:

- Report for Biennial Period, 1990-91 (Part I), 1991. (published in the three official languages of the Commission in May-June).
- Statistical Bulletin, Vol. 20 - (published in June, 1991).
- Collective Volume of Scientific Papers, Vol. XXXIV, which contains the Report of the Second Albacore Workshop, 1990 (published in March, 1991).
- Collective Volume of Scientific Papers, Vol. XXXV (1) and (2), which contains the papers presented at the 1990 SCRS Meeting (published in March, 1991).
- Collective Volume of Scientific Papers, Vol. XXXVI, which contains Report of the Yellowfin Year Program (published in September, 1991).
- Collective Volume of Scientific Papers, Vol. XXXVII, which contains the translation into Spanish of FAO Technical Report #292 entitled "Recurso, pesca y biología de los túnidos tropicales del atlántico centro-oriental" (published in May, 1991).
- Data Record, Vol. 32, which contains a catalog and summary of data received up to December 1990 (published in July, 1991).
- Field Manual for Statistics and Sampling of Tunas and Tuna-like Fishes, Third Edition (French and Spanish versions published in January, 1991).

In order to cut costs, most of the publications issued by the Commission were prepared and photocopied at the Secretariat, except for the covers and binding. However, the volume of copying work far exceeded the capacity of the Secretariat. Therefore, three publications in 1991, the Collective Volume, XXXVI (Yellowfin Year Program Report), and the French and Spanish versions of the Field Manual (Third Edition) were printed by a commercial firm.

The distribution of the "Data Record" and "Collective Volume" series (with the exception of Volumes XXXVI and XXXVII) were limited to scientists and laboratories directly involved in tuna research.

Also, for reasons of economy, almost all the ICCAT publications have been reduced in number and are shipped by surface mail, except for a few occasions when urgent distribution is essential.

10. SECRETARIAT AND ADMINISTRATION

Ms. Donna DaRodda, computer programmer, resigned from the Secretariat as of July 31, 1991. The position was not yet filled as of December 31, 1991. The current Secretariat staff consists of the Executive Secretary, Assistant Executive Secretary, and Systems Analyst in the U.N. Professional Category, six multi-lingual secretaries, a statistical secretary and a clerk in the U.N. General Services Category and four locally-contracted staff.

O. Rodríguez Martín
Executive Secretary

1991 FINANCIAL REPORT
*COM/91/9 (Revised)**

FISCAL YEAR 1990

AUDITOR'S REPORT

The Auditor examined the books and accounts of the Commission up to December 31, 1990. In accordance with Articles 9-3 and 12-7 of the Financial Regulations, and following a recommendation of the Council at its Second Regular Meeting, the Secretariat distributed a copy of the Auditor's Report to all the member country governments in May, 1991. An extract of the Auditor's Report was included in the "Report for Biennial Period, 1990-91 Part I".

Statement 1 shows the status of Cash and Bank at the end of Fiscal Year 1990. At that time there was a cash balance of US$ 203,809.89, which included an overpayment of US$ 456.38 from Gabon. This statement also shows extra-budgetary funds, such as US$ 8,832.29, corresponding to the Yellowfin Year Program, US$ 15,052.51 of the Albacore Research Program, and US$ 2,030.00 in FAO contract funds.

At the end of Fiscal Year 1990 there were accumulated pending contributions which totaled US$ 606,492.31.

FISCAL YEAR 1991

1. REGULAR BUDGET

The Regular Budget for the 1990-1991 biennial period was approved by the Commission at its Eleventh Regular Meeting (Madeira, November 1989) and revised at the Seventh Special Meeting of the Commission (Madrid, November 1990). (See Annex 9 to the Biennial Report, 1990-91, Part I, 1990.)

Financial status of the second half of the biennial budget (1991) and member country contributions pending payment

Statement 2 shows the status of the contributions of each of the Contracting Parties to the end of Fiscal Year 1991.

Of the total approved budget (US$ 1,185,000), income received towards 1991 contributions totalled US$ 965,597.34. Only thirteen of the 22 Contracting Parties paid their 1991 contributions in full. Two countries made partial payment and have a balance on their 1991 contribution still pending.

On the other hand, seven Contracting Parties have not paid any amount towards their 1991 contribution and many of these countries also have debts pending from other years as well.

There are contributions pending payment towards the 1991 Budget totaling US$ 219,402.66, which represents 18.5% of the total budget.

The above figure is highly indicative of the apathy of some Contracting Parties towards meeting their debt to the Commission. However, what is even more alarming is the accumulated debt owed to the Commission, which amounted to US$ 722,116.51.

Statement 3 shows the liquidation of the 1991 budget and a breakdown of expenditures, by budget chapter, to the end of the fiscal year. The total expenditures were slightly below the total budget.

Some general comments, by budget chapter, are as follows:

Chapter 1 - **Salaries:** Due to a favorable currency exchange rate, this chapter showed a positive balance of US$ 23,608.68.

Chapter 2 - **Travel:** Some expenses pertaining to

*Updated to the end of the Fiscal Year.

the Secretariat's participation (P. M. Miyake) in the Working Group on Western Tropical Tunas, held in Miami, were charged to this budget chapter. However, the major expense in this chapter corresponded to "home leave" for two Professional staff members and their families.

i) P. Miyake, Asst. Exec. Secretary	US$ 14,891.42
ii) P. Kebe, Systems Analyst	5,379.04
	US$ 20,270.46

Chapter 3 - **Commission Meeting:** Expenditures remained within the amount budgeted.

Chapter 4 - **Publications:** The majority of the Commission publications listed in the Administrative Report were charged to this budget chapter. All work, except for binding, was done by the Secretariat.

Chapter 5 - **Office Equipment:** No office equipment was purchased in 1991. Hence, funds allocated to this budget chapter were not utilized.

Chapter 6 - **Operating Expenses:** This chapter showed a positive balance of US$ 10,153.62. Expenditures of this chapter were reduced by US$ 2,300.00, which were charged to the Billfish Program.

Chapter 7 - **Miscellaneous:** Since only a minimal amount was allocated to this chapter, only minor expenditures were charged here.

Chapter 8 - **Coordination of Research**

a) *Salaries*: This sub-chapter showed a positive balance of US$ 27,476.08, due to a favorable currency exchange and to the fact that one staff member left the Commission at the end of July.

b) *Travel to improve statistics:* The trip expenses for Secretariat participation in the Working Group on Western Tropical Tunas in Miami (P. Kebe) and the Swordfish Workshop in Canada (P. Kebe and P. M. Miyake) were charged to this sub-chapter. Ms. D. DaRodda also participated in this meeting. However, her expenses were covered by funds received from FAO for statistics (US$ 2,030.00).

c) *Port Sampling:* In addition to the port sampling expenses charged to this sub-chapter, part of the cost of the publication of the Yellowfin Year Program results was also charged to this sub-chapter (since there was insufficient cash available in YYP funds to cover expenses).

d) *Biostatistical Work:* The publication costs for the "Field Manual" (Third Edition, French version) (US$ 4,783.94) were charged to this sub-chapter, as were two lottery prizes (US$ 1,000). Also charged was payment of US$ 1,583.65 to IATTC to cover the cost of copies of the publication entitled, "World Meeting on Stock Assessment of Bluefin Tunas: Strengths and Weaknesses", for distribution to SCRS scientists.

e) *Electronic Equipment:* Expenditures charged to this sub-chapter included the purchase of three laser printers, a dot matrix printer, computer software ("Bridge" and "Wordperfect 5.1"), a personal computer, font cards, computer manuals, cables, etc.

f) *Data Processing:* The majority of the expenditures charged to this sub-chapter refer to computer equipment maintenance contracts and computer materials.

g) *Scientific Meetings:* Expenditures were practically the same as the amount budgeted.

Chapter 9 - **Contingencies:** There were no funds allocated to this chapter for 1991. However, the expenses (US$ 4,119.88) for the two meetings of the Pre-Selection to Select a new ICCAT Executive Secretary were charged here.

Statement 4 shows income received in 1991 which totaled US$ 1,115,792.27 from member country contributions, past-due contributions, and advance contributions (overpayments), as well as extra-budgetary income.

Statement 5 presents the composition and balance of the Working Capital Fund. This fund showed a positive balance of US$ 199,623.37 at the end of Fiscal Year 1991.

Statement 6 shows the cash flow in Fiscal Year 1991, i.e., a summary of income and expenditures during the last Fiscal Year.

Statement 7 shows the status of Cash and Bank at the end Fiscal Year 1991. There was a balance of US$ 216,942.96, including US$ 3,683.50 in advances (overpayments) in contributions from Gabon.

As noted earlier in this report, the accumulated debt owed to the Commission for unpaid contributions amounted to US$ 722,116.51 at the end of Fiscal Year 1991.

Statement 8 shows the General Balance Sheet at the end of Fiscal Year 1991.

II. YELLOWFIN YEAR PROGRAM (YYP) FUNDS

At its Ninth Regular Meeting (November, 1985), the Commission approved the Program, with a total budget of US$ 175,000.00, to be financed by the Working Capital Fund.

Although the Program ended in 1990, there was a balance of US$ 8,832.39 at the beginning of 1991 to finance the printing cost of the YYP publication. The total cost of this publication amounted to US$ 19,800.00. Since the cost exceeded the funds available, some funds from the Regular Budget were used to cover the excess (US$ 10,967.61).

III. ALBACORE RESEARCH PROGRAM FUNDS

At the 1990 Commission meeting, it was decided that the balance in Sub-chapter 8-i (Albacore Research Program) which amounted to US$ 15,052.51, would be kept in a special fund, which would only be used for this Program. After expenditures in 1991 which amounted to US$ 1,416.42, Albacore Research Program funds showed a balance of US$ 13,636.09 at the end of Fiscal Year 1991.

IV. PROGRAM OF ENHANCED RESEARCH FOR BILLFISH

A special fund to administer the Billfish Research Program was created in 1987. The status of this account at the end of the Fiscal Year was as follows:

-- Balance at the end of FY 1990	US$ 13,425.77
-- Deposits to the fund in 1991	15,000.00
	28,425.77
-- Expenditures in 1991	27,321.00
Balance (at end of Fiscal Year 1991)	US$ 1,104.77

V. FINAL COMMENTS

Over the last few years I have consistently called attention to the Commission's financial crisis, which was caused by the delays in the payment of the member country contributions. Perhaps some people thought I was being overly pessimistic.

As I leave my position as Executive Secretary of ICCAT, and we close accounts for Fiscal Year 1991, there is a theoretical balance of almost one million dollars (US$ 939,059.47). However, of this amount, there are US$ 722,084.85 owed to the Commission in contributions. This is the eternal problem.

However, on the other hand, the situation seems to be showing signs of improvement and our financial outlook is more optimistic, as demonstrated by the fact that some Contracting Parties that have been in arrears are beginning to liquidate their debts.

The two agreements reached by the Commission at its November, 1991, meeting could be decisive in solving the financial difficulties, i.e., the new scheme to calculate the country contributions for a fairer distribution of the contributions, and the change of the budget base currency to Pesetas to avoid the negative influence in the U.S. dollar/Peseta currency exchange.

O. Rodríguez Martín
Executive Secretary

Status of Cash and Bank at end of Fiscal Year 1990 ($USA)

SUMMARY		*BREAKDOWN*		
Balance in Cash and Bank	203,809.89	Available in Working Capital Fund.....	177,438.61	
		Advance from Gabon.....	456.38	
		Yellowfin Year Program Funds.....	8,832.39	
		Albacore Research Program Funds.....	15,052.51	
		FAO Contract.....	2,030.00	
	203,809.89			203,809.89
Accumulated pending contributions..	606,492.31	Contributions pending payment.....		606,492.31
		a) from 1985 and before.....	60,084.85	
		b) from 1986.....	53,156.00	
		c) from 1987.....	90,228.00	
		d) from 1988.....	107,271.00	
		e) from 1989.....	100,547.00	
		f) from 1990.....	195,205.46	

Status of Member Country Contributions - Regular Budget (US$) (at the end of Fiscal Year 1991)

Country	*Past Due at Beginning of Fiscal Year 1991*	*1991 Budget Broken Down Among Member Countries*	*Contributions Paid Towards the 1991 Budget*	*Contributions Paid Towards Previous Budgets*	*Balance Due at end of Fiscal Year 1991*
Angola	18,807.00	26,202.00	1,434.00	18,807.00	24,768.00
Benin*	50,941.70	7,180.00	0.00	0.00	58,121.70
Brasil	37,109.00	48,709.00	0.00	1,000.00	84,818.00
Canada	0.00	23,583.00	23,583.00	0.00	0.00
Cap Vert	29,974.00	21,970.00	0.00	0.00	51,944.00
Côte d'Ivoire	53,373.00	14,075.00	14,075.00	53,373.00	0.00
Cuba	82,297.00	28,046.00	0.00	0.00	110,343.00
España	0.00	313,950.00	313,950.00	0.00	0.00
France	0.00	132,856.00	132,856.00	0.00	0.00
Gabon**	0.00	14,075.00	14,075.00	0.00	0.00
Ghana	212,004.27	63,357.00	0.00	0.00	275,361.27
Guinea Ecuatorial	15,528.00	7,627.00	0.00	0.00	23,155.00
Japan	0.00	85,955.00	85,955.00	0.00	0.00
Korea	0.00	39,379.00	39,379.00	0.00	0.00
Maroc	0.00	28,830.00	28,810.00	0.00	20.00
Portugal	0.00	55,991.00	55,969.00	0.00	22.00
Sao Tomé & Principe	0.00	14,642.00	14,642.00	0.00	0.00
South Africa	0.00	22,773.00	22,773.00	0.00	0.00
Uruguay	0.00	8,806.00	0.00	0.00	8,806.00
U.S.A.	0.00	124,211.00	124,211.00	0.00	0.00
Russia	0.00	34,128.00	34,128.00	0.00	0.00
Venezuela	30,597.46	68,654.00	59,757.34	30,597.46	8,896.66
Sub-Total	530,631.43	1,184,999.00	965,597.34	103,777.46	646,255.63
Sénégal***.....	75,860.88	0.00	0.00	0.00	75,860.88
Sub-Total.....	606,492.31	1,184,999.00	965,597.34	103,777.46	722,116.51
Rounding.....		1.00			1.00
TOTAL	606,492.31	1,185,000.00	965,597.34	103,777.46****	722,117.51

*Includes Benin's pending contribution to the Skipjack Budget ($3,044.70).
**There is an overpayment by Gabon of $3,683.50 which will be applied to future contributions of Gabon.
***Senegal's withdrawl from the Commission was officially effective on December 31, 1988.
****To the Working Capital Fund.

Liquidation of Regular Budget 1991
Breakdown of Regular Expenditures by Budget Chapter (US$) (at the end of Fiscal Year 1991)

Chapters	1991 Budget	Expenditures at end of Fiscal Year 1991
Chap. 1 Salaries	654,000	630,391.32
Chap. 2 Travel	22,000	23,530.36
Chap. 3 Commission Meeting	45,500	45,129.83
Chap. 4 Publications	25,000	27,088.31
Chap. 5 Office Equipment	7,500	0.00
Chap. 6 Operating Expenses	93,000	82,846.38
Chap. 7 Miscellaneous	1,000	1,499.59
Sub-total Chapters 1-7	848,000	810,485.79
Chap. 8 Statistics and Research:		
8A Salaries	190,000	162,523.92
8B Travel to improve statistics	12,000	8,281.73
8C Port Sampling	15,000	6,211.51
8D Biostatistical Work	12,000	7,764.91
8E Electronic Equipment	15,000	12,843.72
8F Data Processing	41,000	26,091.84
8G Scientific Meetings (incl. SCRS)	52,000	52,057.09
8H Miscellaneous	0	0.00
8I Albacore Research Program	0	0.00
8J Billfish Research Program*	0	0.00
Sub-Total Chapter 8	337,000	275,774.72
9. Contingencies (Pre-selection Committee)	0	4,119.88
TOTAL CHAPTERS 1-9	1,185,000	1,090,380.39

*Funded by the Trust Fund for Billfish Research.

Income received (at the end of Fiscal Year 1991) ($USA)

1.1 Contributions received towards 1991 Budget:			
Canada	(February 6, 1991)	23,583.00	
United States	(Feb. 6,& Nov.11, 1991)	124,211.00	
France	(March 6, 1991)	132,856.00	
Japan	(March 21, 1991)	85,955.00	
Spain	(April 19, 1991)	313,950.00	
Venezuela	(May 5 and 30, 1991)	59,757.34	
South Africa	(May 13, 1991)	22,773.00	
Portugal	(June 21, Oct. 7, 1991 and Feb. 3,1992)	55,969.00	
U.S.S.R.	(July 15, 1991)	34,128.00	
Gabon	(August 16, 1991)	14,075.00	
Korea	(August 30, 1991)	39,379.00	
Morocco	(November 14, 1991)	28,810.00	
Côte d'Ivoire	(January 7, 1992)	14,075.00	
Sao Tomé & P.	(January 7, 1992)	14,642.00	
Angola	(February 18, 1992)	1,434.00	965,597.34
1.2 Past-due Contributions paid in 1991:			
Venezuela	(May 10, 1991)	30,597.46	
Côte d'Ivoire	(January 7, 1992)	53,373.00	
Brazil	(February 6, 1992)	1,000.00	
Angola	(February 18, 1992)	18,807.00	103,777.46*
1.3 Other Income (Extrabudgetary):			
Voluntary Contributions:			
Club de Pesca de Altura de Gran Canaria		94.33	
Observers in annual meetings		6,000.00	
Bank Interest		14,109.29	
Refund from VAT		16,107.21	
Reimbursement for publications		2,841.51	
Reimbursement for trip expenses-Univ. de Bari		1,672.68	
Difference in exchange rate		2,365.33	43,190.35*
1.4 Advance on 1992 Contributions:			
Gabon			3,227.12**
Total income in 1991			1,115,792.27

*To the Working Capital Fund.
**This amount, received in 1991, increases the previous overpayment by Gabon of $456.38 to a total of $3,683.50.

Composition and Balance of Working Capital Fund (US$) (at the end of Fiscal Year 1991)

Cash Balance at start of Fiscal Year 1991.....		177,438.61
Deposits:		
Contributions received toward previous budgets.....	103,777.46	
Extrabudgetary Income.....	43,190.35	146,967.81
		324,406.42
Less:		
Amount to cover the difference between contributions received towards 1991 Budget ($965,597.34) and Regular Budget expenditures (Chapters 1-9) at the end of Fiscal Year 1991 (1,090,380.39)		124,783.05
Cash Balance in Working Capital Fund at the end of Fiscal Year 1991.....		199,623.37

Cash Flow in Fiscal Year 1991 (US$) (at the end of Fiscal Year 1991)

INCOME			EXPENDITURES		
Balance in Cash and Bank (1/1/91) ..		203,809.89	Expenditures for Chapter 1-9, Regular Budget.....		1,090,380.39
Income:					
Contributions to 1991 Budget.	965,597.34		Other Expenditures:		
Past-due contributions from previous years	103,777.46*		Yellowfin Year Program.....	8,832.39	
Other income	43,190.35*		Albacore Research Program....	1,416.42	
Advance from Gabon	3,227.12**	1,115,792.27	FAO Contract.....	2,030.00	12,278.81
			Total expenditures.....		1,102,659.20
			Cash Balance of Working Capital Fund.....		199,623.37
			Balance of Albacore Research Program Funds.....		13,636.09
			Total Advance from Gabon**.....		3,683.50
TOTAL.....		1,319,602.16	TOTAL.....		1,319,602.16

*To the Working Capital Fund.
**This amount, received in 1991, increases the previous overpayment by Gabon of $456.38 to a total of $3,683.50.

Status of Cash and Bank at end of Fiscal Year 1991 ($USA) (at the end of Fiscal Year 1991)

SUMMARY		*BREAKDOWN*		
Balance in Cash and Bank	216,942.96	Cash Balance of Working Capital Fund	199,623.37	
		Albacore Research Program Funds.....	13,636.09	
		Yellowfin Year Program Funds.....	0.00	
		FAO Contract.....	0.00	
		Advance from Gabon	3,683.50	
	216,942.96		216,942.96	
Accumulated pending contributions..	722,116.51	Contributions pending payment.....		722,116.51
		a) from 1985 and before.....	60,084.85	
		b) from 1986.....	53,156.00	
		c) from 1987.....	70,869.00	
		d) from 1988.....	95,874.00	
		e) from 1989.....	88,941.00	
		f) from 1990.....	133,790.00	
		g) from 1991.....	219,401.66	

General Balance Sheet at end of Fiscal Year 1991 (US$)

ASSETS			*LIABILITIES*		
Available: (Banco Exterior de España):			Acquired holdings (gross).....	376,946.00	
Acct. 30.8231279.840 (time deposit).....		0.00	Less: Amortization of Fixed Assets..	-248,477.00	
Acct. 030-31279.43-E (US$).....		207,509.10	Acquired holdings (net).....		128,469.00
Acct. 030-17672.60-A (Pt).....	899,687 Pt				
Acct. 030-17329.75-F (Conv.Pt)..	-17,645 Pt		Guaranty deposit.....		815.64
Cash on hand (Pt).....	61,344 Pt				
Exchange rate 1US$ = 100 Pt.....	943,386 Pt	9,433.86	Available in the Working Capital Fund.....		199,623.37
		216,942.96			
			Available in Albacore Research Program.....		13,636.09
Available in Billfish Trust Fund:					
Acct. 030-31555.90-B.....		1,104.77	Available in Billfish Trust Fund:		
			1990 Balance.....	13,425.77	
Receivables:			Received.....	15,000.00	
Angola	24,768.00		Spent.....	27,321.00	1,104.77
Benin	58,121.70				
Brazil	84,818.00		Advance from Gabon.....		3,683.50
Cape Verde	51,944.00				
Cuba	110,343.00		Contributions pending payment.....		722,116.51
Ghana	275,361.27				
Guinea Ecuatorial	23,155.00				
Maroc	20.00				
Portugal	22.00				
Senegal	75,860.88				
Uruguay	8,806.00				
Venezuela	8,896.66	722,116.51			
Fixed Assets:					
Acquired before 1991.....	368,363.62				
Acquired during 1991.....	8,582.38				
Retired during 1991.....	0.00				
Total Fixed Assets, in use.	376,946.00				
Accumulated amortization.....	-248,477.00	128,469.00			
Guaranty deposit.....		815.64			
TOTAL ASSETS.....		1,069,448.88	TOTAL LIABILITIES.....		1,069,448.88

Furniture ceded by Undersecretariat of Merchant Marine of Spain	$3,365.38	Undersecretariat of Merchant Marine of Spain	$3,365.38

SECRETARIAT REPORT ON STATISTICS AND COORDINATION OF RESEARCH
COM-SCRS/91/11 (Revised)*

I. DATA COLLECTION AND SAMPLING

1. COLLECTION OF 1990 STATISTICS THROUGH NATIONAL OFFICES

Table 1 of the Report of the Sub-Committee on statistics (Appendix 7 to Annex 16) shows the progress made by the national offices and by the Secretariat in the collection of 1990 statistics. At the time of the 1991 stock assessment sessions, data from the following major tuna fishing countries** had not yet been received by the Secretariat, despite having sent many reminders by fax and telegram:

Task I data (total nominal catches):

Cape Verde, Cuba, Ghana, Venezuela, Greece, **Japan** (LL), Senegal and Yugoslavia.

Task II catch and effort data:

Brazil, Cape Verde, Cuba, France (BFT), **Ghana**, Greece, Italy, **Turkey, Japan** (LL), **Morocco** (PS), **Russia**, Uruguay, Yugoslavia and **Venezuela** (LL).

Task II size data:

Angola, Brazil, Cape Verde, Chi-Taiwan (except ALB), **Cuba, Ghana**, Greece, Italy, **Morocco, Japan** (LL, except SWO and western BFT), **Portugal** (partial), **U.S.S.R.**, **Venezuela** (LL) and Yugoslavia.

2. IMPROVEMENTS AND REMAINING DIFFICULTIES

a) Delay in submission of Task I data

Although many reminders were sent, there were still many missing catch data from major fisheries.

b) Mediterranean statistics

Major improvements were made on Mediterranean statistics in 1990, as a result of the joint GFCM/ICCAT stock assessment session. However, this momentum could not be maintained. In 1991, no statistics were received from any of the major Mediterranean fishing countries that are not the members of ICCAT (except for Algerian data and Task I preliminary data for Italy).

c) Submission of catch-at-size data

Most of the major fishing countries for west Atlantic bluefin, north Atlantic swordfish and north Atlantic albacore presented catch-at-size data, not quite on time but before the start of the stock assessment sessions. However, no catch-at-size data were received for east Atlantic and Mediterranean bluefin (except for Spanish fisheries) or the coastal fisheries of South Atlantic swordfish or albacore.

3. PORT SAMPLING BY THE SECRETARIAT

Routine sampling from longliners at various transshipment ports was carried out as usual by ICCAT, but the sampling rate remained very low at ports in the Canary Islands and at St. Maarten.

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*The Secretariat Report on Statistics and Coordination of research presented at the Commission Meeting was revised.
**Countries shown in dark type are ICCAT' members.

II. SECRETARIAT DATA PROCESSING AND BIOSTATISTICAL WORK

1. FACILITIES

A personal computer with a 286 processor, 1 MB real memory, a 50 MB hard disk, two disk drives (5 1/4" and 3 1/2") was purchased for use as a terminal for the VAX. The 386 PC purchased in 1989 was upgraded to 100 MB disk capacity.

2. DATA PROCESSING AND BIOSTATISTICAL WORK

A programmer resigned as of July 31, 1991. The position had not yet been filled as of December 31, 1991.

a) Extra statistical work and data processing

The Secretariat prepared the data bases for two intersessional meetings held in 1991 (the Working Group on Western Atlantic Tropical Tunas and the Swordfish Stock Assessment Session) and for the SCRS. The Secretariat also assisted in the analyses carried out by the scientists involved in the Albacore Research Program. These tasks included:

- preparing catch tables
- preparing data catalogues
- updating and preparing data bases
- creating catch-at-size bases by substitutions and raising
- preparing catch-at-age catches
- providing computer support during the meetings
- preparing catch and effort indices
- preparing all the graphics and tables for the meeting reports
- checking the analyses during the meeting sessions, and editing the reports

b) Improvements to the data base

Many improvements have been made to the data base, particularly as concerns the catch-at-size record, which now has two fields to record the time of the catch and time of the catch of the samples which were used as data substitutions. Also, a field to record the sex has been incorporated in the size base.

c) Routine work

The volume of routine work increased as the volume of data increased. Routine work included entering, verifying and processing all the catch, catch and effort and biological data, updating the data catalogue and tagging file for recent years, and making copies of data files for scientists who request certain data. Also, data processing for statistical publications was also done.

d) Coordination of the Program of Enhanced Research for Billfish and of the Albacore Research Program

The Secretariat,in collaboration with the Coordinators of these Programs, was involved in coordinating, administering and preparing data for the research activities.

e) The 1991 tuna tagging lottery (for tag recoveries reported in 1990)

The annual ICCAT lottery for the international cooperative tagging program was held on June 17, 1991, at the Commission Headquarters. Three US$ 500 prizes were awarded for the following tag recoveries: one for tropical tunas (252 eligible tags this year), one for temperate tunas (143 tags), and one for billfishes (69 tags).

The prize for the tropical tuna category was won by a Spanish baitboat fisherman, the prize for the temperate tunas category was also won by a Spanish baitboat fisherman and the one for billfish by a U.S. skipper for the recreational fishery.

III. *PUBLICATIONS*

Details on the scientific publications issued in 1991 are reported in the Administrative Report.

CHAPTER II

RECORDS OF MEETINGS

PROCEEDINGS OF THE TWELFTH REGULAR MEETING OF THE COMMISSION

Madrid, November 11-15, 1991

FIRST PLENARY SESSION
November 11, 1991

Item 1. OPENING OF THE MEETING

1.1 The Twelfth Regular Meeting Commission was held in Madrid, Spain, at the Hotel Pintor, and was chaired by Mr. S. Makiadi J. Lopes (Commission Chairman). He introduced the people seated at the head table: Dr. J. Loira (Secretary General of Maritime Fisheries of Spain), Dr. A. Ribeiro Lima (First Vice-Chairman of the Commission), Mr. K. Shima (Second Vice-Chairman of the Commission), Dr. J. L. Cort (SCRS Chairman), Dr. O. Rodríguez Martín (ICCAT Executive Secretary), and Dr. P. M. Miyake (ICCAT Assistant Executive Secretary).

1.2 Dr. Loira welcomed the participants to Madrid. After pointing out the obvious interest in the activities of ICCAT as evidenced by the growing number of participants at its meeting, Dr. Loira called for continued collaboration on the part of the various countries interested in tuna fisheries. He expressed his best wishes for success in the work to be carried out by the group meeting this week. He paid tribute to Dr. O. Rodríguez Martín, who will soon be retiring from the Commission after many and fruitful years of service to ICCAT. Dr. Loira's opening address is attached as Annex 4.

1.3 The meeting was formally opened by Mr. S. Makiadi J. Lopes (Angola), the Commission Chairman, who briefly reviewed the work done by the Commission this past year as well as the matters to be discussed at this year's meeting. He also spoke of the imminent retirement of the ICCAT Executive Secretary and commended his long years as the head of the ICCAT Secretariat. Mr. Makiadi's opening address is included in Annex 4.

Item 2. ADOPTION OF AGENDA, ARRANGEMENTS FOR THE MEETING AND APPOINTMENT OF SUBSIDIARY BODIES

2.1 After the Commission reviewed the Tentative Agenda, it was adopted. The Agenda is attached as Annex 1. The List of Commission Documents is attached as Annex 3.

Item 3. INTRODUCTION OF DELEGATIONS

3.1 Each head delegate introduced his delegation. The names and addresses of all the members of delegations are found in the List of Participants, attached as Annex 2.

Item 4. ADMISSION OF OBSERVERS

4.1 The observers to this year's meeting were invited to introduce themselves; they were all admitted and welcomed by the Chairman. The observers are also included in the List of Participants (Annex 2).

Item 5. REVIEW OF COMMISSION MEMBERSHIP

5.1 The membership of the Commission was reviewed. The Chairman reported that Cuba had presented a formal notice of withdrawal from the Commission. Therefore, the effective date of withdrawal by Cuba is December 31, 1991.

Item 6. STATUS OF THE RATIFICATION OF THE PROTOCOL OF AMENDMENT TO THE CONVENTION

6.1 The Chairman noted that 17 member countries had ratified or accepted the Protocol for adherence of the European Economic Community to the Commission. He asked the Contracting Parties which had not yet ratified or accepted whether any progress had been made.

6.2 The Delegate of Canada reported that due to a delay in the internal process in his country, a definitive answer could not be given at this time. Everything possible is being done to speed up the process and he hopes to have an answer as soon as possible.

6.3 The Delegate of Gabon reported that the National Assembly of Gabon has voted on this Protocol, allowing Government to ratify it, and assured that this procedure has almost been completed. Before December of this year, formal ratification should reach the FAO.

6.4 The Delegate of Morocco explained that the ratification procedure is well under way and that the text of the Protocol was adopted by the Council of Ministers. It now must be ratified, which should be done in the next few months. Morocco expects the Protocol to be ratified by next year's ICCAT meeting.

6.5 The Delegate of Côte d'Ivoire reported that his country is in the process of decentralizing and restructuring its administration, thus causing delays in ratifying the Protocol. However, the procedure is in progress and it is hoped that between now and the next Commission meeting, the Protocol will be ratified.

6.6 The Observer from the EEC thanked the countries that informed the Commission on the status of the Protocol. He indicated that in accordance with the pertinent articles of the International Convention for the Law of the Sea, the European Economic Community reiterates the absolute priority which it gives to the rational exploitation of marine resources. In this regard, the EEC considers that the conservation of highly migratory species and the management of their stocks should be done through international regulations adopted by the competent regional organizations.

6.7 He noted, in this context, that the European Economic Community has expressed for several years a strong desire to adhere as a full member to the International Convention for the Conservation of Atlantic Tunas. To bring this about, a Final Act, annexed to the Protocol for amendment of the Convention, was signed in 1984 by all the Contracting Parties of this Convention.

6.8 The Observer from the EEC also noted that, to date, seven years after this signature, the required ratification of this document by all the Contracting Parties and the necessary deposit of the instrument of ratification with FAO has still not been done.

6.9 In thanking the countries that have already ratified, the Observer from the European Economic Community expressed once again the EEC's desire to adhere to the Convention and to collaborate as fully as possible in all the scientific work being carried out in ICCAT.

6.10 He pointed out that, in view of its observer status, the European Economic Community cannot at present envisage any other form of support to the Commission, particularly regarding a financial contribution.

6.11 The Observer from the EEC then noted that one country, Benin, that had not ratified the Protocol, was not present. He inquired whether the Secretariat had been in contact with Benin in this regard.

6.12 The Executive Secretary responded that during the past year the Secretariat had contacted all the countries which have not yet ratified or accepted the Protocol, including Benin. In addition, whenever a country has ratified or accepted the Protocol, this information is distributed to all Contracting Parties. There are countries, such as Benin, that have never expressed any views on the matter. He suggested that personal contact be made with authorities of Benin instead of only corresponding by mail.

SECOND PLENARY SESSION
November 11, 1991

Item 7. REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)

7.1 Dr. J. L. Cort (Spain), SCRS Chairman, presented his Committee's Report to the Second Plenary Session of the Commission and summarized the scientific findings. The SCRS Report is attached as Annex 16.

7.2 The SCRS Chairman reported on the results of the evaluations made by the Committee on the stocks of yellowfin, bigeye, skipjack, albacore, bluefin,

billfishes, swordfish, southern bluefin tuna and small tunas (Item 10 of the SCRS Report). The recommendations for statistics, research and management are included in each species section of the report and the Chairman requested the Panels and the Commission to consider these recommendations when considering any stock management measures.

7.3 The SCRS Chairman informed the Committee that the Sub-Committee on Environment met for the first time, with Mr. J. Pereira (Portugal) as Convener. The Sub-Committee's Report is attached as Appendix 8 to Annex 16.

7.4 Dr. Cort reported that the Sub-Committee on Statistics had met, with Dr. S. Turner (U.S.A.) as Convener, and had discussed all matters concerning statistics and the data base. The Report of the Sub-Committee on Statistics is attached as Appendix 7 to the Annex 16. Dr. Cort pointed out that some items discussed by the Sub-Committee required financing by the Commission.

7.5 The SCRS Chairman reported that the Committee had studied the progress made by the Billfish Program and agreed on the Program Plan for 1992, which will be carried out through private contributions to this Program.

7.6 The SCRS Chairman stated that the Committee had reviewed the proposed plan for the Bluefin Year Program and had recommended that the Commission endorse the Program. He added that the Program will be funded by national sources and that no Commission funding was requested.

7.7 The SCRS Chairman explained that the following meetings are scheduled for 1992 by the SCRS and requested the Commission to take them into consideration during its deliberations, particularly as some of these meetings have financial implications for the Commission.

1) A joint GFCM-ICCAT meeting on the stock assessment of large pelagic fish in the Mediterranean Sea
2) A Data Preparatory Meeting for the Southwestern Atlantic
3) A Billfish Workshop
4) A Swordfish Stock Assessment Session
5) An Albacore Stock Assessment Session
6) An Expert Meeting to restructure the surface fishery sampling scheme (to be held if the Commission approves contracting a biostatistician)

7.8 The Chairman of the Commission commended the results of the hard work carried out, as exemplified in the Report by the scientists, led by a competent SCRS Chairman.

7.9 The U.S. Delegate, commending the scientific achievements made by the Committee, asked that the Report be reviewed in detail at the Panel meetings and proposed postponing adoption until a later session. The Delegate of Cote d'Ivoire seconded this proposal and was supported by France. The Report was accepted but adoption was postponed until after discussion by the Panels. (See Item 11.1)

THIRD PLENARY SESSION
November 13, 1991

Item 12. DISCUSSION OF THE POSSIBLE INCLUSION OF BLUEFIN TUNA ON THE LIST OF ENDANGERED SPECIES

12.1 France, as Chairman of Panel 2, indicated that it preferred to discuss the matter after the Report of Panel 2 had been made available to the Commission. However, for practical reasons, France agreed that the Commission could listen to the statement which the Observer from Sweden concerning the Swedish position in proposing the inclusion of Atlantic bluefin tuna in the appendices of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Commission decided that this procedure would be acceptable, with the condition that any discussion on this Agenda Item would be postponed until after the Commission accepted the Report of Panel 2. (This item was discussed again later at the Plenary Session.)

12.2 After introducing himself, the Observer from Sweden made a statement on the standpoint of the Swedish Government concerning this Agenda item. The Statement is attached as Annex 8.

FOURTH AND FIFTH PLENARY SESSIONS
November 15, 1991

Item 8. REPORT OF THE WORKING GROUP TO STUDY ALTERNATIVE SCHEMES TO CALCULATE THE MEMBER COUNTRY CONTRIBUTIONS TO THE COMMISSION BUDGET

8.1 The Group's Report was presented by its Chairman, Mr. L. Weddig (U.S.A.). The Commission noted that the Working Group had concluded its work. It had investigated various formulas for calculation of contributions and had successfully prepared flexible, basic principles to calculate the contributions upon which all the Contracting Parties agreed.

8.2 The Commission commended the Group on successfully completing this very difficult task. The Commission thanked Mr. Weddig, the Chairman of the Working Group, for his excellent work and leadership demonstrated throughout the many sessions and which led to such successful results. At the same time the collaboration of other members of the Working Group was much appreciated. The Commission reviewed and adopted the Report of the Working Group, attached as Annex 5.

8.3 The Commission discussed the procedure necessary to amend the Convention, which is required to put this new scheme into effect. The Delegate of Spain drew the attention of the Commission to Paragraph 7.8 of the Report of the Working Group, which recommended that steps be taken to convene, as soon as possible, the Conference of Plenipotentiaries.

8.4 The Executive Secretary pointed out that a letter from the legal department of FAO indicated that such change in the calculation scheme requires a meeting of Plenipotentiaries. Article XIII of the Convention indicates that any Contracting Party or Commission can propose amendment of the Convention. He further pointed out that a Plenipotentiary Conference could be called by any Contracting Party or by the Commission.

8.5 The Delegate of the U.S., considering that the Group's work has been completed and that a consensus has been reached within the Commission, moved that such a Conference be called by the Commission itself and that it be held as soon as possible. The Spanish Delegation seconded the proposal. This motion was unanimously supported.

8.6 The Delegate of Spain noted that holding such a Conference has some financial implications, and required certain diplomatic procedures involving Ministries of Foreign Affairs, Finance, and Fisheries. While recognizing these problems, he requested that a deadline be set for convening this Conference, as it is such an urgent matter.

8.7 The Executive Secretary responded that the Conference would require at least two to three days and the cost would be about US$8,000 per day. Using the quickest mailing procedures available (fax, courier service, electronic mail), for official correspondence with Ministries of Foreign Affairs with a copy to all the Delegates and pertinent authorities, the earliest it could be held would be March or April, 1992.

8.8 The Delegate of Spain, while recognizing that holding the Conference as early as spring of 1992 would be quite timely and was in favor of it, he requested that the Conference of Plenipotentiaries be reviewed in terms of the Commission Budget and that the final decision on this matter be postponed until the Commission has had time to discuss the budget.

8.9 The Commission decided that the venue of the Conference would be Madrid.

Item 9. ELECTION OF THE NEW ICCAT EXECUTIVE SECRETARY

A) Closed Sessions

9.1 During the 1991 Commission Meeting, two closed sessions comprised only of Head Delegates of the member counties were held. At the first closed session, held on Tuesday, November 12, Mr. C. J. Blondin (U.S.A.), Chairman of the "Pre-Selection Committee to Select a New ICCAT Executive Secretary" reported to the Commission that the Committee had met on two occasions in Madrid during the interim period, on March 6 and 7, and on October 9 and 10. He indicated that at the Committee's first meeting, the Group's terms of reference were reviewed, and that after considerable discussion of the educational requirements, professional experience, and language proficiency, etc., the Pre-Selection Committee drafted the text of the Post Vacancy Announcement and established the July 15 deadline date for the receipt of applications. At that time, the Group also developed guidelines for the review of the applications and some procedures to follow in the pre-selection process.

9.2 Mr. Blondin also reported to the Commission that at the Pre-Selection Committee's second meeting,

a thorough review of all the applications received was carried out and the voting procedure to be followed at the Commission meeting was discussed. He emphasized that all the candidates were very highly qualified. However, after considerable discussion, six candidates were pre-selected by the Committee for recommendation to the Commission.

9.3 The Head Delegates congratulated Mr. Blondin and the Pre-Selection Committee for the excellent work carried out on such a difficult task. At the first closed session, held on Tuesday, November 12, the Commission also discussed some aspects of the personal interviews to be held at a later closed session and reviewed the voting procedure to be followed.

9.4 At the second closed session, held on Thursday, November 14, personal interviews were conducted of the six pre-selected candidates, at which time each of the pre-selected candidates presented a ten-minute summary of his professional experience, etc. Upon termination of these interviews the Commission proceeded with the voting process to elect the new ICCAT Executive Secretary.

9.5 As a result, Dr. Antonio Fernández González (Spain) was elected Executive Secretary of the Commission.

B) Open Session

9.6 At the open session, the Chairman of the Commission announced the results of the election and introduced Dr. Antonio Fernández González, the newly-elected Executive Secretary. Dr. Fernández González thanked all the ICCAT Delegates for having placed their confidence in him. He stated that he was proud to head such a distinguished international fisheries organization, which had gained international prestige for its professional achievements over the years. In view of the many problems which the Commission faces at present and the challenges it faces for the future, Dr. Fernández González solicited the collaboration of all the Contracting Parties and, in particular, Spain, the host government.

Item 10. REPORT OF PANELS 1-TO 4

10.1 The Reports of Panels 1, 3 and 4 were presented by each Chairman, Dr. L. Koffi (Côte d'Ivoire), Mr. C. J. Blondin (U.S.A.) and Mr. F. F. Litvinov (Russia), respectively. The Report of Panel 2 was presented later by its Chairman, Mr. D. Silvestre (France). All the Chairmen were thanked for their efficient work.

10.2 After a brief review, all the Panel Reports were adopted by the Commission, and all the recommendations included in the Reports were reiterated. These Reports are attached as Annex 6.

10.3 The Commission endorsed the "Recommendations (made in 1991) for Enhancement of the Current Management of Western Atlantic Bluefin Tuna", presented by Panel 2. The Recommendation is attached as Annex 7.

Item 11. RECOMMENDATIONS IN RESEARCH AND STATISTICS

11.1 The Chairman noted that the SCRS Report, which was presented under Agenda Item 7, had been reviewed by the Panels and STACFAD. Hence, the Commission adopted the SCRS Report and reiterated all the recommendations included therein. The SCRS Report is attached as Annex 16.

Item 12. DISCUSSION OF THE POSSIBLE INCLUSION OF BLUEFIN TUNA ON THE LIST OF ENDANGERED SPECIES (Continued)

12.3 The U.S. Delegate stated that although the Agenda item as first proposed read "Discussion of the U.S. intention to include bluefin tuna on the list of endangered species", and although the subject had been under discussion within the United States, the Government did not propose this to the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). He further explained that one group in the U.S. urged the U.S. Government to propose inclusion of western bluefin on Appendix I and east Atlantic bluefin on Appendix II of CITES. When the National Marine Fisheries Service (NMFS) was consulted, it recognized the possible benefit of listing Atlantic bluefin tuna in Appendix II, to assist in implementing ICCAT regulations and getting more accurate figures on trade of bluefin tuna. The plan was publicly announced and comments were solicited. The U.S. Government finally decided that this year it would not propose such action to the CITES, waiting for the problems to be resolved at ICCAT. Therefore, the U.S. Delegate requested that the wording of the Agenda be corrected.

12.4 The Delegate of Japan understood the U.S. standpoint, but observed that the Government of Sweden had proposed placing on the CITES Agenda the consideration of including west Atlantic bluefin tuna on Appendix I and east Atlantic bluefin tuna on Appendix II of the CITES Convention. Japan believes that ICCAT has the competence on this matter and if Sweden had been serious about bluefin conservation

it would have presented its concern first to ICCAT. He noted that Sweden had been invited to ICCAT every year but had never attended the meeting before it presented the proposal. Japan noted various sections of the SCRS Report and concluded that Atlantic bluefin tuna is not an endangered species and therefore, not a matter to be considered by CITES. He added that this could lead to the inclusion of many commercially-exploited fish stocks in the CITES Appendices. The Japanese statement is attached as Annex 9.

12.5 The Spanish Delegate stated that his Government had sent comments to the United States on this issue. With regard to the position of the CITES, the Delegate of Spain believed that it would be more appropriate to send the SCRS Report to the CITES Secretariat. Since the Observer from Sweden was no longer present at the Plenary Session, the Delegate of Spain suggested that the Swedish government be informed, by correspondence, of all the deliberations during the Session.

12.6 The Executive Secretary referred to document COM/91/22, which included all the correspondence on this issue. He also noted that the Observer from Sweden had left the meeting immediately after making his statement. The Executive Secretary also introduced the letter from the Secretariat of CITES to the Commission, which informed the Commission of the proposal by Sweden and requested ICCAT to provide scientific information on this matter.

12.7 The SCRS Chairman stated that a response to the CITES Secretariat had been drafted by Mr. J. S. Beckett, the rapporteur of the bluefin stock assessment session, and several members of the SCRS. Mr. Beckett presented the draft to the Commission. The Delegate of Portugal commended this excellent draft. The Delegate of France shared in the congratulations. The draft letter was unanimously supported, with minor corrections, by the Commission. The scientists, and in particular, Mr. Beckett, were congratulated for their extraordinary efforts in summarizing precisely the current status of bluefin tuna research. The letter, with its appended scientific commentary, is attached as Annex 10.

12.8 The Commission agreed that the letter to CITES should be signed by the Commission Chairman, in response to the inquiry of CITES. The French Delegation proposed that one of the Contracting Parties that plans to send a person involved in fishery-related matters to the CITES General Conference (Kyoto, March, 1992) be nominated to represent ICCAT as an observer. The Delegate of Canada proposed that Mr. Beckett represent ICCAT in an observer capacity. However, it was decided that the Commission should be represented either by the Chairman of the Commission or the Executive Secretary. Since no financial provisions had been made for the Executive Secretary to attend the meeting, it agreed that the Chairman represent ICCAT, if at all possible, so that ICCAT funding is not necessary.

Item 13. REVIEW OF THE FISHING ACTIVITIES OF NON-CONTRACTING PARTIES ON ATLANTIC BLUEFIN TUNA AND POSSIBLE MEASURES TO ENSURE THE EFFECTIVENESS OF ICCAT REGULATIONS

13.1 The Delegate of Japan expressed his serious concern on the catches of bluefin tuna by countries that are not members of the Commission. He stated that a draft resolution was presented earlier at the Panel meeting and that this draft had been reviewed and revised among the various delegations. He introduced the revised draft resolution and moved that it be adopted by the Commission.

13.2 The resolution was seconded by Canada and was unanimously adopted. The Delegate of Russia noted that the problem was not only with bluefin tuna but with many other species covered by the Convention. The Resolution adopted by the Commission is attached as Annex 11.

13.3 The Delegate of Japan stated that his country will be hosting the Working Group meeting mentioned in the Resolution. Japan, Canada and the U.S. made a joint statement, to the effect that if the present resolution is not effective, more restrictive measures will be placed on trade. This statement is attached as Annex 12.

13.4 The Delegate of Spain stated that he would take due note of the matter and consider it in terms of EEC policy. The Delegate of France and the Observer from the EEC also commented that due note was taken of the Resolution and future consideration will be made in terms of EEC policy.

Item 14. COLLABORATION OF NON-CONTRACTING PARTIES IN THE OBJECTIVES OF THE COMMISSION

14.1 The Executive Secretary introduced this subject and referred to document COM/91/20, which summarized the correspondence the Secretariat had during 1991 on this matter. The Commission noted that the SCRS had studied carefully the problem of the possible unreported tuna catches taken by non-ICCAT member country flag vessels and that the Committee had recommended various measures to be taken for obtaining statistics on these catches.

14.2 The Delegate of Spain stressed the importance of monitoring the fishing activities of the non-Contracting Parties. He recommended that the Commission maintain close contact with these countries and try to obtain as much information as possible. He also proposed that collaboration with Senegal and Cuba would be particularly important since these countries are former members of the Commission and have withdrawn only for financial reasons. In the hope that the new calculation scheme which has been agreed upon may encourage many of the non-Contracting Parties to become members of the Commission, the Delegate of Spain asked the Secretariat to inform these countries of the scheme, with special priority given to Senegal and Cuba, and ask them to consider rejoining the Commission. This view was supported by the Commission.

Item 15. POSSIBLE EFFECTS OF LARGE-SCALE DRIFTNET FISHING ON TUNA STOCKS

15.1 The Executive Secretary introduced this subject and referred to document COM/91/13 and to United Nations Resolution 45/197. The Commission noted that the SCRS had studied this subject under Item 18 of its Agenda (see Annex 16).

15.2 The U.S. Delegate presented a statement on large-scale driftnet fishing, which is attached as Annex 13, urging the implementation of U.N. Resolution 45/197 and proposing a world moratorium on large-scale driftnet fishing by the Commission's Contracting Parties.

15.3 The Delegate of France expressed his satisfaction with the recent decision made by the European Economic Community on this issue and with the fact that no driftnet fishing by Taiwanese vessels was observed in 1991 in the Atlantic Ocean.

15.4 The Delegate of Uruguay expressed her support of the U.N. Resolution and reported that Uruguay had banned the use of driftnets in its territorial waters. The Delegate of Spain stated that the U.N. Resolution is a positive one and should be supported. The Delegate of Venezuela reported that his country is now considering to ban the use of driftnets.

15.5 The Delegate of Brazil expressed his country's concern and informed the Commission that measures are being taken at present. He asked for the definition of a large-scale driftnet. He was informed that driftnets over 2.5 km in length are considered large scale.

15.6 The Delegate of Japan requested that not only driftnet fisheries but all high-seas fisheries be managed based on sound scientific evidence. The Delegate of France, in agreeing with Japan, noted that the basic Resolution by the U.N. defined that all management should be on a scientific basis. The EEC Observer stated that the Community had adopted a maximum length of 2.5 km. for driftnets, starting on June 1, 1992. The Delegate of France also indicated that the Commission's Plenary Session was not the proper forum for discussing further the scientific aspect of the issue.

15.7 The Commission noted that the problem is currently under discussion by the United Nations, hence, the Commission could not take any position on the subject, at this point. On the other hand, the Commission agreed to include all the comments made by each delegation in the record.

Item 16. REPORT OF THE INFRACTIONS COMMITTEE

16.1 The Report of the Infractions Committee was presented by the Committee Chairman, Mr. A. J. Penney (South Africa). After review, the Commission formally adopted the Report and all the recommendations included therein. The Report is attached as Annex 14.

Item 17. REPORT OF THE STANDING COMMITTEE ON FINANCE AND ADMINISTRATION (STACFAD)

17.1 The Report of the Standing Committee on Finance and Administration (STACFAD) was presented to the Commission by Mr. Makiadi, acting Chairman of STACFAD. The Committee was commended for the excellent work carried out throughout the Session.

17.2 In adopting the Budget for the 1992-1993 Biennial Period recommended by the STACFAD, the Commission decided to add 2,600,000 Pesetas to the 1992 budget to finance the Conference of Plenipotentiaries to amend the Convention as concerns the change in the scheme to calculate the country contributions. The Commission also reconfirmed the recommendation of STACFAD that the 1993 Budget be considered tentative and be subject to change after discussion at the Commission meeting in 1992 (see Agenda Item 19).

17.3 With these changes, the Budget was adopted and the country contributions were recalculated accordingly. The Commission agreed to replace Tables 1, 2-A and 2-B of the STACFAD Report with the new budget and country contribution tables.

17.4 The Commission noted that there had been several important recommendations made by the

STACFAD this year. One of them was changing the budget base currency from U.S. Dollars to Convertible Pesetas.

17.5 The STACFAD Report, thus modified, was adopted, together with all the other recommendations included therein. The Report is attached as Annex 15.

Item 18. REPORTS OF SUBSIDIARY BODIES APPOINTED BY THE COMMISSION FOR THE MEETING

18.1 No subsidiary bodies were appointed for this meeting.

Item 19. DATE AND PLACE OF THE NEXT REGULAR MEETING OF THE COUNCIL OR SPECIAL MEETING OF THE COMMISSION

19.1 The Commission, in view of the need to take decisions on various important issues on stock management and financial matters, decided to hold a special meeting in 1992, instead of a Council meeting, on November 9 to 13, 1992, in Madrid. The Commission decided that the SCRS will meet the week preceding the Commission Meeting (i.e., November 2 to 6, 1992).

19.2 The Executive Secretary commented that the old system of starting the meetings on a Wednesday and ending on a Tuesday would facilitate the Secretariat's in providing the meeting with the reports. However, such a schedule is more costly, especially as concerns contracting conference rooms and simultaneous interpretation, since it would include two weekends. The Executive Secretary suggested that when the Commission's financial situation improves, it should consider returning to this meeting schedule.

Item 20. ITEMS TO BE DISCUSSED BY THE COUNCIL AT ITS NEXT MEETING

20.1 As a special meeting of the Commission will be held in 1992, instead of a Council meeting, this Item was not discussed.

Item 21. DATE AND PLACE OF THE NEXT REGULAR MEETING OF THE COMMISSION

21.1 This matter will be decided at next year's Special Meeting of the Commission.

Item 22. ELECTION OF THE COMMISSION CHAIRMAN

22.1 The Delegate from Côte d'Ivoire congratulated Mr. Makiadi, the outgoing Commission Chairman, for his work. He nominated Dr. A. Ribeiro Lima (Portugal), the current First Vice-Chairman, for election as the new Commission Chairman.

22.2 The Delegate of Spain seconded this nomination and Dr. Lima was unanimously elected Chairman of the Commission for the 1992-1993 biennial period.

Item 23. ELECTION OF THE VICE-CHAIRMEN OF THE COMMISSION

23.1 The Delegate of the United States nominated Mr. K. Shima (Japan), the current Second Vice-Chairman, as First Vice-Chairman of the Commission.

23.2 Portugal seconded this nomination and Mr. Shima was unanimously elected First Vice-Chairman of the Commission.

23.3 The Delegate of France then nominated Mr. G. Pambo (Gabon) as Second Vice-Chairman.

23.4 Mr. Pambo was unanimously elected Second Vice-Chairman.

Item 24. ELECTION OF THE MEMBERS OF THE COUNCIL

24.1 This Item was not discussed since the Council will not be meeting next year.

Item 25. OTHER MATTERS

25.1 No other matters were discussed.

Item 26. ADOPTION OF REPORT

26.1 The Proceedings of the First, Second and Third Plenary Sessions were adopted. However, it was agreed to adopt the Fourth and Fifth Plenary Sessions, held on the last day of the meeting, by correspondence as soon as possible.

Item 27. ADJOURNMENT

27.1 The 1991 meeting of the Commission was adjourned.

ANNEX 1

COMMISSION AGENDA

1. Opening of the meeting
2. Adoption of Agenda, arrangements for the meeting and appointment of subsidiary bodies
3. Introduction of delegations
4. Admission of observers
5. Review of Commission membership
6. Status of the ratification of the Protocol of amendment to the Convention
7. Report of the Standing Committee on Research and Statistics (SCRS)
8. Report of the Working Group to Study Alternative Schemes to Calculate the Member Country Contributions to the Commission Budget
   - -- Review of the alternative schemes studied by the Working Group in 1990
   - -- Updating of various criteria used in the model calculations
   - -- Some adjustments still to be considered
   - -- Adoption of a contribution scheme by the Working Group for final consideration by the Commission
9. Election of the new ICCAT Executive Secretary
   - -- Procedure to be followed
   - -- Voting
10. Reports of Panels 1 to 4
    - -- Review of Panel membership
    - -- Possible new regulatory measures to be considered
11. Recommendations in research and statistics
12. Discussion of the possible inclusion of bluefin tuna on the list of endangered species
13. Fishing activities of non-Contracting Parties on Atlantic bluefin tuna and possible measures to ensure the effectiveness of ICCAT regulations.
14. Collaboration of non-Contracting Parties in the objectives of the Commission
15. Possible effects of large-scale driftnet fishing on tuna stocks
16. Report of the Infractions Committee
    - -- Status of the application of the regulations recommended by the Commission on yellowfin, bigeye, bluefin and swordfish
    - -- Port Inspection
17. Report of the Standing Committee on Finance and Administration (STACFAD)
    - -- Administrative Report (1991 activities)
    - -- Auditor's Report - 1990
    - -- Financial status at the end of the 2nd half of the biennial budget - 1991
    - -- Member country contributions pending payment
    - -- Review of the Working Capital Fund
    - -- Financial status of the Yellowfin Year Program
    - -- Financial status of the Albacore Research Program
    - -- Financial status of the Program of Enhanced Research for Billfish
    - -- Study of the possible change in the Commission's budget currency
    - -- Review of the financial implications of 1992 Commission activities:
      a) Recommendations in research and statistics
      b) Proposed intersessional meetings
      c) Commission publications
      d) Next Commission meeting
      e) Change in the Executive Secretary
      f) Others
    - -- Adoption of the 1992-1993 biennial budget
    - -- Member country contributions to the 1992-1993 budgets
    - -- Other financial and administrative matters
18. Reports of subsidiary bodies appointed by the Commission for the meeting
19. Date and place of next Regular Meeting of the Council or special meeting of the Commission
20. Items to be discussed by the Council at its next meeting
21. Date and place of the next Regular Meeting of the Commission
22. Election of Commission Chairman
23. Election of Commission Vice-Chairmen
24. Election of the members of the Council
25. Other matters
26. Adoption of Report
27. Adjournment

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ANNEX 3

LIST OF COMMISSION DOCUMENTS

COM/91/1 1991 Tentative Commission Agenda

COM/91/2 Annotated Tentative Agenda

COM/91/3 Tentative Agenda of the Standing Committee on Finance and Administration (STACFAD)

COM/91/4 Tentative Agenda for Panels 1-4

COM/91/5 Tentative Agenda of the Infractions Committee

COM/91/6 Tentative Agenda of the Working Group to Study Alternative Schemes to Calculate the Member Country Contributions to the Commission Budget

COM/91/7 Panels

COM/91/8 1991 Administrative Report

COM/91/9 1991 Financial Report

COM/91/10 Estimated Budget and Member Country Contributions for the 1992-93 Biennial Period

COM/91/11 Secretariat Report on Statistics and Coordination of Research

COM/91/12 Meeting of the Working Group on Western Atlantic Tropical Tunas (Miami, April 17-24, 1991)

COM/91/13 Information Relating to Large-Scale Driftnet Fishing

COM/91/14 Number not used

COM/91/15 Secretariat Report on the Coordination of the ICCAT Enhanced Billfish Research Program

COM/91/16 Some Comments on the Eventual Change of the ICCAT Budget Base Currency

COM/91/17 Working Group on the Calculations of Member Country Contributions

COM/91/18 Status of the Regulatory Measures Recommended by ICCAT for the Conservation of Yellowfin Tuna, Bigeye Tuna, Bluefin Tuna and Swordfish

COM/91/19 ICCAT Port Inspection

COM/91/20 Collaboration of Non Member Countries with ICCAT

COM/91/21 Declaration by the Executive Secretary on the Commission's Outlook for the Future (see Appendix 2 to Annex 15)

COM/91/22 Proposals to Add Two Agenda Items Regarding Bluefin Tuna Management, and Other Related Matters

COM/91/23 Proposal by Sweden for Amendments to Appendices I and II of the CITES Convention to include Atlantic Bluefin Tuna

ANNEX 4

OPENING ADDRESSES

Opening Address by Mr. J. Loira Rua
General Secretary of Maritime Fisheries of Spain

On behalf of the Government of Spain, I have the honor again to welcome to Madrid all the Delegations of the ICCAT Contracting Parties participating in this Twelfth Regular Meeting of the Commission.

At the same time, I would to extend this welcome to the representative of the EEC and the Delegations of the non-Contracting Parties and international organizations that will be closely following our work. The fact that each year the number of participants at ICCAT meetings increases, makes us think that the studies, research and programs that we carry our are more and more interesting, not only for those responsible to the management of Atlantic tuna fisheries, but also to the international community as a whole. Therefore, we would like to encourage all those countries that are developing their tuna fisheries in the ICCAT Convention area to join the Commission, so that by uniting all our efforts, we can reach the Commission's objectives to maintain the stocks of tunas and tuna-like species at levels which permit maximum, continuous catches for food purposes for mankind.

We hope that the work being carried out by the Working Group to change the contribution calculation scheme is culminated by the adoption of a scheme which is fair and which will allow the adherence of new members of the Commission and which will discourage countries that have traditionally been members to withdraw because of financial difficulties.

We await with sincere interest information from the Standing Committee on Research and Statistics, which worked so hard during their meetings of the last two weeks and which serves as the pillar on which the Commission rests, regarding the results of the work carried out by the scientists throughout the year and the current status of the Atlantic tuna stocks. Based on this information, the Commission's discussions will develop, taking into account the results of the ICCAT recommendations, for a rational exploitation of the resources.

We are confident that the measures recommended at the Seventh Special Meeting for swordfish, which went into effect in July, 1991, and which represented a great sacrifice for some fleets, will start to show benefits in the near future, with a recuperation of this stock about which we are very concerned.

We also hope that the stock assessment carried out in recent days on western Atlantic bluefin tuna, will provide the most reliable knowledge possible on the state of this resource, which is of concern the world over, so as to adopt the necessary measures for its conservation. Because of its mandate, objectives, studies, experience and its knowledge, ICCAT is the ideal international forum from which each and every recommendation aimed at conserving Atlantic tunas and tuna-like species should originate. We cannot and should not delegate our responsibilities in times of difficulty.

The work which you usually carry out during these meetings, under a tight schedule, will be further increased by the responsibility of having to elect a new Executive Secretary of the Commission.

We all recognize the work carried out by Dr. Olegario Rodríguez Martín as Executive Secretary of the Commission since its beginning and the effort he has exerted to solve the Commission's problems throughout his illustrious career. We regret his leaving and we hope that the candidate selected to succeed him will have the necessary qualities to assure that ICCAT continues its journey along a path already set out.

I don't want to take any more of your precious time, since you have a lot of work to accomplish. I sincerely wish you success in your work and a pleasant stay in Madrid, a city which is always willing to host ICCAT's activities.

Opening Address by Mr. S. Makiadi J. Lopes
Chairman of the Commission

First of all, I would like to extend a warm welcome to the Delegations of the Contracting Parties to the Twelfth Regular Meeting of the International Commission for the Conservation of Atlantic Tunas. I would also like to welcome the representatives of the non-Contracting Parties and the international organizations who will be participating in our meetings in an observer capacity.

I have been attending these Commission meetings since 1982 as Head Delegate of my country, Angola. I was elected Chairman of the Commission at the 1987 meeting held in Sao Miguel, Azores, and every year since then I have had the honor to welcome you at the time of the opening of these annual meetings.

Throughout this period, the matters discussed by the Commission have been of prime importance:

- The Yellowfin Year Program activities have ended and have culminated in the publication of an excellent book will be presented to us at this meeting.
- Activities have started on the Albacore Research Program
- Studies have advanced on swordfish and have culminated with the management recommendations aimed at the conservation of the stocks of this species.
- Research has been intensified towards gaining a better knowledge on the current state of the stocks of bluefin tuna in the eastern Atlantic and Mediterranean and in the western Atlantic.
- Research on billfishes has increased.
- The Commission has supported the United Nations Resolutions concerning the use of large-scale drift nets, and has taken decisions in this aspect.

This period has also been marked by a serious financial crisis which put the Commission is a very difficult situation. It is absolutely necessary that appropriate measures be taken so that the lack of financial resources do not have an effect on the Commission's activities. Therefore, we believe it is fundamental that the Commission study the report that the Working Group to Study an Alternative Scheme to Calculate the Member Country Contributions. We cannot forget that this Commission has several Contracting Parties that are developing countries that find it difficult to meeting their financial obligations to the Commission.

This year's agenda includes several important matters to be discussed by the Commission, and the time available is limited and cannot be extended.

On the other hand, this year the Commission is also faced with a matter of capital importance. That is, we have come to the end of an era, marked by the changed in the Executive Secretary. The man who, since the beginning of the Commission and during more than 20 years, was responsible for the overall management of the Commission's activities is retiring. Of course, I am referring to Dr. Rodríguez Martín, who the Commission recognizes for his devotion, his humane qualities, his ability and efficiency, factors which have contributed to the Commission's prestige among other international commissions. Let's give him a round of applause!

Such a change can be difficult. We need a person who has a knowledge of the fisheries, has experience in administrative and financial matters and who possesses those human qualities so as to facilitate relations with the member country governments, with the members of the different delegations that attend the meetings, with the scientists and the national administrations, and lastly with the persons with whom he will have to maintain a permanent professional relationship.

However, we have a Pre-Selection Committee made up of a group of people who are highly-qualified and very experienced. This Committee met two times during this year in Madrid and at this meeting they will present the pre-selected candidates. I am sure that any of the candidates they are going to propose meet the necessary qualifications for the Executive Secretary position. However, among these candidates the Commission must select only one.

Yes, the matters to be discussed are many and our time is short. Such important discussions would need at least three weeks time, but we only have five days, and we have to act in accordance with that schedule. In this aspect I would like to remind you that the last Plenary Session in 1990 was very confusing since we literally lacked time to adopt the proceedings, and some of the reports had to be adopted later by mail. That experience should not be repeated this year and we should always bear in mind that our time should be treated as if it were gold. The schedule that you approve the first day of the meeting should be followed and the time allotted to each agenda item should not run over.

If a particular subject cannot be sufficiently discussed in the time assigned to it, the discussions should continue, but outside the conference room, perhaps within a working group, without simultaneous translation, and at the most adequate time and place.

I think we should administer our time with austerity and keep our interventions during the discussions as short as possible. These interventions should be as concise as possible, which is the only way we can carry out our work in an efficient manner.

I hereby declare the Twelfth Regular Meeting of the Commission open.

ANNEX 5

REPORT OF THE WORKING GROUP TO STUDY ALTERNATIVE SCHEMES TO CALCULATE THE MEMBER COUNTRY CONTRIBUTIONS TO THE COMMISSION BUDGET*

1. OPENING OF THE MEETING

1.1 The Working Group to Study Alternative Schemes to Calculate the Member Country Contributions to the Commission Budget met at the Hotel Pintor on November 12, 13 and 14, 1991, at the time of the 12th Regular Meeting of the Commission. The meeting was opened by the Chairman, Mr. L. Weddig (U.S.A.).

2. ADOPTION OF AGENDA

2.1 The Tentative Agenda, circulated prior to the meeting, was adopted without change and is attached as Appendix 1 to Annex 5.

3. ELECTION OF RAPPORTEUR

3.1 Dr. C. Senanez (Spain) was nominated Rapporteur.

4. REVIEW OF THE ALTERNATIVE SCHEMES STUDIED BY THE WORKING GROUP IN 1990

4.1 The Chairman referred the Group to Document COM/91/17 and summarized the progress made by the Working Group since its last meeting. He pointed out the different tables prepared and noted that, in general terms, there would be several segments that would have different forms of calculations, i.e., one to include developed nations --as classified in the Handbook of the "United Nations Conference on Trade and Development (UNCTAD, 1990)-- a middle segment, and a third segment with very limited contributions for countries with limited resources. Table Alternative 2*, for example, allots 85 percent of the total budget for contributions to the top segment, 14 percent for the middle segment, and 1 percent for the bottom segment.

4.2 The Chairman went on to explain all the other tables of this above-mentioned document, which are variations of the fundamental principles agreed upon previously by this Group.

4.3 Several countries inquired about general points before arriving at specific questions. The Delegate of Spain mentioned the fact that only one member country, Spain, had answered the letter of the Secretariat asking for opinions, and pointed out that Table Alternative 2 was preferred, without excluding other suggestions better founded.

4.4 The Delegate of Russia indicated that his country was opposed to any changes to the Convention. He also questioned the reasons for the inclusion of Russia in Group A for all tables.

4.5 The Chairman clarified that an amendment to the Convention, through FAO as Depository of the ICCAT Convention, was necessary in order to change the calculation scheme. He indicated that the Group was trying to prepare a recommendation which would be acceptable to all.

4.6 The Delegate of the U.S.A indicated his country's preference for Table B*.

4.7 The Delegate of Gabon noted that, since his country has no tuna fleet, it could not accept Table B. He also added that the GNP per capita of Gabon was about US$3,000, but that it would not be logical to include Gabon among the developed countries.

4.8 The Delegate of Angola reminded the Group that at its 1990 meeting, Tables F* and G* were the most acceptable for all and consequently felt that we should go back to them, particularly to Table G.

4.9 The Chairman summarized the comments and/or proposals presented by the different countries:

*See Annex 8 of the 1990 Proceedings, contained in the "Biennial Report, 1990-1991, Part I".

-- Portugal was in favor of Table B.
-- Brazil preferred Table Alternative 2.

-- Uruguay was for Table Alternative 2 and added that if Table B was selected, they would withdraw from the Commission.

-- Morocco preferred Table G.

-- Gabon preferred Table Alternative 2, although indicating they were flexible as concerns Table G. The Delegate of Gabon added that if Table B is selected, his country would withdraw from the Commission.

-- Russia, although reiterating opposition to any changes in the Convention, considered that Table B was the most realistic since it included catches.

-- France indicated that some of the suggested Tables should be perfected and others should be disregarded.

4.10 The Chairman agreed with the observations made by France and synthesized the comments made on Table Alternative 2, Table B and Table G, since these seemed to be the ones most preferred by the Group.

a) Table Alternative 2 consists of three segments: Group A with developed countries, as determined by the criteria of the United Nations, Group C with 4 countries that have a low GNP per capita and low tuna production, and the remainder of the countries assigned to Group B. The total budget is distributed among these three groups as follows: 85 percent to Group A, 14 percent to Group B, and 1 percent to Group C. This table represents the Working Group's original scheme.

b) Table B was derived from the above scheme, but it established a GNP per capita cut-off figure between Groups B and C of US$500, and tuna production less than 1,000 MT. In order to belong to Group A, a country should have a GNP per capita above US$2,000.

c) Table G was based on the same list of 8 countries assigned to Group A, however, a cut-off GNP per capita figure of US$1,000 was established as the limit between Groups B and C. In addition, this scheme assigns 2.17 percent to each country in Group B and 0.25 percent to each country in Group C.

4.11 The Delegate of Russia insisted that the Convention should not be modified, but if some change had to be made, they preferred Table B.

4.12 The Delegate of Canada pointed out to the Group that the Secretariat had informed the Working Group in April, 1991, that if the Convention had to be modified, the amendment should be worded in such a way that would permit the Commission to adapt to any changing situation which might occur in the future, without having to modify the text of the Convention each time. He also observed that the financial situation of the Commission is very serious and that we should move quickly to find a solution to these problems, rather than each country only looking at the scheme under which it would pay the least contribution. He noted that Table Alternative 2, if worked on somewhat, could be valid.

4.13 The Delegate of South Africa supported, in part, Canada's opinion and indicated that at the 1989 meeting of the Working Group, Table Alternative 2 was preferred by the majority. He noted that at the 1990 meeting, Table Alternative 2 was also the preferred scheme, although there was some discussion about its lack of flexibility. In view of these discussions, South Africa had proposed in 1990 some variations of Table Alternative 2, and Tables E, F, and G were developed. He indicated that while South Africa preferred Table G, his country is open to a logical proposal and his main concern is solving the problem rather than opting for the scheme with the lowest contribution for South Africa.

4.14 The Chairman of the Working Group reiterated South Africa's preference for Table G, since it establishes criteria for possible movement of countries between Groups.

4.15 The Delegate of Canada pointed out that the limit (or cut-off) between Groups of, for example, US$1,000 GNP per capita, may be meaningful today, but may not be meaningful 10 years from now. Therefore, such a scheme may solve the problem for today, but would not resolve the Commission's problem for the future. He suggested looking for more permanent and flexible formulas.

4.16 The Delegate of Russia reiterated its position about changes amending the Convention and indicated that he would have to consult with his government before taking any decisions.

4.17 The Delegate of Côte d'Ivoire indicated that in his point of view Table G, which was accepted by practically all the countries last year, would be the best scheme for those countries with limited financial resources and would, at the same time, solve definitively the financial crisis of the Commission.

4.18 The Delegate of Korea also indicated that his country preferred Table G.

4.19 The Delegate of Spain pointed out that he was open to any constructive and, if possible, rapid solutions which take into account those aspects of

production relative to catches and canning of tunas. He also drew the Group's attention to the reduction in the amount of the contributions for the countries in Group C in Table G as compared to the current (1991) contributions.

4.20 The Chairman explained that since ICCAT was a fisheries Commission, both GNP per capita and tuna production should be taken into account in calculating the member country contributions. He also answered several questions about certain aspects of the various schemes under study by the Group.

4.21 The Delegate of Canada inquired whether the catch and canning from joint ventures would be taken into account. The Chairman answered that, independent of their origin, only the catch and canning figures provided to the ICCAT Secretariat by the respective national offices of the member countries will be considered valid for use in the calculations of the contributions.

4.22 The Delegate of Russia asked for some clarification of his country's annual catch figures for 1989 used in the tables of Document COM/91/17, and indicated that their catches in the Atlantic in recent years were about 8,000 MT.

4.23 The Delegate of France considered it absolutely necessary that the calculation scheme include fishing effort, no matter how little, since otherwise it would be contrary to the ethics of this fishery commission and since fixed percentages could result in unrealistic situations, such as those derived from the structure of Group C in Table G.

4.24 The Chairman explained that Group C of Table G does take into account catch and canning for the 8 countries included in the Group, and indicated that the 2.00 percent of the total budget for this Group was arrived at by assigning 0.25 percent to each country in the group.

4.25 The Delegate of Côte d'Ivoire reiterated his country's support for Table G, since it has some flexibility.

4.26 The Delegate of South Africa indicated that his country could also accept Table G since in this scheme Group A would absorb what Group C countries cannot pay and this is precisely one of the objectives of all our debates.

4.27 The Delegate of France then indicated that he would also accept Table G.

4.28 The Delegate of Canada also expressed preference for Table G, and added that this scheme was useful for the long-term. However, the US$1,000 GNP per capita was perhaps too low.

4.29 The Delegate of the U.S.A indicated he would approve Table G as a base for solutions, but indicated that the US$1,000 GNP per capita was perhaps too low.

4.30 The Delegate of South Africa clarified that the US$1,000 figure was perfectly valid since this figure was arrived at after detailed discussions on cut-off figures of $500 and $600.

4.31 The Delegate of Spain supported the French position as regards the consideration of catch and canning data to calculate the contributions.

4.32 The Delegates of Brazil, Uruguay and Venezuela reiterated their preference for Table Alternative 2, to the detriment of Table G.

4.33 At this point, the Chairman, observing that there were still some discrepancies regarding the contribution schemes preferred by the member countries, adjourned the first session of the Working Group, but indicated that the Group would continue its work at a second session later on. He stressed the need for the members of the Working Group to come to a final decision without further delay.

5. UPDATING OF VARIOUS CRITERIA USED IN THE MODEL CALCULATIONS

5.1 The Secretariat presented updated information regarding catch and canning data (1989), GNP per capita (1988) and a hypothetical total budget value of US$1,185,000.

6. SOME ADJUSTMENTS STILL TO BE CONSIDERED

6.1 On November 13, 1991, the second session of the Working Group was held, chaired by Mr. L. Weddig.

6.2 The Chairman recalled the importance of what the Group was trying to achieve. The Commission's financial situation depends on a better formula for defining the contributions of the countries. It was agreed that the Convention must be modified and that the key word of any new formula was "flexibility", so as to take into account the numerous changes that may occur.

6.3 The Chairman stated that after consultations with different delegations, a draft of the "Basic Principles of the New Calculation Scheme" was prepared.

6.4 The Chairman explained that the draft "Basic Principles" assigned the developed market economy countries (according to the classification in the Handbook of the "United Nations Conference on Trade and Development") to Group A; it assigned those countries whose GNP per capita is over US$ 1,000 or whose production is greater than 5,000 MT to Group B. Therefore, only those countries with both GNP per capita less than US$, 1,000 and production less than 5,000 MT were assigned to Group C.

6.5 The Delegate of France commended the efforts made by the Chairman of the Working Group

and favored the development of such criteria, cautioning, however, that the figures used are in U.S. dollars, which soon might not be valid if the base currency of the budget is changed. He noted that priority should be given to the production criterion, and not to the GNP per capita.

6.6 The Delegate of Portugal supported the draft "Basic Principles" presented.

6.7 The Delegate of Spain also commended the efforts made by the Chairman of the Working Group and agreed with the aforementioned draft "Basic Principles", noting that in any solution mention of a possible change of the base currency from U.S. dollars to Spanish Convertible Pesetas in order to avoid wide fluctuations in the budget should not be omitted.

6.8 The Delegate of Russia, in various interventions, reiterated that the draft "Basic Principles" document was very positive. However, he noted that the matter of the contributions is one of the most important in the Convention. He also indicated that since the country contributions were initially established in U.S. dollars, a Conference of Plenipotentiaries should be convened to resolve these questions.

6.9 The Delegate of France clarified that, regarding procedure, two perfectly distinct subjects were under discussion. One was the change in the method to calculate the contributions and the other was the monetary unit for payment. He indicated that a change in the base currency of the budget did not require an amendment to the Convention, since the only specific figures cited in the Convention are the amount "equal to $1,000" annual fee for Commission membership, and the amount "equal to $1,000" for each Panel membership (Article X, paragraphs 2(a) and 2(b)).

6.10 The Delegate of Côte d'Ivoire and the Delegate of South Africa, both indicated that establishing a ceiling of 5,000 MT as one of the limits between Groups B and C would cause some countries many problems, even though, paradoxically the Working Group was initially created at the proposal of Côte d'Ivoire. Eliminating the 5,000 MT of production as a condition to separate Groups B and C would make a solution easier.

6.11 The Delegate of Russia reiterated his difficulties to take a decision at this time and insisted that to resolve this matter a Conference of Plenipotentiaries would have to be convened. He also pointed out his country's serious financial situation and added that while Russia is willing to pay its debts to the last cent, it will not accept, in any way, to cover the obligations of others.

6.12 The Delegate of Gabon observed that this is a fisheries Commission, just as the Delegate of France had pointed out, and as such priority should not be given to GNP per capita in our analyses.

6.13 The Delegate of Morocco agreed with the Delegates of South Africa and Côte d'Ivoire as concerns point 2A of the draft "Basic Principles". He pointed out that the main objective of this Working Group was to find a scheme which would make it easier for countries with financial difficulties to pay their contributions and, in this way, assure the operation of the ICCAT. He noted that his Ministry of External Affairs awaited the results of the discussions being held, given that the Ministry is currently evaluating Morocco's contributions to all international and regional organizations.

6.14 The Delegate of Ghana indicated that while the Convention was signed 21 years ago, it was not "cast in granite" and therefore must keep pace with change. In accordance with France, Spain and Portugal, the Delegate of Ghana reiterated that ICCAT is a fisheries Commission. He added that Ghana figures in the documents as having a high production and it seems to gain the hostility of many. He pointed out, however, that Ghana's circumstances are unique, that most of its production was derived from joint ventures mainly with Japan, Korea and the United States, and that proceeds do not necessarily stay in the country. He noted that his government is awaiting news on outcome of the debates of this Working Group, so as to react, in all cases, with dignity.

6.15 The Delegate of the U.S. associated his comments to previous interventions, and emphasized that priority for countries in Group C should be given to GNP per capita rather than production, to avoid non-payment of contributions or withdrawal of any countries from the Commission. He supported the utilization of a ceiling figure of $1,500 or $2,000 GNP per capita, rather than $1,000, between Groups B and C, since it is more in line with the present reality and the immediate future.

6.16 The Delegate of Japan thanked the Chairman for the work carried out and although he shared the view for the necessity for flexibility and preferred a less arbitrary method of calculation, he agreed with Canada in that the Convention should not be amended often. He also indicated that the wording for amendment should be simple and flexible so that future changes in the calculation method could be made without amending the Convention. In addition, the Delegate of Japan asked for clarification concerning the classification of the countries and the percentages used in the different Tables presented.

6.17 The Chairman responded that the classifications used were from the Handbook of the "United Nations Conference on Trade and Development" (UNCTAD, 1990). These country classifications are subject to periodic revisions and thus countries can be re-classified from one group to another. He indicated that from this, the Working Group tried to maintain 85%, 14% and 1% as basic percentages for each

group, and taking into account the number of countries in each group, originally assigned 2.0 percent and 0.25 percent to the members of Groups B and C, respectively.

6.18 The Chairman presented a new contribution table which reflected the draft "Basic Principles" and served as an example for the Group's discussions. The Chairman pointed out, however, that many of the suggestions made at today's session were not yet included. He indicated that this draft "Basic Principles" increases substantially the financial obligations of Group A and reduces significantly those of Groups B and C, as compared to the current scheme. He quoted an old American proverb, "There is no such thing as a free lunch." and added that eventually payment must be made.

6.19 The Delegate of South Africa, supported by Côte d'Ivoire, proposed removing the 5,000 MT of production cut-off between Groups B and C in the draft "Basic Principles" and increasing the restrictive $1,000 GNP per capita income to $2,000 for Groups B and C.

6.20 The Delegate of Portugal noted with reluctance that this scheme meant an increase of 60 percent in Portugal's contribution, and although his country has been flexible at all times, the discussion was now getting too complicated. He felt that not all should be charged to Group A and urged that the Working Group reach a conclusion soon.

6.21 The Delegate of Morocco recognized that the proposed scheme only confirms his country's concerns, as expressed earlier, as to the possible repercussions in the level of the contribution of Morocco. He, therefore, objected to this method of calculation, indicating that this would reduce, even further, the possibility of arriving at a solution.

6.22 The Delegate of Venezuela objected to South Africa's proposal of using GNP per capita as the only criterion, for the same reasons expressed by Gabon, and because it would considerably increase the relative financial burden of developing countries, such as Venezuela.

6.23 The Delegate of Russia repeated that we should consider our present discussions only as preparatory for a study document to serve as a guideline for the Conference of Plenipotentiaries, which will have the mandate to decide these matters.

6.24 The Delegate of the United States indicated that if the countries in Group B have problems, the other countries also have them, coinciding with Portugal's view. If Group B should maintain, in some way, its present contribution levels, the last suggestions by South Africa could be accepted.

6.25 The Delegates of Gabon and Venezuela felt that damage will be done if the production factor was not duly considered in any calculation since the idea of GNP per capita was too vague to give it complete priority.

6.26 The Delegate of Spain intervened pointing out that the objective was to distribute the financial burdens more equitably. He indicated that Group A countries had their contribution increased considerably in relation to the current scheme and to the alternatives presented previously. However, in a spirit of cooperation, Spain would accept new burdens as long as the reductions rebound favorably on those countries with financial problems.

6.27 The Delegate of Brazil agreed with the Delegates of Venezuela and Gabon in the sense that production should not be omitted.

6.28 The Delegate of Canada considered, again, that the draft "Basic Principles" were very positive and that that stated by South Africa should be taken into account. While we are a fishery Commission, and for this reason production should always be considered, we should not weaken it just to maintain this idea "*a fortiori*". Canada proposed a ceiling of $15,000 for any country contribution in Group B and the resulting difference should be redistributed in Group A.

6.29 The Delegate of Côte d'Ivoire indicated that not taking production into consideration within each Group would distance us from the text of the Convention and from the fundamental principles which should guide the Commission.

6.30 Finally, the Chairman observed that there are still differences about the relation of catches and canning in the formula to determine the contributions. He also added that he was not authorized to decide now, but that ultimately we must arrive at a recommendation with basic, clear criteria for use by the Plenipotentiaries who will resolve this matter at the appropriate time.

7. ADOPTION OF A CONTRIBUTION SCHEME BY THE WORKING GROUP FOR FINAL CONSIDERATION BY THE COMMISSION

7.1 The Chairman of the Working Group opened the third and final session on Thursday, November 14, 1991, indicating that a conclusion must be reached. The members' contributions to ICCAT must somehow be derived from basic membership fees, and assessments incorporating production and GNP per capita.

7.2 The draft "Basic Principles" presented at the previous session implied a certain degree of flexibility, although true that some countries with low income and high production, or vice versa, felt impaired by this proposal.

7.3 In order to lessen such difficulties, the draft "Basic Principles for the New Method of Calculating Contributions" was modified. According to the revised "Basic Principles", the countries are divided into four Groups, instead of three: A, B, C, and D. The main difference with the previous draft is that the former Group B has been sub-divided into two groups, B and C. As a result, the members of Group B have their contributions increased slightly, but in a very acceptable manner, in principle, for all countries. (The revised "Basic Principles" adopted later by the Working Group are attached herewith as Appendix 2 to Annex 5.)

7.4 A table, Table H, showing the effect of these revised "Basic Principles", was distributed; it reflects the structure of the four Groups in question, i.e.:

A - Countries defined as developed market economies by the United Nations Conference on Trade and Development (UNCTAD, 1990);

B - Countries with a GNP per capita above [S$2,000] and catch and canning of tunas over [5,000 MT];

C - Countries with either GNP per capita above [US$2,000] or catch and canning of tunas over [5,000 MT];

D - Countries with GNP per capita below [US$2,000] and catch and canning of tunas below [5,000 MT].

7.5 According to this scheme, the countries in Group A experience a significant increase in their contributions, the contributions for those in Group B decrease moderately, and the countries in Groups C and D see their financial obligations reduced markedly. Table H is attached herewith to the revised "Basic Principles".

7.6 After the corresponding explanation of the implicit details of Table H, the Chairman suggested that the Working Group submit the definitive criteria as drafted in the attached document to the Plenary Session of the Commission. The final objective of simplifying and accelerating the decision of the Conference of Plenipotentiaries, to be convened shortly according to established procedure, should be kept in mind. As a complementary clarification, it is indicated that all the figures included in the revised "Basic Principles" concerning the limits to establish each criterion and the percentages assigned to each member within a group appear within brackets [ ], so that the Plenipotentiaries can study further variations without changing the contents of the items.

7.7 The Delegates of Korea and Morocco then indicated that the production figures on the table were not for the latest years, and the Chairman answered that, precisely, the fundamental characteristic of Table H was its flexibility and fairness, so that after updating the various elements for each country, the countries would be placed in the appropriate Group. After these clarifications, Korea as well as Morocco supported the Table under discussion. Later, the Delegates of Côte d'Ivoire, France, Brazil, Gabon, Angola, Canada, Venezuela, Russia, Portugal, Japan, U.S.A., Sao Tomé and Principe, and Uruguay expressed their support. The Delegates of Ghana and Spain, in addition to supporting the proposal, commended the Chairman for the magnificent work carried out. The Delegate of South Africa also accepted the proposal, in general terms, but would wait for the results of the Conference of Plenipotentiaries, especially as concerns the figures, before giving its final approval.

7.8 The Chairman noted that, finally, a consensus had been reached that will permit submission of the proposal to the Plenary Session of the Commission, as described in the revised "Basic Principles" and indicating that the Working Group was recommending a scheme based on GNP per capita and tuna production. At that time, the procedures to follow would be defined to convene, as soon as possible, the Conference of Plenipotentiaries that will have, thanks to the Group's work, a base document that will allow them to settle this delicate matter without major difficulties.

7.9 The calculation scheme, as outlined in the revised "Basic Principles" was approved by the Group, and was recommended to the Commission for adoption. The Working Group considered that its mandate had been met and that its recommendations could serve as a basis for the Conference of Plenipotentiaries when it meets to formulate the amendment to the ICCAT Convention to change the contribution calculation scheme.

8. OTHER MATTERS

8.1 No other matters were discussed.

9. ADOPTION OF REPORT

9.1 The Report of the Working Group was adopted.

10. ADJOURNMENT

10.1 The Meeting of the Working Group was adjourned.

TABLE H - EXAMPLE OF CALCULATIONS OF CONTRIBUTIONS BASED ON THE ADOPTED ''BASIC PRINCIPLES''

GROUP D : 0,25 PERCENT ASSIGNED TO EACH MEMBER IN THIS GROUP
GROUP C : 1.00 PERCENT ASSIGNED TO EACH MEMBER IN THIS GROUP
GROUP B : 3.00 PERCENT ASSIGNED TO EACH MEMBER IN THIS GROUP
GROUP A : PERCENTAGE OF THE TOTAL BUDGET REMAINING AFTER ASSIGNMENT TO GROUPS B, C AND D

COUNTRY CATEGORIES: A = MEMBERS DEFINED AS DEVELOPED MARKET ECONOMY COUNTRIES BY THE U.N. CONFERENCE ON TRADE AND DEVELOPMENT (UNCTAD, 1990)
B = MEMBERS NOT INCLUDED IN GROUP A, WHOSE GNP/CAPITA EXCEEDS $2000 AND WHOSE COMBINED TUNA CATCH AND CANNED PRODUCTION EXCEEDS 5,000 MT.
C = MEMBERS WHOSE GNP/CAPITA EXCEEDS $2000 OR WHOSE COMBINED TUNA CATCH AND CANNED PRODUCTION EXCEEDS 5,000 MT
D = MEMBERS NOT INCLUDED IN GROUPS A, B AND C.

(Based on 1989 catch and canning figures)

TOTAL BUDGET= $ 1185000 *

COUNTRY	NO OF PANELS	MEM + PANEL %	CATCH (MT)	CANNING (MT)	CATCH+ CANNING (MT)	CATCH+ CANNING %	MEMBER FEE	PANEL FEE	1/3x ** DIST'D BY MEM+PANEL	2/3x ** DIST'D BY CATCH+CAN	TOTAL CONTRIB $	TOTAL %
Canada	2	10.71	1,940	4,974	6,914	1.57	1,000	2,000	33,598	9,857	46,455	3.92
Espana	4	17.86	155,661	36,743	192,404	43.74	1,000	4,000	55,996	274,312	335,308	28.30
France	3	14.29	57,600	22,883	80,483	18.30	1,000	3,000	44,797	114,745	163,542	13.80
Japan	4	17.86	63,355	0	63,355	14.40	1,000	4,000	55,996	90,326	151,322	12.77
Portugal	3	14.29	13,299	13,198	26,497	6.02	1,000	3,000	44,797	37,777	86,574	7.31
South Africa	1	7.14	6,670	67	6,737	1.53	1,000	1,000	22,399	9,605	34,003	2.87
U.S.A.	4	17.86	26,427	37,076	63,503	14.44	1,000	4,000	55,996	90,537	151,533	12.79
GROUP A SUB-TOTAL	21	100	324,952	114,941	439,893	100	7,000	21,000	313,579	627,158	968,738	81.75
Brasil	2	23.08	21,023	1,475	22,498	24.55	1,000	2,000	9,938	21,144	34,082	2.88
Korea	3	30.77	12,512	0	12,512	13.65	1,000	3,000	13,251	11,759	29,010	2.45
Russia	2	23.08	20,472	294	20,766	22.66	1,000	2,000	9,938	19,516	32,454	2.74
Venezuela	2	23.08	32,875	2,999	35,874	39.14	1,000	2,000	9,938	33,715	46,653	3.94
GROUP B SUB-TOTAL	9	100	86,882	4,768	91,650	100	4,000	9,000	43,067	86,133	142,200	12.00
Cote d'Ivoire	1	20.00	5,120	8,000	13,120	18.83	1,000	1,000	3,283	6,182	11,466	0.97
Gabon	1	20.00	0	0	0	0.00	1,000	1,000	3,283	0	5,283	0.45
Ghana	1	20.00	47,091	0	47,091	67.58	1,000	1,000	3,283	22,190	27,473	2.32
Maroc	2	30.00	8,888	58	8,946	12.84	1,000	2,000	4,925	4,215	12,140	1.02
Uruguay	0	10.00	522	0	522	0.75	1,000	0	1,642	246	2,888	0.24
GROUP C SUB-TOTAL	5	100	61,621	8,058	69,679	100	5,000	5,000	16,417	32,833	59,250	5.00
Angola (1987 GNP)	2	33.33	609	244	853	12.40	1,000	2,000	646	481	4,126	0.35
Benin	0	11.11	444	0	444	6.45	1,000	0	215	250	1,465	0.12
Cap Vert	1	22.22	4,675	177	4,852	70.53	1,000	1,000	431	2,733	5,164	0.44
Guinea Ecuatorial	0	11.11	400	0	400	5.81	1,000	0	215	225	1,441	0.12
S.Tome et Principe	1	22.22	330	0	330	4.80	1,000	1,000	431	186	2,616	0.22
GROUP D SUB-TOTAL	4	100	6,458	421	6,879	100	5,000	4,000	1,938	3,875	14,813	1.25
TOTAL	39		479,913	128,188	608,101		21,000	39,000	375,000	750,000	1,185,000	100.00

* This table has been maintained in U.S. dollars, using a hypothetical total budget of US$ 1,185,000, for purposes of comparison with the scheme currently in effect (1991) to calculate the member country contributions.

** x = The total contribution of the group, less Commission and Panel fees.

Appendix 1 to Annex 5

AGENDA OF THE WORKING GROUP

1. Opening of the meeting
2. Adoption of Agenda
3. Election of Rapporteur
4. Review of the alternative schemes studied by the Working Group in 1990
5. Updating of various criteria used in the model calculations

    a) Member country catch and canning figures
    b) EEC catch and canning figures
    c) GNP per capita of ICCAT member countries
    d) Revised total budget figure used in the model calculations

6. Some adjustments still to be considered

    a) GNP per capita cut-off figures between groups
    b) Review of percentage distribution among groups
    c) Factors to take into account as regards movement between groups

7. Adoption of a contribution scheme by the Working Group for final consideration by the Commission.
8. Other matters
9. Adoption of Report
10. Adjournment

Appendix 2 to Annex 5

BASIC PRINCIPLES OF THE NEW CALCULATION SCHEME

1. Each Contracting Party shall contribute annually to the Budget of the Commission an amount equivalent to US$ 1,000 for Commission membership and an amount equivalent to US$ 1,000 for each panel membership, as provided for in the Convention (Article X, paragraph 2).

2. Contributions for Commission expenses in excess of the amount made under item one shall be determined by a formula which considers both the economic capabilities of the member countries and their tuna harvest and canning production. This formula includes the following criteria:

A) Member countries are classified into four groups: Group A: members defined as developed market economies by the appropriate United Nations economic organizations. Group B: members not included in Group A whose GNP per capita exceeds [US$ 2,000] (adjusted to 1991 dollar values) and whose combined round weight of catch and net weight of canned products of Atlantic tuna and tuna-like fishes exceeds [5,000 MT]. Group C: whose GNP per capita exceeds [US$ 2,000] or whose combined round weight of catch and net weight of canned products of Atlantic tuna and tuna-like fishes exceeds [5,000 MT]. Group D: members not included in Groups A, B and C.

B) The total Commission Budget shall be assigned to each of the four groups according to the formula given below. Within each group, the contribution for each Contracting Party shall be calculated by the method defined in Article X, paragraph 2, of the Convention.

Group D: The percentage of the total budget assigned to this group shall be [0.25] percent per member in the Group.

Group C: The percentage of the total budget assigned to this group shall be [1.0] percent per member in the Group.

Group B: The percentage of the total budget assigned to this Group shall be [3.0] percent per member in the Group.

Group A: The percentage of the total budget remaining after the assignment to Groups B, C and D.

ANNEX 6

REPORTS OF THE MEETINGS OF PANELS 1-4

Report of the Meeting of Panel 1

1. OPENING

Dr. L. Koffi, representing Côte d'Ivoire, Chairman of the Panel, opened the meeting of Panel 1.

2. ADOPTION OF THE AGENDA

The Agenda was adopted without change (attached as Appendix 1 to Annex 6).

3. ELECTION OF RAPPORTEUR

Dr. A. Fonteneau (France) was designated rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

The Panel presently has 17 members (Angola, Brazil, Cape Verde, Côte d'Ivoire, Cuba, France, Gabon, Ghana, Japan, Korea, Morocco, Portugal, Sao Tomé and Principe, Spain, United States, Russia, and Venezuela).

Three countries were absent from the meeting: Cuba, which has declared its intention to withdraw from the Commission, Cape Verde and Ghana. The Delegate from Uruguay expressed its interest in participating in the future in the work of Panel 1, but stated that the formal decision was still being studied in her country.

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

The SCRS Chairman, Dr. J. L. Cort (Spain), summarized the conclusions of the Committee concerning yellowfin and skipjack.

5.a Yellowfin

The hypothesis that there exists two independent stocks of yellowfin, one in the east and one in the west Atlantic (separated at 30°W) was admitted as the working hypothesis as in the past. However, it is becoming more and more evident that there is significant or even high levels of mixing between eastern and western yellowfin. This conclusion is based on several converging observations: regular transatlantic migrations, sizes of fish caught, and seasonality of catch rates by area for longline and purse seine. Such a migratory stock structure is difficult to model, despite the first attempts to do so by the Working Group on Western Atlantic Tropical Tunas (Miami, April, 1991) because of the uncertainties on the amount of age-specific migration.

For the east stock, the analysis could only be made by a production model: the maximum equilibrium catch is estimated at 123,000 MT, a level very near that estimated previously. The 1990 catch reached a record level of 147,000 MT, with a fishing effort that seems to be at a level slightly below that corresponding to the MSY. This high level of catches can be explained by the occurrence in the fishery of strong year classes from 1986 and 1987. It could also be caused by improved efficiency in purse seine (the main fishing gear) fishing effort which could not be taken into account by the SCRS. No yield-per-recruit analysis was made as data were lacking; however, it was noted that in 1990 the increase in catches come exclusively from the higher catches of large yellowfin.

The Working Group which met in Miami in April clarified to a certain degree the statistical data base for the western Atlantic. Unfortunately, it was not possible to carry out a comprehensive analysis on the state of the stock; this will only be possible when various statistical problems have been resolved. The SCRS made several recommendations to this effect.

5.b Skipjack

The skipjack catches remained at a high level in 1990, i.e., 136,000 MT (116,000 MT in the east and 20,000 MT in the west), despite the fact that the nominal fishing effort remained low. This situation results from, among other factors, improved purse seine efficiency, mainly due to the recent systematic use of bird radar and the use, mostly after 1990, of numerous artificial aggregating platforms used by purse seiners (in particular, Spanish purse seiners).

No analysis on the state of the stock was done by the SCRS. However, there was no information provided which would change the previous conclusions that the stock is being only moderately exploited and that there is no reason for a possible size limitation for skipjack in the Atlantic.

After this explanation by the SCRS Chairman, several questions were posed:

The Delegate of Brazil indicated that the skipjack catch figures for his country used by the SCRS were preliminary and that they should be replaced by the figures in the National Report of Brazil.

The Delegate of Gabon asked two questions on the generalized use of aggregating devices by purse seiners. His first question was related to the selectivity of this fishing method, and the second was on the possible problems which could result from this method as regards the rational exploitation of the resources. The SCRS Chairman answered that different tuna species under aggregating devices were being caught together, and with other species, under the aggregating devices. This poses various problems for the scientists in statistics as well as in the evaluation of the yield per recruit of the stock, since tuna caught under aggregating devices, particularly yellowfin and bigeye, are most often smaller than fish of the same species caught in free schools. These problems do not affect skipjack, as the sizes caught are homogeneous. The SCRS will study in detail all these elements in 1992, in light of the results of 1991, in which fishing with artificial platforms was developed.

The Delegate from Sao Tomé and Principe asked about the reasons for the association between floating objects and tunas. The SCRS Chairman clarified that this association, although still mysterious, does not seem to be related to tuna spawning, but more to a peculiarity in their behavior and to the tunas searching for "reference points" in the ocean. The SCRS recommended analyzing better this association and its consequences, in particular through active participation in the working group concerning this matter to be convened by IATTC in February, 1992.

6. MEASURES FOR THE CONSERVATION OF STOCKS

The Panel Chairman reviewed the ICCAT regulation prohibiting the landing of yellowfin less than 3.2 kg.

No new information was provided which would change the previous conclusions of the SCRS concerning the incomplete application of this regulation and its beneficial, but reduced, effects on the yield per recruit of the stock.

Panel 1 considers it desireable, therefore, to maintain the size limit of 3.2 kg in effect on yellowfin tuna.

7. RESEARCH

Panel 1 reviewed the recommendations of the SCRS concerning yellowfin and skipjack and supported all the research recommended by the SCRS.

8. DATE AND PLACE OF NEXT PANEL MEETING

The Panel agreed to meet at the same time and same place as the next Commission meeting.

9. ELECTION OF PANEL CHAIRMAN

At the proposal of Gabon, Côte d'Ivoire was reelected Chairman of Panel 1.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The report of Panel 1 was adopted.

12. ADJOURNMENT

The meeting of Panel 1 was adjourned.

Report of the Meeting of Panel 2

1. OPENING

The meeting was opened by the Mr. D. Silvestre (France), Panel Chairman.

2. ADOPTION OF AGENDA

The Agenda was adopted without change and is attached as Appendix 1 to Annex 6.

3. ELECTION OF RAPPORTEUR

Mr. A. Fernández Aguirre (Spain) was designated rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

Canada, France, Japan, Korea, Morocco, Portugal, Spain and the United States were present. Sweden asked to be allowed to participate in the meeting of Panel 2 as an observer and was accepted.

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

The SCRS Chairman, Dr. J. L.Cort, reviewed and summarized the SCRS work on bluefin and albacore tunas in the North Atlantic.

5.a Bluefin

In 1990, it was decided to carry out assessments on the eastern and western Atlantic stocks in alternate years, beginning with the western stock; thus the SCRS did not evaluate the eastern stock this year.

For the western stock, after the catch restriction was put into effect in 1982, the reduction in catches was expected to produce a slow increase in the stock during 30 years and it was hoped that the recovery would first affect the small fish. The increase in medium-sized fish would be delayed for some years, especially when taking into account that these fish had suffered heavy exploitation before 1982. This delay in the start of an increase would affect the large fish even more.

The trends in the stock size estimated by an alternative analytical technique (age-structured production model in non-equilibrium conditions) are within 90 percent of the confidence limits around the trend estimated by VPA.

The conclusions of the VPA are that, overall, the exploitable biomass has decreased to a level between 10 and 23 percent of the 1970 level, as was previously estimated. The VPA allows the study of trends in abundance of the various size groups after the introduction of the management measures in 1982 and 1983 and the levels of fishing mortality of the different groups.

As regards small fish (ages 1-5), the catch decreased after the regulation went into effect, although it then increased to half the levels reached at the end of the 1970's. The year-classes of the 1980's seem much lower than those of the early 1970's. The 1987 year-class was the largest since that period, although in comparison with the estimates of the 1969-75 year classes, it seems smaller than any of them, and has been exploited quite heavily. There is no evidence of any strong year class that could have contributed significantly to the small-fish component.

The catch of medium-sized fish (ages 6-7) decreased markedly after 1981. In terms of fishing mortality, there was an initial sharp decrease and then an increase since the mid-1980's to a level similar to or above the period prior to 1982. It is probable that abundance of this size category has increased in comparison to 1982.

The catch of large fish (ages 8+) decreased in 1982 and then increased in 1983 and 1984, corresponding to a higher quota. Nevertheless, the catch levels are far below those of the 1970's. The abundance of ages 8 and 9 seems to have remained quite stable at the end of the 1980's and it is expected that abundance of age 10 and older fish will decrease since the year classes that would contribute to reinforce it were fished heavily before 1982.

The Delegate of Canada called attention to BFT-Table 5 and observed that in the western Atlantic, the catches of bluefin tuna in 1990 with a length of less than 120 cm was 14.7 percent in weight of the total catches. He requested details on the catch tables by country, and the SCRS Chairman informed him that this information was available but that at that moment the pertinent calculations would have to be made to answer the question.

The Delegate of the U.S.A. reported that the data contained in BFT-Table 1 also include discards and

stated that it would be convenient to separate the catch and discard data, since discards are not included in the national quotas.

5.b Albacore - North

This year work was done to correct the biases and uncertainties of all the data used in last year's analysis.

During the meeting to evaluate the progress made by the Albacore Research Program, held in Sukarrieta (Spain), it was proposed that the generation of standardized CPUE indices by age classes of the Spanish surface fisheries be considered.

The results showed fluctuation of CPUE among the different age classes, and the Group considered the CPUE trends of ages 2 and 3 to be more reliable than the indices obtained for ages 1 and 4. The ages 2 and 3 constitute the main groups sought by the fishery. Age-2 fish show a slow increase from 1983 to 1988, a decline in 1989 and some recovery in 1990.

The age-3 fish abundance index may have remained stable from 1983 to 1987 and show a sharp decline followed by the lowest CPUE level since 1988. Two reasons were given for this: a reduction in the catchability by the surface fisheries as a result of the interactions with new fishing gears introduced after 1983, and for another, a decrease in the abundance of age-3 fish as a result of a possible increase in fishing mortality on the age-2 fish after 1987. Nevertheless, the results of the VPA in 1990 do not support this second explanation.

The Committee could not add anything to the conclusion of the 1990 SCRS, i.e., the VPA analyses indicate that albacore in the North Atlantic are being exploited below the maximum sustainable yield. The indices indicate that the stock of North Atlantic albacore supports moderate exploitation, although the uncertainties in the analysis could alter this conclusion.

The French Delegate referred to the explanations given by the SCRS for the decline in age-3 fish since 1988. He recalled that last year the Observer from the EEC informed the Commission that the EEC had financed a scientific study on albacore and noted that perhaps this study could clarify the aforementioned decline. Another possible explanation could be environmental changes. This type of environmental changes could have detectable consequences for several years.

The SCRS Chairman expressed his opinion that the anomaly detected in CPUE only affected one age-class (age 3) and that if it had any relation with an environmental change it could have also affected the age-2 class. Nevertheless, the Panel took note of the third hypothesis presented by the French Delegation.

As regards the EEC study, the SCRS Chairman reported that he personally had seen this study and that it did not help greatly to explain the controversial matter. The Executive Secretary reported that the Secretariat had not received the EEC study.

The Panel Chairman proposed that the Executive Secretary request officially the EEC to provide the study, and the Panel agreed.

The Delegate of Spain noted that some facts, such as the problems the Spanish surface fisheries have suffered since 1987, date of the appearance of new gears in the fishery, are more than mere coincidences and should be studied, since they have already caused damage, especially raising the cost of exploitation for the Spanish fisheries. Spain was pleased that a series of actions have been adopted and hoped that they would serve to resolve the problems.

6. MEASURES FOR THE CONSERVATION OF STOCKS

6.a Bluefin tuna

A regulation that prohibits catching and landing bluefin weighing less than 6.4 kg for the entire Atlantic stock entered into effect in 1975. For the west Atlantic, an additional measure was taken to limit catches in 1982 to 1,160 MT and to 2,660 MT annually since 1983, and a third measure limited catches of individuals less than 120 cm since 1983. The catch made during the 1990 calendar year was estimated at around 2,770 MT (including 133 MT of discards).

6.a.1 Bluefin tuna - West

The SCRS used the results of the VPA analyses to forecast probable trends in the population under four scenarios:

1) Present catch patterns
2) Catches in accord with domestic regulations promulgated in response to the ICCAT management recommendations (which imply the reduction of catches of ages 1-3)
3) As in 2) but with all catches reduced by 50 percent
4) As in 2) but assuming numbers at each age, for ages 6+, 50 percent higher at the beginning of 1991 than estimated in the VPA.

Scenario 1 deals with the present situation and it was agreed that it would not be advisable to adopt a

model that did not consider full compliance of the measures in effect.

The Delegate of the U.S. stated that, however moderately, the measures adopted had shown encouraging effects, but it was necessary to act with caution. He also expressed his willingness to support the recommendations of the SCRS as regards obtaining information on foreign commerce and to take steps to reduce fishing mortality on small fish. He said that, even with Scenario 3, there was only a 50/50 chance of stabilizing group 8+ fish within a year. Risks must be avoided and more conservative measures must be adopted in order to guarantee a more robust population. He stated that the catches of small fish had to be reduced and, as with Scenario 3, the catch limit had to be reduced which could help the biomass recover. He proposed a gradual reduction of 50 percent of the catch limit by 1994, and that the measures be reviewed later if there were indications of recovery. He also proposed that catches in excess of the catch limit be discouraged, deducting these excesses from the catch limits of successive years. Finally, he indicated that the U.S. had worked together with the other delegations to study schemes to control foreign commerce with non-ICCAT member countries.

The Delegate of Canada reviewed the measures adopted in 1982 and 1983 and the effects of these on the stocks. He emphasized the problems with unreported catches and explained the efforts made by his country through the national management program for bluefin tuna, to regulate this species through a system of licenses and numerous fishing restrictions, in addition to a tagging program for bluefin caught and retained. Canada has fulfilled its compromises with ICCAT and is concerned about the catches in excess of the 2,660 MT quota. He reported that the total catches could have surpassed 3,000 MT if we consider the catches by non-Contracting Parties. The increased catch of small-fish has also become a serious problem. The statement by Canada is attached as Appendix 2 to Annex 6.

The Delegate of Japan also made a statement expressing his country's view on regulatory measures taken up to now on western Atlantic bluefin stocks and observed that the downward trends of the west Atlantic bluefin stock had stopped and the stock was becoming stable. He insisted on the need to implement all the regulatory measures adopted by the Commission. This statement is attached as Appendix 3 to Annex 6.

The Delegate of Spain shared the concern expressed by previous delegations on the stock of bluefin tuna in the western Atlantic. He supported the principle identified by the scientists that the stocks in the west and the east were clearly separated, but noted the possible interaction due to the movement of the fleets, more than the movement and interchange of the fish populations. Without disregarding further studies on possible interchange between the two stocks of bluefin, he called the attention of the Panel to the need to abide by the measures related to the prohibition of the shift in effort from the west Atlantic to the east Atlantic. He asked the SCRS to analyze regularly the fishing effort exerted in both areas. In this sense, he noted the coincidence in the adoption of drastic measures in the western Atlantic with an increase in effort in the eastern Atlantic. The lack of statistics data should be resolved and he stated that it was necessary to see that all the Contracting Parties fulfill their obligations.

The Delegate of France shared Spain's concern for the shift in effort from the west to the east Atlantic.

Japan then reported that it had asked the Secretariat to distribute a Resolution, co-sponsored by Japan, Canada and the U.S., directed at combating the detrimental effects of fishery activities of countries that are not Contracting Parties of ICCAT, and that it wished to present the Resolution for consideration by the Panel.

The Chairman considered that, given the content of the Resolution, it was preferable to deal with this subject under Agenda Item 13 in the Plenary Sessions, but, after an exchange of viewpoints, it was agreed that Japan could present the Resolution in the Panel but it would be discussed at the Plenary Sessions.

Once the presentation of the Resolution was made, the Panel took note of its contents and decided to submit it for consideration and discussion at the Plenary Session.

The SCRS Chairman then submitted to the Panel scientific information prepared by the SCRS on which management scenarios could be drawn.

Canada presented a draft Recommendation on the management of the stock, which was submitted for consideration by the Panel.

The Delegate of Canada reported that the three countries directly involved in the west Atlantic bluefin fisheries (Canada, U.S.A., and Japan) had come to an agreement on a proposed recommendation for this stock.

The United States and Japan again supported the necessity of adopting these measures, and Japan indicated that, in order to guarantee its effectiveness, it was absolutely necessary that it be accompanied by other measures designed to control the fishing and commercial activities of other countries that are not Contracting Parties of ICCAT. The Statement by Japan is attached as Appendix 4 to Annex 6. Japan indicated that it would propose in the Plenary Session the adoption of a resolution in this sense. If this new resolution were not accepted, the sacrifice that is derived from the adoption of the recommendation concerning management, would be in vain.

The draft recommendation for enhanced management of west Atlantic bluefin received the support of all the delegations, hence, Panel 2 agreed to submit it to the Commission for approval. The text of the Recommendation is attached as Annex 7.

6.a.2 Bluefin Tuna - East

The Japanese Delegation asked for reconfirmation of the 1975 Commission decision to freeze fishing mortality and to set a size limit of 6.4 kg and that a special item be placed on the agenda for the 1992 meeting to review the measures being taken by the member countries. The statement by the Delegate of Japan on eastern bluefin tuna is included in Appendix 3 to Annex 6.

The Chairman of the SCRS stated that this year there was no mention in the SCRS Report of the state of the eastern Atlantic stock, but the creation of a three-year Bluefin Program for both parts of the Atlantic Ocean should be emphasized. The SCRS Chairman noted that in 1992 there would be an assessment of the eastern stock and that this year no additional regulatory measures were suggested for the east Atlantic.

The Delegate of Spain reminded the SCRS that last year he had asked that the gears that appear under the title "Other Gears" be classified. This year he reiterated his request that Table 1 include a breakdown of the gears listed under "Others". He emphasized the importance of the joint GFCM/ICCAT meeting for stock assessment to be held in 1992.

The Panel Chairman then reported that the Committee on Management of the GFCM had recommended that countries bordering the Mediterranean adopt the ICCAT recommendation on a 6.4 size limit for bluefin tuna in the Atlantic Ocean.

6.b Albacore - North

The SCRS Chairman reported that the Committee had not recommended any regulatory measures for albacore in the North Atlantic. The Panel did not recommend any conservation measures for this resource.

7. RESEARCH

7.a Bluefin tuna

The SCRS Chairman noted that the biological information available is much better for the west Atlantic than for the east Atlantic. The SCRS urges the countries concerned to submit size sampling data, so that the Secretariat can prepare the substitutions necessary to complete the catch-at-size tables, for assessment purposes.

For the western Atlantic, although there is good information available, there can be biases caused by the activities of boats flying flags of convenience. For this stock, the Panel ratified the priorities identified in the Bluefin Year Program Plan and recommended by the SCRS.

7.b Albacore - North

The SCRS Chairman called attention to the meeting of the Albacore Research Program scheduled for October, 1992, to be held separately from the SCRS meeting. This meeting will deal with a series of assessment methods to obtain information on the status of the resource.

The Delegate of Spain placed priority on the observer programs in order to obtain data on injured fish, losses, discards and interactions of the different gears. These observations could contribute to the understanding of the interaction between fisheries.

With these explanations, the Panel adopted the research recommendations made by the SCRS.

8. DATE AND PLACE OF NEXT PANEL MEETING

Panel 2 agreed to meet at the same time and same place as the next Commission meeting.

9. ELECTION OF CHAIRMAN

France proposed that Morocco be elected Chairman of Panel 2. This proposal was supported by the Panel members and Morocco was elected Chairman of Panel 2.

10. OTHER MATTERS

The Delegate of the U.S. indicated that there was a long-term plan for recovery of the western Atlantic bluefin tuna and asked the SCRS to prepare a series of scenarios on the recovery on this stock, taking into account the maximum sustainable yield in the projections. The Panel took note of this request and endorsed it to the SCRS.

11. ADOPTION OF REPORT

The report of Panel 2 was adopted.

12. ADJOURNMENT

The meeting of Panel 2 was adjourned.

Report of the Meeting of Panel 3

1. OPENING

The meeting of Panel 3 was opened by the Chairman of the Panel, Mr. C. J. Blondin of the U.S.A.

2. ADOPTION OF AGENDA

The Tentative Panel Agenda was adopted without change and is attached as Appendix 1 to Annex 6.

3. ELECTION OF RAPPORTEUR

Mr. A. J. Penney of South Africa accepted a request to act as rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

All the Panel members, consisting of Brazil, Japan, South Africa, Spain and the U.S.A. were present.

The Delegate of Uruguay notified the Panel that she planned to recommend to the Uruguayan government to apply for membership to Panel 3 at the next meeting. Uruguay was admitted as an observer to the Panel proceedings.

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

5.a Southern Bluefin Tuna

Dr. J. L. Cort, Chairman of the SCRS, reviewed the SCRS Report on the state of the southern bluefin stock. The status of this stock was evaluated at the Tenth Tripartite meeting of Australia, Japan and New Zealand in 1991. Assessments showed that the spawning stock biomass has continued to decline to its historically low levels, that recruitment has declined from 1970 to 1984 and that the parent stock should reach its lowest level in 1991 or soon thereafter.

5.b Albacore - South

Dr. Cort reviewed the state of the southern albacore resource. The only available index of abundance for this resource is the standardized CPUE index of the Taiwanese longline fleet exploiting adult albacore. This shows a marked decline from 1970 to 1976, followed by a more gradual decline from 1983 onwards. A generalized production model fitted to these data suggests an MSY of 28,000 tons at an optimal effort of 102 million effective hooks. An alternative assessment using a non-equilibrium age-structured production model suggests an MSY of 20,000 to 23,000 tons and indicates that the stock has been reduced to 20-30 percent of its unexploited biomass. Recent catches have exceeded MSY levels and the southern albacore resource is considered to be maximally exploited.

6. MEASURES FOR THE CONSERVATION OF STOCKS

6.a Southern Bluefin Tuna

Japan, Australia and New Zealand have adopted a number of measures to manage the southern bluefin resource, including avoidance of areas of juvenile abundance, seasonal area closures and restricted annual quotas. Under the current regulations, most assessments suggest long-term recovery of the southern bluefin stock.

As this resource is being effectively managed by another international management body, the Panel made no recommendations for southern bluefin management.

6.b Albacore - South

There are currently no management measures for southern albacore. No management measures were proposed for this stock. However, the Delegate of South Africa drew the attention of the Panel to the large decline in southern albacore biomass and the current maximal exploitation of this resource. She noted that those were causes for concern and suggested that the progress of this resource be closely monitored with a view to considering management

recommendations at the next meeting of the SCRS and Panel 3.

7. RESEARCH

A number of the research recommendations made by the SCRS for the northern albacore resource were also considered relevant for southern albacore, particularly concerning length-weight data, age determination and catch-at-size data. It was further recommended that ICCAT assist the nations exploiting this resource in the development of a cooperative program to improve statistics and sampling in the southwestern Atlantic Ocean.

8. DATE AND PLACE OF NEXT PANEL MEETING

It was agreed to hold the next meeting of Panel 3 to coincide with the next Commission meeting.

9. ELECTION OF PANEL CHAIRMAN

The Executive Secretary explained that the Panel Chairman's term of office had expired and it was proposed that U.S.A. be re-elected as Panel Chairman. This proposal was unanimously supported by all Panel members.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The report was adopted by the Panel.

12. ADJOURNMENT

The meeting of Panel 3 was adjourned.

Report of the Meeting of Panel 4

1. OPENING

The Chairman, Mr. F. F. Litvinov of Russia, opened the meeting.

2. ADOPTION OF AGENDA

The Tentative Agenda was reviewed and adopted by the Panel (Appendix 1 to Annex 6).

3. ELECTION OF RAPPORTEUR

Mr. D. Aldous (Canada) served as Rapporteur for the Panel.

4. REVIEW OF PANEL MEMBERSHIP

The Chairman confirmed the membership of the Panel as: Angola, Canada, France, Japan, Korea, Portugal, Spain, United States, Russia, and Venezuela. All Panel members were present.

Uruguay, Gabon and Cote d'Ivoire were admitted as observers to the Panel.

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

5.a Bigeye

Dr. J. L. Cort, Chairman of the SCRS, reviewed the state of the stock drawing the attention of the Panel to the SCRS Report. He stated that current catches appear to be below the MSY values, i.e., from 60,000 MT to 75,000 MT indicated by an updated production model.

There were no questions from the Panel members on the SCRS report with respect to bigeye.

5.b Atlantic bonito

Dr. Cort stated that information available on catch and biology of this species does not allow an assessment of the stock. The SCRS believes bonito is under-fished at the present time. There were no comments from the Panel concerning the SCRS report on bonito.

5.c Billfishes

Dr. Cort reported that the most recent analysis of the status of the eastern stock of sailfish was presented in the 1988 SCRS Report and that the ICCAT Billfish Workshop scheduled for 1992 should improve the state of knowledge concerning this stock. The SCRS expressed concern for any increase in effort on the stocks of both white and blue marlins and on the state of uncertainty concerning the status of these stocks.

The Delegate of the U.S. reported on the progress of the ICCAT Enhanced Research Program for Billfish. The work in 1991 included tagging, at-port sampling, and at-sea observers. He expressed his gratitude for the continuing generous private funding from the International Billfish Foundation. The complete text of his statement is attached as Appendix 5 to Annex 6.

5.d Other Species

Dr. Cort reviewed the results of the Swordfish Workshop held in September, 1991. The SCRS considered new information concerning the definition of stock structure including updated CPUE and genetic information. The SCRS expressed its concern about the continued decline in the abundance of swordfish aged five and older. MSY estimates ranged from 13,100 MT to 14,300 MT, a level comparable to the range of catches reported for North Atlantic swordfish during 1983 to 1985. Since 1986, catches have been above this estimated MSY level.

The Delegate of Spain thanked Dr. Cort for his presentation and commended the work of the SCRS on this stock. More work is necessary to improve the information on the morphology of the species, the identification and structure of the stock and the effect of developing fisheries. The inclusion of this information from members and non-members would improve the database concerning this population.

6. MEASURES FOR THE CONSERVATION OF THE STOCKS

6.a Bigeye

Under the present condition of reduced fishing effort, Dr. Cort reported that there were no gains to be made in yield per recruit by adopting new management measures. The SCRS recommended maintaining current measures with respect to the minimum size of 3.2 kg.

There were no comments from the Panel members with respect to management measures for bigeye.

6.b Atlantic bonito

The SCRS made no recommendations concerning conservation measures for Atlantic bonito. There were no comments from the Panel concerning management measures on this species.

6.c Billfishes

The SCRS recognized the national regulations of Venezuela, the U.S. and Mexico and recommended no ICCAT measures at this time.

6.d Other Species

Dr. Cort stated that the SCRS has made no additional recommendations concerning management measure for swordfish. Since the measures were put into effect in June, 1991, the SCRS will not be able to assess the effects of the measures until more time has passed. The SCRS expressed its concern for the increase in fishing effort and the decline in CPUE in the south Atlantic fishery.

The Delegate of Japan stated that he would prefer not opening the subject of management measures for swordfish until the measures adopted in 1990 are given some time to work in practice. Japan will continue to take best efforts to maintain the swordfish by-catch at the average level of the past ten years. The complete text of his statement is attached as Appendix 6 to Annex 6.

The Delegate of the U.S. expressed his concern for the state of the swordfish stock in the north and south Atlantic. The U.S. supports the caution of the SCRS in this respect and suggested these uncertainties be explored. He noted that a further reduction in fishing mortality may be necessary in the near future. He urged all members to exercise caution with respect to the swordfish fishery and that any further measures to be taken by ICCAT should be shared equitably among all members.

The Delegate of Canada supported the points raised by previous speakers concerning the state of the stock and suggested more time be taken to allow the measures of 1990 to work.

The Delegate of Spain expressed his concern for the state of the swordfish stock. He supported the Delegate of the U.S. in the equitable distribution of any further measures in the future and noted it was important to study more accurately the contents of paragraph 4 of the Regulatory Measures on Swordfish recommended in 1990 (Appendix 11 to Annex 6 of the 1990 Proceedings). He suggested that each member provide the Commission with the national legislation, especially on size limits.

The observer from Uruguay expressed her concern about the effects that directed effort in the South Atlantic could be having on swordfish stock abundance.

The U.S. Delegate stated that his country intends to improve data collection and monitoring of the mortality of discarded, undersized swordfish. He urged that other ICCAT member nations do the same and suggested that the SCRS might advise the Panel on this matter.

7. RESEARCH

7.a Bigeye

Dr. Cort reviewed the recommendations of the SCRS regarding research on bigeye. The SCRS recommended improvements in both the collection of statistics and the analysis of data to increase the knowledge of this stock. Research could benefit from the service of a biostatistician to assist in the restructuring of the sampling scheme for the surface fleet.

There were no comments from the Panel members regarding bigeye research.

7.b Atlantic bonito

Dr. Cort stated that the recommendations for research on Atlantic bonito could be found in the text of the SCRS Report in the section dealing with small tunas (SMT), which includes efforts to improve information regarding the biology, ecology and catch of small tunas.

7.c Billfishes

Dr. Cort reported that the recommendations for research on billfish are found in the SCRS Report. Among these, the ICCAT Billfish Workshop scheduled for 1992 is an important one where the present accumulated knowledge will be reviewed and assignments for the future will be discussed.

7.d Other Species

Dr. Cort stated that the SCRS had prepared a list of recommendations concerning swordfish research. These are included in the SCRS Report. The SCRS is concerned about the lack of data from the south Atlantic fishery and suggested that steps be taken to improve the knowledge of that fishery.

The Delegate of the U.S. supported the research recommendations of the SCRS. He stressed the need to have more information concerning the mortality of discarded undersized fish and the catch in the south Atlantic.

The Delegate of Canada expressed his concern for the lack of definition of stock structure and the possible effects that an increased catch in the south Atlantic may have on the north Atlantic stock. He urged the SCRS to make best efforts to determine the structure of the stock.

The Delegate of France stated that the generalized production model presented by France could address any change in the efficiency of the fleet that might suggest conclusions that differ from present evaluations of the state of the stock. More work should be undertaken to study this problem in more detail.

The Delegate of France emphasized the importance of the SCRS recommendation to analyze the changes in fishing strategy and efficiency of the fleet, as well as their consequence on the present assessment of the state of the north stock. France also stressed the need for the SCRS to conduct a detailed assessment of the state of the south stock, on which very high effort has been developing during recent years.

The Delegate of Spain praised the work of the SCRS and urged continued research efforts to follow up all the research recommendations of the SCRS.

Dr. Cort stated that effects of changes in the efficiency of fishing vessels will be taken into account in future research efforts.

8. DATE AND PLACE OF NEXT PANEL MEETING

The Panel agreed to meet at the time of the next meeting of the Commission.

9. ELECTION OF PANEL CHAIRMAN

The U.S. proposed that Russia continue to chair this Panel. This was supported by Angola, Korea, Venezuela, Japan, Portugal, Spain, France and Canada.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The Panel reviewed and adopted the report.

12. ADJOURNMENT

The meeting of Panel 4 was adjourned.

Appendix 1 to Annex 6

AGENDA FOR PANELS 1 - 4

Panel 1 (Tropical Tunas)
Panel 2 (Temperate Tunas-North)
Panel 3 (Temperate Tunas-South)
Panel 4 (Other Species)

1. Opening
2. Adoption of Agenda
3. Election of Rapporteur
4. Review of Panel membership
5. Report of the Standing Committee on Research and Statistics (SCRS)
6. Measures for the conservation of stocks:

Panel 1

a) Albacore
b) Skipjack

Panel 2

a) Bluefin (North)
b) Albacore (North)

Panel 3

a) Southern bluefin
b) Albacore (South)

Panel 4

a) Bigeye
b) Atlantic bonito
c) Billfishes
d) Other species

7. Research
8. Date and place of next Panel meeting
9. Election of Panel Chairman
10. Other matters
11. Adoption of Report
12. Adjournment

Appendix 2 to Annex 6

STATEMENT BY CANADA ON BLUEFIN TUNA
(attached to Report of Panel 2)

In 1982, the Commission implemented a catch level for scientific monitoring purposes on western Atlantic bluefin tuna that had as its basis the consistent collection of scientific data and the accumulation of scientific information by the SCRS. The purpose of this monitoring catch level was to ensure the stabilization or increase of the stock. Canada supported and continues to support this program.

The 1991 SCRS Report indicates that there are potential problems with unreported catches of bluefin tuna by non-Contracting and Contracting Parties to the Convention. The Report also points out that mortality levels for bluefin tuna in the small fish category (ages 1-5) have now returned to levels found in the late 1970's. Medium-sized fish (ages 6-7) and the large fish of ages 8 and 9 have, more likely than not, increased in abundance compared to 1982 and 1986, respectively. Further, the SCRS indicates that the abundance of bluefin tuna of ages 10 and older is expected to decline, given that the year classes contributing to it were all fished heavily prior to 1982. The SCRS Report also indicates that the high level of harvest of small fish since 1982 has contributed to the slower than expected recovery of the entire western Atlantic bluefin tuna stock.

Notwithstanding the 1991 scientific information, we believe it is important to remember that the Commission has long been concerned with the health of the western Atlantic bluefin tuna stock. This general concern goes as far back as 1974, when the

Commission recommended the first management measures for western Atlantic bluefin, that included a prohibition on landing any fish weighing less than 6.4 kg and limiting fishing mortality at the level of that time. Since then, the Commission has adopted a number of regulatory measures for the management of bluefin in the western Atlantic. In 1981, scientists recognized a decrease in the abundance of bluefin tuna in the western Atlantic and they expressed serious concern. Because of this, a number of further regulatory measures were adopted for this stock in 1981.

ICCAT introduced substantial restrictions on the western Atlantic catch since 1982 which resulted in a 50 percent drop in the total catch compared to the period prior to 1982. This restriction was expected to result in slow stock improvement which could take up to thirty years.

For many years, Canada has been deeply committed to the conservation and rational management of all fish stocks. Canada is proud of its domestic management program for bluefin tuna which includes:

- limited entry licenses
- quotas for fleet sectors
- gear restrictions
- vessel replacement restrictions
- submission of log record requirements
- a mandatory bluefin tuna tagging program for all bluefin caught and retained

Canada has recognized that the warnings of the scientists in 1981 required a commitment to fulfilling its obligations in managing its share of the ICCAT catch limit for the western Atlantic bluefin tuna. We feel that we have met that commitment and, in fact, in 1990, 100 MT of Canada's share of bluefin tuna was left in the water as a result of the very cautious approach it took in the management of the fishery. Canada is concerned that in the last three years, the total catch of bluefin tuna in the western Atlantic has exceeded the 2,660 MT catch limit. In fact, when we consider catches by non-Contracting Parties, we know that total catches are well in excess of 3,000 MT. This is not acceptable to Canada, and I am sure it is not acceptable to other Parties. The increased catch of small fish in recent years has also become a serious problem affecting future recovery of this stock.

Obviously, if the regulatory measures originally adopted at the 1981 Commission Meeting are to be effective, the overall catch must be restricted to the level of the scientific quota. It is also important, we believe, to get a better control over the harvesting of small fish and over the harvesting by non-Contracting Parties.

Later on in our discussions, Canada will be pleased to cooperate with other Parties in putting forward some very concrete proposals for dealing with these issues.

Appendix 3 to Annex 6

STATEMENT BY JAPAN ON REGULATORY MEASURES FOR ATLANTIC BLUEFIN TUNA

(attached to Report of Panel 2)

1. Western Atlantic Stock

Ten years have passed since the meeting in Tenerife, where a severe catch limit was introduced for the western Atlantic bluefin tuna stock. This year we were very pleased to note in the SCRS Report a promising projection on the stock trend for the future. Namely, all the Scenarios from 1 to 3 in the projection conducted by the SCRS this year showed recovery of the stock by 1995. According to this year's SCRS Report, the stock did not decline as drastically as the previous SCRS reports had indicated. In the last several years, the stock has been stable. A sign of recovery was recognized for the small and medium-sized fish. While large fish (ages 8+) are still showing a declining trend, the decline will stop and turn to an increase by 1995 if the current catch limit is maintained, according to the SCRS Report.

Moreover, the 1987 year-class was found to be a probable strong year-class which is comparable to those of the late 1970's. This is quite encouraging news for us, and we have to pay due attention to maintain this year class to rebuild the stock.

This year, the SCRS also reported that the estimated biomass of each year-class has a downward bias, in other words, it is underestimated in the VPA results for Atlantic bluefin. Scenario 4, which incorporated correction of this bias in its assumption, showed a result similar to that of Scenario 3.

After finding much positive information on stock recovery in the SCRS Report, we prefer the option of maintaining the current monitoring quota level at this

stage. However, prudent consideration is necessary in determining the regulatory measures for the stock due to the low level of the stock. We would like to hear the views from other member countries, particularly from the U.S. and Canada, and then decide our final position at a later stage.

At the time of the Commission's 1981 decision, it was a basic, common understanding that the recovery of this stock should be considered in a long time frame, such as 30 years. The present situation, where a marked recovery of the stock has not yet been recognized, was fully foreseen at that time. Thus, that cannot be a reason for further reduction of the catch limit at this stage.

The first thing we should do for this stock is to strengthen management measures and to reinforce the enforcement of management measures to ensure that the current monitoring quotas are not exceeded. For this purpose, each of the three fishing nations concerned should take further measures suitable to its own fishing activities and report the results to the Commission. Japan is considering the following three measures.

a. Introduction of a satellite location monitoring and catch reporting system

b. Random inspection of landings at Japanese ports

c. Assignment of a patrol boat to the west Atlantic area in the bluefin fishing season

Secondly, strenuous joint efforts should be exerted to improve the scientific basis for conservation and management of this species. We would like to urge all the member countries to support the Bluefin Year Program (BYP) proposed by the scientists of SCRS. Japan is willing to extend full cooperation to this program and at the same time it intends to improve the catch data in terms of timeliness and quality.

Japan would like to add one new aspect to these research activities: the artificial seeding of bluefin tuna. The technique has yet to reach the level of actual application, and many problems have to be solved before the seeding can be realized. However, Japan has endeavored to establish this technique for over two decades and has achieved the level of successful farming of small bluefin to enhance the parental stock. We are willing to offer our accumulated knowledge to the Commission for joint efforts in this field.

2. Eastern Atlantic Stock

With respect to the eastern Atlantic bluefin stock, the freeze on fishing mortality has been in effect since 1975. However, the Commission has made no substantial review of these measures since then.

The two-stock hypothesis for Atlantic bluefin has not yet been proved. At least a significant rate of mixing of the two stocks exists according to the scientific knowledge accumulated so far. Thus, taking severe management measures only in the western Atlantic without sound management measures in the eastern Atlantic is somewhat unbalanced and incomplete.

Therefore, Japan would like to propose reconfirmation, at this meeting, of the 1974 decision to freeze bluefin fishing mortality at the level of that time and to have a special item on the 1992 Commission agenda to review the measures taken by each member nation in accordance with this decision. Japan has taken internal measures to control its direct catch of bluefin to below 1,600 MT, its catch level in 1975. The Japanese total bluefin catch in the eastern Atlantic has remained below this level since 1985. We would like to see that other member countries make similar efforts and report the results of such efforts at next year's session.

3. Small-Fish Catch

In consideration of the management measures for Atlantic bluefin, we must take due account of the issue of the small-fish catch. The U.S. commercial and recreational fisheries are catching a large number of juvenile fish (ages 1-3 or less than 120 cm FL).The juvenile catch amounted to over 12,000 fish, 45 percent of the total number of the fish caught by the three nations. That small-fish catch resulted in an excess of the catch limit in the last two years. To rebuild the stock, it is important to reduce the number of small fish caught.

In this respect, I would like to refer to the small-fish catch in the eastern Atlantic, because there may be only one bluefin stock in the entire Atlantic. We are deeply concerned about the large number of small bluefin less than 6.4 kg being caught in the eastern Atlantic and Mediterranean. The reported catch of fish weighing less than 6.4 kg represents about 50 percent of the total number of bluefin caught in this region. We may have to consider restrictions on that catch.

4. Activities by Non-member Countries

From reliable sources, Japan has learned that over 20 longliners, re-flagged to non-member countries of convenience, conducted fishing operations for Atlantic bluefin this year (during the spawning season) in the Mediterranean Sea. We are afraid that those vessels will move or have already moved to the western Atlantic. It was also reported that non-member nations along the coast of the Mediterranean Sea have recently increased their fishing effort on bluefin.

I would like to point out that making stricter management measures as explained here will inevitably have the effect of encouraging such fishing activities outside the Commission, if no counter-measures are taken. Thus, Japan would like to propose a series of measures under Item 13 of the Commission's Proceedings.

In this respect, Japan would also like to point out that unreasonably severe measures, such as a further reduction in the western Atlantic bluefin catch limit, would undermine the willingness of member nations to implement the ICCAT regulations within the framework of the Commission, and may reduce the incentive for non-member nations to join the Commission. These type of measures seem to penalize those member countries that take the Commission's regulatory measures seriously, and benefit the outsiders.

Appendix 4 to Annex 6

STATEMENT BY JAPAN ON WESTERN ATLANTIC BLUEFIN TUNA
(attached to Report of Panel 2)

The Japanese delegation tried its best to work out effective and enforceable regulatory measures for western Atlantic bluefin tuna. In this effort, we followed the results of SCRS analysis as closely as possible while carefully listening to the view of our two fellow Commissioners of the U.S. and Canada.

In any scenario of the SCRS analysis, the population of large bluefin tuna (8+) will hit bottom in 1993 and 1994 and bounce back afterwards. We think that it is appropriate to take the most conservative approach during these two years. Therefore, we proposed applying the most conservative option, i.e., Scenario 3, to these critical two years. More specifically, a 50 percent reduction of the current catch level should be applied in 1993 and 1994 while the catch limits should return to the current level in 1995, unless the SCRS advises otherwise.

Unfortunately, our idea was not shared at this stage by the other nations concerned. I would like you to understand our genuine intention to ensure the conservation of this stock.

I would also like to point out that strengthening the management measures would inevitably have an effect of encouraging fishing activities outside ICCAT. It is important to learn from the history of ICCAT bluefin management and the effect of such management on international trade. In 1981, bluefin imports from the non-member nations to the Japanese market were only a few hundred metric tons, and now they have reached the 3,000 MT level. Unless effective counter-measures are taken against the fishing activities outside ICCAT, the non-members' fishing fleets or re-flagged vessels of convenience may fill the void created by further restriction of the member nations' fishing activities. In other words, the positive effect of further conservation measures may be nullified easily by such outside activities. Therefore, we strongly believe that it is essential to take counter measures, parallel to the implementation of the new management measures, against such outside activities.

In short, Mr. Chairman, Japan is prepared to accept even a 50 percent reduction of the current monitoring quota for the western Atlantic bluefin tuna, but we urge that effective measures be taken against the fishing activities by non-member nations. Otherwise, our efforts would be in vain.

Appendix 5 to Annex 6

STATEMENT BY THE UNITED STATES ON BILLFISH
(attached to Report of Panel 4)

The ICCAT Enhanced Research Program for Billfish was undertaken in 1987. There was initial concern that the ambition of the Program and the reliance upon private funding would create a burden on the ICCAT staff.

We are pleased that the Program has progressed as hoped. As reported at this meeting, the work in 1991 includes tagging, at-port and at-sea sampling, and further research.

A Billfish Workshop has been scheduled for July, 1992, in Miami, where a comprehensive review of the program will be held and the data compiled and analyzed. A number of scientists have been invited and it is hoped that all others interested, not only from ICCAT countries, but non-ICCAT countries as well, will attend.

The Program is still hampered by a lack of current data on effort. Also, a recent expansion of longline fisheries in the Caribbean and increased recreational fisheries complicates the established format. The 1992 Program will encompass twelve specific task assignments to benefit research and statistics.

The Program is again funded as required, and we thank the International Billfish Foundation for its recent most generous contribution.

Appendix 6 to Annex 6

STATEMENT BY JAPAN ON THE REGULATORY MEASURES FOR ATLANTIC SWORDFISH
(attached to Report of Panel 4)

With respect to Atlantic swordfish, the Commission held long and tedious discussions and reached a decision on a series of regulatory measures in 1990. This year the member nations have taken internal measures to implement the regulations.

Although we can understand that some member countries are still dissatisfied with the decision made last year, it is the basic position of Japan that reopening discussions on swordfish regulatory measures this year would be inappropriate and counterproductive, and that the Commission should wait and study the effect of the regulations put into effect in 1991, for at least two or three more years. Japan believes that frequent changes of regulatory measures without proper assessment of their effects would jeopardize the Commission's activities and undermine its integrity.

We understand that some members feel concern about the increase in the Japanese swordfish catch in the last few years. However, as was explained last year, Japanese fishing vessels are incidentally catching swordfish in their bigeye tuna fishing operations, and their swordfish catch naturally fluctuates from year to year. The catch increase in the last few years is a part of such fluctuation. In the last ten years, the Japanese swordfish catch in the north Atlantic has fluctuated within a range between 500 and 1,700 MT. The Commission understood this situation and decided last year to allow a certain flexibility in swordfish incidental catches, by imposing a limit on incidental catches to no more than 10 percent in weight, rather than a limit of an absolute catch amount. Japan has no intention to increase its swordfish incidental catch in the north Atlantic and will make every effort to maintain the catch within its average level of the last ten years, although the annual fluctuation is unavoidable.

ANNEX 7

RECOMMENDATIONS (MADE IN 1991) FOR ENHANCEMENT OF THE CURRENT MANAGEMENT OF WESTERN ATLANTIC BLUEFIN TUNA

The Commission recommends:

First

In order to achieve the goals of maintaining improvements in the western Atlantic bluefin tuna stock and allowing ICCAT to develop an enhanced multi-year recovery program for this stock:

a) the Contracting Parties whose nationals have been actively fishing for bluefin tuna in the western Atlantic, institute, for the interim, effective measures to limit the quota for scientific monitoring purposes as follows:

Quota for Period	*Max in period*	*1st year*
1992 & 1993	4,788 MT	2,660 MT
1994 & 1995	3,990 MT	2,261 MT

b) the biannual scientific monitoring quotas described in Paragraph 1(a) be taken by these Contracting Parties in the same proportions as previously agreed for in 1990;

Notwithstanding Paragraph (a) the catch limits in 1994 or, if not in 1994, in 1996 will return to those in 1991 unless the SCRS analysis in 1993 or 1995 indicates otherwise.

c) a special western Atlantic bluefin management review committee consisting of representatives of these Contracting Parties be established for the purpose of discussing approaches for implementing the measures and reviewing the status of western Atlantic bluefin catch. This management review committee will meet early in 1992 to consider a possible reduction of the fishing level to 50 percent of the 1991 scientific quota to allow for a more rapid rebuilding of the western Atlantic bluefin stock in accordance with the following proposed schedule:
The catch limits for the western Atlantic bluefin tuna for the years 1993 and 1994 are as follows:

	US	*Canada*	*Japan*	*Total*
		(MT)		
1993	693	286	350	1,329
1994	693	286	350	1,329

The catch limits in 1995 will return to those in 1991 unless the SCRS analysis in 1994 indicates otherwise.

d) Beginning with the 1992 catch, if the catch of one of these Contracting Parties exceeds its annual or biannual scientific monitoring quota, then in the biannual period or year following reporting of that catch to ICCAT, that Contracting Party will reduce its catch to compensate in total for that overage. Such a reduction will be applied to the domestic catch category of the applicable Contracting Party of the overage.

Second

The three Contracting Parties will prohibit the taking and landing of bluefin tuna weighing less than 30 kg. or in the alternative having a fork length less than 115 cm.

Notwithstanding the above regulatory measure, these three Contracting Parties may grant tolerances to capture bluefin tuna either weighing less than 30 kg, or in the alternative having a fork length less than 115 cm to limit the take of these fish to no more than 8% by weight of the total bluefin catch on a national basis and would institute measures such that there would not be any economic gain to the fishermen from such fish;

Third

These three Contracting Parties will encourage their commercial and recreational fishermen to tag and release all fish less than 30 kg or in the alternative having a fork length less than 115 cm.

ANNEX 8

STATEMENT BY OBSERVER FROM SWEDEN AT THE ICCAT PLENARY SESSION

Mr. Chairman, Delegates of ICCAT:

I would like to take this opportunity to state some of the reasons why the Swedish Government is seriously concerned about the present status of west Atlantic bluefin tuna, but before doing so, I would also like very briefly to introduce myself to this distinguished audience.

My professional background is in genetics and conservation biology, and the past 25-odd years I have worked with population biology, population genetics and conservation of marine and freshwater fish stocks.

Presently, I am Director of Research with the National Swedish Board of Fisheries. This information is simply given, to tell you that I am neither an economist nor a politician.

Well, Swedish concern about Atlantic bluefin tuna stocks is based primarily on information previously published by ICCAT. These data seem to indicate that:

1) West Atlantic bluefin tuna have declined steadily during the past 25 years, fish aged 10 years or older actually by some 90 percent. The latter stock component constitutes the bulk of the spawning population.
2) A projection of the curve of decline seems to indicate that the breeding stock is headed towards extinction, probably within a decade.
3) The very high fishing mortality, 3-4 times the normal value, indicates the same direction.
4) We lack knowledge whether there is a population threshold below which the breeding population might collapse, like what seems to have happened with the Icelandic herring.
5) At least I am not aware of any population genetic data that would indicate or refute the presence of discrete stocks of Atlantic bluefin tuna. The larger the number of sub-units that exist the greater the risk of local stock extinction.

   Such genetic data would also indicate whether mixing occurs among west and east Atlantic stocks.
6) Finally, we are also concerned that overfishing of large and old fish may result in loss of genetic variation in the population. Such depletion of genetic resources, which by definition should be called inbreeding, has indeed been shown to occur in another overfished pelagic fish, namely the orange roughy, off New Zealand.

   (It was shown that old fish were more variable than young year classes.)

To conclude, the Swedish Government feels that a reduction of the fishing pressure on bluefin tuna of breeding age is urgently required, and, unless fishing mortality is reduced considerably, we feel that the road to extinction is a more likely scenario than a return to a healthy sustainable fishery, which all interested parties would benefit from.

I read this year's SCRS report on Atlantic bluefin tunas with great pleasure. I found it balanced and well written, and the same can be said about the joint Japanese, Canadian, U.S. draft resolution aimed at reducing the uncontrolled tuna fishery exercised by non-Contracting Parties.

However, my preliminary opinion is that the measures proposed may not prove adequate and fast enough to halt the decline of the breeding stock of west Atlantic bluefin.

I might also point out that Swedish interest in bluefin tunas is not of such recent origin as it might seem. Up until 15 years ago sport fishing for bluefin was in high esteem off the south and west coasts of Sweden. This fishery does not exist anymore.

Also, already in 1978, a Nordic gene bank conference, sponsored by the Nordic Council, recommended that east Atlantic bluefin tuna be protected because of its endangered situation in Scandinavian waters.

The bluefin was the only species specifically named as endangered at that conference.

The official reaction was nil on that occasion, but now, obviously, time seems to be ripe for some action.

I cannot, of course, give any indication how the Swedish Government will respond with regard to the new data and resolutions presented at this meeting, but I will report back to the Government as best I can.

Thank you, Mr. Chairman.

ANNEX 9

STATEMENT BY JAPAN ON AGENDA ITEM 12 (CITES)

We appreciate the U.S. decision not to submit the proposal to list Atlantic bluefin tuna in CITES Appendix II. However, Japan has noted that the Swedish Government has included this issue on the Agenda of the CITES meeting, which will be held in Kyoto in March, 1992.

We have listened to the presentation made by an observer from the Swedish Government at the Third Plenary Session. It is our view that to criticize from the outside is easy. ICCAT is the responsible organization for the conservation and management of Atlantic tuna and tuna-like species including bluefin tuna. We, who are interested in bluefin tuna, joined the Commission and meet every year to study stock conditions and to discuss and decide conservation and management measures. If Sweden is seriously concerned about the stock condition of Atlantic bluefin tuna, it should have come first to ICCAT like we, all the member countries, are doing now. Although the Commission has sent an invitation to Sweden every year, Sweden has never attended an ICCAT meeting. Only after having submitted the CITES proposal has Sweden come to our meeting. We must say that this action by Sweden cannot be considered responsible for a member of the international community.

Japan has the following comments, from a scientific point of view, on the Swedish statement presented to ICCAT.

1) Reduction of the stock size for ages 10+ by 90 percent

It should be noted that at the Commission's 1981 meeting, it was a basic common understanding that the recovery of this stock should be considered over a long time frame, such as 30 years. This year's SCRS Report indicates that medium-sized fish and young spawners are increasing. These fish will replace the current aged spawners in the near future.

2) Extinction of the breeding stock in ten years

There is no basis to postulate that the western Atlantic bluefin tuna will be extinct in ten years. The SCRS Report gives evidence which is just the opposite. That is, the abundance of fish of ages 8 and 9 has been, more likely than not, increasing since 1986 and therefore, the breeding stock will recover in the near future.

3) Local disappearance of bluefin tuna and extinction of the local stock.

Bluefin tuna have a wide-range distribution in the Atlantic. Their spawning grounds are known so far to be in the Gulf of Mexico and in the Mediterranean. Therefore, the concept of local stocks is biologically incorrect. The local disappearance of fish is irrelevant to the extinction of this species. Such local disappearance of bluefin tuna is often reported in many areas. However, it should be noted that the condition of the eastern stock of Atlantic bluefin tuna, which is considered to migrate to Nordic waters, is relatively stable.

Japan feels strongly that the mandate for conservation and management of Atlantic bluefin tuna lies clearly with ICCAT. As is shown in the SCRS Report, Atlantic bluefin tuna is not a species threatened with extinction. Therefore, CITES involvement with the management of Atlantic bluefin tuna is inappropriate, counter-productive and undermines the effectiveness of ICCAT.

We have been working hard during this week to improve ICCAT's conservation and management measures for Atlantic bluefin tuna. As a result of our endeavors, we have developed more effective management measures for the western Atlantic bluefin tuna.

The fact that the Atlantic bluefin tuna is not a species threatened with extinction, combined with the new conservation measures that will be taken by ICCAT, CITES involvement in the management of Atlantic bluefin tuna is not necessary. Including bluefin tuna in the CITES Appendices will lead to the further inclusion of many other fishery resources in the CITES Appendices. Should that happen, the world's fisheries and the fish trade could end up in a chaotic situation.

Japan has already formally requested the Swedish Government to reconsider its proposal. Japan would like to urge all other member nations to make a demarche to the Swedish Government to withdraw their proposal. At the same time, Japan urges the Commission to send ICCAT's view to the CITES Secretariat for circulation to its Contracting Parties as well as to the Swedish Government.

ANNEX 10

LETTER FROM THE COMMISSION TO CITES

November, 1991

Mr. Izgrev N. Topkov
Secretary General
CITES
6, rue du Maupas
Case postale 78
CH-1000 Lausanne 9
Chauderon, Switzerland

Dear Sir:

I am pleased to respond to the invitation extended in your letter of 29th October concerning the Atlantic bluefin tuna (*Thunnus thynnus*) and a proposal by one of the Contracting Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), that the populations of the species in the North Atlantic be placed on Annexes of that Convention.

The proposal submitted to CITES quotes ICCAT publications extensively and it is appropriate to examine the intention of the quotations and to provide the most recent information. I attach therefore a detailed review of the CITES submission in the context of both the material available previously and of the most recent scientific information. I am providing you also with a copy of the latest (November 1991) report of the ICCAT Standing Committee on Research and Statistics with respect to the western Atlantic bluefin stock, and of the report of the relevant deliberations of the ICCAT Commission during its 12th Regular Meeting, 11-15 November 1991.

The SCRS report updates information that was available to the drafters of the proposal received by you. There are a number of points that I would like to draw to your attention:

The latest analyses represent a substantial improvement in our knowledge of stock status due both to a significant increase in the data available and to the utilization, and rigorous testing of, improved analytical procedures and methods.

It is important to consider the balance of the report in its entirety, rather than to select Statements out of their context. There is detailed examination and discussion in the new SCRS report of the uncertainties concerning the analyses and the results. The uncertainty about the strength of the most recent young year-classes is more than it is for the older year-classes, because data on the older fish have been collected over a greater number of years.

There is more uncertainty about the size of the year-classes in the earliest part of the analysis than there is for the recent period, because of the much increased quantity of data on size and on abundance indices in the 1980's. The difficulty in determining the size of the year-classes spawned in the 1950's and 1960's is seen in the revision of the estimate of population sizes in 1970, and particularly for the oldest group of fish. Examination of the likely ratio of fishing mortality on younger fish compared to that in the oldest group, suggests that these older fish were being harvested relatively harder in the late 1960's, and early 1970's, than was estimated in 1990. It was noted that the 1990 analysis produced a much higher estimate of 1970 population numbers for older fish than had earlier analyses, and the new (1991) estimate of the 1970 population numbers is about half the estimate provided in 1990. In consequence calculation of changes in abundance of the age 10+ population are now considerably less. There are wide confidence limits on both the 1990 and 1991 estimates of 1970 population numbers, although a different analytical technique (age structured non-equilibrium production model) supports the conclusions of the 1991 virtual population analysis (VPA) as to the extent of the changes in numbers over time.

The assessment shows clearly that the ICCAT management strategy has been of benefit to the stock,

that there are encouraging signs that the numbers of fish up to age 9 are now stable and that there is some evidence for limited increase in numbers. The stock is not endangered, as the process of stabilization shows. The stock is expected to continue to respond even under recent catch levels, and the actions being taken by ICCAT member countries for 1992 and the future will speed and increase the probability of the process. The decisions taken by ICCAT include lower quotas, measures to decrease the harvest of young fish, measures to increase the effectiveness of the regulations, measures to increase the data on catches, measures to address fishing outside the framework of ICCAT, a framework for enhanced research, and the adoption of steps towards formulation of a specific long-term recovery plan.

The eastern population of Atlantic bluefin is relatively stable, and the SCRS advised during its analysis of stock status in 1990, that no additional management measures were needed to maintain the stock. The next detailed review will be conducted next year.

Another element raised in connection with stock status concerns the apparent existence of unreported catches, as revealed by trade statistics. The SCRS this year received information on Japanese imports, that suggests that perhaps 200-700 tons, depending upon assumptions and year, may have been unreported catches from the western Atlantic. This matter, too, was addressed by the ICCAT Commission.

ICCAT has strengthened the effectiveness of the measures adopted in 1982 to allow rebuilding of the western stock, given the evidence that the results have been slower than would have been hoped. In addition, an enhanced research program has been developed by SCRS (attached). The SCRS will be re-assessing the eastern stock in 1992, and the western stock in 1993, and will provide updated analyses and conclusions to the Commission.

It must be concluded therefore that the stocks of Atlantic bluefin can be managed effectively by ICCAT, and that statements concerning a threat of extinction are without justification.

Yours sincerely,

Dr. Adolfo Ribeiro Lima
Chairman, International Commission for the Conservation of Atlantic Tunas (ICCAT)

COMMENTARY ON PROPOSAL TO LIST ATLANTIC BLUEFIN ON THE APPENDICES OF THE CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FLORA AND FAUNA (CITES)

The proposal submitted to CITES quotes publications of ICCAT extensively and it is appropriate to place these in the context in which the statements were intended and to provide the most recent information available.

The general assessment of Atlantic bluefin stock status is that in the east the population is relatively stable although at a lower level than in the past, which is the expected reaction of a population to a higher level of fishing pressure. In the west the rate of decline in the population was slowing during the 1980's and has apparently been stopped for ages up to 9. Harvest of small fish (ages 1-3) has increased in the past five years, to levels not compatible with the 1982 ICCAT management recommendations. Additional national and international measures are being taken to reduce this harvest of smaller sizes to levels that are compatible with the 1982 ICCAT decision. This will speed recovery of the medium age sizes as these young fish reach maturity and the process will spread through older ages with time. The very oldest ages must be expected to continue to decline until fish spawned since 1982 reach those ages. The rate of decline of older fish has however been slowed greatly during the 1980's since the adoption of the 1982 ICCAT management measures (1991 SCRS BFT-Figures 5-8). It is expected that this should level off and start to increase over the next several years, particularly following the enhanced management measures adopted by ICCAT at its November 1991 meeting.

It must be concluded therefore that eastern bluefin show no evidence of further decline and that western bluefin are now benefitting from the measures taken to stop the decline in the population and to initiate the process of recovery.

Before commenting further on the proposal directly, it is relevant to consider certain elements of the management of renewable, and in particular, marine resources. One basic element is that fish populations must be expected to be lower when subject to harvesting than when they are not, but that lower level can be maintained, subject to some annual variation due to natural factors. This is because a

resource that is not subject to harvesting will be in a state of equilibrium with the environment. This equilibrium does not mean that the numbers at each age, or even the total numbers in the population will be constant. There will be fluctuations due to environmental and biological factors, with the extent of these depending upon the biological characteristics of the species and its place in the ecosystem. When harvesting is added to the factors influencing the population, there will naturally be a decrease in the population, and the average age of the population and hence average size of individuals, will decline due to the increase in mortality rates. The population will contain fewer of the very oldest ages, with the extent of the effect depending both on the rate of harvesting and also on the manner in which it is applied to the range of ages. Harvesting within reasonable bounds can result in an overall increase in relative productivity of the resource by increasing the proportion of faster growing younger ages.

Fish stocks have demonstrated that they can maintain themselves even when harvested heavily. At a particular harvesting rate, the resource should come into equilibrium. Population fluctuations will occur, however, due mostly to the year-to-year variation in the survival of the very youngest ages. Most of the variability in survival appears to occur during the first few days to months of life. Some fish species show very marked natural variation in this survival, and hence in the number of fish that survive the first year. Others show greater stability, with fluctuation of less than 10 fold between the highest and lowest numbers in comparison to as much as a hundred fold or more for other species. The species that vary the most can be reduced severely if heavy harvesting pressure is applied during periods of low abundance, whereas the species that are relatively stable can be harvested heavily, at rates as much as several times that of natural mortality, and while the population will be relatively small, it will reach and maintain an equilibrium, with actual numbers fluctuating in response to the pattern of recruitment.

Atlantic bluefin tuna is a long-lived species, showing relatively small fluctuation in the survival of young fish in comparison to shorter-lived species such as anchovy. Consequently, natural changes in population size will tend to be much slower, both in extent and time. This is an important factor when considering the status of this species. The bluefin stocks were harvested hard in the 1960's and 1970's, and particularly at the youngest and oldest ages, much of them by purse seine, although longliners also took considerable numbers of medium and large fish. The heavy harvest of the large fish meant that the abundance of this group dropped rapidly in many parts of their range, particularly in the areas near the northern limits of the annual migration pattern. This was exacerbated for bluefin because, being warm blooded, the larger the fish the more successfully can they utilize the cooler northern waters with their variable and complicated temperature structure. The smaller fish can only move into such areas in unusual years; so that in these northern areas it may appear that the species is much more reduced than it really is. Western bluefin in particular were also harvested hard at both medium and very young ages, which meant that relatively few fish were left to grow to what would now be the old fish.

It is incontestable that bluefin were heavily harvested by the time ICCAT came into being, and by the time that the first measures for bluefin were adopted in 1974 (for the 1975 fishing year). It is also clear that those measures were inadequate for western bluefin, in part because there had been a significant increase in effort, and hence catches, in the western Atlantic, shortly before the regulation came into effect. Faced with the evidence of the continuing decline in western bluefin, and a very pessimistic report from the Standing Committee on Research and Statistics (SCRS), ICCAT took more stringent measures at meetings in 1981 and early 1982. Later that year, with a less pessimistic report from the SCRS, the quota was increased for 1983 to allow the more normal conduct of certain fisheries and hence to provide the data series that the scientists were already beginning to rely on for their analyses.

The adoption of these measures in 1982 (limit upon total catches and on the proportion of smaller fish) were expected to stop the decline of the population and allow a slow recovery over a period of at least 30 years. The recovery was expected to take a long time, due both to the stable nature of the population dynamics of bluefin and to the large numbers of years in the population (25 or more).

The 1991 SCRS report draws attention to this time element, and particularly the fact that total abundance of the largest age classes, i.e., the sum of ages 8 to 25 (or so) could not have been expected to increase for a considerable number of years. This is because the total population of these ages would not be augmented until a substantial number of the year classes in the 8+ group were year classes that had been spawned since the regulation came into effect. The SCRS has also revised the estimate of the number of fish in the population in 1970 at approximately half that reported in 1990. SCRS noted in 1990 that the 1990 estimate of large fish was significantly higher than in previous assessments. Using the 1991 SCRS estimates, which are close to estimates made prior to 1990, the extent of decline for large fish cited in the proposal is overestimated.

Many of the arguments contained in the proposal

submitted to CITES, appear to be based on the expectation that fish stocks will not be reduced by harvesting, that fishing mortality rates exceeding the rate of natural mortality are excessive, that the rate of decline in western bluefin is increasing and that there is a direct link between the level of recruitment and the size of the spawning stock. None of these assumptions are supported by general knowledge of fish population dynamics nor by the specific information available on Atlantic bluefin. The arguments make selective use of ICCAT reports and frequently ignore adjacent statements that would place the phrases selected into their proper context.

As noted earlier, the evidence is that the decline in the numbers of western Atlantic bluefin in the middle range of ages has stopped, and there is some evidence that there has been some increase. This increase will be enhanced substantially by actions to reduce the harvest of small fish (to be completed when decisions of ICCAT member countries are known), and by measures being taken to limit the fisheries by non-member countries.

With respect to the population of bluefin in the eastern Atlantic, this was reviewed by the SCRS in 1990. The population is as would be expected due to increased harvesting during the past 30 years, considerably smaller than at the start of the period. It does however seem to be generally stable, and therefore not requiring additional management measures under the present implied management strategy of maintaining the stock status. It is noted that stock increase might be expected from reducing the high catches of small fish and that the General Fisheries Council for the Mediterranean will be considering the appropriateness of adopting the ICCAT minimum size regulation at its next meeting.

In conclusion, it was premature to judge that the ICCAT management was not achieving its goals of stabilization in the short term and recovery in the long term to the ICCAT objective of a population capable of sustaining the maximum sustainable harvest.

DETAILED COMMENTARY

i) (Page 1, Section 21. Distribution, para. 1.) The discussion of occurrence of *Thunnus thynnus* in the Pacific ignores the understanding that there is only one stock with the spawning area in the western Pacific.

ii) (Page 1, para. 2.) There are no reports of fisheries in the Black Sea but anecdotal information does indicate continued appearance there. Other statements about areas in which bluefin "may no longer occur" may accurately reflect the changes in distribution that are the normal result when a stock is exploited and the number of old fish is reduced substantially. This is not a negative aspect with respect to stock status. It is clear that large bluefin, even when abundant, changed their area of abundance over periods of years and this was likely in response to environmental factors including but not limited to abundance of food species. It is noted that because of their adaptation to maintain a high internal temperature, it is the larger fish that can utilize the more extreme parts of the geographic range. In these areas, the water temperatures are not only colder but they are more variable and the vertical structure of warm and cold water is more extreme.

iii) (Page 2, Section 22, Population, para. 2.) The use of the word "tremendous" is inappropriate for the east Atlantic where it is the older (10+) fish that declined during the 1970's but have been relatively stable since. This is what would be expected at the harvest rates being applied. Furthermore, the harvest rates are not unusual for marine fish stocks that have maintained their status over very long periods.

iv) (Page 2, para. 3.) The discussion of fishing mortality should not focus only on the age 10+ group if it is to be argued that mortality is too high. Fish aged 8 and 9 are mature and considered to spawn fully, so that high fishing pressure on the 10+ group per se, would in fact almost maximize the yield per recruit if fishing mortality is lower on younger ages. The significant element is the level of fully recruited fishing mortality (estimated at 0.36 in 1991) which, while high, has been shown to be sustainable by other fish stocks.

It is relevant to note that the comparisons between 1970 and 1990 in the proposal are based on the 1990 SCRS assessment which estimates a much greater change than the 1989 assessment. The 1991 SCRS analysis does not support the estimate of the 1970 population level (121,125 for age 10+ cf. 234,900 in the 1990 assessment). The new estimate of the 1970 level is however higher than estimates made in 1989 and earlier. The new estimates are based on fuller use

of available data series and further analysis, using separable VPA of the relative pattern of fishing mortality on the 10+ group relative to the mortality on younger fish. The 1991 assessment does agree closely with the 1990 assessment, as regards recent population levels (13,945 age 10 cf. 13,300 in the 1990 assessment). The pattern of recent trend is for a leveling off. The pattern and the extent of decline since 1970 are supported by a production model analysis (non-equilibrium age structured model (1991 SCRS BFT-Figure 6)). The actual 1970 points for the graph shown in the proposal are now estimated to have been 121,125 fish age 10+ which were being fished at an F of 0.034. The declines in 10+ fish would therefore be 88.5 percent while F increased 11.8 fold.

Citing the 1977 and 1978 larval abundance index values would appear to be misleading, since the value for 1977 and 1978 were very different (a factor of 2.4) which means that the points cannot both be direct estimates of spawning biomass. The stock of fish of ages 8 and over could not vary that much over 12 months.

v) (Page 3, paras. 1 and 2.) The current analysis changes these conclusions by certain percentage points. The conclusions of the 1991 SCRS will be discussed in the next section (vi). The description of SCRS's 1990 action in changing the estimate of age at maturity from 10 years old to 8 years old, does not include the reason for the change. Analyses of the growth of fish recaptured after being tagged in earlier years indicated that the growth rate of medium sized fish is faster than had been estimated previously using projections of the growth rate of younger fish. The age of smaller fish and hence their growth rate is much easier to determine, but after age 5 it can no longer be determined directly.

vi) (Page 3, para. 3.) This paragraph correctly notes that the ICCAT predictions were for "the near future" but this caveat is lost to all but the most careful readers. The quotes do not include other statements in the 1990 SCRS report such as "estimates of medium sized fish have increased from the low value of 1983" nor that "the downward trend in the abundance of the younger age groups (ages 1 to 5 and ages 6 to 7) in the 1970's appears to have stopped after the program begin in 1982. However, the most likely estimate showed little change in the abundance of small (ages 1 to 5) in recent years (1983 to 1987)."

It is appropriate at this point to note the conclusions of the 1991 SCRS, that for: "Small fish (ages 1-5). "Overall for this age component, there is no evidence of any trend in recent years, although there may have been a slight recovery in the early 1980's, and no change since then."

"Medium fish (ages 6-7). "It is more likely than not that this size category has increased in abundance compared to 1982."

"Large fish (ages 8+). "...The abundance of ages 8 and 9 appears to have been fairly stable over the late 1980's, but it is more likely than not that there has been an increase in abundance since 1986 ..."

"The abundance of fish aged 10 and older must be expected to decline given that the year classes contributing to it were all fished heavily prior to 1982. The numbers will not increase until the year classes reaching age 10 do so in strength.

"In aggregate for fish aged 8+, there is a high likelihood that the abundance of this category ... has continued to decline since 1982."

"There is, however, reasonable evidence that the current management regime has resulted overall in arresting the decline for medium-sized fish and for the youngest ages of the 8+ group, i.e., ages 8 and 9. Some year-to-year fluctuation must be expected due to the variation in year-class strength, but the process can be expected to spread through all ages."

vii) (Page 4, para. 4.) Catches in the 1960's from the western Atlantic were included in analyses conducted by the SCRS up to 1990, but were not examined in 1990 because there were questions about the adequacy of age sampling of important components of the catches. The catches 1960-1969 were however included in 1991 in an age-structured non-equilibrium production model analysis. There are inherent uncertainties in the model about the conclusions for the earliest part of a time series. In addition, detailed analysis was not conducted on the implications of the assumption used in the model that the age-specific distribution of effort had been constant, when in fact there was significant change in this over time. Consequently, SCRS noted "the results of the model run from 1960 do suggest that there had been considerable reduction in the biomass level by 1970, but the extent cannot be determined."

In the submission to CITES, the discussion of the level of catches in 1970-75 in comparison to the period in the 1960's ignores the limitations that Canada and the U.S.A. were already placing on their purse seine catches, on a bilateral basis.

viii) (Page 3, para. 5.) This brief paragraph "Despite the declines....ICCAT in 1983 allowed a doubling of the catch quota" ignores the material available in the SCRS report for 1982 which provided a considerably less pessimistic review of stock status than had been provided in 1981. It was noted that "the principal analyses presented this year [1982] agree that, for the west, there has been some decline in abundance, that recruitment may have decreased in recent years, and that there is little relation between recruitment and spawning potential. Also, in the west, there exists concern that 1982 catches are insufficient to monitor the stock, but the weight of evidence suggests that catch levels for monitoring should be conservative.

"Risk is involved in the face of uncertainty as to an appropriate catch level in considering the present stock condition. The SCRS is unable to determine whether a 6,000 MT catch will cause a decline or whether a decline will occur regardless of any catch. It was not possible to find agreement within this range."

ix) (Page 3, para. 6.) See Comment ii).

x) (Page 4, Eastern Atlantic and Mediterranean, paras. 1 and 2.) The two paragraphs together address two issues, one being the reductions in population size and the other being uncertainties in the estimates. The reduction in stock size is not unexpected given the normal response to fish populations when subject to harvesting. The trends indicate relative stability over the past 15 years for ages 10 and older, at about 50 percent of the 1970 level. The pattern for ages 5-9 is that there was an early reduction to 70 percent of the 1970 level, a recovery to above the 1970 level and a reduction over the percent 1982-90 to 75 percent of the 1970 level. The future trend of that group cannot be predicted except that the age 2-4 population while variable, has apparently increased overall to nearly double the level in 1970. The extent of the increase is however, as quoted in the CITES proposal subject to "only limited confidence."

It should be noted that while estimates of fishing mortality on the younger ages categories of eastern Atlantic bluefin are relatively high (0.4), the levels on large fish groups are low (0.11-0.15).

xi) (Page 4, para. 3.) Discussion of catch declines should reflect the shifts of effort that occurred and the actual pattern of catches. The average catch was indeed 20,900 MT between 1960-62 but it was only 9,000 MT in 1963, and thereafter did not rise above 10,800 MT. This drop in 1983 reflected a reduction of 8,000 MT in the Norwegian purse seine fishery and 3,000 MT in the Moroccan and Spanish traps.

xii) (Page 4, para. 4.) See Comment ix) re: fishing mortality levels. Fishing mortalities in excess of the level of natural mortality are not considered excessive for any stock, and many fish stocks continue in equilibrium at fishing mortality levels several times the rate of natural mortality.

xiii) (Page 4, para. 5. and Page 5, para. 1) See ii) (change in distribution).

xiv) (Page 5, para. 2.) The 1990 SCRS statement that catches of fish less than 6.4 kg. "may become crucial for the future of the stock" was intended to refer to future stock levels and hence catches, not to the existence of the stock as might be interpreted from the presentation in the proposal.

This paragraph in referring to the ICCAT size limit being "largely ignored in the Mediterranean" ignores itself the fact that many of the countries involved are not members of ICCAT. It is noted that in November, 1991, the Committee on Fisheries Management of the GFCM recommended that Council consider adopting the 6.4 kg minimum size limit itself, at its next session.

xv) (Page 5, para. 3.) The "John Gill" referred to is likely Joao Gil Pereira, a Portuguese bluefin scientist who does not recall providing information in the manner cited. Pereira reports that large bluefin have been seen, and still are seen, at times around the Azores, that a one-time fishery by handline was discontinued for a variety of reasons, while a limited purse seine fishery originally caught some bluefin but then concentrated on other species. The reasons included market factors at that time, but not a change in abundance. There is nothing surprising for this area, or for any other tuna fishery, that large catches of various tuna species are being made without bluefin also being taken.

xvi) (Page 6, para. 2.) The reference to ranching operations, to fatten tuna, presumably refer to such activities in Nova Scotia, Canada, rather than in Maine, U.S.A.

xvii) (Page 6, para. 4.). 32. Legal International Trade. It is likely that the increased prices of bluefin have attracted some more effort, but it is also true that there has been diversion of ongoing catches to the Japanese market, especially where catch quotas were already being filled before the recent escalation

of prices. In these cases, any effort increase would be reflected by earlier attainment of the quota rather than an increase in catch. It is relevant that Canada and Japan both limit the number of licensed vessels and Canada has strict gear regulation.

xviii) (Page 6, bottom para.) The text describes the withdrawal of "a sizeable fleet of Japanese longline vessels ... in the Gulf of Mexico" as a response to the ICCAT recommendations. This was, in fact, an explicit requirement of the recommendation (the fourth provision of the 1982 agreement).

xix) (Page 7, 33. Illegal Trade, para. 1.) Among the various additional measures adopted by ICCAT in November 1991 (see Recommendations for More Effective Management of Western Atlantic Bluefin Tuna and Resolution Concerning Catches of Bluefin Tuna by Non-Member Countries) was the decision to develop recommendations to prohibit transfer at sea.

xx) (Page 7, para. 2.) 34. Potential Trade Threats. There is no basis to state that "trade is not sustainable" on the grounds that the breeding populations is "collapsing". The 1991 SCRS report concludes that the overall number of spawning fish will continue to decline until recruitment by substantial numbers of year classes spawned since 1982, but that the numbers of young spawners are stabilizing and may have increased since 1986. SCRS expects this process to spread through the spawning population under the 2,660 MT quota scheme. Additional measures to be undertaken by ICCAT member countries in 1992 and following years will increase the probability and speed of this process.

xxi) (Page 7, para. 5) See xiv) re: status of action by GFCM.

xxii) (Page 7, para. 6.) The discussion of the changes in the level of the quota does not mention that during 1982 SCRS was considered to have developed less pessimistic advice about the status of the stock. (See viii.)

xxiii) Page 8, para. 1.) 43. Additional Protection needs. The reference to the 1990 SCRS statement that "fishing mortality rates of large fish have increased ..." in part "due to the increase allowed for by the ICCAT regulations (doubling of the catch from 1982 to 1983)." was written to describe the change between 1982 and 1983. The 1982 level of fishing mortality was very much lower than in preceding years, as might be expected when the catch was cut from around 6,000 MT to 1,500 MT in response to the 1982 quota.

xxiv) (Page 8, para. 2.) Reference to the 1991 SCRS analysis (e.g., 1991 SCRS BFT-Figures 5-8) of the trend in abundance of fish aged 8 and older (the breeding population) shows clearly that the decrease has not been constant but that the rate has been slowing through the 1980's. The prospects for the future are provided elsewhere. (See vi)

xxv) (Page 8, para. 3). (See vi)

xxvi) (Page 9, para. 3). This conclusion should be reviewed in light of both the 1991 SCRS report and the actions taken by ICCAT in November 1991 with respect to additional management mensures and steps to restrict non-member harvesting.

xxvii) (Page 9, para. 4.) The reference to ICCAT's "statistical committee" presumably refers to the SCRS. [The quote "concern regarding" should be read in the context of the Agenda item, i.e., the planning of enhanced research, rather than advice on the status of the stocks.]

xxviii) (Page 9, para. 5.) The opening quote should be read in connection with the sentence that follows it in the 1990 SCRS report, "significant progress was made at the GFCM/ICCAT meeting...".

xxix) (Page 9, para. 7.) There is no basis given for describing the number of spawning age fish as being at a dangerous level and SCRS has not provided any such advice. As noted earlier in this review, SCRS has concluded in 1991 that stabilization of numbers can be expected to spread through all age classes and that this process, together with faster recovery, will result from actions undertaken at the 1991 ICCAT meeting.

xxx) (Page 10, No.6. "Comments from Countries of Origin") None are known to have been solicited from countries in whose waters bluefin occur in any number.

xxxi) (Page 10, No.7, second para.) The proposal may make extensive use of quotations from the report of the SCRS of ICCAT, but the quoted statements are often taken out of context, and qualifying statements have frequently been omitted. Any reference to stock stability or increase has been omitted. The 1991 SCRS report provides overall, a different view of stock status and prospects, especially in light of ICCAT management undertaking.

It is notable that the anecdotal information is all from negative sources and there are no references to the reports carried in Canadian and U.S. newspapers, and publications of the high abundance of bluefin encountered in various areas in 1990 and 1991.

xxxii) (Page 10, bottom para.) The phrase "clearly headed in the direction of extinction," is incompatible with the population dynamics of fish such as bluefin and the status of the stock described by SCRS. Figure 10 from the 1990 SCRS report, reproduced in the proposal itself, clearly shows the levelling off of the downward trend in abundance.

The statements concerning survival of ages 6-7 fish since 1983, must be taken in the context that many of the relevant year classes were fished hard prior to 1982, that the 1982 year class itself would only have reached breeding age in 1990, that it did contribute substantially to the spawning stock, and that SCRS has concluded that ages 8 and 9 have more likely than not increased in number since 1986.

xxxiii) (Page 11, para. 1.) There is no basis for categorizing a spawning stock that is half its former level as being an indicator of any form of potential problem for a marine fish stock.

xxxiv) (Page 11, para. 2.) The conclusions in this paragraph need to be updated to reflect the 1991 SCRS findings. (See vi)

xxxv) (Page 11, para. 3.) Sub-paragraph 3 also is outdated. (See xix)

xxxvi) (Page 11, para. 4.) Apart from requiring updating, the estimate made in 1990 of the 1970 population is discussed in section iv. The 1991 SCRS has reanalyzed the data and revised the estimate of the 1970 population of mature fish, resulting in almost a halving of the estimate. The 1991 SCRS Report states that the exploitable biomass is at 10-23 percent of the 1970 level.

xxxvii) (Page 11, para. 5.) The 1982 management recommendations were intended to maintain commercial and recreational fisheries from which indices of abundance are developed in order to monitor the stock. The statement about non-lethal methods of collecting information is also misleading. ICCAT will consider information on methodologies brought forward for review, many questions must be answered about the usefulness for stock assessment purposes of non-lethal methods. SCRS has included a review of those methods, particularly aerial surveys, in the proposals for the Bluefin Year Program of enhanced research.

ANNEX 11

RESOLUTION CONCERNING CATCHES OF BLUEFIN TUNA BY NON-CONTRACTING PARTIES

Whereas it is the objective of the International Commission for the Conservation of Atlantic Tunas, established under the International Convention for the Conservation of Atlantic Tunas, to provide for the effective conservation and management of Atlantic tunas;

Whereas the Commission has made recommendations concerning regulatory measures designed to maintain the populationS of tuna and tuna-like fishes, including Atlantic bluefin tuna, at levels that permit the maximum sustainable catch;

Whereas the Commission recognizes that the effective implementation of its regulatory measures requires the participation and support of all tuna fishing nations in the Atlantic Ocean;

Whereas several non-Contracting Parties have harvested and continue to harvest Atlantic bluefin tuna outside the regulatory regime of the Commission and contrary to the principles of customary international law, as articulated in the United Nations Convention on the Law of the Sea;

Whereas the Commission has previously addressed appeals to non-Contracting Parties urging them to join the Commission and abide by its regulatory measures;

The International Commission for the Conservation of Atlantic Tunas:

1. Resolves that it should again invite all non-Contracting Parties fishing tuna in the Convention area to join the Commission as a member or to participate as an observer;

2. Resolves that the Contracting Parties should actively seek to encourage non-Contracting Parties fishing tuna in the Convention area to join the Commission as a member or to participate as an observer;

3. Resolves that the Commission should invite all non-Contracting Parties fishing tunas in the Atlantic Ocean to facilitate, during the following year, catch statistics of their fleets of tuna and tuna-like species.

4. Resolves that the Contracting Parties should actively seek to encourage non-Contracting Parties fishing tunas and tuna-like species in the Atlantic Ocean to facilitate the aforementioned statistics.

5. Resolves that all Contracting Parties should, by January 1, 1993, implement measures to collect statistical information for the purpose of ensuring that ICCAT will have at its disposal sufficient annual import and export statistics to ensure proper management and administration of tuna and tuna-like species. Taking into account the specific problems of the western bluefin tuna stock, these measures for that species will be adopted by Contracting Parties within six months.

6. Given the shared concerns of Contracting Parties as to the western Atlantic bluefin tuna stock, requests that the Executive Secretary convene a specific working group before the 1992 ICCAT meeting to develop the technical details for implementation of this resolution, to accomplish the following:

   -- obtain and compile all available information on the fishing activities of non-Contracting Parties, including details on the type, flag and name of vessels and reported or estimated catches by species and area;

   -- obtain and compile all available information on landings and transshipments of fish caught by non-Contracting Parties, including details on the name and flag of the vessels; the quantities landed and transshipped, and the countries' landing ports through which the product was shipped;

   -- review recommendations to prohibit the transfer at sea of western Atlantic bluefin tuna between vessels from different countries;

   -- consider and outline measures to prevent the re-flagging of vessels of Contracting Parties for the purpose of avoiding fisheries management measures established by the Commission;

   -- recommend measures to the Commission. The Contracting Parties will ensure that these measures will be consistent with the General Agreement on Tariffs and Trade (GATT).

ANNEX 12

JOINT STATEMENT BY CANADA, JAPAN AND UNITED STATES

Canada, Japan and the Unites States jointly recommended that, after taking actions outlined in this Resolution in 1992 (see Annex 11), the Contracting Parties consider and, if appropriate, implement measures consistent with the General Agreement on Tariffs and Trade (GATT) of restricting the import of Atlantic bluefin tuna from countries which are not Contracting Parties, or are not participating in the ICCAT management program.

ANNEX 13

U.S. STATEMENT ON DRIFTNETS

The United States remains seriously concerned about the continuing operation of high seas pelagic driftnet fisheries around the world. As all the delegations here are aware, these fisheries have been the subject of resolutions by the United Nations in 1989 and in 1990. Now, while we are here in Madrid at our annual ICCAT meeting, the issue of high-seas pelagic driftnet fishing once again is being debated in New York at the U.N. General Assembly.

The United States has introduced a resolution on driftnet fishing for consideration at this year's U.N. session. As of yesterday, this resolution was co-sponsored by 19 other nations. It is scheduled to be discussed in the U.N. General Assembly's Second Committee next week.

The United States has put forward a strong proposal at the United Nations which reaffirms the previous U.N. resolutions and calls upon all members of the international community to end all large-scale pelagic driftnet fishing on the high seas of the world's oceans and seas effective 30 June, 1992. This resolution, and the U.S. position, is based upon our view that the best available data and scientific information available shows that large-scale high seas driftnets have an unacceptable impact on the marine environment. Their continued use cannot be justified, in the view of the United States, and we believe that a global moratorium must be imposed by June 30, 1992. We urge all of the member and observer nations represented here to strongly support and co-sponsor the proposed U.S. resolution at this year's U. N. General Assembly meeting.

ANNEX 14

REPORT OF THE MEETING OF THE INFRACTIONS COMMITTEE

1. OPENING OF THE MEETING

At the request of Mr. S. Makiadi, Commission Chairman, the meeting was opened by Mr. A. J. Penney (South Africa). Mr. Penney chaired the meeting since Cuba, the elected Chairman, was not present.

2. ADOPTION OF AGENDA AND ORGANIZATION OF THE MEETING

The Agenda was adopted without change and is attached as Appendix 1 to Annex 14.

3. ELECTION OF RAPPORTEUR

Mr. R. Dalton (U.S.A.) served as rapporteur.

4. STATUS OF THE APPLICATION OF THE REGULATIONS RECOMMENDED BY THE COMMISSION ON YELLOWFIN, BIGEYE, BLUEFIN, AND SWORDFISH

The Executive Secretary presented document COM/91/18, which contains the text of the ICCAT regulations currently in effect, and shows the status of their application in the different member countries (See Tables 1, 2, 3 and 4 which were updated and are attached to this Report). The Executive Secretary noted that for the first time this document includes the 1990 ICCAT recommendation for Atlantic swordfish. He also stated that, at this time, Spain is the only country that has informed the Secretariat on the status of implementing the swordfish recommendation. The Executive Secretary urged all countries to comply with the regulations and to cooperate in advising the Secretariat of the status of implementation.

The Chairman noted that some of the blanks in these Tables were due to failure to report the status of implementation by the Contracting Parties, not to a failure to implement the measures. He reiterated the request for cooperation in reporting.

The Delegate of Brazil indicated that no steps had been taken to implement minimum size requirements for swordfish because Brazil only catches adult swordfish. He added that his country would monitor catches and incorporate a minimum size requirement if necessary.

The Delegate of the United States advised that action had been taken in June, 1991, to implement a quota and minimum size by emergency regulation for swordfish. He also indicated that information regarding implementation would be forwarded to the Secretariat.

The Delegate of Canada indicated that the Canadian National Report provided the details regarding implementation of the swordfish recommendations. A full response to the recommendations was issued on May 1, 1991, including reduction in quota from 3,500 MT to 2,000 MT and prohibition on taking fish less than 25 kg live weight. He noted that only 11 % of their swordfish catch, by number were small fish.

The Chairman suggested it would be helpful if status of implementation were reported separate from national reports and so requested.

The Delegate of Portugal reported that the appropriate regulations have been implemented and that the Secretariat would be informed as soon as possible.

The Delegate of Japan stated that appropriate regulations were implemented on August 1, 1991.

The Delegate of South Africa indicated that although his country only has a small swordfish fishery, regulations for minimum size have been drafted, and swordfish catches would be restricted to less than 10 percent of the their total catch in the south Atlantic.

The Delegate of Uruguay stated that her country had no information in Table 4 because the swordfish recommendations did not affect Uruguay since they only target large fish. She added that measures for yellowfin, swordfish and bigeye would be adopted this year.

The Chairman emphasized that effective implementation of the measures at sea is essential. The

Chairman noted that there have been serious problems regarding practical implementation and cited reported violations relating to minimum sizes of yellowfin and bluefin tunas, Contracting Parties and non-Contracting Parties exceeding bluefin harvest levels, re-flagging, and transfer of effort between the western and eastern Atlantic. The Chairman emphasized the Committee's responsibility to investigate these matters thoroughly and work with the Secretariat to address them.

The Delegate of Spain concurred with the Chairman's comments regarding effective implementation of recommended measures. She advised the Committee that she was concluding work on the status of the swordfish fleet, including the exact number of vessels, stringent measures on transfers among the fleet, a fishing plan to adjust effort to comply with the measures adopted by ICCAT, strengthening inspections to monitor enforcement. The Delegate of Spain also noted that Spanish legislation requires a license to export a fishing vessel and includes criteria vis-a-vis the country of destination to avoid making re-flagging easy.

5. COLLABORATION OF NON-CONTRACTING PARTIES AS REGARDS THE REGULATORY MEASURES ADOPTED BY THE COMMISSION

The Executive Secretary presented a document on this subject and noted that this item is also on the Agenda for the Plenary session. The Executive Secretary stated that there are good relations and exchange of data with a number of non-Contracting Parties. The Executive Secretary noted the possibility of Senegal coming back to ICCAT if circumstances allow and indicated that the report of the Working Group on Calculating Contributions had been sent to Senegal.

The Chairman stated he was encouraged by the cooperation with Mediterranean countries. He complimented the cooperation between the Secretariat and GFCM. The Chairman noted that increased cooperation with Mediterranean countries may be delayed by the slowness to allow the EEC to enter ICCAT. The Chairman expressed disappointment that Cuba had withdrawn as a Contracting Party and stressed the Committee's obligation to encourage participation in ICCAT.

The Delegate of Spain strongly supported the Secretariat's cooperative efforts with non-Contracting Parties.

The Executive Secretary referred to contacts made with Mauritania and Algeria, who are interested in becoming Contracting Parties of the Commission.

6. REVIEW OF PORT INSPECTION

The Executive Secretary presented document COM/91/19, which provided background information on port inspection and contains the forms used for inspection, as well as a list of inspectors and correspondents named by each country. He noted that the scheme has been accepted by ten countries and that Angola and Uruguay intend to participate in the scheme and have designated inspectors.

The Executive Secretary indicated that port inspection reports were received this year from South Africa and Spain. He noted that each year the list of inspectors is renewed, and he requested that corrections to the list be communicated to the Secretariat. The Chairman then solicited comments on acceptance of the scheme.

The Delegate of Uruguay expressed agreement with the scheme and indicated that a list of inspectors had been submitted.

The Chairman emphasized that the Secretariat requires notification of official acceptance of the scheme and a list of inspectors.

The Delegate of Spain expressed concern that the inspection scheme had been accepted by less than half of the members but stated that the action by Uruguay was a positive note. She suggested that the Chairman address each country that has not yet accepted the scheme regarding their status.

The Chairman supported the concern but declined to address on a country by country basis. He stressed the importance of full participation in the scheme. The Delegate of the United States stated that the U.S. currently conducts a domestic enforcement program equivalent to the ICCAT Port Inspection scheme. There were no other comments from other countries.

The Delegate of the United States stated that its annual report would be submitted promptly.

7. FUTURE WORK OF THE COMMITTEE AND PLANS FOR IMPROVEMENT

There were no comments.

8. DATE AND PLACE OF THE NEXT COMMITTEE MEETING

The Infractions Committee will hold its next meeting at the same place and time as the next Commission meeting.

9. ELECTION OF CHAIRMAN

The Delegate of Spain expressed appreciation to Mr. A. J. Penney (South Africa) for temporarily acting as Chairman and nominated him for Chairman for the next biennial period. Mr. Penney was elected by unanimous consent.

10. OTHER MATTERS

The Delegate of the United States proposed that each country submit detailed information regarding their implementation of the 1990 ICCAT recommendations for swordfish, particularly the specific methods of implementation.

The Delegate of Canada concurred with the concerns of the United States and supported the proposal. The Delegate of Spain seconded the motion by the United States and the Committee agreed on this matter.

11. ADOPTION OF REPORT

The Report of the Infractions Committee was adopted.

12. ADJOURNMENT

The meeting of the Infractions Committee was adjourned.

Appendix I to Annex 14

AGENDA OF THE INFRACTIONS COMMITTEE

1. Opening of the meeting
2. Adoption of Agenda and organization of the meeting
3. Election of Rapporteur
4. Status of the application of the regulations recommended by the Commission on yellowfin, bigeye, bluefin, and swordfish
5. Collaboration of non-Contracting Parties as regards the regulatory measures adopted by the Commission
6. Review of port inspection:
   a) Acceptance of the Scheme
   b) Review of reports of inspections carried out
   c) Updating of the list of authorized inspectors
   d) Updating of list of national correspondents
7. Future work of the Committee and plans for improvement
8. Date and place of the next Committee meeting
9. Election of Chairman
10. Other matters
11. Adoption of Report
12. Adjournment

Status of implementation by the member countries of the ICCAT recommendations.

Table 1. YELLOWFIN and BIGEYE TUNAS.

Species	*Y E L L O W F I N*	*B I G E Y E*	
Commission recommendation	*3.2 kgs minimum size limit*	*3.2 kgs minimum size limit*	*3.2 kgs minimum size limit*
Area of application	*Entire Atlantic*	*Entire Atlantic*	*Entire Atlantic*
Date of entry into effect	*July 1, 1973*	*September 7, 1980*	*July 17, 1985*
Date of expiration	*Indefinite period*	*December 31, 1984*	*Indefinite period*
ANGOLA	June 17, 1979		
BENIN			
BRAZIL	Feb. 23, 1973	March 1981	
CANADA	Sept. 4, 1973	No fishing	
CAPE VERDE	Sept. 5, 1987		Sept. 5, 1987
COTE D'IVOIRE	March 2, 1970	March 2, 1970	
EQUATORIAL GUINEA	.....	..No fishing..	.....
FRANCE	June 29, 1973	March 3, 1981	
GABON	No fish./land.	Being considered	
GHANA	June 19, 1976		
GUINEA, Rep. of			
JAPAN	June 14, 1973	Sept. 7, 1980	Sept. 7, 1980
KOREA, Rep. of	Jan. 21, 1973	Sept. 15, 1980	
MOROCCO	No fishing		
PORTUGAL	Nov. 26, 1973	July 17, 1981	Aug. 10, 1984
RUSSIA	Sept. 28, 1978	Sept. 28, 1978	
SAO TOME & PRINCIPE			
SOUTH AFRICA	May 1973	Dec. 5, 1980	Dec. 5, 1980
SPAIN	May 29, 1974		Aug. 14, 1987
URUGUAY			
USA	Nov. 5, 1975	March 30, 1981	April 9, 1986
VENEZUELA	Nov. 19, 1981	Nov. 19, 1981	Nov. 19, 1981
CUBA*	July 1, 1973	Sept. 7, 1980	
SENEGAL*	July 2, 1976	July 2, 1976	July 2, 1976

* These countries have withdrawn from the Commission (Senegal 31-XII-88, Cuba 31-XII-91).
NOTE: For more details on national regulations, please request information from the country's administration.

Status of implementation by the member countries of the ICCAT recommendations.

Table 2. BLUEFIN TUNA - ATLANTIC OCEAN (including MEDITERRANEAN SEA).

Recommendation	*Minimum size 6.4 kgs*	*Limiting fishing mortality to recent levels*				
			1st Extension	*2nd Extension*	*3rd Extension*	*4th Extension*
Area of application	*Entire Atl.*	*Entire Atl.*	*Entire Atl.*	*Entire Atl.*	*Entire Atl.*	*East Atl. only*
Entry into effect	*Aug. 10, 1975*	*Aug. 10, 1975*	*Aug. 10, 1976*	*Oct. 10, 1978*	*Sept. 4, 1980*	*July 21, 1982*
Date of expiration	*Indefinite*	*Aug. 10, 1976*	*Aug. 10, 1978*	*Aug. 10, 1980*	*Aug. 10, 1982*	*Indefinite*
ANGOLA	No fishing	.....No fishing.....				
BENIN						
BRAZIL		Aug. 10, 1977	Aug. 18, 1977	March 2, 1979	Nov. 17, 1980*	
CANADA	Feb. 17, 1973	Feb. 17, 1976	Feb. 17, 1976	Feb. 15, 1979	Feb. 15, 1979	Feb. 15, 1979
CAPE VERDE						
COTE D'IVOIRE						
EQUATORIAL GUINEA						
FRANCE	Aug. 8, 1975		Dec. 27, 1974	Dec. 27, 1974	Dec. 27, 1974	Dec. 27, 1974
GABON	No fish./land.	.....No fishing.....				
GHANA						
GUINEA, Rep. of						
JAPAN	April 16, 1975	April 16, 1975	April 16, 1975	April 16, 1975	April 16, 1975	March 3, 1982
KOREA, Rep. of	Dec. 17, 1975	Dec. 17, 1975	Dec. 17, 1975	Oct. 14, 1978	Sept. 15, 1980	
MOROCCO						
PORTUGAL	Nov. 27, 1976		Nov. 27, 1976	**	**	**
RUSSIA	Sept. 28, 1978					
SAO TOME & PRINCIPE						
SOUTH AFRICA	June 27, 1975	June 27, 1975	Oct. 19, 1976	Feb. 9, 1979	Jan. 11, 1980	
SPAIN	March 3, 1975	Feb. 19, 1976	Feb. 19, 1976	Feb. 19, 1976	Jan. 24, 1980	
URUGUAY						
USA	Aug. 13, 1975	Aug. 13, 1975	May 18, 1976	June 15, 1979	June 13, 1980	
VENEZUELA	Nov. 19, 1981					
CUBA***	No fishing	.....Zero catches in 1976-78.....				
SENEGAL***						March 11, 1982

* In process.
** Objections presented and ratified on November 16, 1978, March 19, 1980, and July 21, 1982.
*** These countries have withdrawn from the Commission (Senegal 31-XII-88, Cuba 31-XII-91).
NOTE: For more details on national regulations, pleease request information from the country's administration.

Status of implementation by the member countries of the ICCAT recommendations.

Table 3. BLUEFIN TUNA - WEST ATLANTIC.

Catch prohibited, except for monitoring purposes	*1,160 MT*	*2,660 MT*	*2,660 MT*	*2,660 MT*	*2,660 MT*
Minimum size limit 120 cm	*no*	*yes*	*yes*	*yes*	*yes*
Catch prohibited on Gulf of Mexico spawning stock	*yes*	*yes*	*yes*	*yes*	*yes*
Date of entry into effect	*Feb. 15, 1982*	*January 1983*	*January 1984*	*January 1985*	*January 1986*
Date of expiration	*January 1983*	*January 1984*	*January 1985*	*January 1986*	*January 1992***
ANGOLA	.....No fishing.....				
BENIN					
BRAZIL	.....Developing fishery not subject to limitation.....				
CANADA	June 14, 1982	June 21, 1983	June 21, 1983	Sept. 16, 1985	Sept. 16, 1985
CAPE VERDE					
COTE D'IVOIRE					
EQUATORIAL GUINEA					
FRANCE					
GABON	.....No fishing or landings.....				
GHANA					
GUINEA, Rep. of					
JAPAN	March 3, 1982	March 7, 1983	March 7, 1983	March 7, 1983	March 7, 1983
KOREA, Rep. of					
MOROCCO					
PORTUGAL	.....No fishing.....				
RUSSIA			Feb. 15, 1984	Feb. 15, 1984	
SAO TOME & PRINCIPE					
SOUTH AFRICA	.....No fishing or landings.....				
SPAIN					
URUGUAY					
USA	June 11, 1982	June 17, 1983	July 24, 1984	Nov. 25, 1985	Nov. 25, 1985
VENEZUELA					
CUBA***	.....Developing fishery not subject to limitation.....				
SENEGAL***					

* Details on the ICCAT recommendations are given in the Biennial Reports of the Commission, starting with the "Report for Biennial Period 1982-83, Part I".
** This recommendation has been extended each year since 1986. It was in force until the end of 1991.
*** These countries have withdrawn from the Commission (Senegal 31-XII-88, Cuba 31-XII-91).
NOTE: For more details on national regulations, please request information from the country's administration.

Status of implementation by the member countries of the ICCAT recommendations.

Table 4. SWORDFISH.

Commission recommendations	*Fishing mortality of fish > 25 kgs to be 15 % less than recent levels*	*25 kgs minimum size limit (125 cm fork length)*	*Limiting directed fishing mortality to 1988 levels*	*Limiting incid. catch of SWO to 10 % of total catch in weight of targeted species*
Area of application	*North of 5ºN*	*Entire Atlantic*	*Entire Atlantic*	*North Atlantic*
Date of entry into effect	*July 1, 1991*	*July 1, 1991*	*July 1, 1991*	*July 1, 1991*
Date of expiration	*Indefinite*	*Indefinite*	*Indefinite*	*Indefinite*
ANGOLA				
BENIN				
BRAZIL				
CANADA				
CAPE VERDE				
COTE D'IVOIRE				
EQUATORIAL GUINEA				
FRANCE				
GABON				
GHANA				
GUINEA, Rep. of				
JAPAN				
KOREA, Rep. of				
MOROCCO				
PORTUGAL				
RUSSIA				
SAO TOME & PRINCIPE				
SOUTH AFRICA				
SPAIN		Feb. 25, 1991		Feb. 25, 1991
URUGUAY				
USA				
VENEZUELA				
CUBA*				
SENEGAL*				

* These countries have withdrawn from the Commission (Senegal 31-XII-88, Cuba 31-XII-91).
NOTE: For more details on national regulations, please request information from the country's administration.

ANNEX 15

REPORT OF THE MEETING OF THE STANDING COMMITTEE ON FINANCE AND ADMINISTRATION (STACFAD)

1. OPENING OF THE MEETING

1.1 The 1991 meeting of STACFAD was opened by the Commission Chairman, Mr. S. Makiadi J. Lopes (Angola), since the Committee Chairmanship was vacant after the resignation of Mrs. P. García Doñoro.

1.2 However, Mrs. García Doñoro, the former STACFAD Chairman, attended the meeting for a few minutes to greet the members of the Committee and express her appreciation to the Group for their collaboration over the years. She also wished to say a special good-bye to Dr. Olegario Rodríguez Martín and to thank him for his support during all the years she was involved in the Commission's work.

1.3 The Delegate of Spain thanked Mrs. Doñoro for her excellent work in ICCAT. Several other delegations also expressed their appreciation to the former STACFAD Chairman and wished her success in her new position.

1.4 The Delegate of Spain suggested that Mr. Makiadi serve as interim STACFAD Chairman for the 1991 session. This proposal was unanimously supported by the Committee.

1.5 Mr. Makiadi, on behalf of Commission, congratulated Mrs. Doñoro for her invaluable contribution to STACFAD over the past years.

1.6 He also accepted the chairmanship of this Committee for the interim period.

2. ADOPTION OF AGENDA

2.1 The Tentative Agenda, circulated prior to the meeting, was adopted without change and is attached as Appendix 1 to Annex 15.

3. ELECTION OF RAPPORTEUR

3.1 Mr. J. Pereira (Portugal) was elected rapporteur.

4. ADMINISTRATIVE REPORT (1991 ACTIVITIES)

4.1 The Executive Secretary presented the Administrative Report (COM/91/8). He called attention to various items contained in the Report, particularly those which have financial repercussions. He also referred to the ICCAT meetings held in 1991 and the publications issued by the Commission. He made particular reference to the French and Spanish versions of the "Field Manual", the Yellowfin Year Program publication, and the translation into Spanish of the FAO book on tropical tunas.

4.2 The Committee was also referred to the Secretariat Report on Statistics (COM-SCRS/91/11) which provides details on activities related to the coordination of research.

5. AUDITOR'S REPORT - 1990

5.1 The Executive Secretary reported that the 1990 Auditor's Report had been distributed to the Contracting Parties countries in May, 1991. This Report provided information on the audit carried out on the Commission's accounts.

6. FINANCIAL STATUS AT THE END OF THE 2ND HALF OF THE BIENNIAL BUDGET - 1991

6.1 The Executive Secretary referred the Committee to the Financial Report (COM/91/9). He called the Committee's attention to the accumulated debt owed to the Commission which amounted to over US$ 800,000 at the time of the meeting. He emphasized that the major problem of the Commission was the matter of the pending contributions.

7. MEMBER COUNTRY CONTRIBUTIONS PENDING PAYMENT

7.1 The Committee was referred to a statement in the Financial Report which provides a breakdown of the status of the member country contributions.

8. REVIEW OF THE WORKING CAPITAL FUND

8.1 The Executive Secretary reviewed the current status of the Working Capital Fund, as provided in the Financial Report. He pointed out that cash in the Fund was practically depleted, due to the numerous applications of this reserve to cover the lack of funds in the Regular Budget. He indicated that at the end of the current Fiscal Year, the Working Capital Fund may end with a negative cash balance.

9. FINANCIAL STATUS OF THE YELLOWFIN YEAR PROGRAM

9.1 The Executive Secretary noted that the Yellowfin Year Program had culminated with the publication of the final results. He noted that the cost of the publication had exceeded the funds available from the Program and that the cost overrun was charged to the Regular Budget.

10. FINANCIAL STATUS OF THE ALBACORE RESEARCH PROGRAM

10.1 The Executive Secretary indicated that Albacore Program funds showed a balance of US$ 15,052.51 which are deposited in a special fund, for use only by this Program.

11. FINANCIAL STATUS OF THE PROGRAM OF ENHANCED RESEARCH FOR BILLFISH

11.1 The Executive Secretary informed the Committee that the Billfish Fund had a balance of US$ 9,264.77 as of October 25, 1991. He reiterated that this Program of Enhanced Research is financed entirely by outside sources.

11.2 The Chairman thanked the Executive Secretary for providing details on the financial situation of the Commission and expressed concern about the financial condition of the Commission. He also congratulated those countries who paid their contributions in advance, such as Gabon.

11.3 The Delegate from Uruguay informed the Committee that her country had approved the 1991 contribution to ICCAT and payment would be forthcoming.

11.4 The Delegates of Sao Tomé & Principe and Angola also informed the Committee that the necessary steps had been taken to dispatch their respective contributions to the Commission.

11.5 The Delegate of Ghana informed the Committee that the Government of Ghana had issued the necessary instructions to pay Ghana's full contribution to the end of 1990, i.e. US$ 212,004.27, which would be paid soon.

12. STUDY OF THE POSSIBLE CHANGE IN THE COMMISSION'S BUDGET CURRENCY

12.1 In accordance with a mandate from the Commission at the 1990 meeting, the Executive Secretary presented a document (COM/91/16) on the study of the eventual change in the Commission's budget base currency.

12.2 He commented on the negative effect which currency fluctuations have had on the ICCAT budgets in recent years. He emphasized that if the Commission changed to a Peseta based budget, that these should be "Convertible Pesetas", to allow for changes into any other foreign currencies at any time.

12.3 Several delegations noted that they may have difficulties paying in Pesetas since their budgetary processes must go through dollars and expressed their desire to maintain the budget base currency in United States Dollars.

12.4 The Executive Secretary clarified that even if the budget is in Pesetas, payment of country contributions could still be made in another currency.

12.5 The Delegate of France expressed that the budget based in local currency would avoid problems for the Secretariat, especially since a major part of its expenses are paid in Pesetas. He also indicated that since the Peseta is part of the European Monetary System, there is a limit to its fluctuation, thereby giving more stability to the budget.

12.6 The Delegate of Spain agreed with France that a change in the base currency to Pesetas would be favorable to the Commission and would avoid the effect of fluctuation on the Commission's accounts.

12.7 The Delegate of Russia asked for clarification on the difference between "convertible" Pesetas and "domestic" Pesetas. This was clarified by the Executive Secretary who explained that funds deposited to the Commission's Convertible Pesetas account can be converted later to any other foreign currency.

12.8 The Delegate of the U.S., while not objecting to the change to Pesetas, pointed out that the decision on the currency should be based on what is best for the financial resources of the Commission.

12.9 The Delegate of Ghana indicated that the U.S. dollar was the reference currency for the majority of the countries and that some countries could encounter difficulties to make payments in another currency.

12.10 The Delegate of South Africa expressed his country's support for the Peseta-based budget as it would insure that the Secretariat has a stable budget to work with during the year.

12.11 The Delegates of Canada and Japan indicated that their respective countries could accept the budget based in Pesetas.

12.12 The Executive Secretary pointed out that with the budget based in Pesetas, the effects of currency fluctuation will be assumed by Contracting Party, rather than by the Commission.

12.13 In order to expedite the discussions, the Delegate of Ghana moved that the Committee accept the change in the ICCAT budget currency from United States Dollars to Convertible Pesetas, and that this proposal be recommended to the Commission for adoption. This motion was supported by the Delegates of South Africa, Korea, France, Gabon, Canada, Angola, Sao Tome & Principe, Uruguay, Morocco, Portugal, Côte d'Ivoire, Spain and Venezuela. The Delegates of the United States, Brazil, and Japan abstained. The Delegate of Russia expressed reservation to the motion by Ghana since he has to consult with his Government to confirm whether such a change is in accordance with the ICCAT Convention.

13. REVIEW OF THE FINANCIAL IMPLICATIONS OF 1992 COMMISSION ACTIVITIES:

a) Recommendations made in research and statistics

13.1 The SCRS Chairman referred to the Report of the Sub-Committee on Statistics and pointed out, in particular, those recommendations which may have financial repercussions. He mentioned that a fishery biologist should be recruited for the vacancy left by the programmer who left ICCAT. He also referred to the SCRS recommendation that a biostatistician be contracted to carry out a biostatistical review of the tropical tunas data base and sampling methodology.

13.2 Other SCRS scientists reiterated the necessity to contract a biostatistician to study this matter since at present 80 to 90 percent of the Atlantic purse seine tropical catches are affected by the sampling problem related to the recent changes in fishing strategy.

b) Proposed intersessional meetings

13.3 The SCRS Chairman reported to the Committee on the intersessional meetings proposed by the scientific committee for 1992 and which may have financial repercussions, such as:

- A second joint GFCM/ICCAT meeting on stock assessment of large pelagic fish in the Mediterranean Sea
- A Billfish Workshop, to be held at the NMFS Southeast Fisheries Center in Miami
- A Data Preparatory Meeting of the Working Group on Western Tropical Tunas, tentatively to be held in Brazil, if a formal invitation is received.

13.4 The Delegate of Uruguay emphasized the importance of the program for the southwestern Atlantic, and reiterated the request for financial support for on-board sampling. However, she indicated that no funds would be needed until 1993. Therefore, she asked that funds needed for this program be taken into account at next year's meeting of the Commission.

c) Commission publications

13.5 The Executive Secretary reiterated the ICCAT publications, as outlined in the Administrative Report.

d) Next Commission meeting

13.6 The Executive Secretary reminded the Committee of the financial implications involved in holding its next meeting outside Madrid, since the budget was prepared under the assumption that the meeting would be held in Madrid.

e) Change in the Executive Secretary

13.7 Even though the official announcement of the new Executive Secretary had not yet been made, Dr. O. Rodríguez Martín informed the Committee that no additional funding would be necessary, since the new Executive Secretary resided in Madrid.

13.8 Reference was made to the ICCAT Staff Rules and the pertinent articles that could be applied as concerns an indemnity to the outgoing Executive Secretary. The Committee agreed that this matter would be decided in consultation with the Commission Chairman, STACFAD Chairman, and the new Executive Secretary.

f) Others

13.9 In view of some of the questions raised about indemnity and other staff related matters, the Delegate of Spain suggested that the Staff Rules be reviewed next year, and this was supported by the majority of the delegations present.

13.10 The Delegate of the United States suggested that a memorial or testimonial publication be issued in recognition of Dr. Rodríguez Martín's more than 21 years of dedicated service to ICCAT. This suggestion was wholeheartedly supported by the members of the Committee, and it was also noted that such a publication would lend prestige to the Commission.

13.11 The Executive Secretary expressed his appreciation to the Committee for such a gesture. He also indicated that he felt that the cost of such a publication would have no substantial financial implications on the Commission's budget.

14. ADOPTION OF THE 1992-1993 BIENNIAL BUDGET

14.1 The Executive Secretary referred the Committee to the Estimated Budget (COM/91/10) and explained in detail the different budget items and the tables attached to this document. He indicated that the total 1992 budget was the same as that for 1991, (in terms of U.S. Dollars), i.e. US$ 1,185,000. (See Item 14.4.)

14.2 The Committee asked for some clarification as to whether provision had been made in the 1992 budget for the biostatistician's contract and for travel expenses to attend the various inter-sessional meetings proposed by the SCRS. The Executive Secretary responded that travel expenses would not pose any problem if only one member of the Secretariat staff is required to attend. However, if two members of the staff are required, then there could be some difficulty.

14.3 As regards the biostatistician's contract, the Executive Secretary indicated that when the budget was prepared some provision was provided for biostatistical work, but this amount would not cover the cost of a high-level biostatistician's salary for a 6-7 month period. One suggestion was that the hiring of the contracted biostatistician could wait until the latter part of 1992, and if cash is available, his contract can be funded for a few months from the 1992 budget and the rest of the period from the 1993 budget.

14.4 In view of the earlier discussions of this Committee as regards the change in the budget base currency from United States dollars to Convertible Pesetas, the Committee requested to see the 1992 budget in terms of Pesetas. The Secretariat provided the 1992 budget, based in Pesetas, and explained that the dollar amounts had been converted to Pesetas at the rate of 104 (for a total budget of 123,240,000 Pesetas). The Revised Budget for 1992, in Convertible Pesetas, is attached herewith as Table 1*.

14.5 The Delegate of South Africa moved that the Committee approve the 1992-1993 Biennial Budget (in Pesetas), with the condition that the 1993 Budget be revised at the next Commission meeting, and that this Budget be recommended to the Commission for adoption. This motion was seconded by the majority of the delegations present.

15. MEMBER COUNTRY CONTRIBUTIONS TO THE 1992-1993 BUDGET

15.2 The Executive Secretary referred the Committee to the Estimated Budget (COM/91/10), specifically the table which showed the catch and canning data as provided by the national offices. Dr. Rodríguez Martín indicated to the Committee that the base year used in the calculations of the 1992-1993 member country contributions was 1989. He indicated that the contribution tables had been updated, to reflect changes in the Commission membership (i.e., the withdrawal of Cuba in 1992), Panel membership, and updated information on catch and canning (i.e. Morocco).

15.3 The Executive Secretary referred the Committee to Tables 2-A and 2-B, which show the member country contributions for 1992-1993 (in Convertible Pesetas).

15.4 The Executive Secretary expressed appreciation to all those member countries for their efforts inpaying their contributions in 1991, in particular, Gabon and Venezuela. However, he called the Committee's attention to the accumulated pending contributions of some of the member countries, which is the main reason for the financial problems of the Commission.

15.5 The Chairman of STACFAD recommended that letters, signed by the Commission Chairman, be written to the countries that owe money to the Commission.

15.6 The Delegate of France suggested that the countries that owe money to the Commission be requested to pay at least part of their outstanding debts, and this could alleviate some of the financial difficulties of the Commission.

15.7 The Delegate of South Africa proposed that Tables 2-A and 2-B, showing the 1992-1993 contributions, be adopted by the Committee and recommended to the Commission for final adoption, with

*Later, at a Plenary Session, the Commission agreed to add 2,600,000 Pesetas to the 1992 Budget to cover the expenses of holding a Conference of Plenipotentiaries in 1992. Consequently, the 1992 total budget amounts to 125,840,000 Pesetas.

the condition that the contributions for 1993 could be revised at the next Commission meeting.

15.8 The Delegate of France proposed, in order to be consistent with the adoption of our budget and contributions in Pesetas, that the Commission amend Regulation 2.3 of the Financial Regulations to reflect the change in the budget base currency.

16. OTHER FINANCIAL AND ADMINISTRATIVE MATTERS

16.1 The Executive Secretary presented document COM/91/21, which is his declaration on the financial status of the Commission and an outlook for the future. This document provides information on the critical situation of the Commission, including information on the diminishing cash reserves in Commission accounts, and provides some options to be considered. This declaration is attached as Appendix 2 to Annex 15.

17. ELECTION OF CHAIRMAN

17.1 The Delegate of Portugal nominated Mr. D. Silvestre (France) for the chairmanship of the Committee, and this was seconded by the Delegate of Spain. Mr. Silvestre was unanimously elected STACFAD Chairman for the 1992-1993 biennial period.

18. ADOPTION OF REPORT

18.1 The 1991 STACFAD Report was adopted.

19. ADJOURNMENT

19.1 The 1991 meeting of STACFAD was adjourned.

Table 1. Budget adopted for the 1992-1993 biennial period (in Pesetas)

Chapter	*1992* *125,840,000*	*1993** *129,402,000*
1. Salaries	68,016,000	71,416,800
2. Travel**	1,040,000	1,092,000
3. Annual Commission Meeting	5,200,000	5,460,000
4. Publications	3,120,000	3,276,000
5. Office Equipment	728,000	764,400
6. Operating Expenses	9,568,000	10,046,400
7. Miscellaneous	520,000	546,000
Sub-total	88,192,000	92,601,600
8. Coordination of Research		
a) Salaries	19,760,000	20,748,000
b) Travel for improvement of statistics	1,040,000	1,092,000
c) Port sampling	1,560,000	1,638,000
d) Biostatistical work	1,248,000	1,310,400
e) Electronic equipment	1,560,000	1,638,000
f) Data processing	3,952,000	4,149,600
g) Scientific meetings	5,928,000	6,224,400
h) Miscellaneous	0	0
i) Albacore Research Program	0	0
j) Billfish Program***	0	0
Sub-total	35,048,000	36,800,400
Conference of Plenipotentiaries	2,600,000	0
TOTAL BUDGET	125,840,000	129,402,000

* Provisional.
** No provision has been made for Professional Staff "home leave" in 1993.
*** Funded by the Trust Fund for Billfish Research.

Table 2.A. **Member country contributions to the 1992 Commission Budget**

Based on 1989 figures

				Total Budget (Convertible Pesetas)			**125,840,000**				
Country	Panel # (A)	Panel % (B)	Catch MT (C)	Canning MT (D)	C+C MT (E)	C+C % (F)	Fee Conv. Pts (G)	Panel Conv. Pts (H)	Panel Conv. Pts (I)	C+C Conv. Pts (J)	Total Conv. Pts (K)
Angola	2	5.000	609	244	853	0.142	104,000	208,000	1,993,333	112,849	2,418,183
Bénin	0	1.667	444	0	444	0.074	104,000	0	664,444	58,740	827,184
Brasil	2	5.000	21,023	1,475	22,498	3.733	104,000	208,000	1,993,333	2,976,415	5,281,748
Canada	2	5.000	1,940	4,974	6,914	1.147	104,000	208,000	1,993,333	914,700	3,220,034
Cap Vert	1	3.333	4,675	177	4,852	0.805	104,000	104,000	1,328,889	641,904	2,178,793
Côte d'Ivoire	1	3.333	5,120	8,000	13,120	2.177	104,000	104,000	1,328,889	1,735,735	3,272,624
España	4	8.333	155,661	36,743	192,404	31.924	104,000	416,000	3,322,222	25,454,445	29,296,667
France	3	6.667	57,600	22,883	80,483	13.354	104,000	312,000	2,657,778	10,647,648	13,721,426
Gabon	1	3.333	0	0	0	0.000	104,000	104,000	1,328,889	0	1,536,889
Ghana	1	3.333	47,091	0	47,091	7.814	104,000	104,000	1,328,889	6,229,991	7,766,880
Guinea Ecuatorial	0	1.667	400	0	400	0.066	104,000	0	664,444	52,919	821,363
Japan	4	8.333	63,355	0	63,355	10.512	104,000	416,000	3,322,222	8,381,668	12,223,890
Korea	3	6.667	12,512	0	12,512	2.076	104,000	312,000	2,657,778	1,655,298	4,729,076
Maroc	2	5.000	3,320	210	3,530	0.586	104,000	208,000	1,993,333	467,008	2,772,341
Portugal	3	6.667	13,299	13,198	26,497	4.396	104,000	312,000	2,657,778	3,505,470	6,579,248
Russia	2	5.000	20,472	294	20,766	3.446	104,000	208,000	1,993,333	2,747,277	5,052,610
S.Tomé & Principe	1	3.333	330	0	330	0.055	104,000	104,000	1,328,889	43,658	1,580,547
South Africa	1	3.333	6,670	67	6,737	1.118	104,000	104,000	1,328,889	891,284	2,428,173
U.S.A.	4	8.333	26,427	37,076	63,503	10.537	104,000	416,000	3,322,222	8,401,248	12,243,470
Uruguay	0	1.667	522	0	522	0.087	104,000	0	664,444	69,059	837,503
Venezuela	2	5.000	32,875	2,999	35,874	5.952	104,000	208,000	1,993,333	4,746,018	7,051,351
Total	39	100	474,345	128,340	602,685	100	2,184,000	4,056,000	39,866,667	79,733,333	125,840,000

A: Panel membership.
B: % annual and panel membership (G+H).
C: Catch (live weight).
D: Canned production (net weight).
E: Total (C+D).
F: Percentage distribution of E.
G: Pesetas equivalent to $1000 annual membership fee (at the time of calculation).
H: Pesetas equivalent to $1000 for each panel membership (at the time of calculation).
I: 1/3 of (Total less G+H) distributed according to col. B %.
J: 2/3 of (Total less G+H) distributed according to col. F %.
K: Total (G+H+I+J)

Table 2.B. **Member country contributions to the 1993 Commission Budget**

Based on 1989 figures

				Total Budget (Convertible Pesetas)			**129,402,000**				
Country	Panel # (A)	Panel % (B)	Catch MT (C)	Canning MT (D)	C+C MT (E)	C+C % (F)	Fee Conv. Pts (G)	Panel Conv. Pts (H)	Panel Conv. Pts (I)	C+C Conv. Pts (J)	Total Conv. Pts (K)
Angola	2	5.000	609	244	853	0.142	104,000	208,000	2,052,700	116,210	2,480,910
Bénin	0	1.667	444	0	444	0.074	104,000	0	684,233	60,489	848,723
Brasil	2	5.000	21,023	1,475	22,498	3.733	104,000	208,000	2,052,700	3,065,060	5,429,760
Canada	2	5.000	1,940	4,974	6,914	1.147	104,000	208,000	2,052,700	941,943	3,306,643
Cap Vert	1	3.333	4,675	177	4,852	0.805	104,000	104,000	1,368,467	661,022	2,237,489
Côte d'Ivoire	1	3.333	5,120	8,000	13,120	2.177	104,000	104,000	1,368,467	1,787,430	3,363,896
España	4	8.333	155,661	36,743	192,404	31.924	104,000	416,000	3,421,167	26,212,545	30,153,712
France	3	6.667	57,600	22,883	80,483	13.354	104,000	312,000	2,736,933	10,964,763	14,117,696
Gabon	1	3.333	0	0	0	0.000	104,000	104,000	1,368,467	0	1,576,467
Ghana	1	3.333	47,091	0	47,091	7.814	104,000	104,000	1,368,467	6,415,537	7,992,004
Guinea Ecuatorial	0	1.667	400	0	400	0.066	104,000	0	684,233	54,495	842,728
Japan	4	8.333	63,355	0	63,355	10.512	104,000	416,000	3,421,167	8,631,296	12,572,462
Korea	3	6.667	12,512	0	12,512	2.076	104,000	312,000	2,736,933	1,704,597	4,857,531
Maroc	2	5.000	3,320	210	3,530	0.586	104,000	208,000	2,052,700	480,917	2,845,617
Portugal	3	6.667	13,299	13,198	26,497	4.396	104,000	312,000	2,736,933	3,609,872	6,762,805
Russia	2	5.000	20,472	294	20,766	3.446	104,000	208,000	2,052,700	2,829,098	5,193,798
S.Tomé & Principe	1	3.333	330	0	330	0.055	104,000	104,000	1,368,467	44,958	1,621,425
South Africa	1	3.333	6,670	67	6,737	1.118	104,000	104,000	1,368,467	917,829	2,494,295
U.S.A.	4	8.333	26,427	37,076	63,503	10.537	104,000	416,000	3,421,167	8,651,459	12,592,625
Uruguay	0	1.667	522	0	522	0.087	104,000	0	684,233	71,116	859,349
Venezuela	2	5.000	32,875	2,999	35,874	5.952	104,000	208,000	2,052,700	4,887,366	7,252,066
Total	39	100	474,345	128,340	602,685	100	2,184,000	4,056,000	41,054,000	82,108,000	129,402,000

A: Panel membership.
B: % annual and panel membership (G+H).
C: Catch (live weight).
D: Canned production (net weight).
E: Total (C+D).
F: Percentage distribution of E.
G: Pesetas equivalent to $1000 annual membership fee (at the time of calculation).
H: Pesetas equivalent to $1000 for each panel membership (at the time of calculation).
I: 1/3 of (Total less G+H) distributed according to col. B %.
J: 2/3 of (Total less G+H) distributed according to col. F %.
K: Total (G+H+I+J)

Appendix 1 to Annex 15

STACFAD AGENDA

1. Opening of the meeting
2. Adoption of Agenda
3. Election of Rapporteur
4. Administrative Report (1991 activities)
5. Auditor's Report - 1990
6. Financial status at the end of the 2nd half of the biennial budget - 1991
7. Member country contributions pending payment
8. Review of the Working Capital Fund
9. Financial status of the Yellowfin Year Program
10. Financial status of the Albacore Research Program
11. Financial status of the Program of Enhanced Research for Billfish
12. Study of the possible change in the Commission's budget currency
13. Review of the financial implications of 1992 Commission activities:
    a) Recommendations made in research and statistics
    b) Proposed intersessional meetings
    c) Commission publications
    d) Next Commission meeting
    e) Change in the Executive Secretary
    f) Others
14. Adoption of the 1992-1993 biennial budget
15. Member country contributions to the 1992-1993 budgets
16. Other financial and administrative matters
17. Election of Chairman
18. Adoption of Report
19. Adjournment

Appendix 2 to Annex 15

DECLARATION BY THE EXECUTIVE SECRETARY ON THE COMMISSION'S OUTLOOK FOR THE FUTURE

As the end of 1991 nears, and as I am about to leave my position as Executive Secretary of the International Commission for the Conservation of Atlantic Tunas, I am faced with the necessity of have to present to the Delegates this Declaration on the critical financial situation of the Commission.

1. Cash reserves

We expect to be able to meet all invoices and the staff payroll to the end of 1991. However, there will be no cash reserves for 1992.

2. Delays in the payment of the contributions

2.1 As has occurred in other years, this year several countries have not paid their contributions. However, the problem is getting worse and worse, as more and more countries are in arrears. The situation has reached an extreme.

2.2 In referring to this matter, the 1991 Financial Report (COM/91/9), as presented at this meeting, indicates that:

"Of the total approved budget (US$ 1,185,000), contributions have been received totalling US$ 888,446.34. Only 8 countries have paid their 1991 contributions in full. Three countries have made partial payment, and we hope to receive the balance of these by the end of this Fiscal Year.

"On the other hand, eleven (11) member countries have not yet paid their 1991 contributions and eight (8) of these countries have debts pending from other years.

"There are contributions pending payment for 1991 totaling US$ 296,553.66, which represents 25% of the total budget.

"The above figure is quite indicative of the apathy of some member countries towards meeting their debt to the Commission. However, what is ever

more alarming is the accumulated debt owed to the Commission, which amounts to US$ 872,448.51."

2.3 This matter is nothing new and on numerous occasions it has been the subject of discussion at STACFAD meeting. In this regards, I would like to remind the Commissioners what was stated in a report presented to the Commission at the 1987 Meeting (COM/87/12):

"It is obvious that for an organization to be effective, it should have sufficient resources which guarantee its financing. The downturn which ICCAT has experienced in recent years with regard to it financial resources is notable. The debt owed to the Commission for contributions, that is accumulating year after year, has reached an alarming amount."

The financial crisis of the Commission has been discussed in detail for the past few years at Commission and STACFAD meetings, and at a special intersessional STACFAD meeting in 1986.

Various delegations have indicated their concern about the increase in the Commission's debt, especially that of some of the member countries. They have also indicated concern about the deteriorating condition of the Working Capital Fund.

3. Working Capital Fund

3.1 During those years when there was a favorable currency exchange rate, the Working Capital Fund accumulated a substantial balance, and was able to absorb the unpaid contributions. This Fund has proved extremely useful and because of we have been able to maintain the activities of the Commission.

However, the amount of the unpaid contributions has increased, there have been substantial deductions from the Fund (reallocating to reduce the contributions and the financing of the Yellowfin Year Program), and combined with an unfavorable exchange rate, has resulted in a diminishing Working Capital Fund.

3.2 In 1988, faced with a precarious cash reserve, the Executive Secretary consulted with the STACFAD Chairman, and then invited boat owners and the private sector of member and non-member countries involved in commercial tuna fishing to make voluntary contributions to the Commission.

The responses to these requests were quite diverse, ranging from the receipt of checks, to letters of encouragement to the Commission to continue its important activities but emphasizing that the financial responsibilities of the Commission corresponded to the member country governments, and not to the private sector.

3.3 At the end of 1991, the Commission's already diminishing cash reserves will be practically depleted, further complicated by a 25% shortfall of budgeted income from contributions.

4. Options for the consideration of the Commission

- The realistic budget decided upon by the Commission each year should be increased by 25 to 30% to compensate for the arrears in contributions.

- Adopt, as soon as possible, a new formula to calculate the member country contributions, so that the burden on the countries in arrears can be alleviated.

- Apply Article X-8 of the Convention, which states: "The Commission may suspend the voting rights of any Contracting Party when its arrears of contributions equal or exceed the amount due from it for the two preceding years."

- Apply emergency measures (i.e. a special budget) to rebuild the Working Capital Fund.

- Consider the possibility of applying for a short-term bank loan.

- Consider other sources of income (e.g., charge a registration fee for all participants, increase observer fees and make them obligatory, impose a surcharge on catches, etc.)

5. Final comments

5.1 Before adjourning the 12th Regular Meeting of the Commission, it is absolutely necessary that the Delegates find an adequate solution to put an end to the financial problems of the Commission.

5.2 With this DECLARATION, I hope to find solutions so as to facilitate the administration of the Commission's affairs for the new Executive Secretary, for the benefit of the continuity of this Commission's work.

ANNEX 16

REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)
(Madrid, November 4-8, 1991)

1. OPENING OF THE MEETING

The Standing Committee on Research and Statistics (SCRS) held its 22nd Regular Meeting in Madrid, Spain, at the Hotel Pintor, from November 4 to 8, 1991. During the week preceding the Committee's meeting, the species groups met, reviewed the scientific papers presented, made additional stock assessment analyses and prepared draft reports of the stock assessment sections for each species.

The SCRS Chairman, Dr. J. L. Cort, opened the Committee Meeting and welcomed all the scientific delegations. He pointed out that there were several intersessional meetings in which ICCAT was directly involved in 1991, and other non-ICCAT sponsored meetings in which many of the scientists attending this session also participated. He noted that many achievements were made and he was looking forward to the reports being presented on the progress made by the Committee since its 1990 meeting.

2. ADOPTION OF AGENDA AND ARRANGEMENTS FOR THE MEETING

The SCRS Agenda, circulated prior to the meeting, was reviewed. Some modifications were introduced and the Agenda was adopted (Appendix 1). It was understood that the review of the report of the stock assessments made on Indian Ocean tropical tunas will be made under the Agenda Item 10 (in particular in reference to tropical tunas.)

The following scientists served as rapporteurs for the 1991 Report:

Agenda Item 10:

Tropical Tunas, Gen.:	A. Fonteneau
YFT: Yellowfin	P. Pallarés
BET: Bigeye	J. Pereira
SKJ: Skipjack	J. Ariz
ALB: Albacore	F. X. Bard
BFT: Bluefin	J. Beckett
BIL: Billfish	E. Prince
SWO: Swordfish	Z. Suzuki
SBF: So. bluefin	Y. Ishizuka
SMT: Small tunas	A. Delgado de Molina
All other items:	P. M. Miyake

3. INTRODUCTION OF DELEGATIONS

A spokesman from each member country introduced the members of his respective delegation. The List of Participants is attached as Appendix 2.

4. ADMISSION OF OBSERVERS

The observers from non-member countries and international organizations, listed in the List of Participants (Appendix 2), were introduced and admitted.

5. ADMISSION OF SCIENTIFIC PAPERS

The Committee reviewed the papers submitted to the 1991 meeting. Two papers related to swordfish stock assessments were received much after the stock assessment meeting was over and therefore could not be accepted. However, these documents were distributed at this time with 1992 SCRS numbers.

A few documents did not quite meet the criteria established by the SCRS for the acceptance of the scientific papers. The SCRS Chairman established an Ad Hoc Committee to review the acceptance of the papers and nominated Dr. B. E. Brown (U.S.A.) to convene the Group.

At a later session, Dr. Brown reported the recommendations by the group concerning the acceptance of this year's papers. At the same time the Ad Hoc Committee recommended that another criterion be adopted by the Committee, i.e., only papers presented through the delegations of member countries or of those formally invited as observers by the Commission should be accepted as SCRS documents.

The List of Documents is presented as Appendix 3 and the report of the Ad Hoc Committee to review the acceptance of the scientific papers is attached as Appendix 4.

6. REVIEW OF NATIONAL FISHERIES AND RESEARCH PROGRAMS

In addition to the National Reports, included in Chapter III of this volume, the member countries and

observers were asked to present a short summary of tuna fishing activities to be included in this chapter.

6.1 BRAZIL

Tuna fishing is mainly carried out by the longline fleet, which consisted of: 6 chartered boats (5 with Japanese flags and 1 with Honduran flag) and 21 Brazilian boats; the baitboat fleet, comprised of 7 chartered boats (all with Japanese flags) and 51 Brazilian boats. All these fleets showed an increase in size in relation to 1989. Besides, the Brazilian baitboat fleet has shown a continuous increase in vessel characteristics. There is, also, an artisanal fleet, based in the northeastern region of Brazil, fishing for small tunas, and doing some sport fishing, mainly in the state of Rio de Janeiro.

Total reported Brazilian catches of tunas and tuna-like species (not including data for artisanal and sport fisheries), in 1990, were 24,751.4 MT, representing a slight decrease (2.6 percent) in relation to 1989.

The same species are caught by the longline fleets, but the species composition in the catches is very different because each fleet targets different species, operates nearly always in different areas and, in the Japanese fleet, deep longline has been used, depending on the target species.

Skipjack is the most important species caught by baitboats. After a maximum catch of 25,052 MT in 1985, catches decreased until 1987 (16,153 MT) recovering since then to a level around 20,000 MT. Catches for 1990 amounted to 20,026 MT, and for 1991 (January-June), catch estimates are 15,629.3 MT.

There is a lack of information on catches taken by the artisanal fleet because the statistical system for collection of data (based on census) has been discontinued due to high costs.

The collection of statistics and size sampling continued, having been extended to the longline fishery developed in the northeast, where 1,225 yellowfin were sampled in 1991.

A new statistical system for collection of data from the artisanal fisheries, based on stratified sampling, has been developed and tested in Ceará state, and should be extended to other states of the northeastern region to give estimates of the landings.

6.2 CANADA

The 1990 Canadian nominal catch of bluefin tuna and swordfish was 422 MT and 911 MT, respectively. The number of bluefin licenses issued in 1990 was 747 while 70 swordfish longline licenses were issued. The traditional harpoon fishery for swordfish had 640 licenses issued, of those less than 100 were active (harvesting 10 percent of the catch).

A limited experimental offshore longline fishery has been conducted from 1987 to 1990, and continues in 1991.

Fisheries for bluefin tuna and swordfish are in progress in 1991 at approximately the same levels as 1990.

Major research activities on larger pelagics in 1990 and 1991 included continued monitoring of landings and size of bluefin tuna and swordfish; calculation of abundance index for the bluefin tuna traditional fishery off Prince Edward Island; a multiple mark-recapture experiment to study migratory behavior and to estimate the size of the Browns Bank school of bluefin tuna, initiated in 1990 and continued in 1991 (133 fish tagged); an histological study of bluefin tuna gonad anatomy and maturity, initiated in 1991; collection from the commercial fishery of swordfish hard parts and gonads for ageing and maturity studies; swordfish longlining research cruises in 1990 and 1991 to collect the aforementioned, plus catch and behavioral data; collaboration on swordfish population and growth studies with the University of Toronto; preliminary study to determine the influence of hook size on the size of swordfish captured by longline; hosted the 1991 Swordfish Stock Assessment Meeting at the St. Andrews Biological Station (10-17 September).

6.3 COTE D'IVOIRE

At present there are no active Ivorian tuna vessels; consequently there are no catches for Côte d'Ivoire in 1990. However, the port of Abidjan continues to be a major landing and transshipping center for tropical tunas. An estimated 140,000 MT of tuna were handled in 1990 in this port. These tunas, mainly yellowfin and skipjack, come from catches of approximately 70 purse seiners from Spain, France, Japan, Korea, Norway and Vanuatu.

The "Centre de Recherches Océanographiques" of Abidjan (CRO) systematically collects nominal catch data, logbooks and size samples from the international purse seine fleet. All these data are processed, computerized and transmitted to each flag nation. This produces a large workload for the Ivorian scientists assisted by the French and Spanish scientists. The coverage rate is over 90 percent.

The CRO also collects biological samples from the canneries in Abidjan when it is possible to determine the exact time/area origin of the samples. The CRO also maintains a network for collecting tags, which in 1990 recovered four tags placed by U.S. sport fishermen on large yellowfin and taken by purse seiners in the equatorial spawning grounds off Africa. (Document SCRS/91/71.)

Finally, it should be noted that the CRO is involved in important regional collaboration with Ghanaian scientists (Fisheries Department, Research and Utilization Branch (FDRUB) in Tema).

6.4 FRANCE

The French catches of tuna rose in 1990 to 75,000 MT, a 10-year record. The catches are broken down into 65,100 MT of tropical tunas (yellowfin, skipjack and bigeye) and 8,600 MT of temperate tunas (albacore and bluefin).

The detailed fishery statistics of these fleets were collected by French scientists from IFREMER (temperate tunas) and from ORSTOM (tropical tunas) and were submitted to ICCAT as in the past.

The research carried out on tunas involved biology, population dynamics, tuna behavior as well as the relationship between tunas and the environment. This research has been reported in documents submitted to the 1991 SCRS.

6.5 GABON

Tuna fishing is mainly carried out by the foreign fleet; Gabon does not have a national fleet either for industrialized fishing or for artisanal fishing for the following reasons:

- In artisanal fishing, the techniques and the main fishing areas used (lagoons and estuaries) do not allow the catching of tuna.
- In sport fishing, some specimens, mainly sailfish and swordfish, are reported.
- In industrial fishing, there are no tuna boats because the boat owners do not want to risk a venture that may not have immediate results; an appropriate port and canneries are lacking.

Basic studies have been made by the Department of Planning to build a tuna base with a cannery in the Port Gentil area, not far from Cap Lopez.

Tuna is very important to Gabon, from both economic and biological points of view, and is essential; we cannot forget that the Cap Lopez area is the most productive area of the world, is the main spawning ground, and is the starting point of the biology of tropical tunas of the center-eastern Atlantic.

Thus, the statistical data that we use come from the logbooks of the tropical purse seiners (FIS and Spanish fleets) operating in our fishing zones, which are generally quite good.

6.6 PORTUGAL

Portuguese tuna fishing takes place principally in areas of the Azores and Madeira where the local baitboat fleets seasonally catch tunas. For continental Portugal, the catches of tunas are mainly incidental taken by different gears, such as longline, purse seine and driftnets.

In 1990, catches of tunas and tuna-like species amounted to 14,100 MT, of which 5,953 MT were bigeye, 3,951 MT skipjack, 3,185 MT albacore, 528 MT swordfish, and 483 MT other species.

The total 1990 catch remained at the same level as in 1989, but it was lower in comparison to earlier years. This is mainly due to a very sharp decrease in skipjack catches in the Azorean fisheries. In contrast, in Madeira a marked increase was noted.

Preliminary catch estimates for the first three quarters of 1991 indicate a catch of 5,562 MT for Madeira and 5,269 for the Azores. A sharp drop in skipjack catches was noted in 1991 in the Azores. In contrast, record catches of skipjack were made in Madeira.

Since 1984, a number of new vessels entered the Azorean and Madeiran baitboat fisheries. In the 1989-91 period, sixteen new vessels entered the fishery.

Research, port sampling and the collection of statistics continue satisfactorily as in the past. In the Azores and Madeira, observers were placed on board foreign longliners to carry out sampling and to collect statistics.

6.7 RUSSIA

In 1990, the total catch of tunas and related species amounted to 15,331 MT, including 3,615 MT of yellowfin tuna, 3,635 MT of skipjack, 3,634 MT of bullet tuna, 2,739 MT of frigate tuna, 95 MT of bigeye tuna, 1,240 MT of Scomberomorus unclassified, 706 MT of Atlantic bonito, and 667 MT of Atlantic black skipjack.

The fishery was primarily carried out in the tropical eastern Atlantic, and the catch taken with purse seine amounted to 8,466 MT (yellowfin, skipjack, Atlantic black skipjack, frigate tuna, bullet tuna); with longline the catch amounted to 385 MT (yellowfin and bigeye); and with trawls the catch was 7,570 MT (bullet tuna, frigate tuna, Atlantic bonito, Scomberomorus spp.).

Research was devoted to the analysis of biological fishery statistics and conditions of commercial tuna aggregation formation, age estimation and age composition of the major fishery populations. Three observers worked on board commercial vessels.

6.8 URUGUAY

The Uruguayan fleet continues to operate with longline and targets swordfish, bigeye and yellowfin.

In recent years, the number of vessels has decreased, however, an increase is foreseen for 1991-92. In 1990, 73 percent of the catches of tunas and tuna-like species corresponded to swordfish; high swordfish catch rates are being maintained.

Information on catches and effort from logbooks continues to be processed and sent to ICCAT. At present, Uruguayan scientists are working with those from Brazil and Argentina to improve information on the main species caught by their respective longline fleets.

6.9 U.S.A.

Total reported U.S. landings of tuna and tuna-like fishes (excluding billfishes) in 1990 were 21,441 MT. This represents a decrease of 4,300 MT from 1989. This is primarily attributed to decreases of 2,689 MT in yellowfin landings to 4,692 MT (a level equal to 50 percent of the 1988 landings), a decrease of 1,000 MT in swordfish landings to 5,385 MT, and a net decrease in Spanish and king mackerel landings of approximately 600 MT. Landings from the U.S. longline fishery for yellowfin in the Gulf of Mexico decreased in 1990 to 3,055 MT, down from 5,724 MT (revised) in 1989, accounting for 65 percent of the total U.S. yellowfin landings.

U.S. vessels fishing in the northwest Atlantic landed an estimated 1,704 MT of bluefin, an increase of 214 MT over 1989 and 414 MT over 1988. Additionally, an estimated 133 MT of bluefin were released dead by U.S. longline vessels. Skipjack landings increased by 192 MT to 238 MT, still remaining far below the 1985-1987 three-year average of about 1,150 MT per year. Bigeye landings decreased by 179 MT to 583 MT, and albacore landings increased by 121 MT to 381 MT.

Major research activities on large pelagic fishes in 1990 and 1991 included continued monitoring of landings and size of swordfish, bluefin tuna, and other large pelagic species; continuation of activities responsive to ICCAT-recommended research primarily directed at determining the reproductive biology of Atlantic swordfish; investigation into development of new abundance indices for bluefin; participation in the 1991 ICCAT Swordfish Stock Assessment Meeting in St. Andrews, Canada; continuation of port and tournament sampling for billfishes and other pelagics; coordinating further increased efforts related to the ICCAT Enhanced Research Program for Billfish; continuation of bluefin larvae surveys; and hosting the first ICCAT species group meeting on west Atlantic yellowfin. Through the cooperative tagging program, 6,970 billfish and 1,256 tunas were tagged and released in 1990, increases of 30 percent and 134 percent over 1989, respectively.

6.10 CARIBBEAN COMMUNITY (CARICOM) (Observer)

The CARICOM Fishery Resource Assessment and Management Program (CFRAMP), which began in 1991, is an eight-year, $20 million Canadian dollar program, funded by the Canadian International Development Agency (CIDA), the International Center for Ocean Development (ICOD) of Canada, and CARICOM. Its goal is to promote the management and conservation of fishery resources in CARICOM, to permit their exploitation on a sustainable basis. The Program will be coordinated by the CARICOM Fishery Management Unit, which has been established in Belize City, Belize, for this purpose. There will be two major thrusts: institutional strengthening and resource assessment. Institutional strengthening activities will involve training for CARICOM nationals as well as enhancement of basic fishery management systems at the national and regional levels. The latter will include assistance at the national level with: Fishery management planning; Fishery data collection and management systems; Licensing/registration systems; Community participation in fishery management; and Advisory/decision making mechanisms. A specific activity will aim to define the best mechanisms for fishery research and management at the regional level.

Resource assessments will be carried out by three Resource Assessment Units located in Belize (lobster and conch), Trinidad (shrimp and groundfish) and St. Vincent (oceanic and coastal pelagics, and deep and shallow reef related demersal fishes). The resource assessment projects to be undertaken will be designed by the RAU staff in collaboration with the participating countries. CFRAMP fully recognizes the migratory and shared nature of most of the pelagic species which are exploited by CARICOM Member States. Participation in the activities of ICCAT is seen as one of the most effective ways to acquire data and information on, and to contribute to overall knowledge and management of these resources. More detailed information can be found in SCRS/91/108.

6.11 TAIWAN (Observer)

In 1990, the Taiwanese longline fishery changed its fishing strategy in the Atlantic by using regular longline in temperate areas and deep longline in tropical areas. The 1990 annual catch is estimated to be 34,304 MT, approximately 7,256 MT from the North Atlantic and 27,048 MT from the South Atlantic.

The regular longline targets albacore, and the deep longline targets bigeye and yellowfin. Most Taiwanese regular longline effort was deployed in the South Atlantic; in contrast, deep longline was used in the North Atlantic. As a result, the three dominant

species in the 1990 catches are bigeye (2,803 MT), yellowfin (2,017 MT) and albacore (1,512 MT) in the North Atlantic; and albacore (22,129 MT), bigeye (2,096 MT) and yellowfin (998 MT) in the South Atlantic.

Detailed catch statistics are regularly submitted to ICCAT. Research is carried out only on albacore, and no intensive research is currently in progress for other species due to limited manpower.

7. REPORT OF THE WORKING GROUP ON WESTERN ATLANTIC TROPICAL TUNAS

Dr. M. Prager, one of the rapporteurs of the meeting, reported the results of the Working Group meeting held on April 17-24, 1991, at the NMFS Southeast Fisheries Center Laboratory. The Report of the meeting is available as SCRS/91/12. He reported that the major achievements concerned the critical review of the data base and creation of a new catch-at-size and catch-at-age data base. The group studied many biological parameters such as growth, mortality, sex ratio, etc. Stock structure was studied, particularly in light of the recent recoveries of several transatlantic yellowfin tuna. Abundance indices were also reviewed and several indices were agreed upon.

The Working Group made several recommendations regarding statistics, CPUE, assessment methods such as non-equilibrium production model, and models including a stock-mixing hypothesis. The Working Group was satisfied with the progress made but at the same time recognized there was still much to be achieved and hoped to continue working with greater participation of the nations involved in west Atlantic fishing.

The SCRS Chairman commended the progress made by the Working Group within the short time given to the Group. He also emphasized the importance of implementing the recommendations made by the Group for statistics and research.

Some concerns were expressed by a few Committee participants on the lack of participation by countries directly involved in the fisheries of this region, and the shortage of information and data, particularly on the size of fish, to create catch-at-size and catch-at-age data bases. In this respect, the Committee reiterated the recommendations made by the Working Group and urged those countries involved in this fishery to participate in the work as well as to make all the data available for the Group.

The Working Group met during the SCRS session and its report was presented to the Committee by the Convener, Dr. B. Brown. The Report was adopted and all the recommendations included were reiterated. The Report is attached as Appendix 12.

8. REVIEW OF THE PROGRESS MADE BY THE ALBACORE RESEARCH PROGRAM

Dr. F. X. Bard, Coordinator of the Albacore Research Program, reported on the progress made by this program. The scientists involved in the program met at Sukarrieta (Spain), in July, 1991, and reviewed all progress made. This report is available as SCRS/91/17. The Group checked many of the length frequencies and some corrections were made, in order to provide more accurate catch at length. In addition, a stochastic procedure to age the catch at length into the catch at age, such as MULTIFAN or ELEFAN, will be further examined. The preliminary results have been quite encouraging and the Group would like to age the catch at size by applying such a stochastic method.

Standardized abundance indices are also being developed (up to now only nominal CPUE has been developed). An observer cruise was made on a Spanish baitboat and those data have still to be analyzed. When all these analyses are complete, final VPA can be applied. The Group foresees holding one technical meeting in the earlier half of 1992 and proposed holding a final stock assessment session in September or early October.

The scientists involved met for a short period during this meeting and presented their evaluation. Their report is attached as Appendix 11.

9. REVIEW OF PROGRESS MADE BY THE PROGRAM FOR ENHANCED RESEARCH FOR BILLFISH

Document SCRS/91/15, prepared by the Secretariat, includes a summary of the Billfish Fund, the agenda and the working plan for the 1992 Intersessional ICCAT Billfish Workshop.

Document SCRS/91/18, prepared by the West Atlantic Coordinator of the Program, reports billfish research activities in the west Atlantic. SCRS/91/19 summarized the activities in the east Atlantic.

The Billfish Program Plan for 1992 was presented by the Coordinator, Dr. B. E. Brown. The Plan was reviewed and adopted by the Committee, and is attached to this Report as Appendix 10.

The 1992 Billfish Workshop was discussed. During 1991, scientists were questioned about the venue of the meeting and comments were made on the agenda and working schedule. Most scientists responded that Miami would be the best place to meet. While recognizing that the Workshop had been already agreed upon at the 1990 SCRS session, it was decided to discuss this matter when all the proposals for the intersessional meetings are discussed.

10. REVIEW OF CONDITIONS OF STOCKS

YFT - YELLOWFIN TUNA

YFT-1. DESCRIPTION OF FISHERIES

Yellowfin is fished in the entire tropical Atlantic between 45°N and 40°S by surface gears (purse seine, baitboat and handline) and by longline.

The baitboat fisheries have developed in coastal areas (YFT-Figure 1), catching small yellowfin occurring in mixed schools with skipjack, juvenile bigeye and small tunas in the east Atlantic, and with skipjack and small tunas in the west Atlantic. The average weight of the individuals caught by this gear is around 5 kg., with sizes ranging between 30 and 130 cm for the east and 40 and 125 cm for the west.

Purse seiners target juveniles in the same coastal areas as the baitboats (YFT-Figure 2). In the eastern Atlantic, since the mid-1970's, the area of operation has been expanding towards the high seas where pure schools of large yellowfin are caught in the spawning areas near the equator. The size ranges taken by the purse seines differ from one side of the Atlantic to the other. In the west, the sizes range from 40 to 140 cm, while in the eastern Atlantic a bimodal distribution is observed with modes observed at 50 and 155 cm, with few intermediate sizes (70-100 cm) and with the presence of large individuals (> 160 cm) which are not caught in the west.

The longline fisheries operate in a wide area between 15°N and 10°S throughout the entire Atlantic (YFT-Figure 3); the main fleets use deep longline and target bigeye. The yellowfin caught by these fleets are made up of large individuals with an average weight over 40 kg. On the western side, local longline fisheries have developed such as the United States surface longline fishery in the Gulf of Mexico.

YFT-1.a Catches

YFT-Table 1 and YFT-Figures 4, 5, and 6, show the trends in yellowfin catches by gear for the east, west and total Atlantic, for the period 1961-1990. The changes in total catch are determined by trends in the eastern Atlantic catches which make up more than 85 percent of the total catches. In 1990 there was a record catch of 168,100 MT. For the eastern Atlantic, an increasing trend is observed in the catches, up to the high values over 130,000 MT, reached in the early 1980's. In 1984 a sharp drop occurred (75,200 MT), as a result of the decrease in catchability of yellowfin by the purse seine at the beginning of the year. In the following four years, the catches recovered without reaching the high levels of previous years due to the movement of the purse seine fleets to the Indian Ocean. In the last two years there has been a significant increase in the catches, reaching a historic record in 1990 with 146,800 MT. This increase can be explained partly by the gradual return of the boats from the Indian Ocean and partly by the extraordinarily high catch rates of yellowfin observed during the first quarter of these years by the two most important purse seine fleets, those of FIS and Spain. YFT-Figure 7 shows yellowfin catch rates by 15-day periods for both fleets.

The baitboat catches remained at the same level as previous years. With respect to the longline catches, a decline is observed in the last two years, remaining at a low level.

The west Atlantic catches were stable at around 13,000 MT during the 1968-1980 period, mostly taken by longline. With the development of the surface fisheries in the 1980's, the catches increased to around 35,000 MT in 1983, 1984 and 1985. The subsequent fluctuations are the result of the movements of the surface fleets between the Atlantic and Pacific Oceans. In 1990 there was a sharp decline in the total catch, 21,300 MT compared to 32,000 MT in 1989, due to the decrease in surface (by 37 percent) as well as longline (by 29 percent) catches.

YFT-1.b Effort

In the eastern Atlantic, fishing is mainly carried out by purse seine and baitboat fleets. YFT-Table 2 and YFT-Figure 8 show the changes in nominal effort, as indicated by carrying capacity of the vessels for the period 1972-1990. First, an increasing phase can be observed up to 1983, during the years in which the purse seine fleets were developing, then a sharp decrease in the following three years due to the movement of the purse seine fleets to the Indian Ocean, and later a slight but continued increase in effort in the last two years, partly due to the addition of new vessels in the fleet and partly to the return of part of the FIS fleet from the Indian Ocean. Baitboat effort has remained at the level of the last twenty years.

As regards the west Atlantic, the 1990 data available for the U.S. longliners in the Gulf of Mexico indicate a slight decrease in effort compared to 1989 which would partly justify the decrease in the catches of this fleet. For the Venezuelan purse seine fleet there are indications of a slight increase in effort in the Atlantic in 1990.

YFT-2. STATE OF THE STOCKS

Up to 1990, the Atlantic yellowfin assessments were done using the hypothesis of two independent

stocks in the eastern and western Atlantic. This hypothesis is contradicted by some of the information currently available on the stock structure. YFT-Table 3 presents a summary of the different arguments supporting the hypotheses of either a single Atlantic stock or of two independent Atlantic stocks. Appendix 5 presents the different analyses made on the stock structure.

This year, for the first time, an analytical assessment was made for Atlantic yellowfin considered as a single migratory stock with two geographic components (east and west), and exploited by two gears (longline and purse seine). The model is taken from the VPA and requires certain migratory hypotheses which can justify that catches of a certain age occur in a certain area. In spite of interest in the method, the results obtained do not lead to any definite conclusion on the state of the Atlantic yellowfin stock, due to the preliminary state of these analyses. Therefore, the evaluations continued to consider separate east and west Atlantic stocks.

YFT-2.a East Atlantic stock

No assessment paper was presented on the east Atlantic yellowfin stock since the total catch data were not available before the species group meeting. Therefore, different assessment runs were made during the meeting. First, a generalized production model was fitted to nominal catch and standardized FIS and Spanish purse seine effort data (searching time). Nominal effort was used, following the same reasoning as the previous year, which assumed that the effort calculated from mean CPUEs by $1^{\circ}x1^{\circ}$ squares and by 15-day periods could be underestimated.

The model estimated an MSY of 123,000 MT for an effort of 53,000 searching days. YFT-Figure 9 shows the estimated equilibrium curve. This clearly shows the equilibrium of the early years, the overexploitation of the early 1980's, the sharp drop in catch rates in 1984, the rapid recovery of the stock the following year, a period of stability (1985-1988) and in the last two years the catch rates above the MSY with effort apparently below the optimum. These results lead to various possible interpretations:

- The high catch rates of 1989 and especially of 1990 could indicate an increasing stock biomass due to oceanographic conditions favorable to the increase in stock productivity, as is the case in the eastern Pacific. In this situation, from 1989, a new equilibrium curve should be used in which the MSY would be considerably higher than that obtained on the current equilibrium curve. There are data on a generalized warming that could support this hypothesis; however, the data available for 1991 indicate a sharp decline in the catch rates which return to a level near the currently estimated equilibrium curve.

- An interpretation closer to the reality of the fishery would be that in the last few years, a series of factors have occurred simultaneously which together have contributed to the increase in catch rates. In the first place, the stock biomass could have increased as a result of the high consecutive recruitments in 1986 and 1987 (YFT-Figure 10). Another factor that could have influenced the catch rates was the increase in effective effort as a consequence of the improved techniques incorporated in the vessels (bird radar, etc.). Finally, it is possible that an increase in the catchability of large yellowfin by purse seiners could have occurred, as a result of favorable oceanographic conditions.

Several assessment runs were made using the ASPIC model (non-equilibrium production model). YFT-Table 4 and YFT-Figure 11 show the results obtained. YFT-Figure 12 shows the precision of the parameters estimated by the model. The model considers constant or variable coefficients of catchability. These runs were made with different assumptions on the values of 1984 catchability (decrease with respect to the mean), and on the last few years (an increase after the introduction of bird radar). They confirmed:

--that the state of the Atlantic yellowfin stock is not comparable to that in the Pacific, in that we do not find a process of continued increase in the productivity of the yellowfin stock.

--that the low catch rates in 1984 are the result of the occurrence of low levels in the stock biomass, as a result of the high effort levels of the early 1980's, also suggest a decrease in effort and a decrease in the catchability of yellowfin in that year.

--that there has been an increase in effectiveness of effort in the last few years which is difficult to quantify, but probably near 40 percent.

The MSYs are estimated to be very near 123,000 MT, which were estimated by the generalized exponential production model.

Hence, the production models present a stock situation of possible over-exploitation, with catch rates above the MSY and effective effort at the 1982 level.

No analytical assessments of the stock were made; however, different parameters were analyzed in order to detect possible changes that could modify the conclusions of the previous analysis. YFT-Figure 13 shows the trends in mean weights of the catches; high mean weights are observed for the last few years, which indicates that there is not a situation of growth overfishing and, consequently, that the yield-per-recruit models would lead to results similar to those of the last analyses. In this sense, the comparison of the size distributions in the mean catch of the last ten years and the 1990 catch (YFT-Figure 14) indicates that the

profile of exploitation of juveniles has not changed. On the contrary, there has been an increase in catches of adults.

YFT-2.b West Atlantic stock

The Working Group on Western Atlantic Tropical Tunas could not make yellowfin stock assessments during its meeting in April, 1990, partly because of problems in estimating the basic data and partly because of lack of time. Therefore, the west Atlantic yellowfin assessments that are included correspond to the documents presented to the Committee.

A production model was submitted similar to that presented last year to the SCRS, fitted to standardized effort of large Venezuelan purse seiners. The relative abundance indices, obtained from purse seine data only, should be more representative of yellowfin abundance than those obtained last year from data from purse seiners and baitboats which expend part of their effort assisting the purse seine fishing operations. However, the CPUE trends, thus obtained, show a great variety that probably should be interpreted as changes in catchability or in effort rather than as abundance trends.

YFT-Table 5 shows the parameters estimated by the different models used (Schaeffer, Fox, Schnute). The estimated MSY values (Schnute) for M=2 and K=3 are similar to those from last year (35,332 MT compared to 31,025 MT in 1989), and the stock status apparently has not reached full exploitation. These results are probably only representative of local production and cannot be extrapolated to the west Atlantic, since the Venezuela purse seine fishery operates in a limited coastal area and, the CPUE used may not be representative of the entire stock abundance.

An ASPIC model (non-equilibrium production model) was also presented, fitted to the catch and effort data of the three longline fleets (Japan, Mexico and United States) which historically have fished yellowfin in the Gulf of Mexico. The model allows using the different fleet data separately, without the necessity of standardizing their effort, which is an important advantage in the case of mixed fisheries. Likewise, the model estimates the precision of the estimates of the basic parameters (MSY, F_{opt} and catchability coefficients). The results obtained should be considered preliminary, partly because of deficiencies in the basic data and partly because it was applied to a limited fishing area. By definition the production models should be applied to the entire stock, if not, their results are only indicative of levels of local production.

Despite the fact that results obtained in both assessments cannot be considered conclusive, it is important that this type of work has been initiated for the western Atlantic and in particular, it is interesting that models are developed which permit a less restrictive application than the equilibrium production models.

YFT-3. EFFECTS OF CURRENT REGULATIONS

The adoption, in 1973, of a minimum size regulation of 3.2 kg for yellowfin does not appear to have caused a reduction in fishing mortality on juveniles.

YFT-4. RECOMMENDATIONS

Appendix 6 presents a series of recommendations to improve the processing of tropical tuna size samples from what is currently being done. Besides these general recommendations, common for tropical tunas, the SCRS recommended the following regarding yellowfin tuna.

YFT-4.a Statistics

i) The general recommendation of the Working Group on Western Atlantic Tropical Tunas is reiterated on the necessity for an automated process to be established to make the substitutions in agreement with a series of pre-established priorities. This process would facilitate the Secretariat's work and improve the efficiency of the Group.

ii) Despite the efforts of the Working Group on Western Atlantic Tropical Tunas, the poor participation of the area countries impeded sufficient basic data from the southwest Atlantic from becoming available. Thus it is recommended that the Secretariat establish contact with the area countries and any initiative from the area that could lead to a improvement in the data base should be supported.

iii) The system of currents that exist in the southeastern Atlantic could constitute an oceanographic barrier for the Atlantic and Indian Ocean yellowfin stocks. Therefore, the catches from the eastern Atlantic taken south of 20°S should be considered with caution as they may pertain to the Indian Ocean stock.

iv) The recent introduction of the deep longline in the Taiwanese fleet can present problems in the processing of all the longline data together. So that effort data may be standardized, it is recommended that Taiwan provide detailed information on the new longlines used.

v) CPUE indices were presented, standardized for different methods, for the Japanese longline fleet. However, some of the methods used did not take into account all of the yellowfin fishing areas, excluding important fishing areas such as the area off Uruguay. Any standardization method used should take into consideration the entire fishing area.

vi) This year no assessments could be made on the eastern Atlantic stock before the meeting of the Committee as the Task I data were not available. It is recommended that the Secretariat put into effect the mechanisms necessary so that this situation is not repeated, and, at the same time, the member countries are requested to abide by the deadlines for submitting data established by the SCRS.

vii) The catches of the Japanese longline fleet are reported in number of individuals and not in weight. It is recommended that, if possible, Japan provide Task II data in weight as well as in number of individuals.

YFT-4.b Research

i) Overall evaluations were presented on yellowfin for reduced areas of the western Atlantic. It is recommended that the assessments be made jointly on a larger area.

ii) A size-weight relationship for the western Atlantic was presented which was obtained from the Venezuelan purse seine catches of sizes between 50 and 125 cm. It is recommended that a new relationship on a wider range be established.

iii) Last year, the Committee recommended that a new LD1-FL relationship be established on all the data used in the two relationships presented to the Committee (Caverivière, 1976; P. Pallarés *et al.* 1989). Since the data used in obtaining the first relationship are not available, it is recommended that the Spanish scientists continue obtaining measurements that permit adjusting a definitive relationship. Likewise it is recommended that the available data from the east and west Atlantic be analyzed together in order to determine if there exists a single relationship for the entire Atlantic, or if, in contrast, separate relationships should be maintained.

iv) There are data on the change in fishing strategy of the eastern Atlantic purse seine fleets, with the generalized introduction of artificial floating objects. It is recommended that this change in fishing strategy be monitored closely.

v) An analytical assessment model has been presented that allows for incorporating the migratory components of the stock. Work on this type of model should be continued for the assessment of the Atlantic yellowfin stock.

vi) A production model for non-equilibrium conditions was also presented. This is a more versatile model than the traditional production models and allows consideration of different components of the fleet, accepts different hypotheses on catchability and estimates the precision of the estimated parameters. Although the results obtained are preliminary, studies using this model could be more appropriate for the yellowfin assessment than the traditional equilibrium models.

vii) Different factors lead to the assumption that the abundance indices normally used for Atlantic yellowfin could be biased (increases in individual fishing power of the vessels with the introduction of bird radar, etc.); therefore, it is recommended that work be done on the analysis and correction of these biases. Simultaneously, it is recommended that a study be made of the viability of developing a program to obtain abundance indices independent of the fishery. The aerial surveys could be the most appropriate means to obtain these indices given the characteristics of the tuna fisheries.

viii) It is recommended that the source of the South African catches be analyzed, based on oceanographic, biometric and tagging studies, in order to identify the borders between the Atlantic and Indian Ocean yellowfin stocks.

YFT-4.c Management

The production models fitted to the data coming from the eastern Atlantic yellowfin fisheries show a situation of high yellowfin catch rates during the last two years with effective effort levels that are difficult to quantify, given the recent changes in the fishing power of the vessels, but which could go from values near full exploitation to a situation of overexploitation. However, the high recruitment reported in 1986 and 1987 have contributed to the biomass remaining at a high level. In addition, the possible increase in fishing effort appears to have been directed at adults,

therefore, the conclusions of previous yield-per-recruit analyses would be acceptable in the present situation.

BET - BIGEYE TUNA

BET-1. DESCRIPTION OF FISHERIES

Bigeye tuna are widely distributed in the tropical and temperate waters of the Atlantic Ocean, between approximately 45°N and 45°S. Small bigeye have been observed in the Gulf of Guinea, the only presently known nursery.

The stock is exploited in the entire area of distribution by different fleets and gears: longline, purse seine and baitboat.

The main bigeye fishery is the longline fishery, which operates throughout the year in the entire area of distribution. The longline fishery exploits adult bigeye tuna (which have an approximate average weight of 40 kg). Since 1980, Japanese and Korean longliners directly target bigeye by using deep longline and by concentrating their effort in the time-area strata where the density of bigeye tuna is high. From 1990 the Taiwanese longliners began targeting bigeye tuna in the Atlantic Ocean using deep longline.

Of the surface fisheries, various local baitboat fleets seasonally target bigeye in the area of the Azores, Madeira, and Canary Islands. These fisheries of the northeastern Atlantic islands exploit mainly pre-adult or adult bigeye tuna (approximate average weight of 30 kg).

The Dakar-based baitboats, which fish off Senegal and Mauritania, seasonally exploit medium-sized pre-adult bigeye (approximate average weight of 18 kg). In 1990, the Dakar-based baitboats took bigeye with an average weight of 6.5 kg, which is far below that of previous years.

In the eastern tropical Atlantic, the purse seine and baitboat fleets take small bigeye tuna (approximate average weight of 5.5 kg for purse seiners and 2.5 kg for Tema baitboats) which form mixed schools with skipjack and young yellowfin tunas. The fisheries do not directly target bigeye tuna, but the catches of small bigeye are important, especially in terms of number of fish.

Annual catches of bigeye, for 1960-90 by country and gear, are shown in BET-Table 1 and the total catch from 1950 to 1990 in BET-Figure 1.

BET-Figure 2 shows the areas of operations, size ranges characteristic of each gear, and BET-Figure 3 shows the changes in annual catches of these gears during the period 1975-1990.

Total catches increased regularly up to 63,600 MT in 1974, and then showed a decreasing trend until 1979 (45,100 MT). In the following years, the catch gradually increased, reaching a maximum of 74,400 MT in 1985. The total catch then decreased to 48,700 MT in 1987, increased in the following years and at present is 62,900 MT (1990).

The decrease in catch after 1985 is mainly due to a decline in the longline catch, although a decrease has also been observed in the surface gears.

The fluctuations in bigeye catches between years basically reflect the longline operations, as their catches in 1990 made up 60 percent of the total. Longline has been the dominant gear catching bigeye since the beginning of the fishery in the Atlantic and also in other Oceans.

As regards surface gears, the catches show a decreasing trend after reaching a maximum in 1984 (27,200 MT). The 1990 catch of 25,000 MT is the highest recorded in recent years. This reflects the fluctuations in the catches of Portuguese and Canary Island baitboats which have increased their catches in 1990, as has occurred for the purse seiners.

The decrease in longline catches observed in 1986 and 1987 reflects the decline in the number of Japanese and Korean longliners in the Atlantic in these years. This situation reversed in 1988, and in 1989-90 the number of Japanese longliners operating in the Atlantic was the highest in the last six years.

The high between-year variability observed in the catches of Portuguese and Canary Island baitboats is most likely related to the fluctuations in local hydrological conditions, rather than to changes in stock abundance.

The decrease in purse seine catches observed in the recent period reflects the decline in effort which occurred since 1984, following the departure of part of the purse seine fleet to the Indian Ocean. In 1990 the catches increased slightly compared to the last five years.

BET-2. STATE OF THE STOCKS

The state of the bigeye stock was analyzed based on the hypothesis of a single stock in the entire Atlantic. The single bigeye stock hypothesis seems the most likely, according to the fisheries data, the geographic distribution of the species and the results of tagging, the known spawning areas located in the tropical area between 15°N and 15°S, and the fact that the only nursery of small bigeye in the Atlantic Ocean exists in the Gulf of Guinea.

The only abundance indices used for the bigeye stock are those calculated from the catch rates of the longline fishery, which directly targets bigeye tuna in

the entire Atlantic. In fact, since the surface fisheries only catch bigeye seasonally or incidentally, and since they only catch certain sizes, their CPUE indices are not considered representative of the total stock abundance.

The CPUE of the seasonal fisheries of the north-eastern Atlantic islands reflects the local abundance of a fraction of the stock, and is subject to variations caused by local hydrological conditions. This situation is illustrated in BET-Figure 4, which shows the changes in CPUE of Azorean baitboats from 1979 to 1990, during the second quarter, when this species is fished. The fluctuation of the CPUE has no marked trends and does not correspond to the adult stock abundance.

As concerns the FIS baitboat fishery, its CPUE, although seasonal, is less influenced by environmental changes and could provide a measure of abundance of medium-sized bigeye (BET-Figure 5). The observed increase since 1984 is related in part to a change in the fishing strategy. It has been more or less stable during recent years, with a slight decrease in the last two years.

The CPUE of the purse seiners, which can be interpreted as an abundance index for small bigeye, has no marked trends in recent years. The CPUE of the FIS purse seiners also shows fluctuations without trends for the 1980-1990 period (BET-Figure 6).

Adult stock abundance, calculated from the Japanese longline CPUE after adjusting for the use of deep longline, continues to show relative stability in recent years, with a slightly increasing trend, compared to the period before the introduction of deep longline. However, this increasing trend could be explained by the introduction of bias when adjusting the effort for the deep longline to that of the traditional longline.

The presently estimated abundance index from the average longline CPUE for the 1984-89 period represents 82 percent of the CPUE calculated for the initial phase of the fishery (1961-1965) which can be interpreted as an index of a low exploitation rate (BET-Figure 7).

The mean fishing mortality rates according to age, estimated by cohort analyses for the period 1980-88, indicate that in recent years fishing mortality is at a relatively high level for the small fish (ages 1 and 2) due to the tropical surface gears. For the adults, ages 4 and over, fishing mortality is also relatively high compared to the historical period, especially for the longline fishery. Fishing mortality observed in 1988 is at the average of the 1980-88 period (BET-Figure 8). For the first two years, a very high natural mortality varying with age for juveniles ($M = 0.8$) and for the following years a very low mortality ($M = 0.4$) were adopted for the cohort analyses.

The yield-per-recruit analysis for bigeye indicates that with the current exploitation scheme yield could increase significantly by increasing fishing mortality. In contrast, a modification in the age at first capture would have no effect on the yield per recruit, unless it was accompanied by an increase in fishing mortality (BET-Figure 9).

The multi-gear yield-per-recruit analysis suggests that with the current exploitation scheme the most significant gains by an increase in fishing mortality on adult bigeye tuna would be discounted by a simultaneous decrease in mortality on small bigeye (BET-Figure 10).

An updated production model analysis, adjusted for the 1961-1989 data, indicates MSY values from 67,100 MT ($m = 2$) to 75,700 MT ($m = 1$). This analysis suggests that the current catches, in 1990, are lower than those of the MSY (BET-Figure 11).

The production model analysis also indicates that fishing effort on bigeye tuna is at a level below the optimal fishing effort (F_{opt}) estimated by the model to reach MSY; this was always the case in previous analyses.

BET-3. EFFECTS OF CURRENT REGULATIONS

The bigeye minimum-size regulation of 3.2 kg has been in effect since 1980; it was adopted to reinforce the yellowfin regulation. It has been reported in recent years that the tropical surface fleets (purse seine and baitboat) continue to land a large number of small bigeye tuna.

Under the present condition of reduced effort, the size regulation of 3.2 kg would not provide any possible gains in yield per recruit for bigeye tuna. Nevertheless, if the effort on juveniles returns to the levels of the 1980-84 period of high exploitation, the current regulation would still be useful in improving the yield per recruit of the stock.

BET-4. RECOMMENDATIONS

A series of recommendations which concern tropical tunas and include bigeye tuna are presented in Appendix 6. The Committee also recommended that:

BET-4.a Statistics

i) Species and size sampling of catches transshipped to Puerto Rico be continued as sampling of catches from the eastern and western Atlantic is useful to complement sampling in African ports, by which the extent of bias due to size sorting of catches for different markets can be investigated.

ii) The recent introduction of deep longline by the Taiwanese fleet could pose problems in the processing of longline data. So that the effort data can be standardized, it is recommended that Taiwan submit detailed information on the new longlines used.

iii) All countries which fish bigeye tuna with longline send ICCAT the proportion of deep longlines in operation by five-degrees per month strata.

iv) The collection of data from the southwestern Atlantic longline fisheries be intensified.

BET-4.b Research

i) An abundance index be generated that encompasses information on the bigeye surface fisheries. This should include analyses on the apparent variability of recruitment from the CPUE of age-classes 1 and 2 from FIS and Spanish purse seiners in the coastal areas, and from the CPUE by size class and by limited time-area strata, for purse seiners as well as for longliners.

ii) Research on changes in gear efficiency between traditional and deep longline operations be continued in order to calculate the effective effort exerted on bigeye tuna.

iii) The species composition of the schools and the sizes of fish associated with aggregating devices be studied in detail from observer and logbook data.

iv) Studies be developed on the influence of the environment on bigeye CPUE.

BET-4.c Management

The reduction in effort in the recent period modified the yield per recruit. With the current situation, there are no potential gains to be obtained from a change in the age at first capture according to the available assessments, However, the Committee recommends maintaining the regulations currently in effect, taking into account a possible increase in purse seine effort.

SKJ - SKIPJACK

SKJ-1. DESCRIPTION OF FISHERIES

Skipjack tuna is a cosmopolitan species which is distributed in the tropical and sub-tropical waters of the three oceans.

Skipjack tuna are caught almost exclusively by surface gears in the entire Atlantic Ocean, although minor by-catches of skipjack are taken by longline. In the east Atlantic, the major catches are taken by purse seiners, mainly by the Spanish and FIS fleets, followed by those taken by baitboats from Ghana, Spain, Portugal and the FIS fleet. In the west Atlantic, the most important fishery is the baitboat fishery, comprised mainly of Brazilian, Cuban and Venezuelan vessels. Catches from the west Atlantic purse seine fishery, which are overall much less important than those of the baitboat fishery, were only taken by the Venezuelan and U.S. fleets.

SKJ-Figure 1, shows the size distribution of skipjack catches by the principal Atlantic fisheries.

SKJ-1.a Catches

Catches, by gear, in the east and west Atlantic are given in SKJ-Table 1 and SKJ-Figures 2 and 3.

In the east Atlantic, catches in 1990 are the third highest in the history of this fishery. This important increase is due almost exclusively to the increase in the Spanish purse seine catches, since those from the baitboat fisheries are very similar to those of last year. Catches by the major east Atlantic fisheries are shown in SKJ-Figure 4.

As regards the west Atlantic, there has been a global decline in catches, due to the decrease in catches by the Brazilian baitboat fleet. However, the 1990 catch data were not complete as the catches of baitboats based at Rio de Janeiro had not been reported. Purse seine catches continued the declining trend initiated in 1985, when the major component of the Venezuelan fleet moved to the Pacific Ocean. Catches by the principal fisheries of the west Atlantic are shown in SKJ-Figure 5.

SKJ-1.b Fishing effort

As concerns fishing effort, there is no information available on effective skipjack effort. Therefore, as in other years, vessel carrying capacity has been used as a measure of nominal effort for the east Atlantic. Carrying capacity is not an ideal measure of effort, since it does not take into account the increase in fleet efficiency, fleet interaction, etc. However, it

was used since there are no other estimates of effective effort available. YFT-Table 2 and YFT-Figure 8 show total vessel carrying capacity by fleets for the east Atlantic from 1972 to 1990. The maximum carrying capacity was reached in 1983 (81,800 MT) and since then there has been a slow decline until 1988 (43,800 MT). Afterwards there have been slight increases in 1989 and 1990, and reached 46,500 MT, which represents a 43 percent decline from 1983.

Due to the lack of available data, estimates of nominal effort for the west Atlantic could not be carried out, although there are indications that there has been a slight increase, due to the increase in the number of purse seiners.

SKJ-2. STATE OF THE STOCKS

Up to now, studies carried out on skipjack stock structure in the Atlantic have not provided definitive information to be able to divide the resource into smaller units. Two management units, in the east and west Atlantic, have been established based on the absence of transatlantic recoveries of tagged fish (in the east) even though many skipjack were released, but there could be some minor mixing.

SKJ-2.a East Atlantic stock

The last detailed skipjack stock assessment for the east Atlantic was carried out in 1984 by the Working Group on Juvenile Tropical Tunas. For these analyses, data and parameters obtained mainly during the International Skipjack Year Program were used. The results of this evaluation showed a state of underexploitation of the stock, as the Group, and later the SCRS, had assumed.

In observing the change in carrying capacity, it is noted that at the time of the assessment, the fishery supported the highest exploitation of the historical period. Vessel carrying capacity in 1983 was 81,800 MT, while it is currently 46,500 MT, which represents a 43 percent reduction. This significant drop in recent years, with respect to the time when the assessment was carried out (1984), might not have been accompanied by a similar drop in effective effort, taking into account the increase observed in the individual fishing power of the purse seiners. However, it was considered that even with this increase the current level of exploitation would not be equivalent to that sustained by the stock in the period 1980 to 1983.

Therefore, although no new stock assessments have been carried out, it seems reasonable to consider that if the analyses done in 1984 were repeated at the present time, they would still show that the stock is underexploited.

SKJ-Figures 6 and 7 give an idea of the changes in the fishery, in which two periods of effort and their relation to the catches can be clearly observed.

As regards parameters such as CPUE, the Committee did not advise interpreting their values as indicative of skipjack stock abundance.

In recent years there have been some changes in purse seine fishery strategy. In 1984 and 1988, the FIS fleet has concentrated on time-area strata with high skipjack concentrations, which resulted in important skipjack catches and which have remained stable during this five-year period; whereas skipjack catches by the Spanish fleet have shown continuous fluctuations without trend (SKJ-Figure 8). It should be pointed out that in this fishery the Spanish fleet (since the last quarter of 1990) and the FIS fleet (since early 1991), have started the massive use of artificial flotsam to aggregate the schools, mainly in the equatorial area (6°N-5°S and 3°W-20°W).

In the baitboat fishery of the Azores Islands, which is the northern limit of the skipjack fisheries, the fluctuation of CPUE, with no trend, is more marked, (SKJ-Figure 9) due probably to the influence of environmental changes, which in other places have had a favorable effect. Such is the case of the Madeira Islands, where after various years of practically null catches, the fishery has again developed.

SKJ-2.b West Atlantic stock

The indices of skipjack abundance in the west Atlantic have remained stable since 1984, with minor fluctuation (SKJ-Figure 10). These indices have been obtained from data from the Venezuelan purse seine and baitboat fleets. The low variability of the CPUE, compared to the large fluctuations that are normally observed in the catches of this species, would confirm the local character of these indices.

SKJ-3. EFFECTS OF CURRENT REGULATIONS

There are no regulations of any type in effect for skipjack. The current regulations in effect on yellowfin and bigeye have no effect on skipjack.

SKJ-4. RECOMMENDATIONS

A series of recommendations concerning tropical tunas which affect skipjack are presented in Appendix 6. In addition, the SCRS recommended that:

SKJ-4.a Statistics

i) The collection of catch and effort statistics on the fleets which operate in the west Atlantic be improved.

ii) The quality of sampling in the southwest Atlantic in general, and in Brazil in particular, be improved.

iii) Multi-species sampling coverage of Venezuelan landings, stratified by gear type, be maintained in order to correct the biases detected in the fishing logbooks.

iv) The Secretariat update and improve the current tables on the carrying capacity of the purse seine and baitboat fleets in the east Atlantic, and create similar tables for the west Atlantic. Therefore, the countries concerned should provide the historical data on the composition of their fleets.

SKJ-4.b Research

i) Our information be improved on the associations of tropical tunas with artificial or natural floating objects, marine mammals, etc. For this, the Committee recommends that ICCAT scientists participate in the program which the IATTC has developed on this subject, to determine the repercussions that these interactions can have in the assessment of these species.

ii) The estimates of effort directed at skipjack be updated, in accordance with the scheme developed by the Skipjack Year Program, doing these calculations with the current species composition (which was not available during the Skipjack Year Program).

iii) Complementary research be carried out on skipjack reproduction in the west Atlantic.

iv) The changes in effective effort, caused by the decline in competition between vessels due to the decrease in the number of vessels and to the increase in purse seine vessel efficiency with the introduction of bird radars and generalized fishing with artificial objects, be analyzed.

v) Research be continued on the effect of environmental factors on abundance, recruitment and availability of skipjack. This would benefit new assessments of the skipjack stocks, particularly from an analytical standpoint.

SKJ-4.c Management

There are no apparent reasons to advise management measures on Atlantic skipjack tuna.

ALB - ALBACORE

ALB-1. DESCRIPTION OF FISHERIES

ALB-1.a The fisheries

It is generally agreed that the Atlantic albacore resource is composed of a north stock and a south stock, separated at 5°N latitude. This hypothesis was maintained by the Second Albacore Workshop, (October, 1990) which also noted that the GFCM/ICCAT Expert Consultation considered the Mediterranean stock as a third separate stock.

The main albacore fisheries in the Atlantic are shown in ALB-Figure 1.

North Atlantic

Trollers and baitboats are mainly Spanish and fish in summer in the northeast Atlantic, principally in the Bay of Biscay and in open waters adjacent to the Bay of Biscay. At times, some Spanish baitboats fish in the winter and the beginning of spring in the Canary Islands and during autumn months in the Azores. It was noted that in 1990 a small Spanish baitboat fleet operated in the Azores for the first time since 1976. The French fleet, after a period of sharp decline, introduced two new gears in 1987, driftnets and paired pelagic trawls. These gears are used by vessels which use either driftnets (gillnet vessels) or pelagic trawls (paired trawl vessels) at night, and, as a secondary activity, troll during the day. Size frequencies of fish caught by each gear are shown in ALB-Figure 2. Surface fisheries generally catch juveniles and pre-adults (2-15 kg), except in the Canary Islands and Azores where the baitboats exploit both pre-adult and adult fish (about 15 kg or more).

A minor fishery of the U.S. occurs in the northwest Atlantic. Catches are mainly by the rod and reel recreational fishery with a lesser amount from coastal pelagic longline vessels.

The longline fleet in the North Atlantic is mainly Taiwanese. It has been markedly reduced since 1987, due to economic factors. These longliners mainly exploit a fraction of the adult stock. The group noted that there was no Taiwanese large driftnet operation being conducted for albacore in the Atlantic in 1990. It was noted that exploratory driftnet operations are being conducted by Ireland and Great Britain but results from those activities have not yet been reported to ICCAT.

South Atlantic

The south Atlantic albacore stock has been mainly exploited by longliners for 30 years. Taiwan present-

ly has the main fleet of longliners, having succeeded Japan at the beginning of the 1970's. There are also Brazilian and Uruguayan longline fisheries making minor catches.

The surface fishery is made up by the South African baitboat fleet which took 23 percent of the total south Atlantic catches in 1990. These baitboats target medium-sized albacore in the areas off the west coast of South Africa (Figure ALB-1). Their activities are seasonal and alternate with other fisheries (fishing for squid, etc.).

Mediterranean

Various small fisheries operate along the Italian and Greek coasts, using baitboats and longlines or other gears. The sporadic presence of Spanish baitboats and trollers in the Mediterranean is noted. The status of Italian driftnet and longline operations and other possible fisheries that may be operating on albacore is unknown.

ALB-1.b Catches

ALB-Table 1 shows the historical series of catches for the north and south Atlantic stocks and for the Mediterranean, and by gear, 1961 to 1990.

North Atlantic

ALB-Figure 3a, b, c shows the historical series of the catches of this stock. In general, the total catch has followed a decreasing trend over 1960-1990. In 1990, total catches in the North Atlantic were 34,500 MT, 2,300 MT more than in 1989. The recent decrease since 1987 is mainly due to a very sharp reduction in longline effort due to the departure of the Taiwanese fleet.

The surface fisheries caught 32,400 MT in 1990. These catches are made by the Spanish troll (10,300 MT in 1990, compared to 10,500 MT in 1989) and baitboat (15,400 MT, compared to 14,900 MT in 1989) fisheries. Of this total catch 1,300 MT were taken by the Spanish baitboat fleet operating during the fall in Azores in 1990. Catches by the new French gears were: 750 MT in 1988, 1,400 MT in 1989 and 2,100 MT in 1990 for the driftnet fishery, 1,700 MT in 1988, 2,240 MT in 1989 and 900 MT in 1990 for the pelagic trawl fishery.

The Portuguese baitboat fishery in the Azores caught 3,135 MT of albacore in 1990. The increase in catch for this particular fishery for this year was due to an extension of the regular fishing season into autumn.

South Atlantic

ALB-Figure 4 shows the historical catch series for the south Atlantic stock. In 1990, south Atlantic catches decreased by 2,900 MT (22,400 MT compared to 25,300 MT in 1989). Longline catches decreased from 18,400 MT to 17,100 MT, while catches by the South African surface fishery decreased from 5,500 MT to 4,200 MT. The catches of this recently developed fishery, which began in 1980, are thought to be predominantly from the albacore stock of the South Atlantic.

In general, south Atlantic albacore catches showed relatively strong fluctuations between 10,000 MT and 38,000 MT per year during the last three decades. The decrease in catches from 1983-1984 could be explained by a decline in longline fishing effort; however, the degree to which this has occurred is not known.

Mediterranean

Reported catches of albacore in the Mediterranean reached 1,500 MT in 1990.

ALB-1.c Fishing effort

North Atlantic

ALB-Table 2 and ALB-Figure 5 show the changes in nominal fishing effort of Spanish trollers and baitboats and French driftnet and mid-water trawls in the North Atlantic since 1975.

A continuous and significant decrease in nominal fishing effort was noted for trollers from 1967 to 1975, then a moderate decrease from 1976 to 1984. From 1985 to 1990 effort was stable at a slightly higher level than the previous period. The general decline in effort that began in 1967 and continued through 1984 is explained mainly by the gradual disappearance of the French troller fleet (although it is not shown in the figures). In 1990, troll effort was 18,911 fishing days.

Nominal fishing effort for baitboats decreased slowly over the 1967-1977 period, then was rather stable from 1978-1990, reaching 8,878 fishing days in 1990, slightly lower than the 9,501 fishing days of 1989. Nominal effort of the new French gears (driftnet and pelagic trawl) increased since their appearance in 1987 to 1989. In 1990 the nominal effort of both gears has decreased: 1,450 fishing days in 1989 and 1,290 fishing days in 1990 for the driftnet; 2,900 to 806 fishing days for the mid-water trawl.

Nominal fishing effort for longliners in the North Atlantic (ALB-Table 2 and ALB-Figure 6) showed two periods of high effort (1976-1977 and 1983-1986).

Since 1987, effort dropped sharply to a very low level. This is due to logistic difficulties encountered by the Taiwanese longliners which had to leave the North Atlantic. In 1990, there has been an increase in the nominal effort of longliners, from 3.4 million hooks in 1989 to 14.08 million hooks in 1990. This increase in nominal effort has been produced in conjunction with a change in the target species (from albacore to bigeye and yellowfin), and with a change in the fishing strategy using deep longlines at lower latitudes.

South Atlantic

In the south Atlantic the general trend in longline effort by Taiwan remained rather stable (ALB-Figure 7), but an abrupt increase to the historically highest point occurred in 1987, when the decrease in Taiwanese longline effort occurred in the North Atlantic. Subsequently, effort has been sustained at a high and slightly declining level since 1987, reaching a nominal effort of 60.684 million hooks in 1990.

Nominal fishing effort of the South African baitboat fleet has increased from 1980 to 1989. In 1990 there has been a slight decrease in the nominal effort of this fleet due to restricted access to fishing areas off Namibia.

Mediterranean

In the Mediterranean, trends in fishing effort cannot be calculated due to the absence of a sufficiently long series of statistics.

ALB-1.d Catch Rates

North Atlantic

Nominal catch rates of the surface fisheries are shown in ALB-Figure 8. The catch rate trend for the trollers is relatively stable. The baitboat catch rate trend shows an increase since 1975, which could be explained by an increase in fishing power of the baitboats, particularly due to a technological advancement in the adoption of sonar equipment.

The new gears (driftnets and pelagic trawls) have been developing since 1987 and their catch rates are in the same range as those of traditional gears. The nominal catch rate of the longline fishery in the North Atlantic is given in ALB-Figure 9. The longline catch rate has remained stable from 1973 to 1983, then decreased.

South Atlantic

ALB-Figure 10 shows the nominal catch rates for the Taiwanese longline fleet fishing in the south Atlantic. Catch rates were stable from 1972 to 1986, then decreased.

South African baitboat nominal catch rates declined from 2 MT per boat-day in 1987 to 0.8 MT per boat-day in 1990.

ALB-2. STATE OF THE STOCKS

ALB-2.a North Stock

During the *ad hoc* meeting on progress in the Albacore Research Program in Sukarrieta, Spain, it was proposed that production of standardized indices of CPUE by age class for the Spanish surface fisheries be considered. Initial analyses of age-specific abundance indices for Spanish surface fisheries from 1983 to 1990 were presented in SCRS/91/105. General Linear Modeling (GLM) procedures were used to derive standardized CPUE indices from trip data for trollers and baitboats, stratified by year, gear and area. Preliminary age composition estimates were derived using the MULTIFAN length frequency analysis method. The results varied for the different age classes (ALB-Figure 11), results being more consistent and reliable for the main exploited ages of 2 and 3 than for ages 1 or 4.

Age-1 indices exhibit large annual variation but it is more difficult to relate these to annual recruitment fluctuations as this age class is not targeted, and is occasionally avoided. Age-4 indices showed similar fluctuations, although with a better statistical fit. Interpretation of age-4 trends is difficult, as they do not relate well to trends for ages 2 and 3. The index for age 4 results principally from catches by the baitboat fishery. It was considered likely that this gear had been more affected by factors such as oceanographic conditions and migration offshore, which affect availability to the baitboat fleet.

CPUE trends for ages 2 and 3 were considered reliable. These are the main target groups in the fishery. Age-2 fish show a slow increase from 1983 to 1988, a decline in 1989, followed by some recovery in 1990. Age-3 fish appear to have been stable from 1983 to 1987, showing a sharp decline followed by lower CPUE from 1988 onwards. The reasons for this decline are unclear. Two possible reasons for reduced CPUE of the surface fisheries were proposed. The first was a reduction in catchability by surface fisheries as a result of interaction with new fishing gear introduced after 1987. The second was a decrease in abundance of age-3 albacore as a result of increased mortality of age-2 fish after 1987. It was noted, however, that VPA results produced at the Second Albacore Workshop did not indicate a significant increase in age-2 mortality in recent years, and indicated that

new fishing gears contribute moderately to total fishing mortality.

No production model analysis was presented for the northern albacore stock. The Working Group placed limited confidence on production models for the northern stock but felt that the approach could be applied if valid biomass indices become available. Results, particularly from dynamic age-structured production models such as applied to the southern stock, could then be compared to those from VPA analyses.

Considerable discussion was devoted to the feasibility of conducting VPA analyses for the northern stock with the improved catch-at-age table. It was concluded that the MULTIFAN analysis had greatly improved the catch-at-age data compared to earlier results obtained by "slicing" the catch-at-size data. However, it was noted that some problems still existed with apportioning of catch-at-size data to the 1, 2-3, and 4 age groups in the Spanish surface fishery. It is also possible that this problem has affected calculated CPUE indices for this fishery. It was decided to defer any new VPA analyses to the next meeting of the Albacore Research Program and to encourage national scientists to address the above problems in preparation for such a meeting.

The only available index of recruitment was the age-2 CPUE index for Spanish surface fisheries. This index suggests moderate fluctuation between 1983 and 1990, with no apparent strong trend in recruitment.

The Group could add nothing further to the 1990 SCRS conclusion that recent VPA analyses indicate that northern Atlantic albacore are exploited below the maximum sustainable yield. Available indices suggest that the northern Atlantic albacore stock is currently moderately exploited, but uncertainties in the analyses could result in changes in this conclusion.

ALB-2b. South Stock

The only information on abundance for this stock is the standardized CPUE index of the Taiwanese longline fishery exploiting adult albacore. No other indices of abundance were discussed. It was noted that no applicable abundance indices have yet been proposed for the juvenile stock.

Two production model assessments were discussed: SCRS/91/100 presented an updated production model analysis based on Taiwanese longline catch-rate data. The data series used previously was updated and effort standardized using Honma's algorithm. CPUE indices (ALB-Figure 12) declined fairly sharply between 1966 and 1972, and declined gradually thereafter until 1983. An increase in CPUE from 1984 to 1986 was again followed by a decline from 1987 onwards. The production model based on these data (ALB-Figure 13) indicated an MSY of approximately 28,000 MT at an optimum effort of 102 million effective hooks.

An alternate production model (SCRS/91/84) used a dynamic age-structured approach to avoid the positive bias inherent in the continuous equilibrium assumption coupled to effort averaging in the generalized production model if the resource exhibits a declining trend. Assuming the same mortality, fecundity and growth schedule as for the northern stock, this model used the Taiwanese longline CPUE data series and produced somewhat lower estimates of MSY and replacement yield (RY). Initial analyses using data up to 1988 suggested an MSY of 23,200 MT (coefficient of variation (CV) = 4.5 percent) and a replacement yield of 24,800 MT (CV = 2.2 percent). Updated analyses using the standardized longline data extended to 1990 gave lower values of 20,400 MT MSY (CV = 16.8 percent) and 18,400 MT RY (CV = 18.5 percent) but with larger variances. Biomasses are not precisely determined by the model but the ratios of current biomass to B(MSY) or unexploited biomass were adequately determined. The updated analysis suggests that the resource is currently only 20-30 percent of the unexploited biomass (ALB-Figure 14) and has recently been exploited somewhat beyond MSY. It is concluded that the southern albacore resource is maximally exploited and must be closely monitored.

VPA analyses of the southern stock cannot be considered because a catch-at-age table is not yet available. Recruitment indices are unavailable for the southern Atlantic albacore stock.

ALB-2.c Mediterranean

No evaluation of the state of the Mediterranean stock has yet been possible because of the lack of sufficient data on these fisheries.

ALB-3. EFFECTS OF CURRENT REGULATIONS

No regulations are presently in effect for albacore in the Atlantic Ocean.

ALB-4. RECOMMENDATIONS

ALB-4.a Statistics

The group reviewed recommendations from the previous 1990 SCRS meeting concerning statistics and research information needs drawn up by the second Albacore Workshop. Some of these were referred to the Albacore Research Program (PSG).

Considerable progress was made during 1991 regarding the recommendation concerning evaluation of exploitation of the southern stock using a dynamic age-structured production model.

It was noted that the recommendation concerning investigation and documentation of Mediterranean albacore has not yet been addressed.

Further recommendations from the group regarding statistics were:

i) ICCAT data submission criteria must be strictly observed by national scientists in the collecting and reporting of Task II catch and effort and catch-at-size data. The finest possible stratification is requested to be used in future collecting and reporting of Task II data.

ii) Analyses of catch-at-size data for the Spanish fisheries should be continued and provided to ICCAT to allow further assessments of northern albacore.

iii) Efforts should be made to describe U.S. albacore fisheries for the next stock assessment session and to provide ICCAT with appropriate biometric conversion formulae for this fishery.

iv) Close monitoring of the surface and longline fisheries in the south Atlantic should be continued or increased to improve the database on catch, effort, and catch at size.

v) The group again re-emphasized the recommendation of the 1989 Workshop to maintain complete ICCAT tagging files, including historical statistics collected by French scientists and historical tagging files from previous ICCAT data bases.

vi) Mediterranean albacore fishing nations should be urged to investigate historical catch, effort and size data and should report all existing data to ICCAT. A comprehensive sampling program should be initiated to obtain information of catch at size and biological data for those fisheries.

vii) It was recommended that a data file of nominal effort should be maintained for surface albacore fisheries.

viii) It was recommended that consultations between ICCAT and different countries from the southwest Atlantic increase in the near future. The reported recent increase in fishing effort in this area emphasizes the necessity of improving studies for this area.

ALB-4b. Research

The Committee noted that much interesting work had been conducted during 1991. Intensive work was conducted on the recommendations regarding application of stochastic ageing of the catch-at-size data and on standardization of indices of abundance for the Spanish surface fisheries. Initial efforts were begun to analyze methodology for carrying out hard-part analyses, making age determinations and initiating research to verify annuli readings for the northern stock. Further information was presented to update the descriptions of migration patterns of the north and south Atlantic stocks.

The Committee made the following additional recommendations:

i) Analyses should be conducted on the recently collected and historical length-weight data for the North Atlantic stock. A conclusion on a standard length-weight relationship for the north stock should be achieved.

ii) Analyses should be conducted on the recently collected and historical length- weight data for the Mediterranean stock.

iii) Efforts should be made to initiate the collection of length-weight data and to carry out comparative analyses of length-weight relationships for the southern Atlantic and the Mediterranean stock.

iv) Scientific sampling should be conducted to obtain data on fecundity and sex ratio by size for all albacore stocks. Sampling from this research should be stratified by the finest temporal and spatial resolution possible.

v) Research must be continued to establish routine ageing methodology using hard parts for large fish in the North Atlantic. Verification of research results should be carried out to complete validation requirements.

vi) Collection of spines from a full range of albacore sizes in the first quarter of the year (boreal winter) in the North Atlantic is urgently needed. This is required to complete the sample data set already collected in order to have a full year of spines for studying and determining the time of annulus formation.

vii) Ageing research should be initiated to establish complementary ageing program for the southern and Mediterranean stocks.

viii) The stochastic ageing methodology applied to the northern stock should be continued to extend the time series and to allow investigation of the appropriate ageing methods to use to convert catch-at-size data into catch-at-age data. These analyses should be considered for the south Atlantic as well.

ix) It was noted that simulation analyses would be useful in examining the variation of population parameters.

x) Ongoing tagging studies should continue and further studies should be implemented in other areas. Tagging of large albacore in the North Atlantic must continue to obtain additional information on growth of large individuals.

xi) Analysis of information from tag-return data must continue. A comprehensive review of tagging for studies conducted for Pacific albacore was recommended for comparative purposes.

xii) Standardization of abundance indices made during the recent year for the north and south stocks should be continued using traditional analytical methods.

xiii) Observer programs in the North Atlantic should be continued and expanded to obtain data on injured fish and other factors such as losses and discards, rejects, etc., that could contribute to fishing mortality and would not be reflected by the landings. These observations could also contribute to the understanding of interaction between fisheries. Specific sampling should be initiated to collect this information. Such information is needed to continue the time series of information on injured fish and to validate at sea records.

xiv) A Working Group meeting, separated from the SCRS meeting, will be convened from October 6 to 9, 1992. This group should address the use of a variety of assessment methods such as VPA, production models or other analyses considered appropriate to obtain information on current resource status. Such analyses should examine the variability in results from using different assumptions.

ALB-4.c Management

No management measures were proposed.

BFT - BLUEFIN TUNA

INTRODUCTION

Bluefin tuna are taken in coastal fisheries on both sides of the Atlantic and in the Mediterranean using a wide variety of gears and by longline in many areas. The size of fish taken differs according to the gear and area.

The total catch in 1990 was 22,290 MT (provisional) divided into 2,770 MT in the west Atlantic (division at 45°W), 5,810 MT in the east Atlantic and 13,710 MT in the Mediterranean (BFT-Table 1, BFT-Figure 1) . This was 1,200 MT more than the 1989 catch but somewhat below the 1988 catch of 25,000 MT. The landing figures for some countries are based on assumptions about landings that have not yet been reported. Where catches have not yet been reported for the latest year or years, the most recently reported annual value is carried forward.

There are concerns that catches by a number of countries are not being reported or may be underreported. Some support for this concern comes from information about the source and amount of bluefin imported to Japan. The import figures may represent transshipments through, rather than catches by, the exporting country but there are apparently imports from countries not reporting catches. In other cases there would appear to be imports in excess of reported catches. In addition, even when Japanese imports are less than national statistics, the size composition of the imports suggests that the medium- to large-sized components of national statistics may be underreported. It is not possible to assign all these imports to species (southern or northern bluefin) or to ocean; however, it is clear that in recent years at least one thousand tons of these imports are Atlantic bluefin that have not been reported in national statistics and are not included in estimates of total catch.

In 1990, the Commission accepted an SCRS proposal that, since bluefin populations showed little change from year to year, detailed assessments would be undertaken at two-year intervals rather than every year. Based on the working hypothesis of two stocks in the Atlantic, the SCRS in 1991 undertook an assessment of the western Atlantic stock and scheduled an assessment of the eastern Atlantic and Mediterranean stock for 1992. The SCRS did, however, review the information from the 1990 fisheries on the latter stock to determine whether there was any evidence of significant change.

EAST ATLANTIC AND MEDITERRANEAN

BFT-1E. DESCRIPTION OF FISHERIES

BFT-1E.a East Atlantic

Most of the landings reported in 1990 (BFT-Figure 2) in the east Atlantic are made by traps (37 percent), baitboats (33 percent), and longlines (26 percent). Although the number of traps has increased from 1 to 5 between 1989 and 1990 on the Moroccan coast, most of the trap catch is taken by Spanish traps (89 percent). There was a marked decrease in baitboat catches (1,931 MT) in 1990 compared to the stable level of the previous two years. Almost all the longline catches are made by Japan and have increased significantly (76 percent) in comparison to 1989; this may be due to an increase in fishing effort in the mid-Atlantic area. The Moroccan surface catches and those from French unclassified gears make up the majority of the other 4 percent of the catches.

BFT-1E.b Mediterranean

The joint GFCM/ICCAT meeting in Bari in 1990, which was attended by a large number of countries which are not members of ICCAT, led to a considerable improvement in the data base up to 1988 for several large pelagic species, including bluefin tuna. The reporting of catch data for 1989 was not as satisfactory, however, because 24 percent of the total was estimated as being the same as the catches reported for 1988. For 1990, actual reports for the preceding year amount to only 12 percent of the total estimated catch. Perhaps because it was agreed that no stock assessment would be undertaken for the eastern Atlantic this year, few of the catch reports were accompanied by size composition data. If this situation occurs again next year, too many substitutions could introduce bias in the catch at age and thus distort the results of the assessment.

The French, Italian, Turkish and Yugoslavian purse seine catches still make up the majority of the landings, which were 67 percent or 9,262 MT (BFT-Figure 2). The unclassified gears from Algeria, Italy, and Spain represent 20 percent. Major developments cannot be detected by looking only at the catch data for the Mediterranean fisheries. The redistribution of purse seine effort continues; the total number of purse seiners has not changed in the northern part of the western basin but new boats are progressively being put into operation on the north African coast. For several years, a number of countries supply bluefin to the Japanese market and the import statistics of Japan indicate under-reporting or non-reporting of the catches; some of these data are not traceable to any stock.

WEST ATLANTIC

BFT-1W. DESCRIPTION OF FISHERIES

Catches in the west Atlantic (BFT-Figure 3) have been restricted by regulation since 1983 to 2,600 MT annually, about half the average during the period 1973-1981 (in 1982 the catch limit was 1,160 MT). The reported catch in 1990 was 2,770 MT, about 70 MT less than in 1989, although there were some minor changes in component fisheries. The Japanese longline and U.S. rod-and-reel catches increased (18 percent and 35 percent, respectively), while catches decreased in the Canadian tended line (32 percent) and U.S. longline (21 percent) and unclassified (18 percent) fisheries. The market statistics from Japan (see General Introduction) indicate that these catches may be incomplete as there are imports from west Atlantic countries which do not report these bluefin catches. While it is not possible to determine how much of these imports come from the west Atlantic, assuming that half of the imports to Japan from these countries are of western bluefin, additional catches of 200-700 MT would be indicated annually for the past three years.

BFT-2W. STATE OF THE STOCKS

BFT-2W.a Natural mortality and Growth

This year the growth equation and the assumed value (0.14) for the instantaneous rate of natural mortality were the same as last year.

BFT-2W.b Catch at age

Catch at size was available from 1960-1990. Since 1984 the SCRS has decided to restrict its virtual population analyses to the years since 1970, primarily because of concern that there was only a limited number of size samples available for earlier years. The catch at size was converted to catch at age using the age slicing system established by the SCRS in 1990. That system is primarily based on the growth curve estimated by Turner *et al.* (1991), though in some year-month strata visually determined boundaries between modes in the size data are used to separate younger age groups (ages 1-3), which are not as distinctly separated by the growth curve. For 1990 the lower and upper limits of size at age were judged

adequate for separating apparent year classes, so boundaries from modes were not used. The estimated catch at age, through age 14+, is shown in BFT-Table 2.

BFT-2W.c. Abundance indices

Ten abundance indices were examined (BFT-Figure 4a and 4b). Six of these were used in 1990 for calibration of the VPA, and the same six were selected for this purpose again in 1991, together with a seventh (Japanese longline in northwest Atlantic for large fish). The six series are catch rates for the Gulf of St. Lawrence tended line fishery for very large tuna, the U.S.A. Atlantic coast rod-and-reel fisheries for small and large bluefin (separate indices) and the Japanese longline fisheries for small and medium fish (separate series), together with the Gulf of Mexico larval bluefin index, which is considered to provide information on the spawning component (large fish). Two other indices (U.S. rod and reel ages 6-7 and U.S. swordfish longline bycatch of large bluefin) were considered to require further analysis and/or data points before they could be used for tuning. The tenth series (the Japanese longline catch rate for the Gulf of Mexico 1974-81 for large tuna), had not been used in the past because of concerns about the treatment of the data and changes in harvesting strategy. This year it was noted that progress had been made in addressing these concerns, but that the series was not yet acceptable for inclusion in the suite of abundance indices used in calibration. It was judged, however, that the series could be used to examine the implications of the additional data it contained. Fuller discussion of the various indices are contained in the Reference Paper on 1991 Bluefin Stock Assessments (SCRS /91/118).

The abundance indices were given equal weight in the calibration in contrast to 1990 when the indices were weighted by the inverse of the variance to the fit to the model. The change was made because of concerns about the amount of weight given to one index (Canadian tended line) which represented fish at the upper end of the age range (13 years and older), and because the various analyses indicated no substantial conflicts between the data sets.

BFT-2W.d Partial recruitment

The Committee studied the partial recruitment pattern in 1990 using separable virtual population analysis (SVPA) as it has in the past. Catches for ages 1-13 from 1987-1990 were used to estimate the selectivity pattern. Ages 10-13 were used to obtain an indication of the relationship between the fishing mortality rate (F) on age 9 and the fishing mortality rate on older ages. Two levels of F (0.2 and 0.4) and two relationships between the selectivities of age 2 and age 13 (1X and 3X) were explored. The estimated selectivity pattern showed little sensitivity to these inputs, and therefore the final selectivity pattern for the terminal year was selected from the analysis using F of 0.4 and a relative selectivity of age 13 three times that of age 2.

The Committee also used SVPA to examine the relationship between the relative selectivities of ages 10-13 to age 9 in earlier years. Three periods were considered for these examinations, because it was considered that this relationship may have been relatively stable during those years. Those periods were: 1970-1973 when there was little or no directed fishing on bluefin in the Gulf of Mexico, 1974-1981 when the Japanese longline fishery for bluefin in the Gulf of Mexico was active, and the period since the imposition of catch limitations 1982-1990. These relationships were examined with selectivities on age 13 being 0.5, 1.0 and 2.0 times the selectivity on age 2; little sensitivity to these inputs was observed in the relationships of F's on ages 9 and 10. The F's on ages 10+ were estimated to be 2.22, 1.42 and 1.12 times the F's on age 9 during those three periods, respectively.

BFT-2W.e Population Analysis

ICCAT introduced substantial restrictions on the catch for 1983 which resulted in a 50 percent drop in total catch compared to the period prior to 1982 (in 1982, the measures were more restrictive). This reduction was expected to result in a slow stock increase spread over a period of 30 years (SCRS 1984). It would be expected that any recovery would first be seen in the small fish component, with the extent depending both upon the portion of the total catch taken for this size component and upon the numbers of young fish recruiting to the stock. Increase in the numbers of medium fish would be influenced by the same factors as for small fish, and in particular the numbers of tuna surviving to age 6. Consequently, any increase in medium fish would start some years later than the start of an increase in young fish, particularly because the numbers of young fish would already have been fished hard prior to 1982. This lag in the onset of an increase applies to an even greater extent to the large fish component. It thus could be expected that any increase in large fish would not be detectable for at least eight years, and then beginning only with the youngest year classes (ages 8 and 9) reaching this age. The large fish component comprises fish of many additional ages, since bluefin can live to 25 years or more. Consequently this size category overall would

continue to decline for a considerable number of years after the introduction of the 1982 regulation.

The refinement of the blue fin assessment methodology and data base continues, reducing some of the uncertainties associated with past assessments. The general conclusions are quantitatively similar to those presented previously. The 1991 assessment is illustrated in BFT-Figures 5, 6, and 7. The estimated numbers at each age and of the fishing mortality by age are given for the years 1970-1991 and 1970-1990, respectively, in BFT-Table 3.

This assessment is based on a form of Virtual Population Analysis (VPA) which utilizes catch at age and indices of abundance. Estimates of stock size in the most recent year obtained from VPA are subject to more uncertainty than are the estimates in the same analysis for the stock size two or three years earlier. Investigation of the VPA results were made to examine them for possible underestimation or overestimation. The mathematical model itself was shown not to be influencing, to any great extent, the long-term declining trend. The estimates of stock size in recent years, as implied in the present VPA, were shown to depend upon the number of years of data in the analysis. The direction of change was upwards, i.e., each successive year's estimate of stock size in a particular year was higher than the previous estimate. BFT-Figure 5 illustrates this by graphing the current estimate of stock size in each year, together with the estimates that would be made had data not been available for 1990, in one case, for 1989 and 1990 in another and 1988-1990 in another. BFT-Table 4 provides the successive estimates of numbers of the various age groups for the years 1986-1990. The figures indicate the need to consider whether the estimate of the 1991 stock size will change in future years. As an example it would appear that, had exactly the same mathematical model been used each year, the estimate for the 1986 stock size that was made in 1989 would have been considerably larger than that made in 1988. The 1990 estimate of the 1986 stock size would have been larger again, but by a smaller amount. The 1991 estimate is however very similar to what would have been the 1990 estimate. This trend to convergence of the estimates of stock size in the 1991 assessment with the estimates using only data available at the time of the 1990 assessment, is demonstrated in the illustration (BFT-Figure 5) by the coincidence of the 1991 line with the 1990 line on the graph. This convergence applies not only to estimates for past years such as 1986, but also to the estimate for 1990 as made in 1990 and in 1991. In other words, the current estimate of the stock size of 1991 may indeed change next year, but the magnitude of this change is likely to be much smaller than was the change between the first two estimates of, for example, the 1988 stock size. Analysis of the trends on the basis of the different size components (e.g., 10+, see BFT-Table 4), shows that the extent of the change varies from year to year for the different components, with some of the current estimate of age classes in 1991 being smaller than they would have been estimated last year. Thus the next analysis could produce estimates of 1991 stock sizes lower than those made this year, at least for certain ages. It should be noted that these results were produced as tests of the methodology and other than the base case (the full VPA) were not subject to rigorous examination of the quality of the fit.

A possible reason for the greater agreement between the 1990 and 1991 estimates, may be that most of the abundance indices span a limited number of years, so that addition of data for each new year would be expected to increase the ability to detect real trends in abundance. This is because longer time series of data tend to reduce the uncertainty caused by environmental or other effects that may influence the individual annual value of an abundance index. Other elements of the analyses indicate that there is considerable variability about the estimates. This variability implies that the apparent short-term trends in stock size must be interpreted with caution. However, the variability in the estimated trends is less than might appear from BFT-Figure 8. Variability in the input data tends to make series of stock-size estimates vary in the same direction, so that trends vary less than the individual points, that is to say we have more confidence in the trends than in the absolute numbers.

The trends in stock size estimated by an alternative analytical technique (a non-equilibrium age-structured production model) are within the 90 percent confidence limits about the trend for the VPA (BFT-Figure 6). Non-equilibrium production models generally provide relatively precise estimates of recent trends in abundance even though there is often considerable uncertainty regarding the absolute level of population size. Such a problem may exist in the present analysis because it was conducted assuming that the age-specific exploitation pattern did not change from one year to the next, when in fact there is considerable evidence for change in exploitation pattern over the period considered. In contrast to the relative precision of estimates of recent trends, non-equilibrium production models do not determine well the trends in the earliest part of a data series, and, in this particular case, the uncertainty is increased by the changes in the age-specific exploitation pattern over time. The results of the model run from 1960 do suggest that there had been considerable reduction in the biomass level by 1970, but the extent cannot be determined.

The impact on the assessment (VPA) results of including the abundance index based on the Japanese

longline fishery in the Gulf of Mexico during the spawning season (1974-81) would be to increase slightly (about 4 percent) the estimate of the catches at the beginning of 1991 of fish aged 8+ but to reduce the estimates of fish aged 6-7 by about 7 percent and of fish aged 2-5 by about 10 percent, with similar changes in the estimates of the decrease in numbers in both the long term and short term.

Examination of the abundance indices themselves (BFT-Figure 4a and 4b) for trends over time are generally consistent with the results of the models. One of the indices of abundance that was rejected for use in tuning the VPA on the basis of significant inconsistencies in the data set, that being the catch rate of medium-sized fish in the U.S. rod and reel sport fishery, might suggest 3-fold increase in abundance of medium sized fish. However, the uncertainty about the index means that this increase cannot be confirmed. The Japanese longline CPUE which was used in the analysis also suggests an increase in medium fish abundance since 1986 but to a lesser extent. The second CPUE series (U.S. swordfish longline by-catch of bluefin), which was rejected from use in the VPA, showed no increase.

The conclusions from the VPA are that the overall exploitable biomass has declined, as previously estimated, to between 10 and 23 percent of the 1970 level. The VPA permits consideration of trends in abundance of the various size groups following the introduction of the 1982 and 1983 management measures and of the levels of fishing mortality of the different groups.

Small fish (ages 1-5). The catches by number of fish age 1-5 (BFT-Table 2) declined markedly after the introduction of the regulations, but increased considerably in 1985 although to a level about half of that in the late 1970's. Since then catches have fluctuated around the 1985 level. In terms of fishing mortality on ages 2-5 (BFT-Figure 7), there was an initial decline, but mortality has increased generally to levels of the late 1970's.

The year classes of the 1980's appear to have been considerably smaller than those in the early 1970's. The 1987 year class was the largest since that period but in comparison to the estimates of 1969-75 year classes, appears to have been smaller than any of them and it has already been fished fairly heavily. The 1982 year class was the next largest in the 1980's and the 1986 and 1988 year classes may have been very small. There is therefore no evidence of any strong year classes that would have contributed substantially to the young fish component. Overall for this age component, there is no evidence of any trend in recent years (BFT-Figure 8), although there may have been a slight recovery in the early 1980's and no change since then.

Medium fish (ages 6-7) The catch of medium fish dropped markedly after 1981 (BFT-Table 2), and while it has increased sharply recently, the level is below that of the period pre-1982. In terms of fishing mortality (BFT-Figure 7) there was an initial sharp drop and then an increase since the mid-1980's to levels similar to or higher than the pre-1982 level.

It is more likely than not that this size category has increased in abundance compared to 1982 (BFT-Figure 8). There appears to have been a higher level in the interim than at present, reflecting the pattern of the year classes at ages 6 and 7, and particularly that of 1982 which appears to have been reduced considerably in relative size by the time it reached age 6.

Large fish (Ages 8+). The catch by numbers of large fish also dropped greatly in 1982 (BFT-Table 2), given the very low quota in that year and increased in 1983 and 1984 commensurate with the increase in the quota, fell somewhat in 1984 and increased again in 1988-90 to levels similar to 1983-84. These catch levels are however much below levels in the late 1970's. In terms of fishing mortality (BFT-Figure 7) there has been a considerable increase because the catches, which are in conformity with a regulation based on weight, have been taken from a declining biomass.

Given the large number of ages in this category and the expectation that the benefits of the catch restrictions would be detected first for the youngest ages in the category, the recent trends in abundance were examined for ages 8 and 9 separately from ages 10 and older.

The abundance of ages 8 and 9 (BFT-Figures 8 and 9) appears to have been fairly stable over the late 1980's, but it is more likely than not that there has been an increase in abundance since 1986 although the numbers of the 1983 year class that recruited to this size category in 1991 are low.

The abundance of fish aged 10 and older (BFT-Figures 8 and 9) must be expected to decline given that the year classes contributing to it were all fished heavily prior to 1982. The numbers will not increase until the year classes reaching age 10 do so in strength. It is noted that the 1987 year class which was somewhat stronger than the others in the 1980's has already been fished quite hard.

In aggregate for fish aged 8+ (BFT-Figure 8 and 9), there is a high likelihood that the abundance of this category (which is considered to be the spawning stock) has continued to decline since 1982.

BFT-2W.f Yield per recruit

The assessment allows consideration of the impact of maintaining the current regulations, both as presently applied and in a modified form based on size

categories. In this connection, it is clear that the pattern of increased fishing mortality on small fish since about 1985 has reduced the potential for increase of the stock envisaged when the regulation was adopted. The increase in the yield per recruit that can be expected from the fishery by avoiding capture of small and medium bluefin would mean that a large spawning stock could be maintained under a wide range of fishing mortality. Alternatively, substantial reductions in the capture of small bluefin should have over the long term a high probability of substantially increasing the abundance of medium and large fish.

Two simulations (BFT-Figure 10) of the impact on the yield per recruit of a) a 25 percent reduction in the level of fishing mortality on fish ages 1-5, and b) of a complete elimination of such catches together with a stepped reduction in mortality on age 6-8 (75 percent age 6, 50 percent age 7 and 25 percent age 8) but no reduction in mortality on ages 9+, illustrate this point. In case a) the yield per recruit at current overall mortality levels would increase from the current level of about 25 kg to 35 kg and under scenario b) to over 50 kg.

BFT-3W. EFFECTS OF CURRENT REGULATIONS ON WEST ATLANTIC BLUEFIN TUNA

A regulation prohibiting the catching and landing of bluefin tuna less than 6.4 kg for the entire Atlantic went into effect in August 1975; an exemption allowed incidental catches of 15 percent (by number). After the regulation went into effect, the percentage of individuals less than 6.4 kg in the catch was low in the western Atlantic from 1976 to 1981 (1.7 to 7.2 percent), but it increased to 23.2 and 18.2 percent in 1982 and 1983 (BFT-Table 5). The percentage declined to low levels (2 to 5 percent) between 1984 to 1987 and increased to 10 percent in 1988, dropped to 2.3 percent in 1989, and increased to 5 percent in 1990.

An additional regulation limited catches in the western Atlantic in 1982 to 1,160 MT and 2,660 MT each year from 1983 to 1990, and prohibited fishing directed at the spawning stock in the Gulf of Mexico. As a result, catches have been below or slightly above the catch limits set for scientific monitoring since that date; during calendar year 1990 the catch is estimated to be about 2,770 MT (BFT-Figure 1). This contrasts with catches that have averaged approximately 6,100 MT from 1976 to 1981. In the face of these catch restrictions, analyses indicate that fishing mortality rate on both small (ages 1-5) and large size bluefin (ages 8+) since the inception of these regulations has increased to values as high or higher than before 1982 (BFT-Figure 7).

For medium fish (ages 6 to 7) no effect of the catch restrictions can be detected. The purse seine fishery on ages 1 to 5 ceased after the imposition of catch restrictions. The resulting immediate decrease in fishing mortality rate can be seen in BFT-Figure 7, but the rate increased after about 1985 to levels experienced in the late 1970's, because although total catches of ages 1-5 were considerably less, they were made from weaker year classes.

A third regulation for the west Atlantic limited catches of bluefin tuna less than 120 cm straight fork length (SFL) to no more than 15 percent of the catch (by weight) after 1983. The percentage (in weight) of bluefin less than 120 cm SFL steadily decreased from 1975-1983. Less than 10 percent of the total west Atlantic catch was below 120 cm (BFT-Table 5) between 1979 and 1984, and since then has varied between 7 and 15 percent.

BFT-4E. RECOMMENDATIONS FOR EAST ATLANTIC BLUEFIN TUNA

BFT-4E.a Statistics and
BFT-4E.b Research

Since there was no assessment carried out this year, but one is planned for 1992, the SCRS reiterates the recommendations made in 1990 and recommends also that there be a further joint meeting between ICCAT and GFCM prior to the 1992 ICCAT meeting of eastern bluefin assessment scientists. A particular goal should be the submission of size sampling data to enable the Secretariat to develop the substitutions necessary to complete the catch-at-size tables for assessment purposes.

BFT-4W. RECOMMENDATIONS FOR WEST ATLANTIC BLUEFIN TUNA

BFT-4W.a Statistics

i) The Committee welcomed the provision of data on Japanese imports of bluefin by country of origin. It urged the Secretariat to establish appropriate contacts to obtain specific information on the actual area of capture of the imported fish since this is not yet available and cannot be deduced on the basis of country of export, as well as to collect individual fish size information.

ii) Continued efforts are needed to obtain catch and biological data from non-reporting coun-

tries, which could include mechanisms to involve commercial as well as government contacts.

iii) Catch and effort data should be collected for as many fisheries as possible, an example being the Canadian tended line fisheries other than that off Prince Edward Island.

iv) Despite the intention to carry out the next assessment of western bluefin only in 1993, countries should submit size sampling information for 1991 according to the usual schedule in 1992 so that the Secretariat can undertake the necessary substitutions to produce the full catch-at-size table for use at the 1992 SCRS meeting.

BFT-4W.b Research

i) The proposed Bluefin Year Research Program provides a listing of research requirements, together with an indication of their importance. In particular, for stock assessment, the Committee recommended:

a) Investigation of age structured non-equilibrium production models and in particular the impact of changes in the age composition of the catch over time.

b) Investigation of the retrospective patterns detected in VPA analysis using the bluefin data base.

c) Investigation of the impact of targeting and by-catch strategies on the CPUE in longline fisheries.

d) Further studies of growth rates, given that any systematic error due to the use of age slicing would cause systematic distortion of population estimates. In particular further work is required on length at age and the variability of this over time and geographically.

BFT-4W.c Management

The Committee reiterates that the populations of older size components (10+) of bluefin tuna, are still not likely to have shown any improvement since the adoption of the 1982 and 1983 regulations. It notes that there are encouraging signs that the decline of ages 6-7 has perhaps stopped and there is evidence of increase in ages 8-9 between 1985 and 1990 (BFT-Figure 8). The Committee draws attention to its advice in 1989 that continued high catches of small sizes would slow recovery, and notes that these levels of catch have however continued.

In order to indicate the likely result of future catches, the SCRS used the results of the VPA analysis to project the probable population trends under four catch scenarios:

1) Present catch patterns
2) Catches in accord with domestic regulations promulgated in response to the ICCAT management recommendations (implies reduced catches of ages 1-3)
3) As in 2) but with all catches reduced by 50 percent.
4) As in 2, but assuming numbers at each age, for ages 6+, were 50 percent higher at the beginning of 1991 than estimated in the VPA.

The projections were based upon the same assumptions and decisions that were made in performing the VPA analysis, and thus are subject to the same sources of uncertainty. These decisions included accepting the current two-stock hypothesis. The Committee, recognizing that there are uncertainties about the results of the VPA, carried out scenario 4 in order to investigate the impact of such an assumption on the projections.

As there is no basis for projection of the numbers of fish at Age 1 for the 1991 and subsequent year classes, it was necessary to assume that these would be of about average strength and the period 1976-90 (geometric mean) was chosen as the base for this. The likelihood is that the year classes will vary substantially however, so no projections were made of trends in the population numbers of fish age 1-5. It should be noted that these uncertainties do extend somewhat to the projections for age 6-7 in 1994 and 8+ population trends in 1995. The actual strength of the 1989 and 1990 year classes when they reach the appropriate age will depend upon how much of the future catch comes from them, and how much comes from the year classes for which no estimates can yet be made (a strong 1991 year class would, for example, absorb much of the postulated catch of small fish in 1992-94, while a weak 1991 year class would mean more of the catch would come from the 1989 and 1990 year classes).

The results of the projections (BFT-Table 6) estimate that even if the quota for 1992 is half the current level (scenario 3), the population of age 8+ fish has a 50 percent chance of being lower at the beginning of 1993 than at the beginning of 1992, and that there is a 74 percent chance that it will be below the 1992 level at the beginning of 1994. The projection of the 8+ stock at the beginning of 1995 is for it to be 47 percent larger than in 1992 but that there will still be a 27 percent chance that it will be lower. The in-

crease in the projected numbers and the change in probabilities would reflect the likely contribution of the newly recruiting 1987 year class. For fish ages 6-7, maintaining the quota (scenario 1 or 2) should allow (probability 77 percent) an increase in population by 1993 over 1992 levels and this probability would be greater if less medium fish were caught, as under scenario 3.

It is noted that there is little difference between scenario 1 (current catch) and scenario 2 (catches according to national regulations) because most of the difference between the scenarios is in the postulated catch at ages 1-3, and the oldest of these fish in 1992 (i.e., the 1989 year class), will enter the age 6-7 category only in 1995. Under scenario 2, however, it would be expected that the abundance of the younger fish (ages 1-5) would benefit substantially from the lower harvesting rates. Unless the 1991 and future year classes are all very poor, the abundance of this size category should increase and this increase would subsequently feed into the older age categories. Both the probability and amount of increase would be greater under scenario 3. The impact of assuming that ages 6+ in 1991 are 50 percent more abundant than estimated in VPA (scenario 4) shows that even then, because of the large number of older ages in the 8+ group, the total abundance would still be lower at the beginning of 1993 than at the beginning of 1992, despite the implied lower proportional harvest rate.

It is noted that the high probability of decline in numbers between the beginning of 1991 and 1992 is unavoidable as the catches in 1991 have already been mostly taken. There is, however, reasonable evidence that the current management regime has resulted overall in arresting the decline for medium-sized fish and for the youngest ages of the 8+ group, i.e., ages 8 and 9. Some year-to-year fluctuation must be expected due to the variation in year class strength, but the process can be expected to spread through all ages. Reduction in the catch of small fish would speed the recovery of the larger sizes (i.e., age 7 and older) by increasing the recruitment to these groups. Reduction in the catch of medium and large fish would speed the process of stabilizing the 8+ group as a whole and this could be achieved within one year with a 50 percent probability under scenario 3.

BIL - BILLFISHES

BIL-1. DESCRIPTION OF FISHERIES

Billfishes (Istiophoridae) are distributed throughout the tropical and temperate waters of the Atlantic Ocean. Blue marlin, white marlin, sailfish, and longbill spearfish are caught by many fisheries, both directed and incidental, throughout their ranges. Black marlin landings from the Atlantic, if any, are negligible. Major catches of billfishes are incidental to the tuna and swordfish longline fisheries of many countries.

Other major fisheries are the directed recreational fisheries of the United States, Venezuela, Dominican Republic, Senegal, Costa Rica, Mexico, Jamaica, Bahamas, and Brazil. Smaller recreational fisheries also exist in Cuba, Bermuda, Portugal (Azores, Madeira), Côte d'Ivoire, and numerous other countries in the Caribbean Sea and eastern Atlantic. Artisanal fisheries for sailfish along the west African coast are becoming increasingly important, especially in Ghana and Senegal, but also in the Caribbean island country of Grenada. Artisanal fisheries for marlins and sailfish also exist in Côte d'Ivoire, Barbados, Brazil, Aruba, Curaçao, and in most other Caribbean island countries.

In addition, the recent development and geographical expansion of major longline fisheries in the Gulf of Mexico for tuna, Caribbean Sea for swordfish, and geographical expansion off Africa for swordfish have been reported by various nations (mainly Spain and the U.S. for the east and west Atlantic, respectively). Other countries that are expanding longline fisheries for swordfish in the Caribbean include Venezuela, Barbados, Grenada, and Trinidad. Development of industrialized longline fisheries targeting yellowfin tuna have also recently been reported in St. Vincent and Grenada, using small diesel powered boats (11-14 M) and modern equipment. Because these regions are known to have significant concentrations of billfishes, incidental catches of these species can be expected to increase in areas of concentrated fisheries. The incidental nature of some billfish catches (mainly for the U.S. and Spanish longline fleets) also results in discards which are difficult to document and result in uncertainties in these catch statistics.

BIL-2. STATE OF THE STOCKS

The most recent analysis of the status of the eastern Atlantic stock of sailfish was presented to the SCRS in 1988; however, no other analyses on the status of stocks of other billfish species have been presented to SCRS since 1982. This is due largely to deficiencies in landings and size data, and basic biological parameters which are needed for definitive stock assessment. Consequently, only summaries of the state of the stocks based on analyses presented in previous years are provided. The ICCAT Enhanced Research Program for Billfish was established in 1986 and initiated in 1987 in an effort to resolve data defi-

ciencies for all billfishes in the Atlantic Ocean. In this regard, the proposed agenda for the ICCAT Billfish Workshop scheduled for 1992 has made numerous task assignments (SCRS/91/15) that when accomplished should establish the progress to date, provide a basis for making recommendations for short- and long-term goals, and hopefully lead to new assessments in the near future.

BIL-2.a Blue marlin

Total Atlantic landings of blue marlin (BIL-Table 1, BIL-Figure 1A) increased rapidly from 1960, reaching a peak of more than 9,000 MT by 1963. Landings generally declined until 1967 and remained relatively stable through 1977, fluctuating between 2,000 and 3,000 MT. From 1977 to 1979, landings declined to a somewhat lower level, fluctuating between 1,300 and 2,200 MT. During the last decade, landings have shown a general upward trend, fluctuating between 1,600 and 3,335 MT. The North and South Atlantic regions show trends similar to those for the total Atlantic. Much of these catches are incidental to the longline fisheries for tuna and swordfish; the general trends in catches have followed the intensity of these fisheries. It should also be noted that estimates of blue marlin by-catch kill (as well as other species of billfish) in the U.S. longline fishery in the western Atlantic for 1989 and 1990 are considered under-reported. The by-catch by tropical purse seiners may also be significant but these data have not been updated since 1983.

Production model results based on Japanese longline CPUE indices from 1960-80 (SCRS, 1982), indicated that some over-exploitation may have occurred during the early to mid-1970's. A more recent analysis of this CPUE series (1977-86) was presented to the 1988 SCRS (BIL-Figure 2A) and indicated a stabilized or slightly increased trend for the total Atlantic but only at values far below the 1965-75 average. Comparisons of the recent Japanese indices to the earlier series were not made because the recent effort component was not standardized for changes in fishing gear, fleet deployment pattern, and target species.

A detailed description of CPUE trends for the Japanese and Cuban longline data and for the U.S.A., Venezuelan (BIL-Figure 2B), Jamaican, and U.S. Virgin Island recreational data are given in the 1990 SCRS report. Since updates of CPUE indices from all the above sources were not presented to the 1991 SCRS, a detailed description of these trends will not be repeated again in this report. In general, trends in CPUE can be characterized as highest during the initial phases of exploitation, followed by steep declines to low levels, and then stabilized at low levels during the most recent periods. Monthly nominal CPUEs for blue marlin from the U.S. longline fishery in the western Atlantic Ocean (1987-90) based on reports from logbooks (including discards) were presented to the 1991 SCRS. These data illustrate seasonality of the fishery in six different western Atlantic locations. The problem of incomplete standardization of CPUE's are recognized, particularly for the Japanese longline data, and this makes meaningful comparisons between the early and most recent CPUE's in the time series difficult. Until these standardization problems are resolved, further clarification and interpretations of the CPUE trends will not be possible.

The Committee had previously (1982) expressed concern about any increase in effort on the stock because of the relatively low longline CPUE levels (through 1978) and the production model results discussed above. The Committee was encouraged by the apparent stabilization in some standardized recreational CPUE's over the past decade (U.S. and Venezuela). However, the incomplete standardization of some CPUE indices and lack of current information on others, the recent expansion of longline fisheries, as well as new recreational fisheries by countries previously not fishing in areas of blue marlin abundance (Gulf of Mexico and Caribbean Sea) reinforce the concerns expressed by past Committees. In particular, the Committee is concerned about the continuing uncertainty and lack of new or current information regarding the status of the blue marlin stocks.

BIL-2.b White marlin

Landings from the total Atlantic (BIL-Table 2, BIL-Figure 1B) increased rapidly from 800 MT in 1961 to almost 5,000 MT by 1965 and then gradually declined from 3,500 MT to 900 MT during the following 15 years. Landings during the last decade have been comparatively stable, fluctuating between 958 to 1,676 MT.

Since the initial peak in Japanese longline CPUE indices for the total Atlantic in the mid-1960's (SCRS, 1982), the trend in CPUE's declined rapidly through 1980. More recent Japanese longline CPUE indices from 1977-86 were presented to the 1988 SCRS (BIL-Figure 3A) but as with blue marlin, these values were not compared to the earlier series due to changes in fishing practices.

A detailed description of trends in CPUE indices for the Japanese longline data and for the U.S.A. and Venezuela recreational data (BIL-Figure 3B) are given in the 1990 SCRS report. Since updates of CPUE indices for the above sources were not presented to the 1991 SCRS, a detailed description of these trends will not be repeated again in this report. In general,

the trends in CPUE are highest during the initial periods of exploitation, followed by sharp declines in CPUE's to low levels, and then rates either stabilize (Japanese data in the North Atlantic) or continue to decline during the most recent periods (Japanese data in the south Atlantic and U.S.A. and Venezuelan recreational data). Monthly nominal CPUEs from the U.S. longline fishery in the western Atlantic (1987-1990) were presented to the 1991 SCRS and illustrate seasonal trends from six locations. Incomplete standardization of Japanese longline CPUE indices (as discussed for blue marlin) also make it difficult to further clarify and interpret these trends for white marlin.

The Committee remains unsure of the exact status of white marlin. However, the incomplete standardization of Japanese longline indices and the lack of current CPUE data from major sources, the declining recreational CPUE's (U.S. and Venezuela), as well as the decline of Japanese longline CPUE in the south Atlantic in recent years all continue to reinforce the concerns expressed by previous Committees. As with blue marlin, the Committee is particularly concerned about the continuing uncertainty, and lack of new or current information regarding the status of the white marlin stock(s).

BIL-2.c Sailfish/spearfish

Landings for the total Atlantic (BIL-Table 3, BIL-Figure 1C) increased from about 300 MT in 1960 to almost 3,000 MT by 1965. Landings fluctuated between 1,900-2,500 MT through 1969, increased to over 2,700 MT the next two years, and then declined to less than 2,000 MT by 1977. Landings increased again to about 3,300 MT by 1979, fluctuated between 2,000 to 2,500 MT in 1980-82, and then ranged between 2,500 to 3,600 MT in 1983-1990. An analysis of eastern Atlantic sailfish presented during the 1988 SCRS strongly suggests that Task I data are underestimating landings for several important longline fleets. These problems may also affect the statistics for other species of billfishes since landings by off-shore longline fleets are a major component of the catch. Conversely, the national report of Ghana presented to the 1989 SCRS indicates potential overestimation of landings from this major artisanal fishery. The long-standing problem of separating sailfish from spearfish landings from offshore longline fisheries of many countries remains unresolved. These landing statistics should therefore be considered provisional until problems are clarified.

West Atlantic

There were no new analyses presented on the status of the stock this year. Standardized CPUE's from the Venezuelan recreational fisheries indicate a decline, with fluctuation since 1969, and relative stability, but at low levels of CPUE from the late 1970's to 1989 (BIL-Figure 4A). The seasonality of monthly nominal CPUEs for sailfish from the U.S. longline fishery in six areas of the western Atlantic Ocean (1987-1990) were presented to the 1991 SCRS. Without additional data, the Committee had no basis for changing its previous conclusion (SCRS, 1982) that western Atlantic sailfish appear to be moderately exploited. However, the Committee again cautioned that further analysis would be needed before a more definitive assessment of the status of the stock could be made.

East Atlantic

The most recent production model results, which were presented to the SCRS in 1988, suggest that the coastal eastern Atlantic stock of sailfish is not yet fully exploited (BIL-Figure 4B). Results of a cohort analysis conducted at the same time were not conclusive because of uncertainties with recruitment trends and quality of the data needs to be improved before more definitive stock evaluations can be made.

Japanese longline CPUE indices for the central and eastern Atlantic (SCRS, 1988) indicated a steep declining trend from the late 1960's to the mid-1970's, followed by a more gradual decline through 1986 (BIL-Figure 4C). However, as noted for blue and white marlin, these data are not completely standardized for changes in gear deployment and interpretations may need to be clarified once this is accomplished. Standardized recreational CPUE from Senegal was stable in the same fishing zone from 1970-1980, then declined gradually through 1986 (BIL-Figure 4C). The Senegalese recreational data also need to be interpreted with caution because of potential interactions with the artisanal fishery for sailfish in Senegal occurring simultaneously, which results in the catch of more sailfish. These factors may contribute to the downward trend in recreational CPUE for this fishery during the most recent years (1987-1990), presented to the 1991 SCRS.

BIL-3. EFFECTS OF CURRENT REGULATIONS

No ICCAT regulations are currently in effect for billfishes. However, two ICCAT member countries (U.S.A. and Venezuela) and one observer country (Mexico) established domestic regulations involving Atlantic billfishes in 1988 and 1990-91. Venezuela initially prohibited commercial fishing in the area of La Guaira in 1988 and in 1990, stricter regulations were established to minimize Venezuelan recreational

landings of billfishes and prohibit their sale. In addition, Mexico prohibited commercial longliners within 50 miles of her coast in 1990 and revised billfish regulations to eliminate commercial sale of billfish in 1991. The 1988 regulations in the U.S.A. have affected billfish landing statistics (number and size of fishes landed) in the commercial longline fisheries for tuna and swordfish by eliminating possession and sale of billfish. These changes are presented in the 1990-91 U.S. National Reports and in various SCRS documents in 1990 and 1991. In addition, regulations on minimum size for each species were also established for the U.S. recreational fishery in 1988.

BIL-4. RECOMMENDATIONS

BIL-4.a Statistics

The Committee recommended:

i) That accurate estimates of total landings (Task I data) for all types of gear be made, by species, for Atlantic blue marlin, white marlin, and sailfish. In addition, billfish landing records from non-member countries, that do not normally report to ICCAT, should be obtained.

ii) That catch, effort, and size statistics, and if possible, landings by sex from all countries be reported by five-degree area and by month, as outlined in the ICCAT sampling instructions for billfish (SCRS/88/28).

iii) That catch statistics for sailfish and spearfish, particularly from offshore longline fisheries, be reported separately in order to facilitate stock assessment of both species.

iv) That descriptions of the billfish fisheries and methods of estimating landings be continued in the eastern Atlantic, initiated in other locations, and summarized in ICCAT documents.

v) That sailfish/marlin discards for historical longline and purse seine fisheries as well as more recently developed fisheries be evaluated and updated, especially for those fisheries catching swordfish in the Gulf of Guinea.

BIL-4.b Research

The 1992 Program Plan for the Program of Enhanced Research for Billfish (Appendix 10) describes general recommended areas of research. Twelve specific task assignments proposed for the 1992 Billfish Workshop are given in SCRS/91/15 and these include elements for both research and statistics. General recommendations of the Committee include but are not limited to the following:

i) Age and growth studies of marlins and sailfish be continued. Active sampling of juvenile marlin and sailfish should be continued.

ii) Commercial and recreational fisheries data for billfishes be analyzed to develop standardized abundance indices (particularly for the Japanese longline data) so that relationships between present abundance of billfish and that in the period 1960-75 can be evaluated. In this analysis, gear type, gear deployment, and target species should be taken into account.

iii) Full implementation of the ICCAT billfish tagging program will require special efforts regarding tag-recaptured fish. All ICCAT members and reporting nations are encouraged to make a special effort to distribute tag-recapture posters, particularly the Japanese and Chinese translations, to the larger offshore longline vessels, so tag recapture data and biological samples can be recovered by ICCAT.

iv) The intensity of studies on the reproductive biology of billfishes in the east and west Atlantic be continued and expanded. This will require analysis of data collected in the past, as well as obtaining new information.

BIL-4.c Problems in achieving goals

The Committee recognizes that resolution of statistical and research problems for billfishes, referred to above, are more difficult than for other ICCAT species groupings. At the center of these difficulties is the unique nature of the fisheries and the criteria that ICCAT and member countries use to allocate their limited resources. The major portion of the billfish landings are incidental catches from fisheries targeting other species. Therefore, the collection of statistics requires special effort. In addition, the other major fishery component are the recreational fisheries which are increasingly catch and release, so these landings are vastly under represented in catch statistics, particularly during the last decade. Until such time as ICCAT and member countries change the criteria for partitioning resources to one of overall value of a fishery, instead of being based strictly on the amount of landings, the Committee feels that little if any real

progress will be made. Consequently, the SCRS strongly urges all countries fishing for billfishes in the Atlantic (including non-member countries) to increase their research activities on these species following SCRS recommendations.

BIL-4.d Management

No management recommendations are made at this time, except to stress the need to monitor the fisheries for billfish closely (particularly for blue and white marlin).

SWO - SWORDFISH

SWO-1. DESCRIPTION OF FISHERIES

Swordfish are distributed widely in the tropical and temperate waters of the Atlantic Ocean and Mediterranean Sea. They are believed to spawn in the warm waters of the Atlantic and in the Mediterranean Sea. Swordfish catches in the total Atlantic reached an historic high of 33,223 MT in 1989 and have shown a small decrease to 31,387 MT in 1990 (SWO-Table 1 and SWO-Figure 1).

Swordfish are taken throughout the Atlantic by directed fisheries and as a by-catch of the tuna longline fishery. In the North Atlantic there are directed swordfish fisheries on both sides of the Ocean that have been operating for a long time. Most catches are made by longlines deployed at night, but there are minor catches by driftnet, harpoon, and traps. Since the mid-1980's, U.S. and Spanish swordfish longline fleets have extended their operations offshore, and now the fishing grounds of both fisheries overlap in the central North Atlantic (SWO-Figures 2 and 3).

In recent years, and particularly in 1989 and 1990, the Spanish directed longline fishery has been expanding its fishing grounds towards the south and southwest, as far as the Gulf of Guinea (SWO-Figure 2). The landings from tropical areas now account for 52 percent of Spanish landings in weight and 46 percent in number. In the southwestern Atlantic, longline fisheries have been taking swordfish either as target species or as by-catch, depending on the relative catch rates of swordfish to tunas. In the Mediterranean Sea, swordfish fisheries have a long history of exploitation by various countries.

In the North Atlantic the catch and effort of swordfish indicates a continuous increase from 1978 when the U.S. eased its mercury content standards, through 1987 (SWO-Table 1 and SWO-Figure 1). Since the historic high of 19,959 MT in 1987, the catch has declined continuously to 15,424 in 1990, mainly due to a significant shift of Spanish effort to south of 5°N starting in 1988, an increase of Japanese catch south of 5°N in recent years (SWO-Figure 4), and a shift of some U.S. effort to the Pacific in late 1990.

In the South Atlantic, the catch was relatively low, with fluctuations until 1980. In the early 1980's, the catch was higher, reaching 9,475 MT in 1985, then dropped during 1986 and 1987 and since 1988 increased again to levels over 10,000 MT. Until 1987, the largest amount harvested was by Japan, followed by Uruguay. However, due to the shift of Spanish effort to the south of 5°N (SWO-Figure 2), swordfish catches increased in the South Atlantic in 1988 and 1989, when the yield reached the historic high of 16,249 MT. The catch was slightly lower in 1990 (15,963 MT). In 1989, the Spanish longline catch reached a peak of 7,725 MT and declined to 6,166 MT in 1990 due to a shift of some of the fleet to the Pacific. The Japanese 1990 catch of 5,838 MT was an increase of 45 percent from 1989 as a result of a shift and increased effort in the tropical zone of the south Atlantic (south of 5°N, SWO-Figure 4).

Mediterranean reported catches showed a gradual upward trend until 1983, but remained less than 6,000 MT. Catches almost doubled in 1984 and since then have increased continuously to the historic high of 18,298 MT (SWO-Figure 1) in 1988. Reporting of catches is incomplete in 1989 and 1990. The sharp increase reported in 1984 represents the major improvement in Italian statistics (Report of Joint ICCAT/GFCM (General Fisheries Council for the Mediterranean) Consultation, Col. Vol. XXXIII). In 1988, the last year for which complete catch data are available, Italy was the most important producer (63 percent), followed by Algeria (14 percent) and Greece (7 percent). About one-third of the Mediterranean catches are reported to have been made by longline, but that proportion should actually be higher since many longline catches are reported as mixed gear catches.

SWO-2. STATE OF STOCK

SWO-2.a Stock structure

Stock structure was reviewed to determine if there was sufficient new information to change the analytical priorities established at the 1990 SCRS meeting.

SWO-Table 2 provides an updated summary of information relating to the various stock structure hypotheses. New information considered by the Com-

mittee included updated CPUE and a preliminary genetic analysis. The information previously reviewed and summarized in the 1990 SCRS report was reconsidered, including area-time characteristics of size distributions, mark-recapture data, sex ratio by size classes, and other biological and oceanographic information.

Preliminary information was presented based on genetic (mtDNA) analyses from samples on George's Bank (SCRS/91/48). The sample size was small (six fish), but indicates the possibility of multiple and distinct breeding areas (or times) with widely dispersed and overlapping geographical ranges between groups. These fish exhibited a greater degree of genetic divergence than that between related billfish species.

The GFCM/ICCAT Joint Consultation (Coll. Vol. XXXIII) consider the Mediterranean swordfish separate from the North Atlantic stock(s). However, information reported in SCRS/91/38, on the timing of maturity, and in SCRS/91/37, which documented sex ratio size data from the Straits of Gibraltar, suggests that movement of swordfish between the North Atlantic and Mediterranean occurs, as was previously reported.

Taking into account all the information to date, as well as the limitation of the data base, and in order to be comparable with previous reports, the assessment priorities of the 1990 SCRS were not changed. The Committee recognized the problem with evaluating stock structure given the ICCAT statistical reporting boundaries (i.e., 5°N latitude and 30° and 60°W longitude, see SWO-Figure 5).

The assessment priorities were as follows:

1. North Atlantic (north of 5°N, not including Mediterranean)
2. Total Atlantic (north + south Atlantic, not including Mediterranean)
3. NE - NW (north of 5°N, separated at 30°W longitude, not including Mediterranean)

Additional details and information considered by the Committee for stock structure is provided in SCRS/91/16.

SWO-2.b Catch at size/age

The Secretariat proposed updating to 1990 the catch-at-size data base by eight major sampling areas (1-3, 4A, 4B, 5-7, see SWO-Figure 5) of the Atlantic and Mediterranean. This includes substitutions for the catches which have no matching size data, and raising of them to the catch, according to procedures similar to those adopted in the past (SCRS/91/9).

A problem remains for some of the major North Atlantic fleets (e.g., Portuguese large freezer longline vessels, for which the recent catch was estimated as NEI by the SCRS) and for most of the Mediterranean fisheries.

As in the past, catches calculated from the catch-at-size table using the length-weight relationship and the reported catch (Task I) were compared. There were considerable discrepancies between these two values for the Mediterranean which led the SCRS to suspect that the Mediterranean length-weight relationships were not expressed in correct units. These equations are plotted for six areas in SWO-Figure 6 which clearly shows that the weight for the Mediterranean is overestimated. It was recommended that the Secretariat clarify the units used in developing this equation and if there is any error, the Mediterranean catch-at-size table should be corrected.

After discussing how to estimate catch at age (see Reference Paper SCRS/91/16), the same procedure used in past SCRS assessments was adopted. That is, using the mark-recapture growth equation (Gompertz) calculated in 1988, the catch at size was converted into catch at age by the age slicing method on monthly basis. The growth equation adopted by the Committee does not involve separate functions for males and females. The catch-at-age data thus created are attached as SWO-Table 3 for four scenarios of stocks.

SWO-2.c Catch Rates

The Committee examined catch rate information from the Japanese (SCRS/91/34), Spanish (SCRS/91/49), and U.S. (SCRS/91/41, SCRS/91/45) longline fisheries. The Committee noted that in spite of last year's recommendation for development of standardized indices from South American fisheries, this was not accomplished. Since no new catch rate information was available, standardized indices were not developed for the South American fisheries.

Standardized indices of age-specific abundance for the stock hypotheses considered by the Committee were provided in SCRS/91/34 and SCRS/91/41. The Committee developed age-specific indices of abundance from the Spanish longline data reported in SCRS/91/49. Details of the methods used for developing these indices are provided in SCRS/91/16. All of the standardized indices considered for use in VPA tuning for each of the stock hypotheses are shown in SWO-Table 4. In general, the trends of these indices are similar. The available age-specific standardized indices for the entire North Atlantic stock hypothesis are plotted in SWO-Figure 7.

The Committee also developed a standardized index of swordfish biomass from the combined U.S. and Spanish longline data for use in non-equilibrium production model analysis applying the methodology described in SCRS/91/46. Details on the methods

used in developing this index are provided in SCRS/91/16. This index is also shown in SWO-Table 4.

SWO-2.d Population parameters

There was no new information about natural mortality coefficient (M). For the base case assessment, M was assigned 0.2. However, sensitivity analysis examined a range of M from 0.1 to 0.25.

No new growth rate information was provided to the Committee and the previously adopted mark-recapture Gompertz equation was used. The updated catch-at-age table is similar to previously developed tables. The Committee considered sources of error in developing catch at age because of the monthly age slicing process which assumes no overlapping age-length distributions. Alternative and perhaps less extreme procedures incorporate frequency distributions and overlap by length and age. The Committee reviewed SCRS/91/36 which used length-based methods to develop an alternative catch-at-age matrix. The use of information on age-class size distributions and overlapping cohorts may provide a catch-at-age matrix which more realistically tracks fluctuating age-class strengths. The age slicing procedure will tend to reduce the strength of strong year classes by classifying members of that cohort into adjacent cohorts.

Alternatives for ageing catches were discussed and one was compared with the present slicing method (see SCRS/91/16). It was felt that the data base is now sufficient to explore modal/age or age-length key type ageing of the catch. Similar procedures have been investigated by the SCRS. The Committee considered that it is essential to evaluate the degree of overlap between adjacent cohorts prior to ageing the catch and developing abundance indices by this method. Therefore, the Committee recommended that an intersessional meeting be held before the next swordfish assessment meeting to decide on the appropriate length-at-age keys to be evaluated.

The Committee reviewed reports updating sex-ratio size data for the North Atlantic (SCRS/91/37 and SCRS/91/44). Combined with sex-ratio size data by area described at last year's SCRS swordfish stock assessment session, the Committee concluded that the separation of catch at size into catch at size by sex was limited by the time-area characteristics of the available data. The SCRS was not confident in creating catch at size for each sex by major areas and years. The sex at size data were currently not available in sufficient quantity for a major portion of the catch to allow reliable separation of catches by sex and size. Progress has been made in collecting size information by sex in the past few years and expanded observer coverage could improve collection of this valuable data.

The Committee felt that the season-area dynamics of sex-ratio size data was an important biological characteristic that should be incorporated into any method used for separating the catch by sex. The Committee reiterated concerns expressed at last year's meeting regarding the potential smoothing effect that applying an aggregate sex-ratio size pattern could have on the catch at age. Additional cooperative analyses of available sex-ratio size data should be provided for next year's meeting so that time-area characteristics can be incorporated into the profiles used to disaggregate the catch. The format in which the size by sex should be exchanged between cooperating ICCAT scientists was discussed and agreed upon (SWO-Table 5).

SWO-2.e Stock-production model

The SCRS 1990 report recommended further evaluation of the application of production models for Atlantic swordfish. A non-equilibrium stock-production model initially proposed by Shepherd (1987) is suggested as a model that may be useful for swordfish stock assessment and management advice (SCRS/91/46). Exploited biomass at the beginning of a year is expressed as the sum of the stock biomass of the previous year, plus net production (somatic growth and recruitment) over the year, minus the catch in weight removed from the stock during the year. A statistical framework for Shepherd's model was developed that allows both measurement and process error, variance of all parameters of interest, and diagnostics useful for judging the adequacy of results.

Nine trials incorporating different combinations of model input parameters for North Atlantic swordfish provided estimates of maximum sustainable yield (MSY) that were not sensitive to the values of the input variables. MSY estimates ranged from 13,100 to 14,300 MT, a level comparable to the range of catches reported for North Atlantic swordfish during 1983 to 1985. Since 1986, catches have been higher than this estimated MSY level. Declines in stock biomass estimated by the stock-production model for 1978 to 1990 were more extreme than those suggested by VPA results (SWO-Figure 8; see Reference Paper SCRS/91/16 Tables 5 and 6 for model details and input options). Trends in production level were comparable to those estimated by VPA.

SWO-2.f VPA

Virtual population analysis (VPA) was conducted under the North Atlantic stock hypothesis. The VPA was calibrated to a suite of abundance indices (derived from standardized catch rates) using the ADAPT

framework (Parrack 1986; Gavaris 1988; Conser and Powers 1990; and Powers and Restrepo SCRS/91/40). The ADAPT framework has evolved considerably since it was first used by the SCRS (for bluefin tuna assessment) in mid-1980's. However, the Committee has consistently found application of the framework to be the best approach for integrating the sometimes dissimilar data and biological information that are typically available for many assessments.

The Committee calibrated the VPA using eleven indices of abundance. Indices for ages 1, 2, 3, 4, and 5+ were derived from the U.S. longline catch-effort data using the GLM approach (SCRS/91/41 and SWO-Figure 7). Another index for ages 5+ was derived from the Japanese longline fishery (SCRS/91/34 and SWO-Figure 7). Indices for ages 1, 2, 3, 4, and 5+ from the Spanish longline fishery were derived during the Committee meeting using the GLM approach (SWO-Figure 7 and SWO-Table 4).

As with previous assessments, the Committee examined alternative hypotheses regarding biological and/or fishery characteristics that could influence the assessment results and perception of stock status (e.g., the shape of the selectivity curve for older fish). Several additional analyses were conducted to investigate statistical problems discovered in earlier runs of the models (e.g., patterns in residuals from initial model runs).

After extended discussion and examination of results, the Committee reached consensus regarding an acceptable VPA run. This model assumed flat-topped selectivity for ages 5+, while the selectivity for younger ages was estimated within the model. All eleven indices of abundance were used in the calibration. Each index was weighted by the inverse of its variance (i.e., indices with greater precision received more weight). The full time series of years for which catch-at-age data are available (1978-90) was used in the model.

Results of the VPA indicated that:

1) Stock size estimates at the beginning of the year of age 1 swordfish (recruits) increased gradually from 1978 through 1989 (SWO-Table 6 and SWO-Figure 9). The 1988 year-class (i.e., age 1 fish in 1989) appears to be more than twice the size of the 1977 year-class. However, the 1989 year-class appears to be considerable smaller (40 percent smaller than the 1988 year-class). Stock size of the ages 2-4 juvenile group increased throughout the period 1978-90. Adult stock size (ages 5+) declined continuously throughout the time series (66 percent).

2) The fishing mortality rate (F) of age 1 and the ages 2-4 group fluctuated, but with a generally increasing trend through 1988, with an apparent decline in the last two years (SWO-Table 7 and SWO-Figure 10). F on ages 5+ appears to have increased significantly during the period.

In 1990, the Committee noted that selectivity for older fish could not be determined from available data. Recent changes in methods of operation and fishing areas have increased the catches of larger fish, suggesting that availability of these fish to standard longline may have been lower, particularly in the past. The Committee still has no data with which to measure any decline in availability (i.e., dome-shaped selectivity after age 5), if it is present. However, the directional impact of such an assumption was tested by assuming a decline in availability of age 5+ fish (to 88 percent of age 4). The resulting trend in stock size (1978-1990) of the age 5+ fish was similar to that obtained assuming equal availability (Ref. Paper Table 9, SCRS/91/16). However, the point estimate of age 5+ stock abundance at the beginning of 1990 was 14 percent higher and the fishing mortality rate point estimate was 16 percent lower than comparable point estimates for the flat-topped selectivity assumption. Conversely, the cumulative F on ages 1-4 in 1990 did not change.

Some concern was also expressed regarding the sampling fraction of the U.S. catch-per-unit-effort (CPUE) data in 1981. In addition, the residuals for 1981 and 1982 for ages 3, 4, and 5+ from initial model runs were positive relative to those for 1983-1990 (Ref. Paper Figure 8, SCRS/91/16). For comparative purposes, a VPA was run restricting all indices to the 1983-1990 period, truncating the other years. The resulting trend in stock size (1978-1990) of the age 5+ swordfish was similar to that obtained using the full CPUE data sets (Ref. Paper Table 10, SCRS/91/16). However, the point estimate of age 5+ abundance estimated at the beginning of 1990 was 8 percent higher and the point estimate of fishing mortality rate was 9 percent lower than the comparable point estimates from the run with the full time series of CPUE. Cumulative F on ages 1-4 in 1990 declined less than 3 percent.

In previous years the Committee has observed that the annual cycle of updating data and conducting new VPAs often resulted in different levels of estimated stock size and F, by age, from those estimated the previous year. This tendency was examined this year by conducting a retrospective analysis, i.e., the process of stepping back through the years of available data and conducting VPA tuning at each step, ignoring

all data in the subsequent years. The results indicated that there is a tendency to underestimate F's on younger fish (ages 1-3) and overestimated F's on ages 4-5+ in the current year relative to the F levels that become apparent after additional years are added to the time series (SWO-Tables 8, 9 and 10). The reason(s) for this retrospective pattern are not clear. However, simulations and sensitivity analyses presented to the Committee this year and in previous years have shown that similar difference can occur due to ageing error, sexually dimorphic growth, and/or dome-shaped partial recruitment. Similar retrospective results have been encountered in other scientific fora (e.g., CAFSAC, NAFO, and ICES).

Exploratory VPA runs were made for other hypothesized stocks, i.e., for the total Atlantic, northeast Atlantic, and northwest Atlantic. Because of data shortcomings under the total Atlantic hypothesis (i.e., from the south Atlantic area) and the Committee's preference for the north Atlantic hypothesis in previous years (over separate east and west stocks), these scenarios were given lower priority by the Committee this year. Because of extended discussion and new analyses on the north Atlantic stock, the Committee was not able to review additional runs on other possible stock structures. However, the preliminary results are provided in the Reference Paper SCRS/ 91/16 (Ref. Paper Tables 15, 16 and 17).

SWO-2.g Yield per recruit

The Group noted that the ICCAT recommendations for minimum size and other regulatory measures went into effect in 1991 and are not included in the present analysis of the data collected through 1990. Additionally, it is expected that selection patterns of the fishery are likely to be altered by these regulations. Therefore, the present analysis examined the potential for gain based on the previously observed pattern. The hypothetical effect on yield per recruit of a 25 kg minimum size, were it to be perfectly implemented, was also examined. It was noted that a minimum size will allow for increases in yield per recruit. However, any discard mortality would dissipate those gains. At this point we have no acceptable estimate of what that discard mortality rate might be. The Group feels that it will be important to obtain these estimates, perhaps by observer programs, in order to evaluate the effect of the ICCAT recommendations in subsequent years.

Yield-per-recruit analyses were carried out for North Atlantic swordfish as described in SCRS/91/16. The analyses indicate that estimates of current F are likely to be larger than common reference fishery mortality rates ($F_{0.1}$, F_{max}). The Committee examined a number of sources of possible bias in the estimates of current fishing mortality rate and acknowledge that these sources may indicate that current fishing mortality rates on old fish may be overestimated and those on young fish may be underestimated. However, it is unlikely that such a bias if it exists would be large enough to alter the above conclusion that current F is likely to be greater than the reference points.

SWO-2.h Projections

The Committee decided against carrying out any projections this year. The reason for this is that the fishery regulations that went into effect in 1991 will probably alter fishing patterns in a way that cannot be accurately anticipated. An obvious impact of the minimum size regulation is that the age-specific selectivities may change substantially.

SWO-2.i Variability and Biases

The Committee discussed results of the analyses carried out during the meeting in light of the limitations associated with the assessment process. Two main sources of uncertainty were mentioned: One deals with precision of the estimates given adequate data and models. The other is complementary and includes statistical biases (systematic over- or underestimates) that might arise due to the adoption of inappropriate assumptions and/or data.

The first can be addressed by use of Monte Carlo simulation methods. The method described by Restrepo *et al.* (1991, SCRS/90/28) was used in this fashion to model additional variability not directly captured during the ADAPT VPA analyses of the north Atlantic stock hypothesis (Ref. Paper Figures 9-12 SCRS/91/16).

In the case of statistical biases, if these could be identified and quantified, estimates could be corrected in an objective, scientific fashion. In the case of the North Atlantic stock hypothesis, the Committee examined several problems. These were biases associated with mis-ageing, model mis-specification and other (unknown) reasons (see SWO-Table 11).

Biases due to mis-ageing can affect the results in different ways. Ignoring sexual dimorphism in growth, if it exists, can result in overestimates of fully recruited F, while ignoring variability in length at age could underestimate full-F. The Committee decided that these problems should be examined further in future assessments (Sections SWO-2.b. and SWO-2.d.).

Possible changes in age-specific catchability, that are not detected in present model used to standardize CPUE, could cause variation in stock assessment re-

sults. It is not clear what degree of variation would be imposed, since this depends on the degree and direction of change in age-specific catchabilities. Increasing catchability that is not controlled for in the analyses of age specific CPUE's causes overly optimistic views of age-specific trends. Although this could have happened in swordfish CPUE series, the analyses conducted to date have not identified any strong indications of trends in catchability over the time series studied. However, further study is needed to evaluate additional factors ("micro scale", bioeconomic and others) which might affect catchability.

Models can be mis-specified because assumptions must always be made and sometimes these are not fully supported by the data. An example the Committee considered was the selectivity of the plus group which cannot be estimated for every year in the time series. Sensitivity analyses were carried out with constant selectivity ratios (flat-top or dome-shaped, Section SWO-2.f .).

Other types of biases can arise for unknown reasons. The Committee identified the existence of a retrospective problem in the VPAs (Section SWO-2.f.) but could not identify its causes.

The Committee also discussed that ratios of common reference points (derived from yield-per-recruit analyses) to parameters estimated in VPAs may be insensitive to bias (e.g., ratios of F_{max} and $F_{0.1}$ to current F estimates). A similar case of parameter insensitivity is commonly found in MSY estimates from production models (see Section SWO-2.e.).

Overall, sensitivity analyses and retrospective VPAs produced a comprehensive picture of the status of the resource. Fishing mortality has been much higher in recent years than in the early and mid-1980's. Sustained high levels of yield can be achieved in the long term under lower mortality rates.

SWO-2.j Other fishery indicators

Average weights (kg round) are plotted in SWO-Figure 11 for seven ICCAT swordfish statistical reporting areas; three in the North Atlantic (Areas 1+2+3, 4A and 4B), two in the South Atlantic (Areas 6 and 7), and one in the Mediterranean (Area 5; see SWO-Figure 5). For the North Atlantic the trends were very similar, with the Areas 4A and 4B trends parallel to the trend of Area 1+2+3 but suggesting larger fish. The North Atlantic trends appear to converge in recent years. In the South Atlantic there appeared to be differences in the patterns between the trends of the Areas 6 and 7 with particularly high variability in the early years for the Area 7. Sampling coverage was a problem in the Area 7 especially in the early years when effort and landings were low. The South Atlantic trends suggest larger fish than the other trends. The trend in the Area 5 (Mediterranean) suggests smaller fish than do the other trends.

Greater variability occurs for early years in all time series, particularly prior to 1982. This variability is thought to result from lower sampling levels that may not have provided coverage proportional to landings in all areas. After 1982, the sampling of the major fleets improved and the trends are less variable. The Group did not draw conclusions from these plots.

SWO-3. EFFECTS OF CURRENT REGULATIONS

There were no ICCAT recommendations for regulatory measures of swordfish in effect until early July, 1991.

Prior to the ICCAT recommendations, several national regulations have been adopted by different countries, mostly for the regulation of gear and licencing control. Driftnets have been banned by Spain (1990). A minimum-size regulation (UJ-FL), allowing only for a maximum of 10 percent per trip in weight of swordfish with a length less than 140 cm, has been adopted by Italy since the early 1980's. Canada limited entry into the swordfish fishery in 1984, has strict vessel size replacement regulations and does not permit gillnetting of swordfish.

In response to the 1990 ICCAT recommendations for the Atlantic, the United States, Spain and Canada have adopted national regulations to reduce catches in the North Atlantic and to reduce the catch of small fish.

SWO-4. RECOMMENDATIONS

SWO-4.a Statistics

Progress has been made in some aspects of the data collection. However, the data acquisition from non-member countries of the ICCAT, especially from those in the Mediterranean, still remains in a very poor condition.

i) All countries catching swordfish (directed or by-catch) should report the catch and effort statistics by five degree squares, or smaller areas, by month.

ii) All countries should carry out an adequate level of size sampling and when possible, samples by sex, preferably by month and five degree squares. The data from the coastal countries of the southwest and southeast Atlantic are scarce. In this regard, the Committee recommended that consultations among Uruguay, Brazil and

Argentina continue and the results be reported to the Committee. The Committee also recommended that the ICCAT Billfish Program continue to cover the Venezuelan longline fishery.

iii) Non-member countries of ICCAT in the Mediterranean should provide catch and effort statistics, size measurements and CPUE data. These statistics are recommended to be reported in the ICCAT data forms. The ICCAT/GFCM Joint Consultation held in the past was very helpful to improve the data collection in the area. Such coordinated efforts should be continued with the assistance of ICCAT and be extended to the data analyses.

iv) Efforts should continue to collect catch, effort and size data for landings not covered by the ICCAT data collection systems, especially for various Caribbean countries, Mexico and Portuguese large longline boats, with the assistance of national scientists.

v) All countries catching with driftnets and trawls should report their catch, effort and size data.

vi) With the initiation of swordfish minimum-size regulations throughout the Atlantic Ocean in 1991, numbers of undersized fish caught, numbers released, and their discard mortality rates will become critical for all future swordfish assessments. All countries should establish sampling programs that will acquire these data. In many cases, implementation of such a program will require observer coverage.

SWO-4.b Research

It is encouraging to note this year that several important research recommendations from last year's assessment report have started being carried out on the biology and stock assessment methodology.

i) A validated growth model should be developed, especially with the use of hard parts, if possible. Chilean scientists should be requested to provide information on their methods and research about developing age-length keys from hard parts.

ii) Further studies should be encouraged to evaluate application of methodologies which allow for individual growth variability. In this context, the Committee recommends holding a consultation on the technical aspects of this method before the next swordfish stock assessment session.

iii) Stock assessment by production model analysis and other alternative methodologies that will facilitate comparison with VPA analyses should be continued.

iv) The second ICCAT/GFCM Joint Consultation on stock assessment is recommended to be held in the near future.

v) Development of scientific tagging experimental designs to test hypotheses of growth and stock structure should be initiated. Development of cooperative tagging experiments by all nations should be encouraged. Usage of tetracycline in tagging and collection of hard parts from any recovered fish are also recommended.

vi) Research should be continued on maturity and fecundity at age and sex ratio at size. Coordinated study between interested countries is recommended.

vii) Sensitivity analysis is needed on VPA and other assessment techniques or models that will allow evaluation of mixing rates for stocks exploited over the vast areas of the Atlantic.

viii) Genetic techniques to identify stock(s) and quantify mixing rates should be explored. Samples for mtDNA analysis from the various parts of the Atlantic should be provided to develop the stock identification analysis.

ix) Numbers of discards and mortality rates of undersized fish should be estimated by national fleet, area, time and size of fish to allow reliable analyses and to assess effect of regulations.

x) Further studies should be conducted to evaluate factors which may have induced changes in catchability in the various size-specific CPUE series. Factors which might be evaluated further include possible changes in fishing gear and the deployment of that gear; in fishing strategies (operators and cooperators involved); in changes in spatial-temporal effects and environmental effects; and in bioeconomic factors that might explain changes in size preferences.

SWO-4.c Management

As in last year's analysis, the swordfish stock assessment was conducted for three hypothetical stocks, the north Atlantic (north of 5°N), the total Atlantic and the northwest and northeast Atlantic for

the years 1978 to 1990. Because of data shortcomings from the south Atlantic area and the Committee's preference for the north Atlantic hypothesis (over separate east and west hypotheses), the north Atlantic was given higher priority for VPA analyses by the Committee. Extended discussion and new analyses on the north Atlantic stock were conducted and the Committee was not able to review additional runs on other stock structures hypotheses. However, the preliminary results are provided in SCRS/91/16.

Several new analytical options, which provided additional flexibility, were tested this year, the results were generally compatible with last year's analysis. The following comments and recommendations are limited to the North Atlantic stock:

1) Stock size estimates of age 1 swordfish (recruits) increased gradually from 1978 through 1989 (SWO-Table 6). However, the 1989 year-class appears to be considerably smaller than the 1988 year-class (SWO-Figure 9). Stock size of the ages 2-4 juvenile group increased throughout the period 1978-90. Adult stock size (ages 5+) declined continuously throughout the time series (66 percent overall decline).

2) The fishing mortality rate (F) of age 1 and the ages 2-4 group fluctuated, but with a generally increasing trend up to 1988, with an apparent decline in the last two years (SWO-Table 7). F on ages 5+ appears to have increased considerably during the period (SWO-Figure 10).

Results of the North Atlantic yield-per-recruit analysis indicate that estimates of current F are likely to be larger than commonly referenced fishing mortality rates ($F_{0.1}$, F_{max}). Sensitivity analyses indicate the range in the estimates of the proportional reduction in fishing mortality rate which is needed to achieve these reference points. The Committee considered these factors and a number of sources of potential bias and felt that these uncertainties were not large enough to alter the preceding conclusions.

A non-equilibrium stock production model was fit to North Atlantic swordfish catch and effort data. Different combinations of model input parameters provided a range of estimates of maximum sustainable yield (MSY) from 13,100 MT to 14,300 MT, a level comparable to the range of reported catches during the 1983 to 1985 period. The Committee noted recent catches have exceeded this level. The 1986-88 average harvest was 19,125 MT. The 1990 harvest was 15,424.

Retrospective VPA analysis indicated that there are systematic inconsistencies in recent estimates. There is an apparent overestimation of fishing mortality rates for the older ages while the fishing mortality rates for the younger ages and recruits are apparently underestimated. The reason(s) for this retrospective pattern are not clear. However, the combination of retrospective VPAs, sensitivity analyses, yield per recruit, and stock production models provides a comprehensive picture of the status of the resource. Sustained higher levels of yield can be achieved in the long term under lower mortality rates.

Last year the Committee recommended the reduction of fishing mortality below the 1988 level as well as reduction of catch for juveniles. The new regulatory measures for the Atlantic swordfish fisheries were generally not implemented until June 1991. Therefore, there is no information available to evaluate the effect of these measures. The Committee will be able to assess the effect of the new regulations during the next few years and give appropriate advice. At this time, no new recommendation for management of the North Atlantic swordfish resource is made.

The Committee is seriously concerned about the stock status of the total Atlantic stock, especially because of the rapid increase in the catch from the south Atlantic in recent years. The present south Atlantic catch is about the same as the north Atlantic catch. There has also been decline in adult fish CPUE from the south Atlantic zone. Therefore, the Committee recommends that the fisheries in the south Atlantic be monitored closely.

SBF- SOUTHERN BLUEFIN

SBF-1. DESCRIPTION OF FISHERIES

Southern bluefin tuna (SBF) are distributed exclusively in the oceans of the southern hemisphere. The only known spawning ground is located in the water off Java and northwestern Australia. The habitat of young fish is located in coastal waters of western and southern Australia. As southern bluefin tuna grow, they migrate circumpolarly throughout the Pacific, Indian and Atlantic Oceans.

Historically, the stock has been exploited by Australian and Japanese fishermen for more than 35 years. During the course of this period, the Japanese longline fishery taking older-aged fish recorded its peak catch of 77,927 metric tons (MT) in 1961 and the Australian surface catch of young fish peaked at 21,500 MT in 1982. In the 1970s, New Zealand participated in harvesting this species by handline, troll

and longline in the coastal waters. In 1990, catches by these three countries were 4,596 MT (preliminary), 6,065 MT (preliminary) and 520 MT for Australia, Japan and New Zealand, respectively. As far as the Atlantic Ocean is concerned, southern bluefin tuna are caught by the longline fishery mostly in the area off the southern tip of Africa. The Atlantic catch has varied widely between 400 MT and 6,200 MT during the 1978 to 1990 period (SBF-Table 1), reflecting the shift of the Japanese longline fishery between the Atlantic and the Indian Oceans.

SBF-2. STATE OF THE STOCKS

At the Tenth Tripartite Scientific Meeting of Australia, Japan and New Zealand held in Wellington, New Zealand, in September, 1991, the status of the stock was re-evaluated on the basis of the updated catch at age, fishing effort and tagging data. Fishery modeling results from sets of VPAs based on differing assumptions show similar results:

- current spawning stock biomass has continued to decline to historically low levels;
- the estimated level of recent parental biomass has declined to 16-25 percent of 1960 levels;
- recruitment has declined from the late 1970s to at least 1983 or 1984;
- forward projections are highly sensitive to the assumptions made for stock-recruitment relationships;
- under the current catch levels, deterministic projections show that the parent stock may reach its lowest point in 1991 or soon after, before increasing again. Japanese scientists believe that the most reasonable range of assumptions lead to projections which show stock increases. Australian and New Zealand scientists believe that a broader range of plausible assumptions yield a range of projections, including some which result in declines.

Accumulated experience with the use of VPAs for the SBF fishery has highlighted several factors which contribute to the variability in estimates:

- catches not fully accounted for;
- uncertainty in age composition of catch;
- uncertainty in the relationship between CPUE and abundance;
- the stock-recruitment relationship is unknown;
- the time lag in estimation of recruitment with 1983 being the most recent estimate;
- uncertainty in the value of the instantaneous coefficient of natural mortality (M);
- the present stock projections require prediction of recruitment outside the range of existing estimates.

In addition to the modeling results, the fishery indicators were examined to provide a description of events in the fishery. The indicators show:

- a continuous decline in the parental stock from 1980 to 1989;
- a sharp decline in the pre-adult stock from 1980 until 1986 or 1987, and thereafter some suggestion of a slight increase, but levels in 1989 were still below the 1985 level;
- an increase in CPUE and the reappearance of middle-sized fish in many fishing grounds;
- indications that escapement from the Australian surface fishery is increasing, but uncertainty whether present recruitment will guarantee recovery of the parental stock.

There are differences in the interpretation of analyses between the scientific groups regarding appropriate catch levels.

SBF-3. EFFECT OF CURRENT REGULATIONS

Since 1971, as a first stock management action, Japanese longline fishermen have adopted a voluntary measure of restricting southern bluefin tuna fishing in areas where young fish are abundant, to increase the age at first capture so as to expect a better yield per recruit. Since the 1984 fishing season, Australia has maintained a national quota of 14,500 MT and a seasonal-area closure of its fishery off western Australia. Japan and New Zealand introduced national quotas of 23,150 MT and 1,000 MT, respectively, for the 1985 fishing season. Since the 1987 fishing season, Australia and Japan have reduced their catch limits to 11,500 MT and 19,500 MT, respectively. In 1989, the Tripartite Administrative Meeting decided to reduce their catch limits to 6,065 MT for Japan, 5,265 MT for Australia, and 420 MT for New Zealand. In 1990 and

1991, the administrative meeting decided to continue their catch limits.

Under the current regulations, most of the VPA projections show parent stock recovery. It suggests that the current regulations are effective for long-term southern bluefin tuna stock recovery.

SBF-4. 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.

The Committee made no recommendation for management of southern bluefin tuna in the Atlantic Ocean, since the stock in the Atlantic is a part of the total population and it has been monitored by the other international body.

SMT - SMALL TUNAS

SMT-1. DESCRIPTION OF FISHERIES

Small tunas are mainly exploited by coastal artisanal fisheries, although substantial catches are made either directly or as by-catch by coastal purse seiners. About ten species make up the small tuna category, but only four of them account for about 80 percent of the total weight. These four species are: Atlantic bonito, Atlantic black skipjack, frigate tuna and spotted Spanish mackerel (SMT-Figure 1.). The total catches, all species combined, were relatively stable in the 1960's and 1970's (around 70,000 MT), but increased rapidly since 1980, reaching 130,000 MT in 1982. This increase is mainly due to an increase in catches reported by Turkey of Atlantic bonito, increases in the catch of Atlantic black skipjack reported by Ghana, and frigate tuna by Spain. Increases in recent years are also reported for Spanish and king mackerels from surface gears from Mexico and the United States. As regards 1990, preliminary estimates of total catches of small tunas amounted to 109,000 MT, a decline of 7 percent with respect to the previous year (SMT-Table 1). This drop is due mainly to the decrease in Atlantic bonito and Atlantic black skipjack catch estimates.

SMT-2. STATE OF THE STOCKS

Current available information generally does not allow an evaluation of the status of the stocks of most of these coastal species. It is felt, however, that some of these stocks are underexploited.

Annual stock evaluations of spotted Spanish and king mackerels are carried out for southern coastal areas of the eastern United States. The results of these assessments show overfishing of various stocks. Under the current management measures these stocks are recovering.

SMT-3. EFFECTS OF CURRENT REGULATIONS

A "U.S. Fishery Management Plan for Coastal Migratory Pelagic Resources (king mackerels) in the Gulf of Mexico and South Atlantic Region" (of the United States) is in effect in the U.S. Exclusive Economic Zone (EEZ) since 1982. It provides a total allowable catch (TAC) for spotted Spanish and king mackerels, stratified by area and between the catches from the commercial and recreational fishery. The TAC's and allocations are adjusted, based on the assessments available carried out every year. These regulations appear to be effective in rebuilding the stocks to provide yields at full exploitation rates.

SMT-4. RECOMMENDATIONS

SMT-4.a Statistics

Catch and effort statistics of small tunas are very incomplete for most of the coastal and industrial fishing countries. Therefore, the Committee recommended:

i) That special efforts be made to improve the catch data by species and gear of small tunas by the different fisheries (artisanal, industrial, recreational), as well as the corresponding nominal effort, inasmuch as possible.

ii) That estimates of discards, particularly off the African coasts, and estimates be made and reported to ICCAT of unreported purse seine catches which are sold.

SMT-4.b Research

Some biological studies were carried out on frigate tuna (*Auxis rochei*) which are summarized in Document SCRS/91/51. As regards other small tuna species, little progress was made in biological studies, and therefore, a lot of information is lacking on the status of the stocks of small tunas. Consequently, the Committee recommended:

-- That studies related to the stock evaluation of small tunas be carried out as far as possible, and that the results be presented to ICCAT. These studies should address the development of biological data such as growth rate, maturity, fecundity, and natural mortality; stock structure, distribution, and size; the ecology of small tunas and their association with schools of juveniles of large tunas; and the development of effective effort data for the small tunas.

SMT-4.c Management

The Committee had no recommendations for management of the small tuna stocks. It is recognized that the stocks of small tunas are generally coastal, and that management of the stocks at the local level is easier than managing stocks of large, deep-water tunas, or other species fished by high-seas fisheries of several nations. Nations that have implemented management regulations for coastal small tuna species are encouraged to report these regulations and to describe their effectiveness to ICCAT.

11. REPORT OF THE SUB-COMMITTEE ON ENVIRONMENT

Dr. J. Stretta, rapporteur for the Sub-Committee on Environment, presented its report. After introducing some minor corrections, the report was adopted together with all the recommendations included within. The Report is attached as Appendix 8.

12. REVIEW OF THE ECOLOGY OF TUNAS (e.g., association with other animals, gear selectivity, species interaction, by-catches, etc.)

Dr. J. Cort presented SCRS/91/81 which summarized the studies relating to the tuna association with porpoise in the east Atlantic and Indian Oceans. The paper reviewed the studies and regulations implemented in the east Pacific Ocean on this subject and reviewed all the reports concerning the incidents of tuna associated with porpoise in the Atlantic and Indian Oceans.

Most of Dr. Cort's information for the Atlantic was obtained from the purse seine fisheries through examination of logbooks, interviews with fishing captains, and deployment of at-sea observers. No occurrence of porpoise associated to tuna school was found in observer records in the Atlantic. The SCRS noted that sampling was not adequate for all seasons and fisheries and recommended strongly the development and implementation of a rigorous system for collecting data on tuna/porpoise association in the Atlantic fisheries.

13. REPORT OF THE SUB-COMMITTEE ON STATISTICS AND REVIEW OF ATLANTIC TUNA STATISTICS AND DATA MANAGEMENT SYSTEM

The Report of the Sub-Committee on Statistics was presented by its Convener, Dr. S. Turner. The Committee reviewed the Report, endorsed all the recommendations contained in it, and adopted the report. The Report is attached as Appendix 7.

14. REVIEW OF EDITORIAL AND PUBLICATION POLICY

The Commission's publication policy was reviewed. The Committee agreed that the present publication policy is satisfactory. The Secretariat was requested to take special care in printing accurately the titles and authors of scientific papers in the Collective Volume. The Secretariat asked the authors not to change the titles or authors without duly informing the Secretariat so that any confusion in titles or authors could be avoided.

15. REVIEW OF FUTURE SCRS RESEARCH PROGRAMS AND CONSIDERATION OF SCRS MEETING PROCEDURES

a) Organization of SCRS meeting

The Committee expressed appreciation for the hard, continuous work done by the scientists involved in the bluefin stock assessments. However, the Committee noted that the bluefin tuna draft report was not made available until Wednesday evening, thus giving very limited time for the other scientists to review it and for the Committee to revise the draft. The Committee noted that the proposal to include bluefin tuna in the "Convention on International Trade in Endangered Species of Wild Fauna and Flora" (CITES) was not yet known at the time the meeting agenda and schedule was set up. The Committee recommended that, in the future, groups involved in the evaluation of species for which considerable time is envisaged should schedule accordingly to allow the group to complete its work. Also, separating the meetings of those species groups that have a heavy work

load from the SCRS (e.g., swordfish in 1991) is fully justified.

The Secretariat proposed eliminating the so-called "reference document" system (Report "A"). Preparing these reference documents placed an extra burden on the scientists, and often resulted in repetitive papers. If a species group warrants it necessary to keep on record a report of their detailed analysis for future use, or to separate very technical arguments from the text of the Committee report, it can decide either to attach some information as an appendix (as has been done in the past for bluefin and swordfish, and this year for yellowfin) or to submit it as a scientific paper to be included in the Collective Volume series. The format for such reporting is no longer restricted and should be flexible. This proposal received the unanimous support of the Committee.

b) Intersessional meetings

The Committee noted that many inter-sessional meetings have been proposed by various groups. The Committee recognized the difficulties involved for both the scientists and the Secretariat to organize and prepare for such meetings, and for the scientists to schedule their work for the coming year when there is a short advance notice of such meeting. The Committee decided on the following tentative dates and locations of the 1992 inter-sessional meetings (in chronological order):

1) **GFCM-ICCAT Joint Meeting on Stock Assessment of Large Pelagic Fish in the Mediterranean Sea** - tentatively scheduled for the first half of 1992, at a location in the Mediterranean area. (This meeting will be organized and prepared in collaboration with the GFCM Secretary.)

2) **Data Preparatory Meeting for the Southwestern Atlantic** - tentatively scheduled for July 1-7, 1992, possibly in Brazil. (At the tripartite meeting to be held in December, 1991, between Argentina, Brazil and Uruguay, a decision will be made on the exact meeting venue, after which an official invitation will be sent to ICCAT from the Government of Brazil.)

3) **Billfish Workshop** - tentatively scheduled for July 22-29, 1992, at the U.S. NMFS Southeast Fisheries Center Laboratory in Miami.

4) **Swordfish Stock Assessment Session** - tentatively scheduled for September 22-29, 1992, at the Commission Headquarters in Madrid.

5) **Albacore Stock Assessment Session** - tentatively scheduled for October 6-9, 1992, (with the possibility of extending it to October 10, 1992,) at the Commission Headquarters in Madrid.

6) **Expert Meeting for Restructuring the Surface Fishery Sampling Scheme** - If the Commission approves hiring a biostatistician on a contract basis, a meeting between the biologists involved and the biostatistician will be held. This meeting could be held, at the earliest, in late 1992, or otherwise in early 1993.

The Committee reiterated that these locations and dates are tentative and authorized the Secretariat to modify them, in consultation with the SCRS Chairman and with the Conveners or Coordinators responsible for each particular meeting. To facilitate arrangements and schedules, the Governments of the countries where meetings will be held are asked to send the official invitation to the Secretariat as soon as feasible. In this way, the Secretariat can make the necessary arrangements and issue the invitations and pertinent information as far in advance of the meetings as possible.

The Committee drew the attention of the Commission to the financial implications that these meetings would pose to the Commission.

c) Bluefin Year Program

The Bluefin Year Program (BYP), proposed at the 1990 SCRS meeting for the Atlantic and Mediterranean, was further developed in 1991, through correspondence among the scientists involved. The Program Plan was presented by Mr. Z. Suzuki and Mr. B. Liorzou, who were nominated at the 1990 SCRS to serve as Co-Coordinators of the Bluefin Program.

The Chairman asked Mr. Suzuki to hold a small working group to finalize the plan and to report back to the Committee.

Later, the modified ICCAT Bluefin Year Program was presented (Appendix 9). The Committee adopted the Plan, with some minor changes, and endorsed the program as modified. It recommended the adoption of the plan by the Commission, while recognizing that the funding for the program will be by the participating nations, and not by the Commission.

d) Other matters

The SCRS, as well as the Sub-Committee on Statistics and the Sub-Committee on Environment, discussed the possibility of nominating one of the scientists attending many scientific meetings relating to tuna research as an official observer from ICCAT, when the Secretariat is not represented at such meet-

ings. Recognizing the benefit the Committee would gain from such a procedure, the Committee recommended that any scientists attending meetings related to tuna research contact the SCRS Chairman, the Convener of the pertinent Sub-Committee and/or the Secretariat, requesting the necessary credentials to participate as an official observer from ICCAT.

After consulting with the pertinent officers, the Secretariat is authorized to issue the necessary credentials for the ICCAT scientist and so inform the organizers of the meeting in question. In turn, the scientists who represent ICCAT are required to present a summarized report of the meeting to the Sub-Committee or the SCRS, including any new research findings relating to ICCAT matters.

16. COOPERATION WITH OTHER ORGANIZATIONS

a) LATTC, b) FAO/GFCM, c) IPTP, and d) CWP, NAFO, ICES, etc.

The Committee noted that this Agenda item had been covered by the Sub-Committee on Statistics, and endorsed all the recommendations made by that Sub-Committee on this matter.

The Committee noted with regret that the GFCM Secretary had scheduled the meeting of its Sub-Committee on Stock Management at the same time as this year's ICCAT SCRS meeting. This prevented many people involved in both organizations from attending the two sessions. The Committee suggested that the Secretariat request the GFCM Secretary to avoid such conflict in meeting dates in the future.

The Report prepared by Dr. A. Fonteneau, the ICCAT observer at the recent meeting on yellowfin stock assessment of the Indian Ocean was presented to the Committee. This meeting was organized by the Indo-Pacific Tuna Program (IPTP) and was held at Colombo, Sri Lanka, in October, 1991 (SCRS/91/117). The Committee considered that such summary reports are very beneficial for future research of the Commission.

17. RECOMMENDATIONS

The Committee wished to draw the attention of the Commission to the various recommendations made in the species section of the Report (Agenda Item 10) and to those contained in the Report of the Sub-Committee on Statistics and the Sub-Committee on Environment. Other recommendations that may have immediate financial implications include several intersessional meetings scheduled during 1992 (see Section 15.b) and a possible contract of a high-level biostatistician to assist the biologists in restructuring a sampling scheme for the tropical surface fishery.

18. OTHER MATTERS

The Observer from the European Economic Community (EEC) reported that on October 28, 1991, the EEC decided to prohibit, effective June 1, 1992, all fishing activities with driftnets with over 2.5 km in length. This prohibition affects all the vessels flying flags of Member States of the EEC in the sovereign and jurisdictional waters of the EEC as well as in international waters.

Two exceptions are included in this regulation:

a) The regime relating to driftnets in the Baltic Sea will be established by the International Commission for Baltic Sea Fishing.

b) The other exception, in effect until December 31, 1993, applicable to those vessels which have fished for albacore with driftnets in the northeast Atlantic during at least the last two years prior to the regulation entering into effect. These vessels are authorized to use driftnets whose total length does not exceed 5 km. This exception will end on the date cited unless the absence of all ecological risk is demonstrated scientifically.

In addition, certain technical arrangements are foreseen to reduce the ecological impact, mainly in the catch of marine mammals, as well as to avoid losses of the nets.

19. ADOPTION OF REPORT

The SCRS Report was adopted.

20. ELECTION OF CHAIRMAN

The Chairman asked Dr. E. A. Kwei to preside over the election of the SCRS Chairman for the next biennial period, 1992-1993. Dr. Kwei solicited nominations of candidates. Portugal nominated Dr. J. L. Cort, and this nomination was seconded by the U.S.A. Dr. Cort was unanimously re-elected SCRS Chairman for the next biennial period.

21. ADJOURNMENT

The Committee expressed its appreciation to Dr. Olegario Rodríguez Martín, the Executive Secretary, who will retire shortly and presented him with a gift. The Committee recognized his continuous support of the Committee's work.

The 1991 meeting of the SCRS was adjourned.

YFT-Table 1. Atlantic yellowfin tuna catches (in 1000 MT) by area and by gear, 1961 - 1990. NOV. 1, 1991 15:00

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	59.0	58.0	65.0	69.3	68.0	58.8	60.2	83.2	92.7	73.1	73.3	93.6	94.6	106.7	124.8	123.2	128.7	130.5	124.9	125.1	151.2	159.4	160.1	111.7	149.9	133.9	134.3	127.7	154.3	168.1
EAST ATL.	50.9	28.3	42.4	47.4	54.2	43.3	52.6	73.8	80.3	58.9	57.6	78.2	79.7	92.2	108.2	109.3	115.5	115.7	111.9	112.2	134.7	134.0	123.1	75.2	112.4	105.7	110.0	99.3	122.3	146.8
-SURFACE	10.0	10.9	19.2	28.5	26.7	30.7	35.5	51.9	59.9	42.9	42.9	60.2	59.3	72.8	92.8	96.5	99.8	104.4	105.1	99.8	126.8	124.1	117.0	66.6	104.9	101.8	105.3	91.9	115.9	142.4
BAITBOAT	9.8	10.6	17.8	21.2	18.5	15.1	16.8	22.1	15.7	9.5	10.6	13.1	14.7	19.7	9.7	12.7	11.0	9.0	13.8	7.5	9.7	13.1	11.5	13.7	16.1	15.1	16.4	16.0	12.3	16.2
ANGOLA	2.0	1.8	2.1	3.6	1.9	1.3	0.9	1.1	0.4	0.3	0.5	0.6	0.6	0.8	0.1	1.0	1.9	2.0	0.8	0.5	0.7	1.4	0.7	0.2	0.3	0.1	0.1	0.2	0.1	0.3
CAP VERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.5	0.4	0.4	0.4	0.1	0.1	0.5	0.6	0.9	0.6	0.8	0.9	0.9	0.7	1.3	0.9	0.5	0.9	0.4
FIS	7.8	6.1	12.3	13.2	12.7	13.1	14.4	18.6	14.0	7.4	7.4	7.4	5.5	6.3	2.9	3.7	3.4	2.8	2.2	2.1	2.9	3.0	2.7	3.4	2.9	3.8	3.8	4.4	2.6	3.8
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.7	0.8	0.6	0.3	1.2	1.7	2.5	5.6	5.0	5.5	8.9	8.2	8.9	8.4	6.9	9.0
JAPAN	0.0	1.2	0.9	2.1	1.3	0.5	1.3	2.2	1.0	0.8	2.0	3.5	6.5	7.1	1.1	4.9	2.6	1.4	1.0	0.5	1.7	1.2	1.0	0.1	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	0.0	0.0	0.7	1.7	2.7	1.0	1.2	1.4	3.9	1.4	1.0	0.4	0.1	0.2	0.1	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	0.4	0.1	1.1	0.8	1.0	0.9	0.4	0.2	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SAFRICA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.3	0.1	0.0	0.3	0.7	0.3	0.0	0.0	0.1	0.6	0.3
ESPANA	0.0	1.5	2.5	2.3	2.6	0.2	0.2	0.2	0.3	0.7	0.4	0.7	0.8	2.0	1.0	0.2	0.3	0.2	0.1	0.1	0.1	0.4	0.7	2.5	2.9	1.7	2.7	2.3	1.2	2.4
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0
PURSE SEINE	0.0	0.0	1.3	7.3	8.2	15.6	18.7	29.8	44.2	33.3	32.2	47.0	44.5	53.0	83.0	83.7	88.4	94.5	89.9	91.7	111.8	107.8	101.6	59.5	87.3	84.4	86.0	73.6	101.2	123.8
CAYMAN I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FIS	0.0	0.0	0.8	5.8	6.5	8.9	9.0	12.7	14.4	16.6	18.6	23.8	26.2	31.9	43.8	46.3	44.3	48.9	43.2	47.0	48.9	39.5	36.1	4.4	9.5	13.1	13.5	17.4	28.4	40.0
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2	3.0	4.2	2.7	3.5	3.7	3.6	1.0	0.0	0.0	0.0
JAPAN	0.0	0.0	0.0	0.5	1.1	4.8	5.2	7.5	4.7	1.1	2.0	2.5	1.2	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.2	1.3	2.6	2.3	2.8	2.2	2.1	1.7
MAROC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	1.6	2.2	3.4	3.0	3.2	4.8	4.5	2.3	0.6	2.3	2.3	1.5	0.0	0.0	0.0
PORTUGAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.9	1.3	0.3	0.0	++	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.5	1.0	0.6	1.3	2.9	3.1	5.4	6.4	7.4	8.6	13.3	14.0	23.7	33.2	35.3	33.4	39.9	38.7	51.3	53.8	51.1	37.5	64.0	60.2	63.4	47.9	60.5	66.2
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.9	5.8	18.8	9.0	3.8	12.0	3.0	5.6	14.0	1.7	6.4	8.1	2.9	1.6	1.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.9	1.2	1.8	3.4	1.4	0.7	2.2	3.7	3.4
NEI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	5.4	0.8	0.7	0.8	2.5	3.6	6.2	12.5
OTHERS	0.0	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.9	0.2	0.4	0.1	0.8	0.4	0.3	0.6	0.2	0.5	0.6	0.3	0.5	0.1	0.3	0.3	1.1	0.7	0.6	0.3	0.3	0.0
OTHER SURF	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.9	1.4	0.6	5.3	3.2	3.9	2.4	1.5	2.3	2.9	2.3	2.4	2.4
CAP VERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	2.7	3.4	2.0	1.2	2.0	1.8	1.8	1.9	1.9
OTHERS	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.9	1.4	0.6	0.7	0.5	0.5	0.4	0.4	0.3	1.2	0.5	0.5	0.5
-LONGLINE	40.9	17.4	23.2	18.9	27.5	12.6	17.1	21.9	20.4	16.0	14.7	18.0	20.4	19.4	15.4	12.8	15.7	11.3	6.8	12.4	7.9	9.9	6.1	8.6	7.5	3.9	4.7	7.4	6.4	4.4
CHITAIW	0.0	0.0	0.0	0.0	0.0	0.8	1.9	6.6	7.0	3.9	3.4	3.5	1.5	1.0	1.3	0.6	0.2	0.2	0.2	0.1	0.4	0.2	0.4	0.1	0.1	0.2	0.2	0.2	0.1	0.1
CUBA	0.0	0.0	0.0	0.0	0.5	0.4	2.4	1.2	0.9	1.1	1.4	3.2	4.5	3.0	1.7	1.8	2.9	1.9	2.6	4.9	2.5	2.1	1.6	1.2	1.1	0.7	0.8	1.4	0.4	0.0
JAPAN	40.9	17.4	23.1	18.5	26.5	10.6	10.1	9.8	6.4	2.5	1.6	2.3	1.3	0.7	1.7	0.3	0.1	0.3	0.3	1.7	1.2	2.8	0.9	2.9	3.1	1.3	1.7	3.6	3.8	3.8
KOREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	4.2	8.0	6.9	7.8	8.3	10.1	7.6	6.6	9.8	7.3	2.6	3.9	3.3	3.6	1.5	1.7	1.6	1.0	1.2	1.2	1.5	0.3
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	3.6	2.1	1.2	1.9	0.9	1.1	0.5	1.6	0.3	1.1	1.6	2.2	1.3	0.3	0.2	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.1	0.5	0.8	2.7	2.7	1.9	0.5	1.4	1.1	1.2	2.5	1.9	1.6	1.8	0.5	0.5	0.1	0.2	0.1	++	0.3	0.3	0.4	0.6	1.0	0.6	0.2
OTHERS	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.1	0.1	++	++	0.1	0.2	++	++	0.0	0.0	++	++
-UNCL GEARS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++

YFT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
WEST ATL.	8.1	29.5	22.2	21.6	13.6	15.5	7.6	9.4	12.4	14.2	15.7	15.4	14.9	14.5	16.6	13.9	13.2	14.8	13.0	12.9	16.5	25.4	37.0	36.5	37.5	28.2	24.3	28.4	32.0	21.3
-SURFACE	0.0	0.0	0.2	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	3.4	2.3	1.6	2.0	0.7	1.4	4.7	3.6	5.7	4.8	15.1	29.4	27.1	25.8	14.5	14.4	13.8	18.3	11.5
BAITBOAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.4	0.0	0.0	1.0	0.6	0.4	1.9	2.9	3.6	3.7	4.3	2.4	3.6	6.0	5.0	4.1
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	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.9	1.0	1.8	1.3	2.2	0.7	1.3	1.6	1.4	0.2
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	++	1.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	1.0	1.9	1.8	2.4	2.1	1.7	2.3	4.4	3.6	3.9
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.2	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PURSE SEINE	0.0	0.0	0.2	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	3.4	2.3	0.3	1.6	0.7	1.1	3.6	1.1	5.2	2.8	12.1	25.8	23.2	21.0	10.7	8.4	6.8	12.2	8.9
FIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	1.7	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.8	0.0	0.3	1.0	0.8	0.0	0.0	0.0	2.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0
USA	0.0	0.0	0.2	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.3	0.6	0.0	0.4	0.5	0.8	1.6	0.3	0.5	0.3	0.1	0.1	1.1	4.4	0.6	0.1	0.0	++	0.3
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	2.5	12.0	23.5	17.8	15.6	10.1	8.3	6.8	12.2	8.6
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.0	0.0	0.3	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0
OTHER SURF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.4	++	2.0	0.1	0.1	++	0.1	0.1	0.6	1.5	2.4	1.1	1.0	0.7
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	0.1	0.2	1.3	2.2	0.9	0.9	0.6
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.4	++	0.2	0.1	++	++	++	0.1	0.3	0.2	0.1	0.1	0.1	0.1
-LONGLINE	6.1	25.9	18.8	19.2	11.4	13.0	4.9	7.8	10.4	13.9	15.4	11.7	12.3	12.5	14.2	12.7	11.2	9.6	9.0	6.5	11.4	9.9	6.6	7.9	10.6	12.2	9.4	13.8	12.9	9.2
BRASIL	4.4	1.4	2.4	1.6	0.7	0.5	0.8	0.8	0.5	0.8	0.3	0.3	0.1	0.2	0.5	0.7	0.9	0.8	0.9	0.5	1.3	1.0	0.8	0.5	0.5	0.8	0.4	0.7	1.0	0.6
CHITAIW	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.3	3.8	3.2	1.0	1.2	1.2	1.3	1.1	1.1	0.1	0.2	0.8	0.5	0.4	0.4	0.1	0.5	0.6	1.0	0.6	1.2	0.5	0.7
CUBA	0.0	0.0	1.7	0.9	0.2	0.4	0.6	0.7	0.6	0.5	0.3	0.4	0.0	0.4	0.6	1.2	0.9	0.7	0.2	0.7	2.0	1.5	0.8	2.5	1.9	2.1	1.1	0.1	0.1	0.1
JAPAN	1.7	24.5	14.6	16.6	10.4	11.8	2.7	4.2	3.6	4.3	9.1	4.2	2.5	2.8	2.4	3.1	1.4	1.6	1.7	1.1	3.0	3.3	1.2	1.0	2.2	2.1	1.6	2.4	3.2	3.2
KOREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.8	3.5	3.0	3.3	4.5	5.4	7.7	4.6	6.5	4.3	4.4	1.9	3.3	2.2	1.9	1.0	1.7	0.9	0.2	0.1	1.1	0.5
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	2.0	1.1	1.2	1.3	0.6	0.7	0.0	0.8	0.3	0.7	0.1	0.2	0.0	0.3	0.1	0.0	0.0	0.0
USA	0.0	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.1	0.1	1.7	3.8	4.7	8.4	6.4	3.8
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.5	1.9	1.9	1.2	0.6	0.6	0.8	1.3	1.0	1.0	1.0	0.5	1.2	1.7	1.6	0.9	0.6	0.7	0.5	0.3
OTHERS	++	++	0.1	0.1	0.1	0.0	++	0.1	0.1	0.0	0.2	0.4	0.1	0.1	0.1	0.1	++	++	0.0	0.0	0.1	0.3	0.4	0.4	0.4	0.3	0.1	0.2	0.1	++
-UNCL GEARS	2.0	3.6	3.2	2.3	2.2	2.5	2.5	1.5	2.0	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.5	0.4	0.7	0.3	0.4	1.0	1.5	1.1	1.5	0.5	0.8	0.8	0.6
MEXICO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.6	1.1	0.6	0.7	++	0.3	0.3	0.1
VENEZUELA	2.0	3.6	3.1	2.2	2.1	2.4	2.4	1.4	1.9	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.5	0.4	0.7	0.3	0.4	0.4	0.4	0.5	0.8	0.5	0.5	0.5	0.5
UNCL REGION	0.0	0.2	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-SURFACE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-LONGLINE	0.0	0.2	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.2	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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 GEARS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

++ Catches less than 50 MT and over 04 MT

YFT - Table 2. Carrying capacity (1000 MT), by gear, of east Atlantic surface fleets

YEAR	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL BB+PS	**36.5**	**32.2**	**42.3**	**54.1**	**46.0**	**53.5**	**68.4**	**62.0**	**67.6**	**69.6**	**77.1**	**81.8**	**61.3**	**52.3**	**49.5**	**45.8**	**43.9**	**44.3**	**46.5**
TOTAL BB	**7.3**	**7.6**	**13.0**	**13.2**	**9.7**	**13.7**	**15.5**	**14.7**	**12.8**	**11.8**	**11.7**	**11.5**	**11.3**	**10.8**	**11.0**	**8.8**	**9.2**	**9.6**	**9.9**
FISM	2.7	2.1	2.0	1.8	1.5	1.3	1.3	1.4	1.3	1.3	1.3	1.2	1.2	1.1	1.0	0.5	0.7	0.8	0.9
TEMA-BASED	3.2	4.0	8.7	9.2	7.3	11.0	12.8	11.6	9.7	8.7	8.1	8.0	7.2	6.6	6.6	4.8	4.8	4.8	4.8
SPAIN (CAN. IS.)	0.6	1.0	1.9	1.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
ANGOLA	0.3					0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
CAP VERT.									0.2	0.2	1.0	1.0	1.0	1.2	1.2	1.2	1.2	1.2	1.2
PORTUGAL	0.5	0.5	0.4	0.6	0.3	0.3	0.3	0.6	0.6	0.5	0.3	0.3	0.9	0.9	1.2	1.4	1.6	1.8	2.0
SPAIN (TROP.)																		0.1	0.1
TOTAL PS	**29.2**	**24.6**	**29.3**	**40.9**	**36.3**	**39.8**	**52.9**	**47.3**	**54.8**	**57.8**	**65.4**	**70.3**	**50.0**	**41.5**	**38.5**	**37.0**	**34.7**	**34.7**	**36.6**
FISM	9.2	12.4	14.5	17.2	17.5	14.6	17.6	16.5	17.2	16.8	16.3	16.8	4.8	3.0	3.0	5.1	6.0	6.0	7.0
SPAIN	5.2	7.1	8.4	12.6	16.8	20.7	24.4	25.9	29.5	30.6	31.7	38.0	33.5	30.3	27.3	23.7	20.5	19.5	19.7
U.S.A.	11.9	2.9	5.5	10.4	1.7	4.2	10.5	3.2	2.2	1.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN	1.9	1.9	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.8	0.8	0.8	0.8	0.4	0.4
U.S.S.R.	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.0	3.0	3.9	4.9	4.9	4.9	5.4	5.4	5.4	5.4	5.4	4.2
OTH.**	0.9	0.2	0.2	0.4	0.2	0.2	0.2	0.7	2.9	4.9	10.8	10.2	6.4	2.0	2.0	2.0	2.0	3.4	5.3

* Provisional

** Ghana (1982-87), Mexico (1983), Congo (1980-81), Gran Cayman (1982-83), Portugal (1979-81), Venezuela (1983), and for recent years Norway, Malta, Panama, Vanautu.

YFT - Table 3. Arguments in favor and against the different hypotheses of Atlantic yellowfin stock structure

STOCK STRUCTURE	LL CPUE	PS CPUE BY SIZE		MARK/RECOVERIES		SIZE DISTRIBUTIONS		
		JUVENILES	ADULTS	JUVENILES	ADULTS	<70 cm	70-100 cm	>150 cm
HYPOTHESIS 1	NO	YES	NO	YES	NO	YES	NO	NO
HYPOTHESIS 2	YES	YES	YES	YES	YES	YES	YES	YES

HYPOTHESIS 1 Two independent stocks, with little or no mixing rate, separated by the 30°W meridian.

HYPOTHESIS 2 A single stock, with one or several independent juvenile components on both sides of the Atlantic, with a significant mixing rate of individuals of 70 cm and over, with an east-west migration of intermediate sizes (70-100 cm) and west-east migration of the large sizes (>150 cm).

YFT - Table 4. Parameters estimated by the non-equilibrium production model (ASPIC) fitted to the nominal catch and effort data for eastern Atlantic yellowfin

I. Model with Constant Catchability	
Catchability coefficient	4.688E - 02
Maximum sustainable yield	1.226E+02
Stock biomass at M.S.Y.	5.559E+01
Fishery-specific effort at M.S.Y.	4.704E+01
II. Model with Separate Catchability in 1984	
Catchability coefficients:	
q1 for 1969-1983, 1985-1990	1.538E - 01
q2 for 1984	8.872E - 02
Maximum sustainable yield	1.293E+02
Stock biomass at M.S.Y.	1.652E+01
Fishery-specific effort at M.S.Y.:	
f1 based on 1969-1983, 1985-1990	5.090E+01
f2 based on 1984	8.821E+01
III. Model with Separate Catchability for 1987-1990	
Catchability coefficients:	
q1 for 1969-1986	6.991E - 02
q2 for 1987-1990	1.145E - 01
Maximum sustainable yield	1.232E+02
Stock biomass at M.S.Y.	3.608E+01
Fishery-specific effort at M.S.Y.:	
f1 based on 1969-1986	4.885E+01
f2 based on 1987-1990	2.983E+01

YFT - Table 5. Estimates of the parameters of the different production models used for western Atlantic yellowin: Optimum effort (Fopt) in days fishing of standardized large purse seiners, maximum catch (Ye) in MT, initial CPUE (U init.) in MT/fishing days PSG (SCRS/91/29)

MODEL	F opt	Ye max	U init.	R**2
(1) Shaeffer (linear)	3745	33449	17.273	0.583
(2) Fox (linear)	5000	34002	18.485	0.599
(3) Shaeffer (PRODFIT 3.2.1)	3759	32979	17.546	unknown
(4) Fox (PRODFIT 3.2.1)	5651	37486	18.024	unknown
(5) Schnute (original f)	4128	35332	19.131	0.710
(6) Schnute (modified f')	4140	35179	23.557	0.682

BET-Table 1. Atlantic bigeye tuna catches (1000 MT) by area and by gear Nov. 1, 1991

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	17.0	23.0	25.9	23.3	39.2	24.9	24.7	23.0	35.8	41.3	54.9	46.5	56.5	63.8	60.6	44.6	54.2	51.6	45.1	62.8	67.2	72.8	58.5	68.6	74.4	58.9	48.7	58.1	68.7	62.9
-SURFACE	5.8	7.1	10.9	5.6	9.8	5.2	11.6	4.2	12.7	13.8	15.8	14.0	18.5	24.6	19.7	17.2	25.0	23.3	17.9	21.4	25.7	21.0	25.2	27.2	25.8	24.5	19.9	17.0	19.1	25.0
BAITBOAT	5.8	7.1	10.9	5.6	9.8	5.2	11.5	3.8	9.7	10.4	11.8	9.4	13.6	18.0	14.5	9.9	12.8	14.5	9.5	12.1	9.6	6.8	9.9	11.0	17.7	15.0	12.3	9.1	12.4	15.4
FIS	0.0	0.4	2.4	0.8	++	++	1.7	0.2	2.3	1.4	1.3	1.1	1.2	1.0	1.3	1.4	2.6	3.6	2.0	2.4	2.2	1.8	2.1	2.1	4.0	3.2	2.7	2.5	2.2	2.7
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.5	0.4	0.3	1.1	1.4	1.2	1.3	1.1	2.1	2.7
JAPAN	0.0	++	++	++	0.1	++	0.4	0.6	0.3	0.2	0.5	0.9	1.7	1.9	0.1	0.9	1.0	0.6	0.2	0.4	1.0	0.6	++	++	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	0.0	0.0	0.2	0.5	0.3	0.2	0.5	0.5	0.7	1.3	0.6	0.2	0.0	++	++	0.0	0.0	0.0	0.0	0.0
PORTUGAL	5.8	6.6	8.0	4.7	8.7	4.1	8.1	1.6	5.6	5.1	2.9	4.0	5.9	10.9	6.8	2.9	4.5	5.3	3.3	3.5	2.6	1.8	3.8	3.9	6.4	7.0	4.5	2.2	4.9	5.9
ESPANA	0.0	0.1	0.5	0.1	1.0	1.1	1.3	1.4	1.5	3.6	7.0	3.1	4.4	3.2	5.7	4.2	3.6	3.8	3.0	4.0	2.4	1.5	2.5	2.8	5.0	3.5	3.6	2.6	2.8	3.8
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.2	0.4	0.2	0.2	0.4	0.6	0.1	0.2	0.3	0.5	1.2	1.1	0.9	0.1	0.2	0.7	0.4	0.3
PURSE SEINE	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	3.0	3.4	4.0	4.6	4.9	6.6	5.2	6.9	11.5	8.6	7.9	8.7	15.3	13.9	15.2	16.0	8.0	9.2	7.1	7.6	6.3	9.4
FIS	0.0	0.0	0.0	0.0	0.0	++	++	++	1.3	2.4	2.6	2.8	3.2	4.2	3.5	4.9	6.0	4.9	4.9	3.3	5.4	4.8	5.6	2.0	1.0	1.1	1.3	1.7	1.2	2.2
JAPAN	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	1.3	0.3	0.5	0.7	0.3	0.2	++	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.5	0.5	0.3	0.4	0.4	0.1	0.2
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.4	0.9	1.3	1.3	1.6	1.7	4.8	3.0	2.4	4.4	7.6	7.5	6.2	10.8	5.4	7.4	5.3	5.4	4.9	6.1
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	++	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	++	1.2	1.1	0.5	0.0	0.0	++	++	0.1
NEI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1	0.2	0.0	0.0	0.1	++	0.1	0.8
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	0.2	0.5	0.2	0.1	0.9	0.1	0.3	0.7	0.6	0.6	0.6	1.1	1.3	1.1	1.4	0.6	0.4	++	0.1	++	++
OTHER SURF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	0.2	0.5	0.6	0.8	0.3	0.1	0.2	0.1	0.3	0.5	0.3	0.4	0.2
-LONGLINE	11.2	15.9	15.0	17.7	29.4	19.7	13.1	18.8	23.1	27.5	39.1	32.5	38.0	39.2	40.9	27.4	29.2	28.3	27.2	41.4	41.5	51.8	33.3	41.3	48.5	34.3	28.7	41.0	49.6	37.8
CHI.TAIW	0.0	++	++	++	0.0	0.6	2.2	5.3	7.5	7.6	5.5	5.0	3.8	3.1	4.0	3.3	3.0	2.6	2.2	2.3	1.7	1.9	1.4	0.8	1.1	1.0	1.3	1.3	0.7	0.6
CUBA	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.9	1.0	4.1	3.2	2.0	2.6	2.4	1.9	1.3	1.8	2.3	2.3	1.4	0.7	0.5	0.4	0.4	0.2	0.2	0.2	0.2	0.1	0.0
JAPAN	11.0	15.7	14.5	17.3	28.5	17.6	8.5	10.3	10.3	9.0	20.3	18.1	20.0	20.9	17.4	7.3	9.1	9.3	12.0	20.5	21.0	32.9	15.1	24.3	31.6	22.8	18.6	31.7	39.4	32.7
KOREA	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	1.9	4.1	7.4	5.7	5.8	7.4	10.2	6.7	7.6	9.2	7.3	9.0	11.7	10.6	9.4	8.9	10.7	6.1	4.4	4.9	7.9	2.7
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.7	1.8	2.0	2.0	1.2	2.0	0.5	4.5	2.5	2.9	2.7	2.0	1.1	0.6	0.4	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.4	0.0	0.0	0.0	++	0.3	0.1	++	++	++	0.0	0.0	0.0	0.5
USSR	0.0	0.0	0.0	0.0	0.4	0.7	1.8	1.7	2.2	2.6	2.7	1.6	3.0	3.4	3.7	4.9	4.1	2.1	2.0	2.6	1.7	0.6	0.4	1.2	0.9	1.1	1.9	1.1	0.4	0.1
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.5	0.2	0.3	0.3	1.5	1.0	2.4	2.0	1.7	0.9	0.1	0.1	++	++
OTHERS	0.2	0.2	0.5	0.4	0.4	0.2	0.1	0.3	0.2	0.1	++	0.0	0.1	0.2	0.2	0.4	0.5	0.6	0.6	0.8	0.7	1.1	1.4	1.7	1.2	1.6	1.8	1.7	1.1	1.2
-UNCL. GEARS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	0.1	0.1	0.1	0.1	++	0.1

++ Catches less than 50 MT and over 0.4 MT

For each gear group, countries with less than 950 MT annual catch during the entire period covered are included in "OTHERS"

SKJ-Table 1. Atlantic skipjack catches (1000 MT) by area and by gear Nov. 1, 1991

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	5.9	11.2	20.1	18.7	24.1	22.8	24.2	48.4	29.2	50.1	78.7	78.4	78.9	117.9	57.4	68.7	108.8	106.4	88.4	108.9	128.9	153.2	133.0	126.4	118.0	116.3	110.3	139.9	115.2	136.0
EAST ATLANTIC (SURF)	2.6	9.2	16.1	13.2	22.6	21.0	21.4	45.8	27.3	47.5	76.2	74.4	75.0	113.3	52.2	64.8	105.4	99.1	81.8	96.0	105.9	120.1	100.6	90.9	77.8	89.8	90.1	116.7	90.4	115.7
-PURSE SEINE	0.0	0.0	0.4	0.9	3.3	6.1	7.9	24.2	14.3	29.8	48.8	48.8	49.8	74.2	35.4	32.5	55.9	56.8	35.6	54.0	64.5	72.5	63.6	61.7	47.7	58.1	50.6	67.3	47.4	72.9
CANADA	0.0	0.0	0.0	0.0	++	0.0	0.6	0.9	0.1	0.6	1.2	++	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAYMAN IS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.8	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CONGO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.2	0.0	0.0	0.0	++	++	++	++	++	++
FIS	0.0	0.0	0.2	0.5	0.9	2.2	1.5	5.1	2.6	7.8	13.1	13.6	7.9	22.6	10.5	14.3	26.7	20.7	13.9	19.9	22.4	24.3	25.2	9.1	9.7	10.9	15.2	14.2	11.1	12.9
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.3	2.7	3.9	2.8	3.7	2.9	1.7	0.8	0.0	0.0	0.0
JAPAN	0.0	0.0	0.0	++	1.8	1.4	2.2	6.3	0.7	3.5	6.2	3.4	1.5	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4	1.1	2.1	2.0	2.0	3.2	2.2	2.6
MAROC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.7	1.9	1.9	5.0	3.0	4.0	2.3	0.9	1.0	1.2	0.9	0.0	0.0	0.1
ESPANA	0.0	0.0	0.2	0.4	0.6	2.5	3.1	8.7	6.2	6.1	11.9	19.5	17.8	30.6	16.9	15.6	21.5	24.5	17.4	24.2	31.3	34.7	27.6	44.6	29.4	39.5	29.7	44.2	29.5	43.2
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.2	4.7	11.8	16.2	12.2	21.2	20.0	7.4	1.8	5.9	6.8	2.1	2.6	2.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.1	++	0.0	1.5	0.6	1.0	1.4	1.7	0.5	1.8	1.9	3.6
NEI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	3.4	0.9	0.6	0.5	1.4	3.7	2.3	10.5
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.3	0.2	0.1	0.5	0.2	0.4	0.3	1.0	0.3	0.4	0.6	0.6	0.1	0.2	0.4	0.0
-BAITBOAT	2.6	9.2	15.7	11.8	19.2	14.9	13.5	21.6	12.9	17.6	27.2	25.3	25.0	39.0	16.7	28.6	42.4	41.4	44.7	38.0	38.9	44.5	34.8	27.9	29.9	30.1	38.5	48.1	41.6	41.4
ANGOLA	1.4	2.0	2.3	1.0	1.3	2.8	2.0	4.2	1.8	0.9	1.9	1.5	1.3	3.4	0.6	1.5	3.8	3.2	3.6	3.5	2.3	2.2	0.3	++	0.1	0.1	0.1	++	0.1	0.1
CAP VERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.0	1.5	1.4	1.3	1.2	0.8	0.7	1.3	1.0	2.1	1.6	1.6	1.3	1.0	2.0	0.9	2.1	1.4	0.9	0.2
FIS	0.4	1.7	2.1	1.4	2.7	3.3	3.7	7.3	3.6	4.2	5.6	3.7	3.2	4.4	1.8	2.1	2.7	3.3	3.3	3.1	2.6	4.4	2.6	3.8	3.3	1.9	2.0	3.0	4.8	3.5
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	1.3	2.1	3.5	2.9	4.0	4.7	4.9	14.3	20.5	16.2	16.2	19.2	22.8	26.0	22.2	29.1
JAPAN	0.0	1.5	4.6	3.1	6.3	4.4	3.7	7.3	4.9	7.5	11.7	10.1	13.0	18.7	3.7	15.0	16.8	14.6	14.7	12.3	12.9	8.5	4.6	0.4	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	0.0	0.0	0.9	2.1	4.5	1.9	3.6	8.1	12.0	6.7	7.5	2.8	1.6	0.7	0.2	0.0	0.0	0.0	0.0	0.0
MAROC	0.0	0.0	0.0	0.0	3.2	1.5	0.9	0.9	0.1	1.1	0.1	++	0.1	++	0.3	++	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	0.0
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2	1.0	1.9	2.5	4.0	3.0	1.8	1.7	0.1	2.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PORTUGAL	0.8	2.3	3.4	3.1	2.2	2.3	2.5	1.1	1.7	1.0	4.2	3.7	2.2	1.9	0.6	2.1	4.4	4.4	3.0	1.7	2.7	4.8	1.0	3.8	2.4	5.4	8.0	14.1	7.7	3.9
ESPANA	0.0	1.7	3.3	3.2	3.5	0.6	0.7	0.8	0.8	1.8	2.7	4.1	2.6	5.4	0.8	0.6	0.7	0.6	1.3	2.2	4.2	3.4	1.3	2.0	5.7	2.5	3.4	3.4	5.8	4.6
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	++	0.0	0.0	0.0	0.0	++	0.1	++	++	++	++	0.1	0.1	0.2	0.1	++
-OTHER SURF	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.1	0.1	3.7	7.1	0.9	1.5	4.0	2.5	3.1	2.2	1.3	0.2	1.6	1.0	1.3	1.4	1.4
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.2	0.1	1.0	0.8	0.0	1.4	0.7	0.6	0.6	0.6
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	6.7	0.5	1.1	3.0	1.8	2.5	0.7	0.0	0.0	++	0.0	0.0	0.0	0.0
OTHERS	++	++	++	0.5	0.1	0.0	++	++	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.4	0.4	0.1	0.2	0.5	0.5	0.5	0.5	0.2	0.2	0.3	0.7	0.8	0.8
WEST ATLNTIC (SURF)	3.3	2.0	4.0	5.5	1.5	1.8	2.8	2.6	1.9	2.4	2.2	3.8	3.4	3.9	4.5	3.7	3.2	6.6	6.2	12.8	22.8	32.2	31.4	34.9	40.0	26.3	20.1	22.9	24.6	19.9
-PURSE SEINE	0.0	0.5	3.0	4.4	0.1	0.0	0.0	0.1	0.1	0.0	0.0	1.2	0.4	0.1	0.4	0.7	0.6	3.4	1.5	3.1	4.7	9.7	11.1	17.9	11.2	6.8	6.1	1.7	1.8	2.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.3	1.0	0.8	0.0	0.0	0.0	0.2	2.6	0.5	0.0	0.0	0.0	0.0	0.0
USA	0.0	0.5	3.0	4.0	0.1	++	++	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.5	0.3	1.6	0.7	1.0	2.6	++	0.6	0.8	1.8	1.0	0.6	0.0	++	0.2
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.9	9.5	10.0	14.1	8.9	5.8	5.5	1.7	1.8	1.8
OTHERS	0.0	0.0	++	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4	0.1	0.1	0.2	++	0.8	0.0	0.2	0.2	0.2	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0

SKJ-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	
-BAITBOAT	3.0	1.2	0.7	0.7	1.0	1.0	1.2	1.6	1.3	1.8	1.6	1.4	1.9	2.9	2.8	2.8	2.4	2.8	4.4	9.4	18.0	22.4	20.0	16.7	28.5	18.8	13.7	20.9	22.4	17.1	*
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	0.0	0.0	0.0	0.0	0.0	0.0	1.8	6.1	13.9	18.2	15.6	13.1	25.1	15.2	10.5	17.2	19.8	15.0	*
CUBA	3.0	1.2	0.7	0.7	1.0	1.0	1.2	1.6	1.3	1.8	1.6	1.4	1.5	1.8	2.3	2.8	2.4	1.8	2.0	2.3	1.1	1.1	1.7	1.2	1.6	1.3	1.1	1.6	1.4	1.4	
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	0.4	1.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	0.0	0.0	0.0	0.0	0.0	3.0	3.1	2.7	2.4	1.8	2.3	2.1	2.1	1.2	0.7	
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
-OTHER SURF.	0.3	0.3	0.3	0.4	0.5	0.8	1.6	0.9	0.5	0.6	0.6	1.1	1.1	0.8	1.3	0.2	0.2	0.4	0.3	0.4	0.1	0.1	0.2	0.1	0.3	0.7	0.2	0.3	0.3	0.3	
BRASIL	0.3	0.3	0.3	0.4	0.5	0.7	1.5	0.8	0.4	0.4	0.4	0.9	0.6	0.5	1.1	0.1	0.2	0.3	0.2	0.3	0.0	0.0	0.0	++	++	++	0.1	0.1	0.1	0.1	
OTHERS	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.3	0.2	0.1	++	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.7	0.1	0.2	0.2	0.2	
ATL. LL+TRAWL	++	0.0	0.0	++	++	++	++	++	++	++	0.1	0.1	0.1	0.2	0.2	++	0.1	0.1	++	++	0.1	++	0.6	++	++	++	++	++	++	0.1	
ATL UNCL GEAR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.4	0.5	0.5	0.2	0.1	0.6	0.4	0.1	0.1	0.9	0.4	0.6	0.2	0.2	0.1	0.3	0.2	0.3	

++ Catches less than 50 MT and over 0.4 MT

* Catch data incomplete

For each region-gear group, countries with less than 950 MT annual catch during the entire period covered are included in "OTHERS"

ALB-Table 1. North and south Atlantic albacore catches (in 1000 MT) by area, gear and country, 1961-1990

Nov. 1, 1991

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	53.3	77.1	77.3	90.3	90.7	75.2	74.9	71.8	76.4	70.4	83.1	83.4	75.8	72.5	59.4	77.0	75.2	72.0	73.3	61.3	59.0	72.3	66.8	55.9	72.9	86.1	80.0	65.3	61.6	58.5
NORTH ATL.	42.5	58.2	60.0	64.4	60.4	47.4	58.5	45.6	47.3	46.3	57.6	49.3	47.1	52.3	41.3	57.2	53.0	48.4	50.0	38.2	34.0	42.0	51.1	39.5	40.4	47.2	37.7	33.6	32.2	34.5
-SURFACE	42.0	52.4	45.3	48.5	45.7	39.6	48.9	37.9	32.5	30.2	39.7	34.7	28.9	37.7	28.7	34.3	32.1	34.3	37.8	28.8	24.3	28.8	34.4	19.9	23.4	26.1	30.6	30.8	29.9	32.4
-BAITBOAT	21.1	21.4	20.7	20.5	20.1	16.8	18.3	13.9	14.6	14.4	15.7	8.2	10.2	16.7	19.2	20.4	15.6	11.8	15.7	16.2	13.4	15.9	21.2	8.3	12.6	15.1	18.7	16.8	15.4	18.8
CAP VERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FRANCE	7.9	7.7	6.4	6.8	4.2	3.5	3.9	2.2	1.7	1.7	1.5	0.5	1.1	0.6	0.7	1.1	0.6	0.4	0.2	0.4	0.4	0.2	0.2	0.0	0.1	0.1	0.1	0.0	0.3	0.2
PORTUGAL	0.6	0.6	1.0	0.5	0.8	0.3	0.7	0.1	0.5	0.2	0.3	0.4	0.9	1.2	0.9	0.6	0.1	0.1	0.1	0.1	0.4	0.3	1.8	0.8	0.6	0.4	0.4	0.2	0.2	3.2
ESPANA	12.6	13.1	13.3	13.2	15.1	13.0	13.7	11.6	12.4	12.5	13.9	7.3	8.2	14.9	17.6	18.7	14.9	11.3	15.4	15.7	12.6	15.3	19.0	7.4	11.8	14.6	18.2	16.6	14.9	15.4
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0
-TROLLING	20.9	31.0	24.6	28.0	25.6	22.8	30.6	24.0	17.9	15.8	24.0	26.5	18.7	21.0	9.5	13.9	16.5	22.5	22.0	12.6	10.7	12.8	12.8	11.0	10.7	10.9	11.4	11.4	10.6	10.4
FRANCE	9.2	12.6	9.8	12.7	11.4	10.0	11.6	11.0	7.7	4.5	7.7	8.7	5.8	7.9	5.0	5.7	6.2	8.4	7.8	3.1	2.5	2.7	2.2	2.8	1.8	1.1	1.4	0.4	0.1	0.1
ESPANA	11.7	18.4	14.8	15.3	14.2	12.8	19.0	13.0	10.2	11.3	16.3	17.8	12.9	13.1	4.5	8.2	10.3	14.1	14.2	9.5	8.2	10.1	10.6	8.2	8.9	9.8	10.0	11.0	10.5	10.3
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-OTH 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	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.4	0.6	0.1	0.1	0.5	2.6	3.9	3.2
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.4	3.7	3.0
PORTUGAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.2
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.6	0.1	0.0	0.0	0.1	0.0	0.0
-LONGLINE	0.5	5.8	14.7	15.9	14.7	7.8	9.6	7.7	14.8	16.1	17.9	14.6	18.2	14.6	12.6	22.9	20.9	14.1	12.2	9.4	9.7	13.2	16.7	19.6	17.0	21.1	7.1	2.8	2.3	2.1
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHI.TAIW	0.0	0.0	0.0	0.1	0.1	0.2	0.8	1.9	2.4	4.7	2.9	4.4	9.5	9.5	8.1	14.8	13.7	9.3	7.0	7.1	6.6	10.5	14.3	14.9	14.9	19.6	6.6	2.1	1.3	1.1
CUBA	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN	0.4	5.7	14.6	15.7	14.3	5.9	4.8	3.3	4.7	5.9	6.5	1.3	1.5	2.1	1.3	1.3	0.8	0.5	1.2	1.0	1.7	0.8	1.2	0.6	0.8	0.5	0.5	0.7	0.8	0.8
KOREA	0.0	0.0	0.0	0.1	0.2	1.5	3.9	1.6	6.8	5.0	7.7	7.9	4.8	2.8	2.8	5.4	5.6	3.0	3.0	0.8	0.9	1.3	0.5	1.0	0.4	0.4	0.0	0.0	0.1	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	0.2	2.4	0.2	0.2	1.2	0.6	0.8	0.4	0.2	0.2	0.5	0.4	2.6	0.6	0.5	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
VENEZUELA	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.6	0.8	0.5	0.8	0.8	0.0	0.0	0.1	0.1	0.1	0.4	0.6	0.3	0.3	0.0	0.3	0.4	0.3	0.1	0.0	0.0	0.0	0.1
-UNCL+TRAWL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MEXICO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRINIDAD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALB-Table 1. Continued..

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	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
SOUTH ATL.	10.8	18.9	17.3	25.9	29.8	27.3	15.9	25.7	28.4	23.6	25.0	33.4	28.2	19.7	17.6	19.3	21.6	23.0	22.5	22.6	23.5	29.0	14.5	13.1	28.3	35.1	38.2	27.6	25.3	22.5
-SURFACE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.4	0.2	0.7	2.0	3.2	3.8	2.5	3.2	5.6	4.9	6.7	5.4	5.5	4.2
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0
FIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.5	0.9	0.9	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
JAPAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAROC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PORTUGAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S.AFRICA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.4	1.2	1.4	2.5	1.7	2.6	5.3	4.7	5.8	5.2	5.5	4.2
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.3	0.3	0.2	0.2	0.8	0.2	0.0	0.0
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NEI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-LONGLINE	10.4	17.1	17.3	25.9	29.8	27.3	15.9	25.7	28.4	23.6	25.0	33.3	28.1	19.6	17.4	19.3	21.2	22.8	21.8	20.6	20.3	25.2	11.9	9.7	22.5	29.8	31.0	21.9	19.4	18.1
ARGENTIN	1.5	0.7	1.5	1.5	1.1	0.8	0.7	1.2	0.4	0.5	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.2	0.1	0.3	0.5	0.4	0.4	0.4	0.3	0.7	0.7	0.5	0.3	0.5	0.3	0.4	0.4	0.5
CHLTAIW	0.0	0.0	0.0	0.0	0.0	0.0	1.1	6.8	12.5	12.2	17.5	25.0	22.2	16.7	13.4	14.6	16.1	20.5	20.3	18.7	18.2	22.8	9.5	7.9	19.6	27.6	28.8	20.7	18.4	17.1
CUBA	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN	8.9	16.4	15.1	23.7	28.3	21.0	7.7	11.9	6.3	5.9	3.2	2.1	0.3	0.1	0.3	0.1	0.1	0.1	0.1	0.3	0.6	0.6	0.2	0.2	0.6	0.7	0.4	0.4	0.4	0.4
KOREA	0.0	0.0	0.0	0.1	0.3	5.3	6.4	5.7	9.2	5.0	3.8	5.7	3.7	2.4	3.2	3.4	3.8	1.4	0.9	0.7	0.7	0.6	0.6	0.3	0.5	0.3	0.4	0.2	0.1	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	0.2	1.8	0.2	0.3	0.8	0.4	0.4	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.3	0.9	0.0	0.0	0.0
S.AFRICA	0.0	0.0	0.7	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.1	0.5	0.2	0.0	0.1	0.0	0.1	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.5	1.5	0.3	0.2	0.1	0.1	0.1
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-UNCL+TRAW	0.4	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.4	0.5	0.3	0.4	0.2
ARGENTIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.4	0.5	0.3	0.4	0.2
S.AFRICA	0.4	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MEDITER.	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.7	0.5	0.5	0.7	0.5	0.5	0.5	0.5	0.6	0.6	0.8	0.5	1.5	1.3	1.2	3.3	4.2	3.8	4.1	4.1	4.1	1.5
-SURFACE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.6	0.5	1.6	1.2	0.1	0.2	0.1	0.1	0.1
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.1	0.0	0.0	0.0
ITALY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.1	0.1	0.1	0.1	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.6	0.5	1.3	0.5	0.0	0.0	0.0	0.0	0.1
YUGOSLAV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-LONGLINE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.2	0.2	0.2	0.2	0.0
ITALY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.2	0.2	0.2	0.2	0.0
JAPAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-UNCL+TRAW	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.5	0.5	0.5	0.5	0.5	0.4	0.8	0.5	0.6	0.7	0.7	1.5	2.6	3.5	3.7	3.8	3.8	1.4
GREECE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5
ITALY	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.8	0.5	0.6	0.7	0.7	1.5	2.6	3.0	3.2	3.3	3.3	0.9
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ALB-Table 2. **Nominal fishing effort (North Atlantic), in fishing days for baitboat (BB), troll (TROL), driftnet (GILL), and paired mid-water trawl (MWTD) and in number of hooks for longline (LL)**

YEARS	TROL-Spain	BB-Spain	GILL	MWTD	LL
75	15351	17200			15200
76	29902	21550			30000
77	20144	9960			30900
78	22536	10022			20000
79	16974	10175			9000
80	16739	10383			14300
81	17178	11547			12800
82	17241	10904			19800
83	16057	16123			26000
84	12428	7222			32700
85	23355	9936			37800
86	20660	12753			60100
87	24699	10345			23800
88	19733	12045	1200	750	5200
89	21899	9501	1450	2900	3400
90	18911	8878	1290	805	14080

BFT-Table 1. Atlantic bluefin tuna catches (in MT) by area, gear and country NOV. 1, 1991. 16:14

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	27984	33823	29318	ERR	31002	22706	25207	15738	17385	16019	17493	14492	14532	23534	26121	28167	25457	20388	18347	19786	19487	23597	24008	26480	26525	22117	19747	25041	20997	22289
W.ATL	1620	5799	13838	18679	1417	8090	5940	3176	3012	5466	6591	3948	3871	5393	5032	5883	6694	5763	6255	5801	5771	1431	2541	2292	2678	2322	2595	3011	2840	2770
-PS	903	3768	5770	5158	3331	1006	2082	687	1118	4288	3769	2011	1656	960	2320	1582	1502	1230	1381	758	910	232	384	401	377	360	367	383	385	384
CANADA	0	0	323	579	461	0	0	0	0	1161	935	260	635	103	291	332	298	241	0	0	105	0	0	0	0	0	0	0	0	0
NORWAY	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USA	903	3768	5447	4571	2870	1006	2082	687	1118	3127	2834	1751	1021	857	2029	1250	1204	989	1381	758	805	232	384	401	377	360	367	383	385	384
-RR	101	380	1162	601	1062	3726	343	619	1008	587	1049	1084	519	2913	328	590	630	475	499	535	523	308	476	401	466	328	539	439	557	754
CANADA	41	40	90	99	94	111	56	180	170	151	88	188	239	409	206	342	302	208	214	259	279	0	71	1	1	2	1	7	0	2
USA	60	340	1072	502	968	3615	287	439	838	436	961	896	280	2504	122	248	328	267	285	276	244	308	405	400	465	326	538	432	557	752
-LL	373	1351	6558	12410	9469	3085	3126	1665	593	268	1390	339	1127	946	1522	3066	3752	3217	3691	3972	3879	349	828	835	1238	1278	1330	1588	899	872
ARGENTIN	0	106	271	204	100	100	60	21	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	14	10	2	3	1	1	++	1	0	2	++	2	1
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	32	33	104	53	23
CHI.TAIW	0	0	0	0	0	0	0	12	7	2	13	7	2	20	1	0	1	1	49	15	7	11	2	3	3	3	0	0	3	5
CUBA	0	0	0	0	139	465	2352	1351	468	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JAPAN	373	1219	6191	12044	9147	2471	694	272	116	66	1375	321	1097	905	1513	2902	3658	3144	3621	3936	3771	292	711	696	1092	584	960	1109	468	550
KOREA	0	0	0	0	0	0	0	0	0	0	0	11	23	20	8	7	1	0	1	0	0	0	0	0	0	0	0	0	0	0
NORWAY	0	0	0	63	4	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PANAMA	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	157	92	58	10	9	14	12	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	1	3	0	9	16	6	4	2	++	++
USA	0	26	96	99	79	39	20	9	2	0	++	0	1	1	0	0	0	0	0	10	83	30	114	127	132	653	331	373	373	293
-OTH,UNCL	243	300	348	510	309	273	389	205	293	323	383	514	569	574	862	645	810	841	684	536	459	542	853	655	597	356	359	601	999	760
ARGENTIN	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	0	2	++	1	2
CANADA	79	137	229	318	81	87	174	101	193	130	59	29	144	256	144	172	372	221	31	65	41	291	362	263	141	39	49	282	580	397
MEXICO	0	0	0	0	0	0	0	0	0	0	0	23	29	39	24	37	14	28	22	10	20	14	0	0	0	0	0	0	0	21
POLAND	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	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	0	0	0	++	3	2	0
USA	164	163	119	192	228	186	215	104	100	193	324	462	396	276	694	433	424	592	631	461	398	237	491	392	450	317	308	316	416	340

++ Catch less than 0.5 MT

** Unknown amount of catch

BFT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
E. ATL	20750	23230	9020	10239	10834	9290	10523	4629	5683	5764	4675	4732	4685	6067	9976	5212	6977	5800	4767	4064	3331	6669	8010	7386	4756	4292	4199	6745	5314	5809
-BB	1453	1537	1178	1079	1820	3347	1805	1474	1826	3017	3055	3032	3142	2348	2991	1803	2881	3904	2128	1874	1553	957	3032	2948	2366	2253	2128	2682	2683	1931
CAP VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0
FRANCE	907	965	543	400	621	1624	860	390	534	732	680	740	540	522	692	267	592	723	275	260	153	150	400	566	380	272	533	479	306	305
JAPAN	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	191	303	24	14	56	10	17	16	30	53	15	3	28	58	29	1	12
ESPANA	546	572	635	676	1199	1723	945	1084	1292	2285	2375	2292	2602	1635	1996	1512	2275	3125	1843	1597	1384	777	2569	2366	1983	1953	1537	2174	2376	1614
-PS	10962	9781	1575	3458	3378	2737	4022	1149	1435	669	598	961	932	1455	3612	860	1426	257	266	437	266	655	262	414	86	288	0	0	0	6
MAROC	2994	1628	1419	2059	906	1778	2048	453	678	406	30	531	512	590	2624	331	662	36	206	155	105	600	187	127	86	122	0	0	0	6
NORWAY	7968	8153	156	1390	2472	959	1974	696	757	263	568	430	420	865	988	529	764	221	60	282	161	50	1	243	0	31	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74	3	0	123	0	0	0	++
S.AFRICA	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	12	0	0	0	0
USA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
-TRAP	7576	9014	4472	5059	5172	3123	4540	1790	2220	1786	663	372	505	20	448	490	561	450	600	706	859	2309	1956	2271	1630	891	1062	2424	1478	2139
MAROC	1377	3648	2318	2256	1882	1601	1331	635	59	286	63	122	1	7	0	0	222	0	0	6	72	393	94	0	0	0	123	35	304	228
PORTUGAL	1499	666	354	303	90	122	209	55	261	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	4700	4700	1800	2500	3200	1400	3000	1100	1900	1500	600	250	504	13	448	490	339	450	600	700	787	1916	1862	2271	1630	891	939	2389	1174	1911
-LL	223	2484	1618	582	434	81	141	208	201	274	254	261	91	2243	2923	2048	1806	733	748	1002	575	2705	2626	1538	535	741	904	1169	853	1515
CHI.TAIW	0	0	0	0	0	0	0	138	114	46	12	2	1	12	5	3	2	0	3	5	6	16	2	0	0	0	0	0	0	0
JAPAN	204	2484	1618	582	404	50	100	13	2	21	157	240	44	2195	2900	1973	1594	577	630	880	515	2573	2609	1514	420	710	900	1169	838	1477
KOREA	0	0	0	0	0	0	0	0	0	0	0	19	43	36	15	3	2	0	1	0	0	0	3	0	77	0	0	0	0	0
MAROC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
NORWAY	19	0	0	0	30	31	41	57	85	207	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PANAMA	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	69	208	156	14	117	48	12	0	17	22	11	4	**	**	**
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	100	0	6	104	12	7	16	20	0	0	15	32
-OTH, UNCL	536	414	177	61	30	2	15	8	1	18	105	106	15	1	2	11	303	456	1025	45	78	43	134	215	139	119	105	470	300	218
DENMARK	192	202	4	61	30	2	15	8	1	++	1	++	2	1	++	3	1	3	1	0	4	++	++	0	2	1	0	0	0	0
FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	36	110	76	0	245	154	154
GERMANY	331	212	++	++	++	++	0	++	++	14	1	6	2	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0
GREECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	5	0	0	0	0	0	0	0	0
MAROC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	44	0	0	0	202	144	49
NETHERLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++	++	++	0
NORWAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	0	0	0	0
POLAND	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	7	1	11	47	16	26	42	105	19	2	15
ESPANA	0	0	173	0	0	0	0	0	0	0	0	0	0	0	0	0	300	450	998	38	70	27	2	119	1	0	0	4	0	0
SWEDEN	13	++	++	0	++	++	++	++	0	4	3	0	0	0	2	8	2	2	++	++	1	++	1	++	0	0	0	++	++	0

BFT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
MEDITER.	5614	4794	6460	ERR	5997	5326	8744	7933	8690	4789	6227	5812	5976	12074	1111	17072	11786	8825	7325	9921	10385	15497	13457	16802	19091	15503	12953	15285	12843	13710
-PS	472	419	1533	1261	435	1876	2919	3341	3629	2393	3904	4084	4324	8119	8065	13970	9552	7278	5990	8394	8432	12023	10374	9786	13292	10591	8437	10595	8129	9262
FRANCE	0	0	0	0	0	1000	1500	2500	1500	1100	2200	1100	1400	1800	1600	3800	3182	1566	1527	1701	2300	4818	3600	3570	5400	3460	4300	5750	4404	4663
ITALY	349	332	1256	990	301	630	1088	691	1828	1203	1336	2783	2700	6000	6270	9607	5431	4663	3705	6120	5704	6442	5552	5382	4522	4789	2579	2229	2345	2576
MAROC	0	0	0	0	0	0	0	0	0	0	42	1	0	2	40	1	7	0	2	++	2	++	0	0	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	277	0	79	56	22	0	0	0	0
TUNISIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	180	443
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2230	1524	910	973	640	640
YUGOSLAV	123	87	277	271	134	246	331	150	301	90	326	200	224	317	155	562	932	1049	756	573	376	486	1222	755	1084	796	648	1523	560	940
-TRAP	3043	2861	2059	3081	3872	2250	3337	3082	3768	1489	1372	1023	566	880	817	718	820	331	326	611	565	451	401	1028	677	545	949	708	901	1411
ALGERIE	++	**	++	++	++	150	150	150	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ITALY	1423	1280	1227	1652	1264	945	1949	1739	1324	961	1044	835	367	739	713	650	698	210	195	152	209	155	284	327	295	293	310	301	301	246
LIBYA	1000	800	100	400	600	700	800	1000	2000	0	0	0	0	0	0	0	0	0	0	339	255	130	0	0	0	0	0	0	0	0
MAROC	0	0	0	0	172	11	27	5	0	0	37	36	1	7	0	0	0	0	0	0	0	0	0	0	0	0	337	96	286	640
ESPANA	620	377	472	653	1235	151	104	4	217	280	53	88	146	11	3	3	2	1	0	0	3	66	37	621	302	168	219	228	231	470
TUNISIE	0	404	260	376	601	293	307	184	77	248	238	64	52	123	101	65	120	120	131	120	98	100	80	80	80	84	83	83	83	55
-LL	0	0	800	300	400	500	300	600	400	69	129	236	520	2387	1363	1218	592	153	199	219	300	1499	939	1146	1064	539	461	434	288	269
ITALY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	41	62	1	65	63	63	0
JAPAN	0	0	0	0	0	0	0	0	0	0	0	112	246	2195	1260	968	520	61	99	119	100	961	677	1036	873	421	280	236	127	207
MAROC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
PANAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	0	0	800	300	400	500	300	600	400	69	129	124	274	192	103	250	68	92	100	100	200	538	233	69	129	117	116	135	98	59
-OTH, UNCL	2099	1514	2068	1653	1290	700	2188	910	893	838	822	469	566	688	868	1166	822	1063	810	697	1088	1524	1743	4842	4058	3828	3106	3548	3525	2768
ALGERIE	0	0	0	0	0	0	0	0	0	100	100	1	++	33	66	49	40	20	150	190	220	250	252	254	260	566	420	677	820	820
FRANCE	599	214	668	953	390	0	0	0	0	0	0	0	0	0	0	0	0	31	51	0	50	60	60	30	30	30	30	30	30	50
GREECE	1100	1000	1200	600	700	500	600	500	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131	131	131	131	131	131
ITALY	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	112	134	110	120	0	104	61	0	1390	2320	2493	1608	1563	1563	1073
LIBYA	0	0	0	0	0	0	0	0	0	500	600	300	400	500	634	799	336	677	424	59	16	180	300	300	300	300	300	300	84	84
MALTA	100	100	100	100	100	100	100	100	++	++	++	++	++	21	37	25	47	26	23	24	32	40	31	21	21	41	36	25	34	49
MAROC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	12	18	0	44	9	18
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	88	72	15	33	101	108	542	1974	984	249	581	778	854	543
TURKEY	300	200	100	0	100	100	1488	310	393	138	22	68	66	34	17	181	177	127	27	391	565	825	557	869	0	0	0	0	0	0
UNKNOWN REGIONS - UNCERTAIN FLAG COUNTRY*																										28	196	1049	1314	719
HONDURAS																										14	116	235	386	282
PORTUGAL																													4	255
URUGUAY																												623	538	0
VENEZUELA																										14	80	191	386	182

'++'= Catch less than 0.5 MT '**'= Unknown amount of catch

* Based on import statistics at Japanese customs. The figure may include catches from other oceans or transshipment of catches by boats of flags other than assigned hereto. Total does not include these figures.

BFT-Table 2. Catch (in number of fish) at age of west Atlantic bluefin tuna

Number caught

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	64869	62998	45402	5102	55958	43557	5412	1273	5133	2745	3160	6087	3528	4173	868	568	563	1513	4849	786	2363
2	105064	153364	98577	74304	19846	148026	19643	22395	10848	10537	16160	9606	3710	2438	7495	5510	5896	13268	8995	12864	4216
3	127518	38359	33762	30485	21291	8329	72511	9481	19831	16179	10855	16550	1649	3253	1855	12311	7176	9105	11843	1675	17917
4	20998	46021	3555	7115	6487	11850	2754	32093	6409	14993	8880	4962	519	909	1989	2715	3383	5508	3815	3624	1844
5	4062	704	4031	2010	3137	899	3035	5171	10424	3416	3033	6194	336	816	2110	4216	1162	4334	4182	1840	2712
6	979	1595	117	1594	712	569	372	3560	4213	3407	2869	3602	730	912	1709	4173	1669	2421	4138	2017	1915
7	182	2000	514	825	918	311	187	1080	655	2715	5306	2833	484	1388	584	1014	994	1421	2408	2644	1538
8	115	1481	601	1625	879	565	1166	483	509	633	3790	3332	482	1310	719	655	518	1341	1592	1861	2303
9	542	1146	263	596	1076	1680	514	1089	314	521	1022	2677	823	1012	1014	660	334	1053	1553	1429	1605
10	748	1301	714	773	817	1487	1301	1396	457	589	951	1559	952	1177	1136	965	559	625	1064	1451	1050
11	1059	1604	1376	996	1950	1696	2988	1539	888	1447	813	1169	454	1179	1166	1276	1087	793	989	1181	922
12	949	1696	1576	1034	2814	2539	3828	2831	2002	2671	1816	1134	262	843	919	1569	1541	943	890	1020	927
13	543	909	1062	929	3613	1924	2901	3314	2793	3015	3233	1590	285	654	478	869	1124	691	808	763	686
14+	478	511	820	758	3386	1922	3092	4535	5890	4630	5510	5415	1218	1908	1016	969	1059	856	959	1074	832
Total	328107	313690	192371	128135	122885	225354	119703	90239	70366	67495	67400	66710	15431	21974	23058	37474	27064	43872	48084	34250	40734

BFT-Table 3. West Atlantic bluefin tuna estimated stock size at age and estimated fishing mortality rate at age from the base case assessment

Stock at age at beginning of year

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
1	334860	261619	226702	130500	481793	141083	132134	84864	53917	76333	60900	54405	49931	85210	54641	55831	69276	29450	111433	17361	38279	
2	206877	230844	168952	154904	108701	366797	82261	109834	72590	42098	63804	50001	41635	40124	70193	46694	48009	59701	24195	92359	14361	31079
3	219437	82838	59757	56049	66011	76058	181866	53277	74680	53020	26817	40468	34544	32744	32612	54051	35469	36253	39579	12703	68330	8575
4	97506	73265	36557	20825	20605	37649	58372	90983	37505	46520	31089	13266	19865	28496	25439	26624	35558	24168	23066	23424	9485	42775
5	43239	65264	21348	28475	11509	11898	21743	48182	49361	26648	26543	18789	6937	16786	23927	20264	20621	27765	15895	16506	16994	6532
6	68756	33810	56082	14814	22886	7094	9507	16079	37077	33230	19989	20254	10593	5717	13833	18837	13702	16845	20109	9937	12637	12254
7	23649	58862	27908	48647	11396	19232	5637	7919	10671	28313	25718	14710	14261	8529	4121	10438	12500	10360	12394	13639	6765	9204
8	64543	20565	49310	23783	41523	9052	16430	4727	5879	8667	22089	17428	10156	11947	6123	3040	8132	9942	7686	8538	9400	4453
9	38157	56004	16499	42309	19163	35279	7343	13200	3661	4636	6946	15680	12054	8382	9166	4655	2033	6588	7395	5202	5695	6034
10+	121125	134452	158899	147076	159915	142974	144497	118397	100726	79264	60971	46642	41601	42927	38302	35937	29419	22042	20278	18242	13945	11579

F at age during year

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1	0.232	0.297	0.241	0.043	0.133	0.399	0.045	0.016	0.107	0.039	0.057	0.128	0.079	0.054	0.017	0.011	0.009	0.057	0.048	0.050	0.068
2	0.775	1.211	0.963	0.713	0.217	0.562	0.294	0.246	0.174	0.311	0.315	0.230	0.100	0.067	0.121	0.135	0.141	0.271	0.504	0.161	0.376
3	0.957	0.678	0.914	0.861	0.422	0.125	0.553	0.211	0.333	0.394	0.564	0.572	0.052	0.112	0.063	0.279	0.244	0.312	0.385	0.152	0.328
4	0.261	1.093	0.110	0.453	0.409	0.409	0.052	0.472	0.202	0.421	0.364	0.508	0.028	0.035	0.087	0.116	0.107	0.279	0.195	0.181	0.233
5	0.106	0.012	0.225	0.079	0.344	0.084	0.162	0.122	0.256	0.148	0.130	0.433	0.053	0.053	0.099	0.251	0.062	0.183	0.330	0.127	0.187
6	0.015	0.052	0.002	0.122	0.034	0.090	0.043	0.270	0.130	0.116	0.167	0.211	0.077	0.187	0.142	0.270	0.140	0.167	0.248	0.245	0.177
7	0.008	0.037	0.020	0.018	0.090	0.017	0.036	0.158	0.068	0.108	0.249	0.230	0.037	0.191	0.164	0.110	0.089	0.159	0.233	0.232	0.278
8	0.002	0.060	0.013	0.076	0.023	0.069	0.079	0.116	0.097	0.081	0.203	0.229	0.052	0.125	0.134	0.262	0.071	0.156	0.250	0.265	0.303
9	0.015	0.022	0.017	0.015	0.062	0.052	0.078	0.092	0.096	0.128	0.171	0.202	0.076	0.138	0.126	0.164	0.194	0.188	0.254	0.347	0.358
10+	0.034	0.049	0.038	0.033	0.088	0.074	0.110	0.131	0.137	0.182	0.243	0.286	0.085	0.155	0.141	0.184	0.217	0.210	0.285	0.369	0.401

BFT-Table 4. **Comparison of estimates of stock sizes of bluefin from the base case and three retrospective VPA's for the years 1986 to 1990, conducted using the 1991 model and data sets**

Last year of data	1986 Stock size	1987 Stock size	1988 Stock size	1989 Stock size	1990 Stock size
Ages 2 - 5					
1987 retro.	93705	96485	63060		
1988 retro.	109600	100321	57733	35858	
1989 retro.	137866	142287	100613	141126	120259
1990 base	139656	147887	102736	144991	109170
Ages 6 - 7					
1987 retro.	17780	14657	11984		
1988 retro.	23535	25524	25302	15810	
1989 retro.	26936	27061	30831	26853	19643
1990 base	26202	27205	32503	23576	19402
Ages 8+					
1987 retro.	27374	24086	19785		
1988 retro.	34556	32586	29550	26196	
1989 retro.	40537	39708	36635	32731	28739
1990 base	39584	38573	35360	31982	29039
Ages 10+					
1987 retro.	20656	13899	11065		
1988 retro.	25810	18688	16483	13725	
1989 retro.	30103	22579	20999	19100	14906
1990 base	29419	22042	20278	18272	13945

retro. = retrospective VPA

BFT-Table 5. **Minimum estimates of percent composition of the catch less than 6.4 kg for both stocks of Atlantic bluefin tuna and of fish less than 120 cm for the west Atlantic stock by numbers and weight**

Year	East Atlantic	Mediterranean	East Atlantic & Mediterranean	West Atlantic	
		<6.4 kg as % by number		<6.4 kg % nos.	<120 cm % weight
1974				45.7	15.5
1975	75.1	46.2	64.9	19.6	35.1
1976	45.9	17.7	24.0	4.5	26.3
1977	51.3	51.6	51.5	1.7	12.1
1978	50.6	38.9	42.9	7.8	11.4
1979	48.7	25.6	35.0	4.0	9.2
1980	57.0	20.7	33.2	4.6	8.9
1981	63.7	11.8	26.1	7.2	9.6
1982	67.3	28.9	37.1	23.2	6.8
1983	75.3	59.0	66.0	18.2	4.4
1984	16.7	22.8	21.0	4.2	6.4
1985	20.8	58.7	53.3	1.7	12.0
1986	74.6	58.9	63.5	2.9	9.0
1987	28.4	26.8	27.2	5.3	13.7
1988	73.4	58.3	63.6	10.0	11.8
1989	50.9	26.4	35.7	2.3	6.6
1990	*	*	*	4.7	14.7

* Not yet available.

BFT-Table 6. **Results of projections of population trends under three scenarios of catch and 1991 estimates of stock size, and also (Scenario 4) if population numbers of ages 6+ are 50% larger than those obtained from VPA. Population sizes for the trends are as of 1st of January in the year given and thus reflect the impact of catches in the previous year**

Scenario 1: Current catch (average 1989 - 1990)

Assumed Catch (MT)

Age	1991	1992	1993	1994
1	1	7	7	7
2-3	284	284	284	284
4-5	231	231	231	231
6-7	391	391	391	391
8+	1954	1954	1954	1954

Projected Stock Sizes Relative to 1992

	Ages 6 - 7 Median	Prob (<1992)
1991/1992	1.59	0.00
1992/1992	-	-
1993/1992	2.19	0.23
1994/1992	1.54	0.36

	Ages 8+ Median	Prob(<1992)
1991/1992	1.19	0.24
1992/1992	-	-
1993/1992	0.80	0.82
1994/1992	0.47	0.99
1995/1992	0.92	0.54

Scenario 2: Current catch reduced to national regulation levels

Assumed Catch (MT)

Age	1991	1992	1993	1994
1	7	2	2	2
2-3	284	96	96	96
4-5	231	231	231	231
6-7	391	339	339	339
8+	1954	1954	1954	1954

Projected Stock Sizes Relative to 1992

	Ages 6 - 7 Median	Prob (<1992)
1991/1992	1.59	0.00
1992/1992	-	-
1993/1992	2.20	0.23
1994/1992	1.58	0.35

	Ages 8+ Median	Prob(<1992)
1991/1992	1.19	0.24
1992/1992	-	-
1993/1992	0.81	0.80
1994/1992	0.49	0.99
1995/1992	0.97	0.52

BFT-Table 6. Continued...

Scenario 3: Current catch reduced to national regulation levels and halved

Assumed Catch (MT)

Age	1991	1992	1993	1994
1	7	1	1	1
2-3	284	48	48	48
4-5	231	115	115	115
6-7	391	170	170	170
8+	1954	977	977	977

Projected Stock Sizes Relative to 1992

	Ages 6 - 7 Median	Prob (<1992)
1991/1992	1.59	0.00
1992/1992	-	-
1993/1992	2.37	0.20
1994/1992	1.87	0.29

	Ages 8+ Median	Prob(<1992)
1991/1992	1.19	0.24
1992/1992	-	-
1993/1992	1.00	0.50
1994/1992	0.81	0.74
1995/1992	1.47	0.27

Scenario 4: As in scenario 2 but 1991 stock sizes of ages 6+ increased by 50%

Assumed Catch (MT)

Age	1991	1992	1993	1994
1	7	2	2	2
2-3	284	96	96	96
4-5	231	231	231	231
6-7	391	339	339	339
8+	1954	1954	1954	1954

Projected Stock Sizes Relative to 1992

	Ages 8+ Median	Prob(<1992)
1991/1992	1.04	0.43
1992/1992	-	-
1993/1992	0.96	0.58

BIL-Table 1. Atlantic blue marlin catches (in MT) by area, gear and country, 1961 - 1990 NOV 1, 1991 17:54

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	4083	7308	9037	8010	6155	3859	2240	2434	3091	2864	3201	2375	3181	3017	3181	2312	2168	1495	1381	1611	1896	2734	1780	2212	2668	1913	1845	2476	3352	2494
NORTH ATL.....	653	3452	5141	4809	3682	2040	1173	1344	1601	1845	2115	1315	1616	1916	2075	1364	1253	971	878	1060	1247	1613	1139	1188	1293	1030	654	884	1471	903
-LONGLINE	531	3331	5010	4645	3517	1884	970	1170	1388	1635	1932	1122	1406	1497	1683	978	876	553	480	639	780	1154	763	806	1062	726	384	622	1245	773
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	0	1	0	0	++
CHI.TAIW	0	9	27	8	2	34	131	337	348	369	158	300	155	183	105	169	64	81	51	160	98	100	106	74	86	117	52	20	8	292
CUBA	0	0	123	128	144	91	223	167	122	108	149	67	223	516	594	250	220	97	156	162	178	318	273	214	246	103	68	94	74	0
JAPAN	379	3223	4759	4434	3330	1677	485	474	658	758	1223	335	229	267	551	260	118	54	68	193	332	637	192	351	409	174	78	206	593	176
KOREA	0	0	0	1	4	46	66	93	214	368	221	215	457	385	304	174	307	185	67	45	70	18	25	57	83	49	15	8	99	78
PANAMA	0	0	0	0	0	0	0	0	0	**	**	10	208	62	44	47	87	42	6	0	0	0	0	0	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	1	0	0	23	2
USA	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	61	92	280	428	205
USSR	0	0	0	0	1	1	3	3	3	2	3	7	10	1	3	0	1	1	**	0	0	0	0	0	0	7	23	0	0	0
VENEZUELA	152	99	101	74	36	35	62	96	43	30	178	188	124	83	82	78	79	93	132	79	102	81	167	107	214	214	55	14	20	20
-ROD & REEL	122	121	131	164	165	156	203	174	213	210	183	193	210	236	242	266	296	296	297	297	299	297	192	197	159	202	173	178	126	30
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	11	7	2	0	0
USA	116	115	128	161	163	149	197	168	207	204	179	191	209	234	241	265	295	295	295	295	295	295	187	187	147	187	161	173	121	25
VENEZUELA	6	6	3	3	2	7	6	6	6	6	4	2	1	2	1	1	1	1	2	2	4	2	5	10	5	4	5	3	5	5
-OTHER & UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	183	150	120	81	122	101	124	168	162	184	185	72	102	97	84	100	100
BARBADOS	0	0	0	0	0	0	0	0	0	**	**	**	**	183	150	120	81	72	51	73	117	99	126	126	10	14	13	11	11	11
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	0	0	0	15	15
GRENADA	0	0	0	0	0	0	0	0	0	**	**	**	**	**	**	**	**	**	**	1	1	12	6	8	11	36	33	21	23	23
NLD.ANT.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	++	1	1
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
USA	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	++	++	0	0
SOUTH ATL.....	3430	3856	3896	3201	2473	1819	1067	1090	1490	1019	1086	1060	1565	1101	1106	948	915	524	503	551	436	840	496	924	1275	783	1091	1492	1781	1491
-LONGLINE	3430	3856	3896	3201	2473	1819	1067	1090	1489	1018	1086	1060	1565	1101	1106	937	863	522	488	544	410	812	493	813	1164	673	987	1331	1620	1324
BRASIL	41	24	12	12	12	12	6	15	17	38	21	26	8	16	12	34	171	41	18	20	5	16	16	31	25	30	33	48	53	47
CHI.TAIW	0	11	21	5	2	35	160	385	1016	560	604	628	537	369	422	240	107	177	139	129	104	150	39	50	95	98	265	204	335	208
CUBA	0	0	22	26	32	27	221	113	43	41	17	22	75	170	195	159	100	113	180	187	108	118	123	159	205	111	137	191	77	0
JAPAN	3389	3821	3841	3156	2421	1693	588	472	302	247	172	85	117	17	57	4	17	15	66	115	136	495	248	482	691	335	362	617	962	937
KOREA	0	0	0	1	3	47	79	93	98	120	258	251	532	449	354	392	356	140	78	92	56	33	67	91	141	83	168	239	188	132
PANAMA	0	0	0	0	0	0	0	0	0	**	**	12	244	72	51	107	103	32	7	0	0	0	0	0	0	0	0	0	0	0
S.AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
USSR	0	0	0	1	3	5	13	12	13	12	14	36	52	8	15	1	9	4	**	0	1	0	0	0	7	16	22	32	5	0
-OTHER & UNCL	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	11	52	2	15	7	26	28	3	111	111	110	104	161	161	167
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	0	9	10	7	4	12	0	6
BRASIL	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	11	52	2	15	7	20	20	3	2	1	3	++	11	11	11
C.IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	138	150	150
UNCL. REGION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	213	281	145	100	100	100	100	100	100	100
-PURSE SEINE ..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	213	281	145	100	100	100	100	100	100	100
FIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	180	100	100	100	100	100	100	100	100
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	101	45	0	0	0	0	0	0	0

++ Catch less than 0.5 MT. ** Unknown amount of catch. 1990 catch figures are preliminary.

BIL-Table 2. Atlantic white marlin catches (in MT) by area, gear and country, 1961 - 1990

NOV. 1. 1991 17:53

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	830	2064	2614	3735	4906	3512	1426	2047	2254	2097	2258	2341	1784	1754	1576	1817	979	939	1014	958	1132	1092	1676	1076	1438	1587	1450	1098	1608	939
NORTH ATL.....	108	381	914	1694	2127	1798	588	692	1212	1048	1547	1208	995	1218	1088	1052	501	428	481	508	780	653	1381	701	842	927	582	301	267	218
-LONGLINE	41	302	848	1620	2048	1711	497	594	1114	932	1440	1099	886	1103	977	938	390	317	370	396	669	543	1236	549	693	893	484	202	245	195
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	0	1	0	0	0
CHI.TAIW	0	1	4	3	2	32	47	58	132	97	178	244	120	248	84	142	44	79	62	105	174	130	203	52	100	319	153	++	4	23
CUBA	0	0	35	45	69	118	127	103	58	61	45	34	112	256	294	68	67	43	68	70	189	205	728	241	296	225	30	13	21	0
JAPAN	30	271	754	1493	1913	1417	174	273	451	419	915	339	328	381	404	540	80	27	42	99	118	84	27	52	45	56	60	68	73	15
KOREA	0	0	0	1	1	51	44	52	204	340	219	213	106	90	71	64	71	33	16	12	48	12	28	8	79	42	3	1	24	75
PANAMA	0	0	0	0	0	0	0	0	0	**	**	10	48	14	10	17	20	8	1	0	0	0	0	0	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	14	0	0	0	13	4
USA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	39	11	103	89	82	72	40
USSR	0	0	0	0	0	0	1	1	1	0	1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VENEZUELA	11	30	55	78	63	93	104	107	268	15	82	258	170	114	113	107	108	127	181	110	140	112	230	148	148	148	148	38	38	38
-ROD & REEL	67	79	66	74	79	87	91	98	98	116	107	109	109	115	111	114	111	111	111	112	111	110	145	150	148	34	97	75	21	22
USA	60	74	64	70	76	76	81	87	76	104	95	99	104	108	107	109	109	109	109	109	109	109	141	143	141	31	91	72	16	17
VENEZUELA	7	5	2	4	3	11	10	11	22	12	12	10	5	7	4	5	2	2	2	3	2	1	4	7	7	3	6	3	5	5
-OTHER & UNCL	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	0	1	24	1	1
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	0	0	0	1	1
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	0	0	0	++	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0
USA	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	**	1	++	0	0
SOUTH ATL.....	722	1683	1700	2041	2779	1714	838	1355	1042	1049	711	1133	789	536	488	765	478	511	533	450	352	439	295	375	596	660	868	797	1341	721
-LONGLINE	722	1683	1700	2041	2779	1714	838	1355	1042	1049	711	1133	789	536	488	740	475	509	529	447	352	439	295	375	592	634	862	708	1252	632
ARGENTIN	0	0	0	0	0	0	3	14	0	**	20	100	57	++	2	2	2	**	0	0	0	0	0	0	0	0	0	0	0	0
BRASIL	60	34	17	17	17	17	9	21	24	54	15	94	10	36	31	41	126	163	128	58	36	82	66	60	40	117	84	81	157	204
CHI.TAIW	0	5	10	3	2	29	134	327	436	469	260	469	412	279	255	377	119	197	155	145	136	220	87	66	134	196	613	514	979	261
CUBA	0	0	9	17	33	23	67	15	7	8	4	6	21	48	55	38	57	127	205	212	116	45	112	153	216	192	62	24	22	0
JAPAN	662	1644	1664	2002	2718	1585	494	815	392	284	65	101	27	9	14	3	26	14	15	7	25	27	17	24	81	73	74	76	73	54
KOREA	0	0	0	2	7	58	125	157	177	230	341	332	165	139	109	220	111	5	24	25	37	60	13	18	121	56	29	12	20	112
PANAMA	0	0	0	0	0	0	0	0	0	**	**	16	75	22	16	59	31	1	2	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	1	5	0	54	0	0	0	1	1	1
USSR	0	0	0	0	2	2	6	6	6	4	6	15	22	3	6	0	3	2	0	0	1	0	0	0	0	0	0	0	0	0
-OTHER & UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	3	2	4	3	0	0	0	0	4	26	6	89	89	89
ARGENTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0
BRASIL	0	0	0	0	0	0	0	0	++	++	0	0	0	0	0	25	3	2	4	3	++	++	++	++	++	++	0	1	1	1
GHANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	6	88	88	88

++ Catch less than 0.5 MT. ** Unknown amount of catch. 1990 catch figures are preliminary.

BIL.-Table 3. Atlantic sailfish catches (in MT) by area, gear and country, 1961 - 1990

NOV. 1, 1991 17:35

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	690	903	998	1483	2919	2420	1900	2596	2112	2778	2832	2461	1638	1351	1208	1531	1924	2645	3287	2472	2073	1912	3622	3048	2816	2545	3017	2649	2352	2166
EAST ATL.	0	0	0	0	3	5	90	89	95	98	126	161	160	124	165	193	816	1723	2350	1519	1047	784	2788	2020	1898	1538	2060	1541	1714	1573
-LONGLINE	0	0	0	0	3	5	14	13	14	11	14	39	14	9	7	1	13	5	0	0	37	171	200	128	51	67	56	33	112	14
CAP VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
CHI.TAIW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	0	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	158	200	115	19	55	50	22	53	0
KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	1	1	7	8	14
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	4	7	9	0	0	47	++
USSR	0	0	0	0	3	5	14	13	14	11	14	39	14	9	7	1	13	5	**	0	37	0	0	0	0	2	5	4	4	0
-ROD & REEL	0	0	0	0	0	0	2	5	7	13	38	48	70	33	61	76	93	79	77	62	88	69	49	41	35	43	40	52	50	50
SENEGAL	0	0	0	0	0	0	2	5	7	13	38	48	70	33	61	76	93	79	77	62	88	69	49	41	35	43	40	52	50	50
-TROLLING	0	0	0	0	0	0	74	71	74	74	74	74	74	74	75	91	72	65	27	266	437	448	376	80	224	438	500	385	529	529
SENEGAL	0	0	0	0	0	0	74	71	74	74	74	74	74	74	75	91	72	65	27	266	437	448	376	80	224	438	500	385	529	529
-OTHER & UNCL	0	0	0	0	0	0	0	0	0	0	0	0	2	8	22	25	638	1574	2246	1191	485	96	2163	1771	1588	990	1464	1071	1023	980
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	48	0	53	50	25	32	40	8	20
C.IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	40	40	76	60	5
GHANA	0	0	0	0	0	0	0	0	0	0	0	0	2	8	22	11	638	1574	2246	1191	449	16	2161	1658	1497	925	1392	950	950	950
KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SENEGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	2	20	1	0	0	5	5	5
WEST ATL.	329	301	236	259	330	312	347	354	352	709	663	467	396	452	440	554	699	691	644	628	568	767	650	931	796	908	914	1029	554	448
-LONGLINE	196	154	77	82	139	107	136	136	116	449	396	196	123	159	144	178	191	203	159	148	116	305	192	409	318	386	493	783	328	223
BRASIL	159	91	46	46	46	46	23	57	27	21	70	105	37	82	88	124	137	139	68	93	46	68	49	87	36	189	127	301	89	100
CHI.TAIW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	39	49	19	300	126	45
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181	28	169	130	50	171	78	55	0
KOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	39	21	24	5	7	38
USA	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	3	78	80	32	21
VENEZUELA	37	63	31	36	93	61	113	79	89	428	326	91	86	77	56	54	54	64	91	55	70	56	115	74	74	74	74	19	19	19
-ROD & REEL	133	147	159	177	191	205	211	218	236	232	239	243	245	255	258	266	310	310	310	311	310	309	312	352	228	233	237	38	34	33
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	26	35	36	27	27	27
USA	126	142	157	173	188	194	201	207	214	220	227	233	240	248	254	261	308	308	308	308	308	308	308	308	195	195	195	8	2	1
VENEZUELA	7	5	2	4	3	11	10	11	22	12	12	10	5	7	4	5	2	2	2	3	2	1	4	7	7	3	6	3	5	5
-OTHER & UNCL	0	0	0	0	0	0	0	0	0	28	28	28	28	38	38	110	198	178	175	169	142	153	146	170	250	289	184	208	192	192
ARUBA	0	0	0	0	0	0	0	0	0	++	++	++	++	10	10	20	20	30	30	30	30	30	30	30	30	30	30	30	30	30
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	119	90	84	87	55	53	8	4	0	20	0	10	10	10
DOMIN.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	50	49	46	18	40	44	44	44
GRENADA	0	0	0	0	0	0	0	**	**	**	**	**	**	**	**	**	31	37	40	31	36	27	37	66	164	211	104	114	98	98
NLD.ANT.	0	0	0	0	0	0	0	0	0	28	28	28	28	28	28	28	28	21	21	21	21	21	21	21	10	10	10	10	10	10
USA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0
UNCL. REGION	361	602	762	1224	2586	2103	1463	2153	1665	1971	2043	1833	1082	775	603	784	409	231	293	325	458	361	184	97	122	99	43	79	84	145
-LONGLINE	361	602	762	1224	2586	2103	1463	2153	1665	1971	2043	1833	1082	775	603	784	409	231	293	325	458	361	184	97	122	99	43	79	84	145
CHI.TAIW	0	2	4	2	2	34	183	594	593	498	779	802	598	248	66	270	64	52	37	49	86	140	108	0	0	0	0	0	0	62
CUBA	0	0	23	49	102	75	371	314	71	100	51	30	100	229	262	185	156	120	191	198	213	0	0	0	0	0	0	0	0	0
JAPAN	361	600	735	1170	2471	1845	678	970	458	594	446	221	144	137	150	137	47	20	39	55	94	173	69	97	122	99	43	79	79	83
KOREA	0	0	0	3	11	149	231	275	543	779	767	745	165	139	109	151	111	32	24	23	65	48	7	0	0	0	0	0	5	0
PANAMA	0	0	0	0	0	0	0	0	0	**	**	35	75	22	16	41	31	7	2	0	0	0	0	0	0	0	0	0	0	0

++ Catch less than 0.5 MT. ** Unknown amount of catch. 1990 catch figures are preliminary.

BIL-Table 4. Atlantic billfish (unclassified) catches (in MT) by area, gear and country, 1961 - 1990

NOV. 1, 1991 17:54

AREA	COUNTRY	GEAR	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	116	0	0	129	176	68	99	104	85	81
ATL	KOREA	LLFB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ETRO	GABON	UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**	116	++	++	++	++	++	++	++	++	++
GOFM	USA	LL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0
GOFM	USA	R 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	0	0	0	0
NE	LIBERIA	UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	129	78	68	94	74	80	80
NE	PORTUGAL	PS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
NE	PORTUGAL	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	0	5	1	1	1
NW	GRENADA	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	0
NW	ST.LUCIA	HAND	0	0	0	0	0	0	0	0	0	**	**	**	**	**	**	**	**	**	**	0	0	0	0	0	0	0	0	0	0	0
NW	USA	GILL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0
NW	USA	HAND	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	0	0	0	0	0
NW	USA	LL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0
NW	VEN-FOR	LL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	29	0	0
SW	BRASIL	LLHB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0
SW	BRASIL	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	22	0	0	0	0	0
WTRO	GUADELOUPE	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	0
WTRO	MARTINIQUE	SURF	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++	++	++	++	++	++	++	++	0	0	0	0	0

++ Catch less than 0.5 MT. ** Unknown amount of catch. 1990 catch figures are preliminary.

SWO-Table 1. Atlantic swordfish catches (in MT) by region, gear and country, 1961 - 1990

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
TOTAL	5591	6399	11900	13669	12954	12960	13792	14672	16897	17657	11746	12598	13247	13365	15344	13478	13910	19805	19831	23968	20657	24536	25704	33425	36940	38644	41127	48836	48805	47509
M AIL	4381	5342	10189	11258	8652	9338	9084	9137	9138	9425	5198	4727	6001	6301	8776	6587	6352	11797	11859	13527	11126	12832	14423	12516	14255	18278	19959	19137	16984	15424
-LL	2060	3202	9192	10833	7759	8492	8656	8950	8938	9127	5140	4430	5446	5078	7015	5125	5401	11085	11099	12800	10507	12600	13897	12350	14120	18080	19753	18792	15297	14068
CANADA	0	311	6682	6888	4155	3731	4534	4342	4149	4800	0	0	0	2	21	15	113	2314	2970	1794	542	542	960	465	550	973	876	686	1097	819
CHI.TAIW	0	0	2	1	1	37	76	115	218	234	226	129	243	204	209	362	189	126	260	103	140	200	209	126	117	121	40	18	13	21
CUBA	300	400	125	134	171	175	336	224	97	134	160	75	248	572	280	283	398	281	128	276	227	254	410	206	162	636	910	832	87	47
JAPAN	54	106	311	700	1025	658	280	262	130	298	914	784	518	1178	2462	1149	793	946	542	1167	1315	1755	537	665	921	807	413	621	1572	1341
KOREA	0	0	0	1	2	27	46	24	22	40	159	155	374	152	172	335	541	634	303	284	136	198	53	32	160	68	60	30	320	29
MAROC	6	12	6	18	14	12	11	13	16	14	21	15	10	12	15	12	6	11	208	136	124	91	125	79	137	178	207	195	219	4
NORWAY	0	0	0	0	++	300	300	200	600	400	200	**	**	**	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	**	**	7	171	24	25	91	22	76	26	0	0	0	0	0	0	0	0	0	0	0
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	15	448	959	600	289	516
ESPANA	1700	2300	1000	1800	1433	2999	2690	3551	3502	3160	3384	3210	3833	2893	3747	2816	3309	3611	2582	3810	4013	4554	7100	6315	7431	9712	11134	9600	5696	5736
USA	0	65	1053	1279	945	534	340	180	93	0	0	0	0	0	0	0	0	3020	3888	5015	3986	4912	4468	4416	4563	5035	5068	6026	5835	4868
USSR	0	0	0	0	5	8	22	21	11	24	24	28	26	17	52	19	15	20	10	21	0	69	0	16	13	18	0	0	0	0
VENEZUELA	0	8	13	12	8	11	21	18	100	23	52	27	23	24	52	43	15	46	182	192	24	25	35	23	51	84	86	108	57	158
NEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	112	529
-OTH	2321	2140	997	425	893	846	428	187	200	298	58	297	555	1223	1761	1462	951	712	760	727	619	232	526	166	135	198	206	345	1687	1356
CANADA	1913	1781	800	211	519	702	260	51	108	0	0	0	0	0	0	0	0	0	0	91	19	12	128	34	35	86	78	18	150	92
CAP VERT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
FRANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	1	4	4	0	0	0	0
IRELAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ITALY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0
LIBERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	38	34	53	++	24	16	30	19	20	20
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	0
MEXICO	++	++	++	++	++	++	++	++	++	0	0	2	4	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
MAROC	0	0	0	100	86	49	23	30	4	3	12	28	8	3	0	0	1	0	0	0	0	0	4	2	0	0	0	1	4	65
POLAND	0	0	0	0	0	0	0	0	0	0	++	0	100	0	0	0	0	6	0	1	0	0	0	0	0	0	0	0	0	0
PORTUGAL	0	0	0	9	6	15	11	12	11	8	11	21	37	92	58	32	38	17	29	15	13	11	9	7	7	20	10	5	8	12
ROUMANIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	1	0	0	0	10	7	1	199	952	650
ST.LUCIA	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++	++	++	++	++	0	0	0	0	0	0	0	0	0	0	0
USA	408	359	197	105	282	80	134	94	77	287	35	246	406	1125	1700	1429	912	664	731	610	544	175	332	122	55	65	83	103	550	517
USSR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	4	0	0	0

++ CATCH: < 0.5 MT
** CATCH: UNKNOWN

SWO-Table 1. Continued.

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
S. ATL.	1016	769	1417	2029	2578	1930	1539	2335	4290	5130	1945	2381	2799	2451	2650	2674	2704	2548	2862	5058	3819	6295	5330	9143	9475	5825	5183	11401	16249	15963
-LL	816	769	1417	2029	2578	1930	1539	2235	4090	5130	1943	2381	2799	2451	2650	2674	2689	2531	2833	4914	3782	6192	5235	8901	8752	4882	4599	10851	15694	15458
ARGENTIN	111	196	400	508	400	200	79	259	500	400	63	100	48	10	10	111	132	4	0	++	0	0	0	0	0	0	0	0	0	0
BRASIL	440	251	125	125	125	125	62	100	181	162	113	108	137	348	318	399	389	293	386	1476	618	978	754	463	501	727	921	810	705	1452
CHI.TAIW	0	1	4	2	1	73	128	375	637	985	599	621	849	617	719	573	519	481	994	540	406	400	201	153	215	166	260	614	469	741
CUBA	0	0	63	101	164	122	559	410	170	148	74	66	221	509	248	317	302	319	272	316	147	432	818	1161	1301	95	173	159	830	448
JAPAN	265	321	825	1288	1845	1300	474	859	2143	2877	662	1023	480	191	805	105	514	503	782	2029	2170	3287	1908	4395	4613	2913	1877	3426	4019	5838
KOREA	0	0	0	1	4	54	79	77	370	382	256	249	602	563	279	812	699	699	303	399	311	486	409	625	917	369	666	1012	776	72
PANAMA	0	0	0	0	0	0	0	0	0	**	**	12	274	90	40	219	28	83	26	0	0	0	0	0	0	0	0	0	0	0
S.AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	3	3	5	0	0
ESPANA	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	66	0	4393	7725	6166
URUGUAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	583	1099	1953	1140	543	699	432	314	302
USSR	0	0	0	4	39	56	158	155	89	176	176	202	188	123	231	138	105	149	70	154	36	26	46	146	60	0	0	0	0	0
VEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	856	439
-OTH	200	**	**	**	**	**	**	100	200	0	2	0	0	0	0	++	15	17	29	144	37	103	95	242	723	943	584	550	555	505
ANGOLA	200	++	++	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	228	815	84	84	84	0
ARGENTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	0	0	0	0	0	20	0	0	361	31	351	198	198	230
BENIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	24	0	86	90	39	13	19	26	28
BRASIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	12	5	1	3	1	1	0	1	0	1	0	0	0	0
BULGARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
C.IVOIRE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10
GHANA	**	**	**	**	**	**	**	100	200	0	0	0	0	0	0	0	0	0	0	110	5	55	5	15	25	13	123	235	235	235
JAPAN	0	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	0	0	0	0
NIGERIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**	**	83	69	0	0	0	0	0	0
S.AFRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	31	9	3	7	23	3	2	2	4	++	0
TOGO	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	32	1	++	2	2
USSR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	4	0	0	12	0	0	0	0	0	0
MED	194	286	294	382	1724	1692	3169	3200	3469	3102	4603	5490	4447	4613	3918	4217	4854	5460	5110	5383	5712	5409	5951	11766	13210	14541	15985	18298	15572	16122
-LL	94	188	94	282	1423	1192	869	1196	1350	1114	1426	1529	1288	893	212	3402	3879	4324	3986	4075	4292	4004	4462	4792	4492	5468	4951	5867	5289	5503
ALGERIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
CYPRUS	0	0	0	0	0	0	0	0	0	0	0	++	++	++	5	59	95	82	98	72	78	103	28	63	71	154	84	121	139	173
GREECE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	690	689	965	925	1530	1163	1251	1251	1251
ITALY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3067	2973	3348	3085	3252	3002	2306	2375	2463	2226	2341	2528	2669	2669	2669
JAPAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	3	1	1	5	6	19	14	7	3	4	1	2
MAROC	94	188	94	282	223	192	169	196	250	214	326	229	183	193	118	186	144	172	0	++	++	0	43	39	37	99	39	62	97	63
ESPANA	0	0	0	0	1200	1000	700	1000	1100	900	1100	1300	1105	700	89	89	667	720	800	750	1120	900	1321	1243	1219	1337	1134	1760	1132	1322
-OTH	100	100	200	100	301	500	2300	2004	2119	1988	3177	3961	3159	3720	3706	815	975	1136	1124	1308	1420	1405	1489	6974	8718	9073	11034	12431	10283	10619
ALGERIE	0	0	0	0	0	0	0	0	0	**	++	++	100	196	500	368	370	320	521	650	760	870	877	884	890	847	1820	2621	590	567
ITALY	**	**	**	**	**	**	1900	1400	2000	1800	2900	3700	2800	3330	3002	279	372	675	424	447	412	318	327	5894	7473	7849	8477	8947	8947	8947
LIBYA	0	0	0	0	200	200	300	500	++	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MALTA	**	**	**	**	++	++	++	++	++	100	200	200	200	171	191	156	199	121	135	198	171	158	53	84	96	87	117	185	108	109
MAROC	0	0	0	0	1	0	1	1	0	0	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360
ESPANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	8	0	0	2	87	85
TUNISIE	0	0	0	0	0	0	0	0	0	++	++	++	++	5	3	5	0	0	0	0	7	19	15	15	61	64	63	80	159	159
TURKEY	100	100	200	100	100	300	99	103	119	88	76	60	59	15	10	7	34	20	44	13	70	40	216	95	190	226	557	596	392	392

++ CATCH: < 0.5 MT
** CATCH: UNKNOWN

SWO-Table 2. North Atlantic swordfish stock structure hypotheses and affirmative/negative comments regarding support of the various hypotheses by available data.

Stock Structure	CPUE By Age	Larval Dist.	Catch Dist. (JLL Data)	Mark/Recapture (Interchange)	Size Dist.	Recruitment Trends	Genetic
N. Atl. single stock	Yes	Yes	Yes	[1]	Yes	Yes	[6]
Separate stocks:							
a) Areas 1, 2, 3, 4A, vs. 4B (Boundary at 30°W)	No	No	No	[1]	No[2]	No[3]	[6]
b) Areas 1, 2, 3, 4A vs. 4B (Boundary at 60°W)	--	No	No	Yes	No[2]	Yes[4]	[6]
N + S single stock	Yes	Yes	--	No[5]	--	--	[6]

[1] There have been no transatlantic recoveries reported which indicate direct E-W or W-E movement. However, movement has been demonstrated from tropical eastern areas to the temperate central areas and from central areas to the tropical west. Moreover, a common spawning stock in the tropical zone could be contributing to E-W production units with slight communication between both sides at the high latitudes. The differences in the probability of obtaining recoveries in different east/west areas are not explained.

[2] If recruitment and exploition are the same for both stocks, similar age composition would mask existence of separate stocks. However, exploitation patterns appear to be somewhat different in the east and west.

[3] In VPAs, run separately for eastern and western stocks, recruitment trends were generally parallel.

[4] Substantial inconsistency exists between eastern and western stock recruitment trends for the West 1, 2, 3 hypothesis.

[5] No recovery from the North Atlantic has been reported in the south. Moreover, a common spawning population in the tropical area could be feeding the North and South Atlantic. The different probabilities for obtaining recoveries in different areas of the Atlantic have not been taken into account.

[6] Preliminary information indicates the presence of population structure somewhere in the Atlantic with mixing in the northern (Georges Bank) area sampled.

SWO-Table 3. Swordfish catches (in number of fish) at age for the four stock scenarios, 1978-1990

Total Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	648	1262	3472	3075	3994	4201	6163	5811	13677	19980	24438	10202	16185
1	6887	11022	26896	16066	23625	30793	33914	40633	51480	78616	97928	99077	53700
2	20764	30707	49752	37988	42336	62163	68090	80123	104915	132784	154152	156280	139923
3	37647	40756	58097	44794	62079	66195	80302	91422	104093	123121	153415	162279	157211
4	37621	37535	51669	40671	56681	60195	67403	86954	83487	87756	101412	124241	117779
5	29903	28196	35457	27520	42111	44080	43923	52007	51044	51970	57071	66831	62306
6	18547	18083	26062	16846	23971	26395	24292	25617	26289	29691	29063	30131	29876
7	11462	11579	16462	11100	13315	11553	13654	12178	13824	13469	15870	15346	14976
8	5314	6286	7305	6471	7743	6114	6488	6812	6787	5988	8930	6958	5294
9	4632	5134	4569	4113	4358	3260	3955	3907	4563	3620	4984	3619	5140
10	2922	3292	2754	2858	2805	2087	2553	2142	3021	2272	1747	1473	1111
11	1580	2390	1499	1725	1745	1008	1572	1108	1688	1693	1199	1171	672
12	1041	964	865	874	902	584	844	634	930	857	1151	496	596
13	1017	980	753	713	675	517	552	515	558	708	1432	873	1685
14	752	746	564	540	499	474	440	444	481	367	296	201	168
15+	7994	6962	6185	8287	7667	4608	5048	5535	5548	5559	3976	4051	8634
Total	188720	205893	292383	223642	294505	326247	359190	415841	472385	558452	657064	683429	615256

Total North Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	580	1178	3308	2953	3697	4149	5187	4995	13401	19646	21366	7538	14087
1	6402	10406	25881	14760	20357	29247	28526	32636	45821	73249	85168	74732	45601
2	19279	27379	46023	34832	31038	54190	51459	57999	91183	116581	131543	112157	115768
3	36184	33384	49655	40424	43192	55267	54705	65603	85681	107162	102241	89391	91575
4	35416	32012	39174	34777	39982	48456	43471	51681	65921	72945	64364	57527	50548
5	26021	22812	25817	20987	26889	30545	25255	27096	34974	37875	31581	27303	25773
6	13661	14327	14852	11283	13260	15415	12365	12857	16198	18216	13235	12607	11364
7	8664	8992	9327	7282	7745	8368	6325	7216	8046	7922	7630	6774	5875
8	4269	4694	4697	4143	4971	4023	3166	3551	4203	3931	3610	3316	3066
9	3290	3494	3228	2428	2932	2599	1985	2258	2862	2206	2039	1915	1684
10	2051	2057	1927	1557	1678	1381	1106	1166	1597	1702	1102	1087	839
11	1074	1470	1151	928	1209	873	738	672	1006	1071	778	765	562
12	820	825	707	622	619	522	407	434	644	604	460	472	411
13	712	851	496	511	478	367	309	287	419	368	346	357	409
14	507	651	399	376	315	352	284	231	322	328	232	169	159
15+	5228	5985	5113	4758	6193	3808	2845	2833	4177	3972	2572	3103	2272
Total	164159	170515	231754	182622	204557	259560	238132	271514	376455	467777	468267	399214	369993

SWO-Table 3. Continued..

Northwest Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	187	788	2260	1263	3098	2263	3206	3055	6344	6132	12519	4583	7928
1	3552	6579	19304	7727	15738	17664	19508	20387	30512	46567	42588	52315	24738
2	11836	19811	34201	21037	21621	26710	35083	33250	60434	67159	82106	79790	63853
3	25585	24278	34832	23631	27616	23716	30631	38377	56798	57828	58520	61549	48952
4	23084	22961	24717	17529	19480	18974	19943	27612	43135	36144	33742	34791	28237
5	15644	16101	16659	10841	12106	12211	11372	15032	21217	18020	15649	17027	14771
6	7810	10177	9378	6530	6396	7414	6021	7295	10323	8673	7348	8323	6940
7	4913	6861	5584	4348	3845	4308	3284	4095	5065	4337	3961	4553	3957
8	2369	3638	3000	2436	2675	2498	1705	2144	2770	2259	1906	2362	2073
9	1826	2654	1866	1586	1657	1649	1017	1362	2068	1272	1167	1420	1198
10	1000	1626	1163	1049	906	923	650	749	1172	931	734	904	653
11	497	1282	781	594	706	619	435	465	722	587	535	600	451
12	548	704	500	423	379	358	225	291	508	313	314	405	320
13	407	740	313	353	315	246	176	183	316	219	178	205	294
14	228	560	269	257	205	272	153	149	245	216	150	137	135
15+	3097	5042	3419	3685	4091	2799	1972	2091	3308	2794	1872	2695	1922
Total	102584	123800	158245	103291	120833	122625	135383	156537	244955	253450	263290	271656	206423

Northeast Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0	393	391	1046	1690	600	1886	1981	1940	7058	13514	8847	2955	6159
1	2849	3827	6577	7033	4618	11583	9018	12249	15309	26682	42580	22418	20862
2	7444	7568	11821	13795	9416	27479	16376	24749	30749	49421	49437	32367	51915
3	10500	9106	14823	16792	15577	31551	24074	27226	28883	49335	43721	27842	42623
4	12332	9051	14458	17249	20502	29481	23528	24069	22786	36801	30622	22736	22311
5	10376	6711	9158	10146	14784	18334	13883	12065	13758	19855	15932	10276	11002
6	5851	4150	5475	4752	6864	8001	6343	5562	5875	9543	5888	4284	4424
7	3751	2131	3743	2934	3900	4059	3041	3121	2981	3586	3669	2222	1918
8	1900	1056	1697	1707	2296	1524	1461	1406	1434	1672	1704	953	993
9	1464	840	1362	843	1275	950	968	895	774	934	871	495	486
10	1051	431	764	508	772	458	456	417	425	771	368	184	186
11	577	188	370	333	503	254	303	207	284	484	242	165	111
12	272	121	208	199	240	165	182	144	136	291	146	66	91
13	305	111	182	157	163	120	132	104	103	149	168	152	115
14	280	91	130	119	111	80	130	82	77	112	83	33	25
15+	2130	943	1693	1073	2102	1009	873	743	869	1178	700	409	350
Total	61575	46715	73508	79331	83723	136934	102749	114977	131500	214326	204978	127557	163570

SWO-Table 4. **Abundance indices used in 1991 swordfish stock assessment (expressed relative to the earliest common year in all series)**

TOTAL NORTH

	SPAIN 1	SPAIN 2	SPAIN 3	SPAIN 4	SPAIN 5+	U.S. 1	U.S. 2	U.S. 3	U.S. 4	U.S. 5+	JAPAN 5+	Biomass Index
1974												2.080
1975												0.677
1976												0.487
1977												0.708
1978											3.496	1.978
1979											1.586	1.014
1980											2.132	0.704
1981						0.716	1.152	2.014	2.087	2.045	1.243	1.692
1982						0.921	0.841	1.572	1.710	1.733	1.714	1.737
1983	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1984	1.026	0.925	1.083	1.041	0.976	0.919	1.177	1.170	1.034	0.761	1.258	0.935
1985	1.024	1.221	1.095	1.043	0.888	1.135	1.037	1.318	1.141	0.770	1.024	0.963
1986	1.539	1.143	0.915	0.766	0.749	1.654	1.547	1.098	0.937	0.487	1.079	0.745
1987	2.093	1.547	1.016	0.736	0.632	1.706	1.480	1.142	0.773	0.398	0.776	0.662
1988	2.321	1.372	0.909	0.657	0.573	1.514	1.698	1.138	0.756	0.360	1.082	0.638
1989	2.051	1.632	0.820	0.595	0.492	2.026	1.531	1.058	0.750	0.394	0.849	0.611
1990	1.255	1.890	1.140	0.651	0.514	1.078	1.438	1.064	0.713	0.380	0.971	0.606

TOTAL ATLANTIC

	SPAIN 1	SPAIN 2	SPAIN 3	SPAIN 4	SPAIN 5+	U.S. 1	U.S. 2	U.S. 3	U.S. 4	U.S. 5+	JAPAN 5+
1978											2.515
1979											1.246
1980											1.439
1981						SAME AS FOR AREA NORTH ATLANTIC					1.210
1982											1.083
1983	1.000	1.000	1.000	1.000	1.000						1.000
1984	1.028	0.924	1.089	1.042	0.976						1.165
1985	1.028	1.220	1.101	1.043	0.887						0.830
1986	1.540	1.143	0.920	0.766	0.749						1.028
1987	2.094	1.546	1.021	0.736	0.632						0.853
1988	2.333	1.375	0.914	0.657	0.573						0.847
1989	2.014	1.647	0.824	0.594	0.492						0.618
1990	1.282	1.865	1.146	0.648	0.513						0.587

NORTHEASTERN ATLANTIC

	SPAIN 1	SPAIN 2	SPAIN 3	SPAIN 4	SPAIN 5+	U.S. 1	U.S. 2	U.S. 3	U.S. 4	U.S. 5+	JAPAN 5+
1978											3.400
1979											1.989
1980											2.673
1981						SAME AS FOR AREA NORTH ATLANTIC					1.169
1982											1.362
1983	1.000	1.000	1.000	1.000	1.000						1.000
1984	1.054	0.907	1.070	1.060	1.007						1.314
1985	1.143	1.242	1.061	0.986	0.831						0.737
1986	1.663	1.232	0.930	0.745	0.707						0.771
1987	2.434	1.675	1.133	0.796	0.649						0.811
1988	2.151	1.192	0.856	0.647	0.600						1.158
1989	1.942	1.528	0.754	0.568	0.475						0.663
1990	1.298	1.886	1.247	0.689	0.575						0.739

SWO-Table 4. Continued..

NORTHWEST ATLANTIC

	SPAIN 1	SPAIN 2	SPAIN 3	SPAIN 4	SPAIN 5+	U.S. 1	U.S. 2	U.S. 3	U.S. 4	U.S. 5+	JAPAN 5+
1978											3.405
1979											1.505
1980											1.721
1981											1.286
1982											2.070
1983						SAME AS FOR AREA NORTH ATLANTIC					1.000
1984											1.115
1985	1.000	1.000	1.000	1.000	1.000						1.429
1986	2.437	0.833	0.628	0.544	0.599						1.552
1987	3.132	1.190	0.594	0.418	0.397						0.671
1988	5.192	1.602	0.699	0.424	0.335						0.888
1989	4.609	1.693	0.719	0.423	0.364						1.102
1990	2.245	1.598	0.581	0.340	0.241						1.368

SWO-Table 5. ICCAT data base format for size frequencies.
(Also can be used for reporting swordfish size data by sex)

Field	Col. Widt	Column	Items	Remarks
1	1	1 - 1	File type	1=Basic files, 2=Working files, 3=confidential, 4=ref.
2	1	2 - 2	Verification	0=without check, 1=data error, 2=data OK
3	2	3 - 4	Year	Last two digits
4	3	5 - 7	Country	ICCAT standard codes
5	2	8 - 9	Gear	ICCAT standard codes
6	2	10 - 11	Port	ICCAT standard codes
7	2	12 - 13	Species	ICCAT standard codes
8	1	14 - 14	Sex	0=unknown, 2=male, 3=female, 9=immature
9	2	15 - 16	Kind of Freq	Fork length etc; ICCAT codes
10	2	17 - 18	ICCAT Area	ICCAT sampling areas
11	2	19 - 20	Size of Square	ICCAT standard codes
12	1	21 - 21	Quadrant	NE=1, SE=2, SW=3, NW=4
13	2	22 - 23	Latitude	Degrees
14	2	24 - 25	Longitude	Last two digits of degrees
15	2	26 - 27	Day	Day of the month (1....31)
16	2	28 - 29	Time of catch	Month=1,2...12, Quarters=13,14,15,16, Yearly=17
17	5	30 - 34	# samples	Number of samples included
18	6	35 - 40	# fish sampled	Total number of fish measured
19	9	41 - 49	Sample weight	Total weight of fish measured
20	9	50 - 58	Catch, # fish	Total catch in number of fish
21	9	59 - 67	Catch, Weight	Total yield in weight (Kgs)
22	3	68 - 70	1st size class	First class of frequencies (cm)
23	3	71 - 73	Increment	Class intervals (mm)
24	3	74 - 76	IMI*	__th class where size freq. starts
25	3	77 - 79	IMA	Last class where size freq. ends
26	6	80 - 85	Coverage	Data coverage (%). F6.2
27	10	86 - 95	Raising factor	If data were raised. F10.5
28	5	96 - 100	Mean length	In centimeters F5.1
29	5	101 - 105	Mean weight	In kilograms F5.1
30	8	106 - 113	Date of file	DD-MM-YY
31	10	114 - 123	Reported catch	Catch from that trip (in MT or #)
32	1	124 - 124	Kind intervals	0=no info., 1=lower limit, 2=mid point, 3=upper limit
33	2	125 - 126	Month of sample	Month in which sampled fish were caught
34	4	127 - 130	Blank	
35	10	131 - 140	Frequency (IMI) F10.1	
36	10	141 - 150	Frequency (IMI+1) F10.1	
37	10	151 - 160	Frequency (IMI+2) F10.1	
38	10	161 - 170	.	
39	10	171 - 180	.	
XX	10	X1 - X2	Frequency (IMA) F10.1	

Format(2I1,I2,I3,2(3I2,I1),4I2,I5,I6,3I9,4I3,F6.2,F10.5,2F5.1,A8,I10,I1,6X) + (IMA-IMI+1)F10.1

* Starting from class 1, in ___th class the first frequency appears.
In other words, Smallest fish length / intervals

XX: IMA-IMI+34, X1: X2-9, X2: [(IMA-IMI+1)*10]+130

SWO-Table 6. VPA estimates for swordfish stock size (in number - as of January 1 of each year) North Atlantic (age pooled for 5+)

Age	78	79	80	81	82	83	84	85	86	87	88	89	90	91
1	393691	394486	417317	423085	493745	529094	557335	613156	619940	611898	728718	838132	504303	0
2	284459	316546	313666	318319	333068	385670	406793	430563	472558	466231	434967	519865	618813	371767
3	205375	215502	234475	215274	229220	244706	267108	286686	300263	304865	276965	238084	324769	402464
4	157298	135578	146375	147314	139875	148803	150860	169482	176741	168916	153567	135189	114880	183682
5+	280379	266908	241305	221426	221330	200350	181228	183545	190103	173864	145586	130539	114420	95753
1	393691	394486	417317	423085	493745	529094	557335	613156	619940	611898	728718	838132	504303	0
2-4	647132	667626	694416	680906	702163	779379	824561	886731	948563	940002	865499	893139	1058462	957913
5+	280379	266908	241305	221426	221330	200350	181228	183545	190103	173864	145586	130539	114420	95753

SWO-Table 7. VPA estimates for swordfish fishing mortality - North Atlantic (ages pooled for 5+)

Age	78	79	80	81	82	83	84	85	86	87	88	89	90
1	0.0181	0.0295	0.0708	0.0392	0.0465	0.0629	0.0581	0.0605	0.0849	0.1413	0.1377	0.1034	0.1049
2	0.0776	0.1001	0.1781	0.1284	0.1083	0.1678	0.1499	0.1604	0.2383	0.3208	0.4026	0.2705	0.2302
3	0.2153	0.1868	0.2548	0.2312	0.2321	0.2850	0.2549	0.2894	0.3753	0.4857	0.5172	0.5287	0.3699
4	0.2840	0.3001	0.3476	0.3000	0.3750	0.4411	0.3903	0.4067	0.5281	0.6377	0.6121	0.6249	0.6544
5+	0.3006	0.3175	0.3678	0.3174	0.3979	0.4668	0.4024	0.4304	0.5588	0.6748	0.6477	0.6613	0.6925
						Fishing mortality pooled over age categories							
1	0.0181	0.0295	0.0708	0.0392	0.0465	0.0629	0.0581	0.0605	0.0849	0.1413	0.1377	0.1034	0.1049
2-4	0.1677	0.1658	0.2400	0.1956	0.1969	0.2516	0.2224	0.2447	0.3295	0.4241	0.4733	0.3823	0.3109
5+	0.3006	0.3175	0.3678	0.3174	0.3979	0.4668	0.4024	0.4304	0.5588	0.6748	0.6477	0.6613	0.6925

SWO-Table 8. Summary of retrospective VPA stock size estimates

Flat topped, F(5+)/F(4)=1.0582 for all years.

Stock at age at beginning of year

Age	1988 Using 1978-90 data	1988 Using 1978-87 data
1	728718	–
2	434967	944235
3	276965	384702
4	153587	119145
5+	145586	58439

Age	1989 Using 1978-90 data	1989 Using 1978-88 data
1	838132	–
2	519865	590206
3	238084	364758
4	135189	184442
5+	130539	79599

Age	1990 Using 1978-90 data	1990 Using 1978-89 data
1	504303	–
2	618813	683129
3	324769	354782
4	114880	140720
5+	114420	81836

Age	1991 Using 1978-90 data
1	–
2	371767
3	402464
4	183682
5+	95753

SWO-Table 9. Summary of retrospective VPA fishing mortality rate estimates

Flat toppped, F(5+)/F(4)=1.0582 for all years.

Fishing mortality rate at age during year

Age	1987 Using 1978-90 data	1987 Using 1978-87 data
1	0.1413	0.0976
2	0.3208	0.2411
3	0.4857	0.5903
4	0.6377	1.1576
5+	0.6748	1.225

Age	1989 Using 1978-90 data	1989 Using 1978-89 data
1	0.1034	0.0941
2	0.2705	0.2503
3	0.5267	0.4508
4	0.6249	0.7916
5+	0.6613	0.8376

Age	1988 Using 1978-90 data	1988 Using 1978-88 data
1	0.1377	0.1223
2	0.4025	0.2808
3	0.5172	0.4037
4	0.6121	0.8641
5+	0.6477	0.9144

Age	1990 Using 1978-90 data
1	0.1049
2	0.2302
3	0.3699
4	0.6544
5+	0.6825

SWO-Table 10. Summary results of retrospective VPA

A. Fishing mortality by age

Age	1989 78-88	1989 78-90	1989 78-89	1989 78-90	Mean absolute Difference	Mean % Difference
1	.12	.13	.09	.10	+.01	+10%
2	.28	.40	.25	.27	+.07	+25%
3	.40	.52	.45	.53	+.10	+24%
4	.66	.61	.79	.62	-.21	-25%
5+	.91	.66	.84	.55	-.22	-25%

B. Stock by age in 1000's fish

Age	1989 78-88	1989 78-90	1989 78-89	1989 78-90	Mean absolute Difference	Mean % Difference
2	590	520	683	619	-67	-11%
3	365	238	355	325	-28	- 22%
4	184	135	141	115	-37	- 23%
5+	80	131	82	114	+41	+ 51%

Note: Flat topped partial recruitment for ages 5+.
All years of catch-per-effort data used.

SWO-TABLE 11. Some potential statistical biases in VPAs and their possible causes and effects.

Cause	Type of bias	Documented effect	In swordfish?	References
Ignoring individual variability in growth	Misageing	Underestimate full-F	Likely	SCRS/90/27, SCRS/91/16-2.d
Ignoring sexual dimorphism in growth/mortality/availability	Misageing	Overestimate full-F	Likely	SCRS/89/87, SCRS/90/26, SCRS/91/47
Temporal changes in catchability	Model mis-specification	Variable 1/ (depends on trend)	Possible	
Systematic changes in collection of catch or CPUE data	Model mis-specification	Variable 2/ (depends on changes)	Unknown	
Incorrect assumption for terminal year partial recruitment	Model mis-specification	Variable 3/	Likely	SCRS/91/35, SCRS/90/27
Other (unknown)	Unknown	Retrospective problem 4/	Yes	

1/ Can bias abundance indices so that VPAs estimate incorrect trends in recruitment or F.
2/ If catch data collection improves systematically, an increasing trend in F will be magnified.
3/ Biases may differ depending on the number of ages used and on whether the last age is a plus group.
4/ It appears that the current full-F is overestimated, but this cannot be proved with the available data.

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

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
ATLANTIC TOTAL	4660	6203	2823	2569	1138	514	1636	1476	413	1152	562	626	600
CATCH BY GEAR													
Longline	4660	6203	2810	2563	1138	514	1636	1476	413	1152	562	625	600*
Baitboat	0	0	13	6	0	0	0	0	0	0	0	1	0*
Sport	0	0	0	0	++	0	0	0	0	0	0	0	0*
CATCH BY COUNTRY													
China-Taiwan	29	11	22	57	3	9	0	8	24	42	14	0	0*
Japan	4651	6192	2768	2506	1135	505	1636	1468	389	1110	548	625	600*
South Africa	0	0	13	6	++	0	0	0	0	0	0	1	0*
WORLD CATCHES (all oceans)													
Longline	23125	27780	33412	28081	20854	24758	23421	20405	15791	14036	11425	10330	6852*
Surface	12190	10783	11325	17042	21806	17827	13504	12683	12613	10880	10684	5434	4329
TOTAL	35315	38572	44757	45123	42660	42585	36925	33088	28404	24916	22109	15764	10181*

* Preliminary.
++ Catch < 0.5 MT.
Source for "world" section: Report of the Tenth Meeting of Australian, Japanese and New Zealand Scientists on Southern Bluefin Tuna. Wellington, New Zealand, September, 1991.

SMT-Table 1. Atlantic catches (in 1000 MT) of small tunas by species, areas and gears

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
ATL. + MED.	84.2	52.2	65.4	49.8	71.4	66.2	91.1	74.5	115.4	88.9	97.6	87.3	66.6	90.7	78.8	74.3	90.7	83.0	87.5	112.8	111.3	130.7	128.3	100.2	95.2	86.3	103.8	124.6	118.2	109.7
MEDIT.	50.6	12.9	29.2	18.5	31.0	26.0	46.3	30.4	60.6	25.4	33.4	20.8	10.9	13.3	10.1	12.4	14.3	15.2	19.6	25.3	34.0	39.3	42.7	22.5	25.6	21.6	25.8	32.1	24.5	25.8
ATL.	33.5	39.2	36.1	31.4	40.5	40.3	44.7	44.1	54.8	63.3	64.2	66.7	55.3	77.5	68.8	61.8	76.2	67.6	67.9	87.4	77.1	91.0	85.4	77.8	69.3	64.5	77.9	92.2	93.6	84.0
ATLANTIC BONITO (S. SARDA)																														
ATL. + MED.	50.6	14.7	28.2	16.8	31.3	29.1	49.0	31.9	61.6	28.8	44.1	25.1	12.2	21.4	15.4	15.7	20.7	17.1	19.9	31.4	39.0	44.0	42.6	21.6	25.2	21.3	29.0	40.0	30.8	23.9
MEDIT	45.8	7.5	22.8	13.5	27.0	22.1	41.2	26.2	55.6	20.7	28.3	16.3	6.2	7.7	6.0	6.4	8.7	9.3	13.5	18.9	29.0	31.2	35.6	14.8	18.4	15.9	21.6	24.3	17.9	18.5
-PS	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	1.0	0.6	13.4	11.8	17.4	18.5	12.3	12.3
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.6	0.6	0.4	0.0	0.0	0.0	0.0
TURKEY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	11.4	17.3	18.5	12.2	12.2
OTHERS	0.1	++	++	++	++	0.1	0.1	++	++	++	++	++	++	++	++	++	++	++	++	0.1	++	0.1	++	++	++	++	0.1	++	0.1	0.1
-SURF	0.0	0.6	0.5	0.3	0.4	0.6	0.8	0.4	0.3	0.7	1.0	0.4	0.6	0.4	0.4	1.0	1.1	0.8	0.9	0.6	1.0	1.0	0.4	0.4	0.5	0.3	0.1	1.1	0.6	0.9
MAROC	0.0	0.0	0.0	0.0	++	++	0.1	++	++	++	0.1	0.1	0.3	0.1	0.1	0.6	0.5	0.1	0.2	0.1	0.3	++	0.1	0.1	0.1	++	0.0	0.1	++	0.2
ESPANA	++	0.6	0.5	0.3	0.4	0.6	0.7	0.4	0.3	0.7	0.9	0.3	0.3	0.3	0.3	0.4	0.6	0.7	0.7	0.5	0.7	1.0	0.3	0.3	0.4	0.3	0.1	1.0	0.6	0.7
–OTH+LL	45.7	6.9	22.3	13.2	26.6	21.4	40.3	25.8	55.3	20.0	27.3	15.9	5.6	7.3	5.6	5.4	7.6	8.5	12.6	18.2	28.0	30.1	34.2	13.8	4.5	3.8	4.1	4.7	5.0	5.3
ALGERIE	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.1	0.1	0.0	++	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.5	0.6	0.7	0.9	0.9	0.9	0.9	0.5	0.2	0.6	1.5	1.5
BULGARIA	0.0	0.0	0.0	0.0	1.7	1.5	2.3	1.8	2.1	0.0	0.1	0.0	0.0	0.0	0.0	++	++	++	++	++	0.2	++	++	++	++	0.0	++	0.0	0.0	++
EGYPT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++	++	++	++	++	++	0.1	0.1	++	++	0.4	0.6
GREECE	1.9	2.0	2.2	0.9	3.2	2.3	1.8	1.7	2.0	0.9	0.6	0.6	0.5	0.5	0.7	0.5	0.6	0.6	0.7	0.8	1.3	1.4	1.4	1.7	1.6	1.3	1.3	1.3	1.3	1.3
ITALY	2.0	1.1	1.0	1.0	0.9	1.0	1.4	0.8	1.0	0.9	1.1	1.0	0.7	0.8	1.0	1.0	1.5	1.4	1.4	1.2	1.1	1.1	1.8	2.8	1.4	1.4	2.1	2.2	1.4	1.4
TUNISIE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.5	0.4	0.6	0.8	0.8	0.9	0.7	0.4	0.7	0.6	0.6	0.5	0.5	0.5	0.6	0.4	0.5
TURKEY	41.8	3.8	19.1	11.2	20.6	16.1	34.5	21.3	50.1	18.1	25.2	13.9	3.9	5.3	3.4	3.2	4.5	5.5	9.1	14.9	24.3	26.0	29.5	7.8	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	0.0	0.0	++	++	0.0	0.0	0.0	0.0	0.0	++
ATL.	4.8	7.2	5.4	3.3	4.3	7.0	7.8	5.7	6.0	8.1	15.8	8.8	6.0	13.7	9.4	9.3	12.0	7.8	6.4	12.5	10.0	12.8	7.0	6.8	6.8	5.4	7.4	15.7	12.9	5.4
-PS	0.0	0.2	0.6	0.0	0.1	0.5	0.3	0.5	2.4	4.2	3.2	2.9	1.2	2.3	0.2	0.3	2.0	2.5	1.3	2.7	0.9	0.0	0.3	0.1	0.5	0.5	0.2	0.3	0.1	0.3
ARGENTIN	0.0	0.2	0.6	0.0	0.1	0.5	0.3	0.5	2.4	4.2	3.2	2.9	1.2	2.3	0.2	0.3	2.0	1.7	1.3	2.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	++	0.0	0.0	++	++	0.1	0.1	++	0.3	0.1	0.5	0.5	0.2	0.3	0.1	0.3
-TROL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.9	0.6	0.2	0.0	0.1	0.3	0.2	0.2	0.3
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.9	0.4	0.1	0.0	0.1	0.2	0.2	0.2	0.2
OTHERS	++	++	++	++	0.0	++	++	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	++	0.0	0.2	0.1	0.0	++	0.1	++	++	0.1
-TRAP	0.3	0.5	1.0	1.0	0.6	1.6	1.2	0.5	1.0	0.8	0.9	0.5	0.3	0.2	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.3	0.2	0.3	0.3	0.2	0.1	0.2	0.2	0.1
ANGOLA	0.3	0.4	0.5	0.7	0.3	1.2	0.8	0.4	0.6	0.7	0.8	0.4	0.3	0.2	++	++	0.1	0.1	0.1	0.2	0.1	0.2	++	0.1	0.1	0.1	0.0	0.1	0.1	0.1
OTHERS	++	0.1	0.5	0.3	0.3	0.4	0.4	0.1	0.4	0.1	0.1	0.1	++	++	++	++	++	++	0.1	0.1	0.4	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	++
-SURF	4.2	6.2	3.6	2.0	3.3	4.5	5.6	4.3	1.9	2.4	11.1	4.6	3.8	8.8	6.5	7.2	4.8	3.9	2.0	8.6	6.9	8.8	4.4	3.3	4.3	3.6	4.8	2.6	3.3	2.5
ANGOLA	++	0.1	++	++	0.1	0.2	0.1	++	0.1	0.2	0.1	0.2	0.2	0.2	++	0.8	0.8	0.5	0.1	0.2	0.1	0.1	0.1	0.1	0.1	++	0.1	++	0.1	++
BRASIL	0.8	3.0	1.6	0.8	1.4	1.5	3.4	2.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.2	0.2	0.3	0.3	0.2	0.2	0.2
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	0.0	0.1	++	0.1	++	++	++	0.0	0.9	0.0	0.0	0.0
MARTINIQ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.4	0.3	0.4	0.4	0.4
MAROC	0.7	0.7	0.7	0.4	0.3	0.7	0.3	0.5	0.4	0.2	0.2	0.1	0.1	0.2	0.3	0.3	0.1	0.2	0.2	0.3	0.5	0.5	0.4	0.2	0.0	0.0	0.4	0.6	0.6	0.3

SMT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
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	0.0	++	++	0.2	0.6	0.5	0.2	0.1	0.1	++	0.2	++	0.4	0.3	0.5	0.0	0.0	0.0
ESPANA	2.7	2.4	1.3	0.8	1.5	2.1	1.8	0.8	1.0	1.6	10.0	3.5	2.0	7.0	4.8	4.3	2.0	1.9	0.6	0.1	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	4.6	6.3	2.4	1.3	2.1	1.1	1.1	0.0	0.0	0.0
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.3	0.5	0.5	0.7	0.5	0.6	0.8	0.8	0.4	0.4	0.9	0.8	0.9	0.6	0.7	0.8	1.4	1.0	1.2	1.8	1.5
OTHERS	++	++	++	++	++	++	++	++	++	0.0	0.0	0.0	0.4	0.4	0.4	0.3	++	++	++	++	0.1	++	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.1
-OTH+LL	0.3	0.3	0.2	0.3	0.3	0.4	0.7	0.4	0.7	0.7	0.6	0.8	0.7	2.4	2.7	1.8	5.1	1.3	2.9	0.8	1.2	2.8	1.5	2.9	1.7	1.0	2.0	12.4	9.1	2.2
ARGENTIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.3	2.1	1.4	0.7	1.6	2.8	1.3	1.2
MEXICO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.4	0.4	0.2	0.1	0.1	0.2	0.3	0.4	0.4	0.6	0.7	0.2	0.2	0.4	0.4	0.3	0.2
USA	0.0	++	++	0.0	0.0	++	0.0	0.0	++	0.1	0.1	++	0.3	0.1	0.1	++	0.3	0.2	0.5	++	0.2	0.2	0.0	++	++	++	++	++	++	++
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1	0.2	++	1.4	1.5	1.3	4.2	0.8	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	7.4	0.7
OTHERS	0.3	0.3	0.2	0.3	0.3	0.4	0.7	0.3	0.3	0.2	0.2	0.3	0.2	0.5	0.7	0.3	0.5	0.2	0.1	0.5	0.6	0.4	0.6	0.1	0.1	0.1	++	0.3	0.1	0.1
ATLANTIC BLACK SKIPJACK (E. ALLETTERATUS)																														
ATL. + MED.	2.4	5.1	4.0	1.7	4.1	3.3	4.0	3.2	3.6	8.4	5.4	2.9	2.4	5.1	8.7	9.9	7.3	16.6	13.1	17.7	16.1	15.8	25.4	17.0	12.1	9.6	20.4	20.4	25.3	22.4
MEDIT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.7	0.5	0.7	0.8	0.9	1.0	1.5	1.5	1.5	1.3	1.0	0.2	0.9	0.1	0.2	0.4	0.3	0.4	0.4	0.4	0.4
-SURFACE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.6	0.4	0.6	0.7	0.7	0.8	1.1	1.1	1.2	1.0	0.8	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ESPANA	0.0	++	++	++	++	++	++	0.1	0.9	0.6	0.4	0.6	0.7	0.7	0.7	1.1	1.1	1.2	1.0	0.8	++	0.7	0.0	++	++	++	0.0	++	0.0	0.0
OTHERS	++	++	++	++	++	++	++	++	++	++	++	++	++	++	0.1	++	++	0.0	++	0.0	0.1	++	++	++	++	++	++	++	++	++
-OTH+LL	0.0	0.0	0.0	0.0	++	++	++	++	++	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.3	0.3	0.2	0.1	0.2	0.1	0.2	0.4	0.3	0.4	0.4	0.4	0.4
OTHERS	0.0	0.0	0.0	0.0	++	++	++	++	++	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.3	0.3	0.2	0.1	0.2	0.1	0.2	0.4	0.3	0.4	0.4	0.4	0.4
ATL.	2.4	5.0	3.9	1.7	4.1	3.3	4.0	3.1	2.7	7.7	4.9	2.3	1.4	4.3	7.9	8.3	5.7	15.1	11.9	16.7	15.8	14.5	25.2	16.8	11.7	9.1	20.0	20.0	24.9	22.2
-BB	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.3	0.6	1.9	1.1	0.6	0.2	0.5	0.5	0.2	0.7	0.4	0.6	1.3	1.0	1.4	1.2	1.7	2.1	1.7	1.7	0.9	1.7	1.4
ANGOLA	++	++	++	++	++	0.1	0.7	0.3	0.6	1.2	0.7	0.3	0.2	0.4	0.4	++	0.6	0.3	0.5	0.8	0.7	1.1	1.2	1.3	1.3	1.1	1.3	0.5	0.4	0.1
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	0.1	0.1	0.1	0.1	0.1	++	++	++	0.0	0.3	0.7	0.5	0.3	0.3	1.2	1.2
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.4	0.3	++	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	++	++	0.5	0.3	0.3	++	0.1	0.1	0.1	0.1	0.1	0.1	0.1
-PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.1	0.0	0.0	5.6	0.0	0.8	1.9	2.8	2.6	1.2	2.6	1.1	2.7	2.9	2.8	2.9
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.0	0.4	0.6	0.0	0.3	0.2	0.1	++	0.0	0.0	0.0
SENEGAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.7	1.0	0.5	1.0	0.6	2.6	2.1	2.1	2.1
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	5.5	0.0	0.0	0.0	0.4	1.6	0.4	0.9	0.3	0.1	0.8	0.5	0.7
OTHERS	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.4	0.0	++	0.1	0.1	0.0	++	0.1	++	0.3	0.1	++	++	++	0.5	0.1	++	++	++	0.1
-TROL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.3	1.5	2.5	0.9	1.2	0.8	1.0	1.5	1.5	1.5
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.5	2.5	0.9	1.2	0.8	1.0	1.5	1.5	1.5
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	++	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	++
-TRAP	2.4	4.8	3.7	1.4	2.9	2.7	3.1	2.4	1.5	1.7	1.1	0.5	0.6	0.7	0.1	0.0	0.2	0.0	0.2	0.4	0.4	0.6	0.5	0.3	0.2	0.0	0.1	0.6	0.7	0.3
ANGOLA	2.4	4.8	3.7	1.4	2.7	2.7	3.1	2.4	1.4	1.7	1.1	0.5	0.6	0.7	0.1	++	0.2	++	0.2	0.4	0.4	0.6	0.4	0.3	0.1	++	0.1	0.6	0.7	0.2
OTHERS	++	++	++	++	0.2	++	++	++	0.1	++	++	++	++	++	0.0	0.0	0.0	++	0.0	++	++	0.0	0.1	++	0.1	++	++	++	++	0.1
-SURF	0.0	0.2	0.2	0.3	1.2	0.5	0.2	0.4	0.6	3.9	2.3	0.9	0.5	1.1	6.2	7.7	4.3	9.1	11.0	13.7	8.1	3.7	13.0	11.0	4.8	5.4	9.2	13.0	13.3	13.2
ANGOLA	++	0.2	0.2	0.3	0.8	0.4	0.2	0.1	0.1	3.2	0.6	0.5	0.1	0.2	++	0.0	0.5	0.5	++	0.1	++	++	++	++	++	++	++	++	0.1	0.0

SMT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.4	0.4	0.1	0.1	0.1	0.1
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	6.0	1.1	6.0	5.4	4.1	2.9	1.5	5.0	5.4	0.0	++	5.2	11.3	11.3	11.3
MAROC	0.0	0.0	0.0	0.0	++	0.1	0.0	0.2	0.4	0.3	0.6	0.1	++	++	0.1	++	++	++	0.3	++	++	++	0.0	++	0.0	0.0	0.1	++	++	0.2
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	0.0	0.4	1.1	0.7	1.5	1.4	1.7	1.9	0.6	1.1	2.4	3.8	3.0	3.6	2.1	0.0	0.0	0.0
ESPANA	0.0	++	++	++	0.4	0.0	0.0	0.0	++	0.1	0.7	++	++	0.0	++	++	++	++	++	0.5	++	++	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	0.7	2.2	6.3	3.6	0.6	4.9	0.3	0.1	0.0	0.0	0.0	0.0	0.0
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.3	0.4	0.4	0.5	0.4	0.4	1.3	0.7	0.8	0.3	0.6	0.6	1.0	1.1	1.5	1.2	1.4	1.3
OTHERS	0.0	0.0	++	0.0	0.0	0.0	++	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.3	0.3	0.2	0.4	0.4	0.3
-OTH+LL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.1	1.9	1.0	0.4	0.5	0.0	0.1	0.4	3.1	4.5	5.4	1.7	0.8	0.1	5.3	1.1	4.9	2.9
C.IVOIRE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.9	0.4	0.4	++	0.1	0.2	2.9	3.1	4.4	1.0	0.6	++	5.3	0.0	4.9	2.8
GERMANY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.1	++	++	++	0.0	++	++
ISRAEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.6	0.3	0.3	0.1	0.0	0.0	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.2	++	0.3	0.1	0.3	0.1	++	0.1	++	++	++	++	0.4	0.2	0.3	0.1	0.1	++	0.2	++	0.1
*FRIGATE TUNA (A. THAZARD)***																														
ATL. + MED.	10.1	8.2	8.0	6.8	9.5	7.2	11.5	8.6	16.2	11.7	10.3	13.4	10.2	13.9	10.4	10.6	20.3	8.7	13.6	20.5	14.6	23.4	20.0	25.0	22.1	15.8	18.1	19.1	17.2	18.3
MEDIT.	3.6	4.0	4.3	2.9	2.7	2.7	4.6	3.0	2.9	3.4	4.1	3.3	3.5	4.3	2.4	4.0	3.6	3.8	4.6	3.5	3.4	5.4	5.6	6.0	4.7	3.2	1.5	4.0	4.2	4.9
-PS	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	1.4	1.3	0.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	1.4	1.3	0.0	0.0	0.0	0.0
OTHERS	++	++	0.1	0.1	0.1	++	0.1	0.1	0.1	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
-TRAP	0.6	0.0	0.5	0.4	0.7	0.7	0.7	0.9	0.6	0.2	0.4	0.4	0.3	0.8	0.1	0.4	0.5	0.3	0.1	0.0	0.1	0.2	0.5	0.7	0.6	0.3	0.6	1.3	2.2	2.1
MAROC	0.0	0.0	0.0	0.0	0.5	0.4	0.4	0.6	0.1	0.1	0.2	0.1	0.1	0.3	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
ESPANA	0.0	++	0.5	0.4	0.2	0.3	0.3	0.3	0.5	0.1	0.2	0.3	0.2	0.5	0.1	0.2	0.4	0.3	0.1	++	0.1	0.2	0.5	0.7	0.6	0.3	0.6	1.3	2.1	2.1
-SURF	2.6	3.2	2.8	1.9	1.2	1.1	2.6	0.8	1.1	1.8	1.9	1.2	1.8	2.0	1.3	1.5	0.9	1.4	1.7	2.1	1.6	1.7	0.1	0.0	0.0	0.3	0.0	2.1	1.5	2.1
MAROC	0.1	0.3	0.7	0.7	++	++	++	++	++	++	++	0.1	0.3	0.1	0.0	0.1	0.1	0.1	0.1	++	++	0.0	0.1	++	++	0.3	0.0	0.8	1.1	1.2
ESPANA	2.5	2.9	2.1	1.2	1.2	1.1	2.6	0.8	1.1	1.8	1.9	1.1	1.5	1.9	1.3	1.4	0.8	1.3	1.6	2.1	1.6	1.7	0.0	++	++	++	0.0	1.3	0.4	0.9
-OTH+LL	1.0	0.8	0.9	0.5	0.7	0.9	1.2	1.2	1.1	1.4	1.8	1.7	1.4	1.5	1.0	2.1	2.2	2.1	2.8	1.4	1.7	3.5	3.4	3.7	2.7	1.3	0.9	0.6	0.5	0.7
GREECE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.2	1.9	2.1	1.4	0.0	0.0	0.0	0.0	0.0
ITALY	1.0	0.7	0.8	0.5	0.7	0.9	1.2	1.2	1.1	1.1	1.6	1.7	1.2	1.3	0.9	0.9	1.1	1.2	1.3	1.4	1.2	1.3	1.5	1.6	1.3	1.3	0.9	0.6	0.5	0.5
TUNISIE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	++	0.2	0.2	0.1	1.2	1.1	0.9	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	0.2
ATL.	6.4	4.2	3.7	4.0	6.9	4.6	6.8	5.6	13.3	8.1	6.2	10.2	6.5	9.6	7.9	6.6	16.6	4.7	8.9	16.9	11.1	18.0	14.3	19.1	17.1	12.6	16.5	14.8	12.9	13.3
-BB	0.0	0.0	0.1	0.0	0.9	0.4	0.6	1.6	3.2	3.1	0.3	0.2	1.6	0.7	0.1	0.0	0.1	0.1	0.3	0.2	0.3	0.5	0.4	0.4	0.3	0.2	0.4	0.2	0.1	0.1
JAPAN	0.0	0.0	0.0	0.0	0.9	0.4	0.6	1.6	3.2	3.1	0.0	++	1.2	0.5	++	++	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	++	0.0	0.1	0.0	++	++	0.0	++	++	++	0.3	0.2	0.4	0.2	0.1	++	++	0.1	0.3	0.2	0.3	0.5	0.4	0.4	0.3	0.2	0.4	0.2	0.1	0.1
-PS	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.3	0.2	0.7	0.7	1.4	0.2	0.0	0.0	0.0	0.0	1.2	0.8	6.0	5.4	4.7	4.7	8.8	5.2	3.6	6.2	4.9	2.6	2.7
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	1.1	0.1	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	0.4	1.3	0.2	0.7	0.6	1.2	0.2	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MAROC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.1	0.5	++	++	0.4	0.2	0.0	0.0	++

SMT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.8	5.8	4.7	2.5	2.5	5.5	3.6	3.1	4.4	3.8	1.6	1.7
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.6	0.0	0.0	0.0	0.4	0.3	3.1	1.6	0.1	0.2	0.4	0.3	0.7
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.4	0.3	0.5	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.2	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	++	++	++	0.4	0.2	0.3
-TRAP	2.8	1.9	0.9	1.3	2.8	2.2	1.5	0.8	1.0	0.8	0.5	1.0	1.0	0.9	0.4	0.3	0.3	0.3	0.4	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.2	0.1	0.4	0.8
ANGOLA	2.0	1.2	0.9	0.8	1.6	1.4	1.1	0.5	0.7	0.3	0.4	0.4	0.5	0.7	0.2	++	0.1	0.1	0.1	++	0.1	0.1	0.1	0.1	++	0.0	0.0	++	++	++
MAROC	0.0	0.0	0.0	0.0	0.8	0.3	0.2	0.1	++	0.4	++	0.3	0.1	0.1	0.0	0.0	++	0.0	0.0	0.1	++	0.0	++	0.0	0.0	0.0	0.0	++	0.1	0.2
ESPANA	0.8	0.7	++	0.5	0.4	0.5	0.2	0.2	0.3	0.1	0.1	0.3	0.4	0.1	0.2	0.3	0.2	0.2	0.3	++	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.3	0.6
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-OTHER & UNC	3.6	2.3	2.7	2.7	3.2	2.0	4.3	1.9	8.9	3.5	4.7	7.6	3.7	8.0	7.4	6.3	16.2	3.1	7.4	10.6	5.2	12.5	8.9	9.7	11.5	8.7	9.7	9.6	9.8	9.7
ANGOLA	0.1	0.3	0.3	0.1	0.1	0.1	0.1	0.2	++	0.2	0.5	1.7	0.2	0.6	0.3	0.0	0.1	0.1	++	++	++	++	++	++	0.0	++	++	0.0	++	0.0
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	1.7	1.7	1.7
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.9	8.2	2.0	1.8	5.1	1.6	6.3	6.0	4.3	13.9	1.0	4.3	7.6	2.0	6.1	5.6	4.5	4.5	3.3	4.7	0.0	0.0	0.0
MAROC	0.1	0.3	1.0	0.8	0.5	0.1	0.5	0.1	0.1	0.5	0.1	++	1.0	0.1	++	0.3	0.7	0.8	0.7	0.7	1.3	0.1	0.7	0.2	0.4	0.0	0.5	0.2	0.5	0.4
ESPANA	2.6	0.7	0.4	0.4	0.8	0.4	0.4	0.3	0.2	0.1	1.8	0.2	0.2	0.1	0.1	0.2	0.4	0.4	0.1	0.4	0.5	0.4	0.0	0.2	++	++	0.0	++	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.5	0.7	0.4	5.2	1.3	2.8	4.4	3.3	2.7	5.5	5.5	5.6
VENEZUELA	0.8	1.0	1.0	1.4	1.8	1.4	1.1	0.4	0.4	0.7	0.5	0.6	0.7	0.9	1.0	1.3	0.9	0.6	1.8	1.2	0.9	0.5	1.2	1.5	1.7	1.6	1.4	2.2	2.1	2.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	0.2	0.1	0.1	0.1	0.1	++	++	++	0.0
SPOTTED SPANISH MACKEREL (S. MACULATUS)																														
ATL.	11.2	11.6	11.1	10.1	11.9	13.5	12.8	12.8	12.4	15.9	13.9	16.8	20.0	21.0	18.2	14.6	15.5	14.9	14.6	18.1	14.9	16.4	14.0	14.0	14.9	16.7	15.3	16.7	18.3	18.5
-LL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.4	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.1	0.1	0.5	0.2	0.2	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	0.0	0.0	0.6	0.5	0.4	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.1	0.1	0.5	0.2	0.2	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.0	0.0
-TROL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.5	1.2	0.4	0.1	0.2	0.0	0.1	0.4	0.1	0.1	0.1
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	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.5	0.4	0.4	0.1	0.1	++	0.1	0.4	0.1	0.1	0.1
USA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.8	0.0	++	0.1	0.0	0.0	0.0	0.0	0.0	0.0
-SURF	8.2	8.5	7.4	7.8	8.3	9.1	7.8	7.0	7.1	4.5	3.9	5.5	7.9	9.7	5.4	2.6	3.4	3.8	4.1	10.1	6.3	3.2	6.6	6.9	7.9	9.2	6.6	9.7	9.3	9.0
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.2	2.8	4.4	6.3	2.7	0.3	1.0	1.5	1.2	1.4	1.5	1.1	1.2	1.7	1.5	++	++	1.2	1.2	1.2
CUBA	1.4	1.0	0.7	1.2	1.6	1.3	1.1	0.8	0.8	0.9	0.5	0.5	0.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.3	0.5	0.7	0.5	0.5	0.5
DOMIN.R	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.5	0.5	0.4	0.2	1.1	1.3	1.3	1.3	1.4	1.4	1.4
USA	3.3	4.2	3.4	2.7	3.5	4.2	3.5	5.2	4.8	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	5.4	1.9	0.0	2.8	1.8	2.8	5.9	3.1	4.9	4.2	3.4
VENEZUELA	3.5	3.3	3.3	3.9	3.2	3.5	3.0	0.8	1.3	1.5	2.0	2.0	2.5	2.5	2.4	2.0	2.2	2.0	2.5	2.8	2.4	1.7	2.1	1.9	2.0	1.5	1.5	1.7	2.0	2.5
-UNCL+TRAW	2.9	3.0	3.6	2.2	3.5	4.3	4.9	5.7	5.2	11.4	10.0	11.3	12.1	11.3	12.2	11.5	11.7	10.5	10.1	7.4	7.2	12.7	7.0	6.8	6.9	7.3	7.8	6.7	8.7	9.4
COLOMBIA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.1	0.2	0.3	0.4	0.2	0.3	0.2	0.2	0.2	0.4	++	++	0.1	0.1	0.1	0.1	0.2	0.1	0.1
MEXICO	2.9	3.0	3.6	2.2	3.5	4.3	4.9	5.7	5.2	4.8	3.5	5.3	6.7	5.2	4.8	3.4	4.4	5.1	5.8	5.9	5.9	7.8	5.9	5.8	5.8	6.2	6.5	5.2	7.2	8.2
TRINIDAD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.2	1.0	0.8	0.8	1.7	1.5	1.5	1.9	1.2	1.3	0.9	1.2	1.1	0.9	1.0	1.0	1.1	1.1	1.1	1.1
USA	++	++	++	++	++	++	++	++	++	5.5	4.7	4.9	4.4	5.0	5.3	6.4	5.5	3.3	2.9	++	++	3.7	++	++	++	++	0.1	0.2	0.3	++
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++	++	++	++	++	0.0	0.0	++	++

SMT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
KING MACKEREL (S. CAVALLA)																														
ATL.	2.7	2.9	3.3	2.8	3.2	3.0	3.9	5.3	5.4	6.4	6.4	7.3	9.7	13.6	9.1	8.3	8.7	6.7	11.4	7.3	8.5	10.6	8.5	6.4	6.3	8.9	8.6	11.4	8.4	8.8
ARGENTIN	++	++	++	++	0.0	0.0	++	++	0.0	0.0	++	0.0	0.0	0.0	0.0	0.5	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.9	2.5	3.3	5.2	2.2	0.5	0.8	0.8	0.8	0.8	0.8	0.6	0.7	0.9	0.8	++	++	0.6	0.6	0.6
MEXICO	1.0	1.0	1.0	0.9	1.0	0.9	1.0	0.7	1.1	0.9	1.3	1.5	2.2	1.5	1.4	1.5	1.3	1.5	2.2	1.9	2.7	4.4	2.9	2.2	2.3	2.6	3.1	3.1	2.3	2.7
USA	1.7	1.9	2.3	1.6	2.1	2.1	2.8	2.8	2.8	3.0	2.6	2.2	2.7	4.7	3.1	4.1	3.8	2.5	6.3	3.2	3.4	3.7	3.0	2.4	2.4	5.4	4.6	6.4	4.0	4.4
VENEZUELA	0.0	0.0	0.0	0.3	0.1	0.0	0.1	1.8	1.5	1.0	1.6	1.1	1.5	2.2	2.4	1.7	1.6	1.3	2.0	1.4	1.6	1.9	1.9	0.9	0.8	0.9	0.9	1.3	1.5	1.1
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.2	0.2	0.1	++	++	++	++	++	0.0	0.0	0.0	0.0	0.0	0.0
WEST AFRICAN SPANISH MACKEREL (S. TRITOR)																														
ATL.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	2.7	0.2	1.3	2.1	1.6	4.7	1.1	2.0	2.5	6.8	4.1	4.9	2.6	5.0	5.0	4.1	4.4	3.2	1.7	3.2	3.6	4.5
GERMANY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.5	++	++	0.0	0.0	0.0	0.0	0.0
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	2.5	0.0	0.7	1.5	1.0	3.5	0.6	0.6	0.7	0.8	1.6	4.4	2.0	3.0	2.2	3.0	3.0	1.5	0.0	1.5	1.5	1.5
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	0.0	0.1	0.3	1.3	1.2	1.1	1.1	0.4	0.5	0.3	1.1	0.9	1.1	1.4	1.7	1.6	1.6	1.6
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.6	0.6	0.6	0.8	0.2	0.1	0.6	4.8	1.4	0.0	0.0	0.6	1.2	0.2	0.2	0.2	++	0.1	0.2	1.2
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	++	0.1	++	0.1	0.1	0.2	++	++	0.1	0.1	++	++	0.3	0.2
BLACKFIN TUNA (T. ATLANTICUS)																														
ATL.	0.4	0.7	0.8	0.8	0.7	0.7	0.9	0.7	0.8	2.0	1.9	1.9	0.9	1.0	0.8	1.1	1.2	1.3	1.2	1.1	2.0	1.9	1.7	1.9	1.5	1.9	2.1	2.8	2.9	3.4
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.6	0.6	0.5	0.2	0.5	0.6	0.3	0.3	0.3
DOMIN.R	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	++	0.6	0.6
GUADELOU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5
MARTINIQ	0.4	0.7	0.7	0.7	0.6	0.6	0.8	0.5	0.6	0.6	0.5	0.3	0.1	0.4	0.3	0.6	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.4	0.4	0.4
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1	0.7	1.3
OTHERS	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.5	0.4	0.5	0.5	0.6	0.4	0.3
WAHOO (A. SOLANDRI)																														
ATL.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.5	0.7	0.6	2.9	2.3	2.4	2.2	0.8	1.0	1.1	1.5	1.4	1.5
CAP VERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	2.3	1.5	1.6	1.4	0.1	0.2	0.3	0.3	0.6	0.6
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.5	0.7	0.6	0.6	0.8	0.8	0.8	0.7	0.8	0.8	1.2	0.8	0.9
CERO (S. REGALIS)																														
ATL.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.5	0.8	0.8	0.8	0.6	0.7	0.5	0.6	0.7	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.5	0.3	0.3	0.3	0.3
MARTINIQ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.4	0.2	0.3	0.2	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.4	0.3	0.2	0.2	0.2
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	++	0.1	0.1	0.1

SMT-Table 1. Continued..

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
SCOMBEROMORUS UNCLASSIFIED (S. SPP)																														
ATL.	1.6	1.6	1.5	1.8	1.8	1.9	2.1	2.1	3.4	0.5	0.4	0.3	0.5	0.6	0.8	0.5	0.5	0.4	0.2	0.2	0.4	0.3	0.2	0.8	0.2	0.2	0.3	0.4	0.2	0.2
BRASIL	1.0	1.0	1.0	1.1	1.1	1.3	1.5	1.6	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COLOMBIA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.1	++	0.5	++	++	0.1	0.2	++	++
OTHERS	0.6	0.6	0.5	0.7	0.7	0.6	0.6	0.5	0.4	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2
PLAIN BONITO (O. UNICOLOR)																														
ATL. + MED.	2.2	3.0	3.1	2.3	0.2	0.3	0.7	0.2	1.3	0.8	0.7	0.3	0.1	0.1	0.1	0.2	0.4	1.0	0.5	0.7	1.5	0.6	0.0	0.0	0.1	0.1	0.6	1.5	1.2	0.4
MEDIT	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++	++	++	0.0	0.0	0.1	0.2	++	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++
OTHERS	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++	++	++	0.0	0.0	0.1	0.2	++	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++
ATL.	2.2	3.0	3.1	2.3	0.2	0.3	0.7	0.2	1.3	0.8	0.7	0.3	0.1	0.1	0.1	0.2	0.3	0.8	0.5	0.7	1.5	0.6	0.0	0.0	0.1	0.1	0.6	1.5	1.2	0.4
MAURITAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	++	++	++	0.1	0.1	0.1	0.1	0.1
MAROC	2.2	3.0	3.1	2.3	0.2	0.3	0.7	0.2	1.3	0.8	0.6	0.2	++	++	++	0.1	0.2	0.7	0.4	0.6	1.0	0.5	0.0	0.0	0.1	++	0.5	1.4	1.1	0.3
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++	++	++	++	++
MIXED OR UNKNOWN TUNA-LIKE SPECIES																														
ATL. + MED.	3.0	4.4	5.4	6.7	8.7	7.2	6.2	7.7	7.9	13.3	12.0	16.0	7.9	8.3	13.2	10.5	12.6	8.3	7.6	9.7	8.2	9.7	7.8	6.5	7.0	7.1	6.3	7.3	8.6	7.5
MEDIT.	1.2	1.4	2.1	2.1	1.3	1.2	0.5	1.1	1.2	0.6	0.5	0.5	0.4	0.4	0.7	0.5	0.4	0.4	0.2	1.9	1.4	1.8	1.4	1.5	2.1	2.2	2.3	3.4	2.0	2.0
ISRAEL	0.7	1.0	0.9	1.1	0.2	0.3	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LEBANON	0.5	0.4	0.5	0.5	0.5	0.3	0.2	0.3	0.8	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
ESPANA	0.0	0.0	0.7	0.5	0.6	0.6	0.3	0.5	0.2	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TUNISIE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1	0.1	0.2	0.4	0.3	0.3	0.1	1.8	1.3	1.5	1.2	1.3	1.8	1.9	1.9	3.0	1.7	1.7
OTHERS	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	++	++	++	++	++	++	++	++	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1
ATL.	1.8	3.0	3.3	4.6	7.4	6.0	5.7	6.6	6.7	12.7	11.5	15.5	7.5	7.9	12.5	10.0	12.2	7.9	7.4	7.8	6.8	7.9	6.4	5.0	4.9	4.9	4.0	3.9	6.6	5.5
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.5	0.3	0.5	0.9	0.4	1.1	0.9	++	++	0.2	++	++	++	++
CHI.TAIW	0.0	0.0	0.0	0.0	++	++	0.2	0.4	1.1	0.8	0.7	0.9	1.0	0.9	0.4	1.0	++	0.5	1.3	0.8	0.8	1.1	0.8	++	++	0.1	0.3	0.1	1.1	1.4
COLOMBIA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	++	++	++	++	++	++	0.3	++	0.3	1.0	0.7	0.9	0.8	1.2	0.3
CUBA	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.4	0.6	1.1	0.3	1.0	0.4	0.1	0.1	0.1	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E.GUINEA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.4	0.4	0.5	0.4	0.4	0.4	0.4
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.9	0.0	0.0	0.9	0.5	0.7	1.0	0.4	0.1	0.2	0.2	0.6	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0
GUADELOU	0.9	0.9	1.0	1.0	1.0	0.8	1.0	1.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ISRAEL	0.0	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN	0.6	1.1	1.5	2.7	5.2	4.8	3.3	1.5	1.1	1.6	1.5	1.0	0.5	0.6	0.4	1.0	0.8	1.0	1.6	1.3	0.8	0.7	0.1	0.3	0.5	0.4	0.3	1.4	2.0	2.0
KOREA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	1.0	7.0	5.7	3.1	2.4	3.5	5.8	2.9	4.2	2.5	1.7	2.1	2.0	1.9	1.2	1.0	1.0	0.7	0.4	0.0	0.5	0.2
LIBERIA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.2	0.4	0.4	0.4	0.3	0.2	0.2	0.3	0.2	0.2	0.2

SMT-Table 1. Continued..

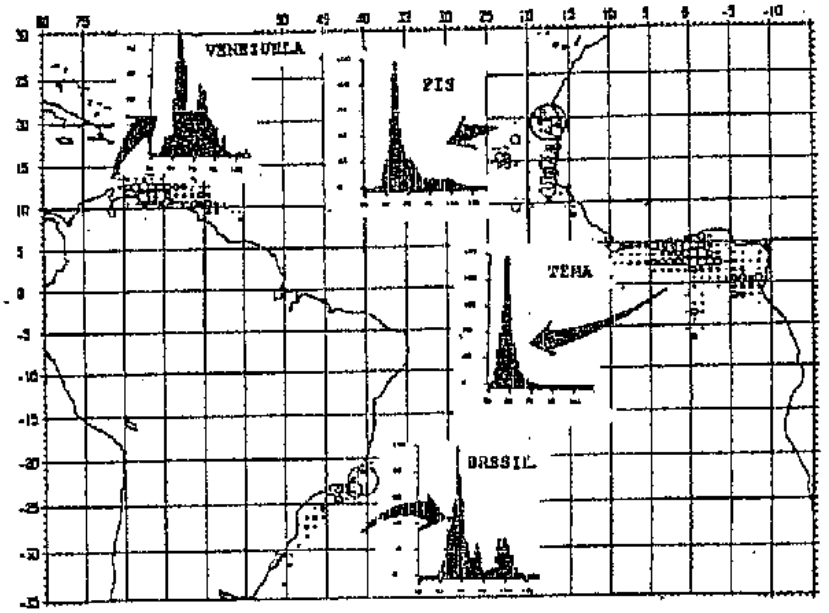
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.8	1.4	2.6	0.8	0.2	0.7	1.1	0.6	0.7	0.0	0.4	0.4	0.4	0.0	0.0	0.0
PORTUGAL	0.3	0.8	0.7	0.8	0.4	0.1	0.1	0.3	0.5	0.3	0.5	0.2	++	++	0.2	0.3	0.3	0.5	0.2	0.2	0.2	0.1	0.0	0.0	++	0.4	0.0	++	0.0	0.0
SLLEONE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1
ESPANA	0.0	0.2	0.1	0.0	0.0	0.0	1.0	0.8	0.7	0.1	0.0	6.6	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	++
TOGO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.5	0.6	0.6	0.8	0.7	0.5	0.5	++	0.4	0.3	0.4	0.3	0.1	0.3	0.1	0.2	0.4	0.3	0.3
USA	0.0	0.0	++	0.1	0.1	++	++	++	++	0.0	0.1	0.0	0.0	++	++	++	0.1	++	++	0.5	0.1	0.2	0.4	0.9	0.2	0.3	0.3	0.1	0.1	0.2
USSR	0.0	0.0	0.0	0.0	0.2	0.2	0.0	++	0.2	0.3	0.3	0.2	0.2	0.3	0.4	++	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VENEZUELA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.8	0.0	0.0	++	0.7	0.0	0.1	++	0.0	0.0	0.0	0.9	0.9	0.4	0.4	++	0.0	0.0	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.5	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4

++ Catch less than 50 MT

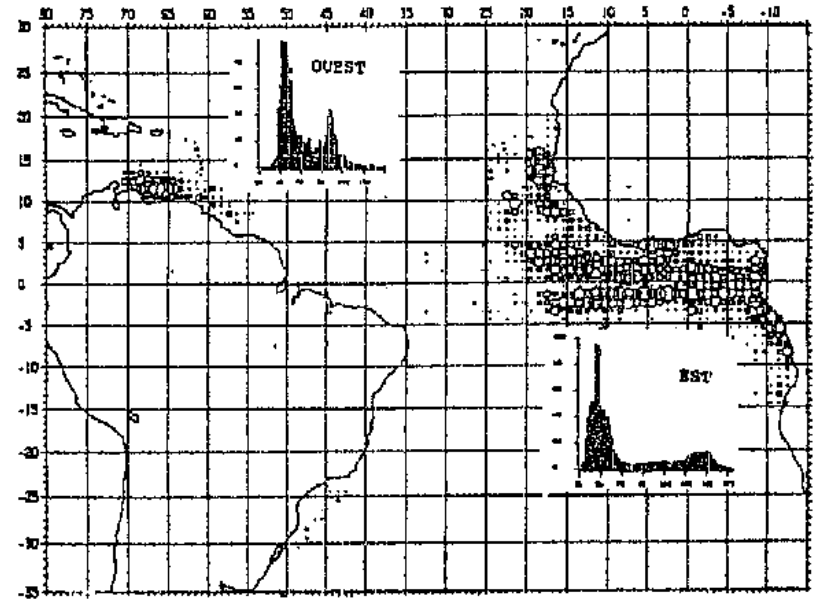
* Includes frigate tuna for Cote d'Ivoire

** Includes bullet tuna (A. rochei) and includes Atlantic black skipjack for Atlantic Spanish purse seine beginning 1978

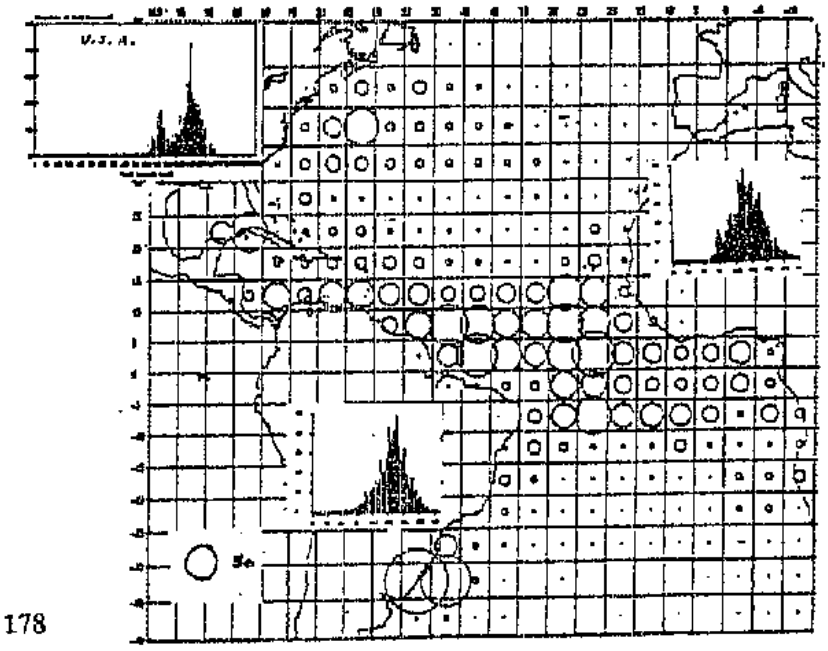
*** Includes Serra Spanish mackerel (S. brasiliensis)



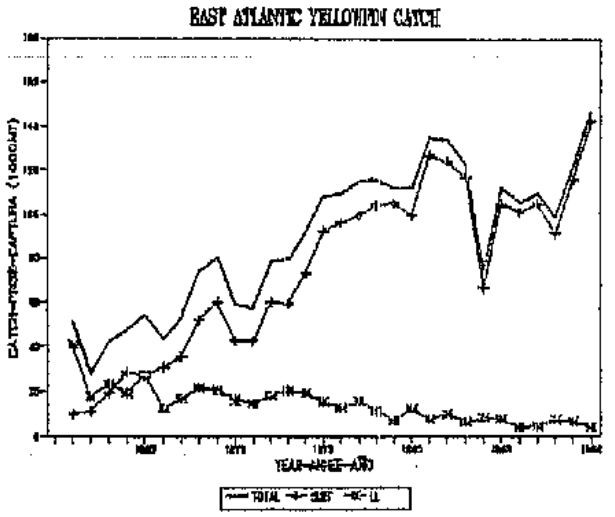
YFT-Fig. 1.
Distribution of the catches of all the baitboats operating in the Atlantic (average of the 1983-1986 period) and distribution of the average sizes of the individuals caught in each area (Coll. Vol. Sci. Pap. XXXVI).



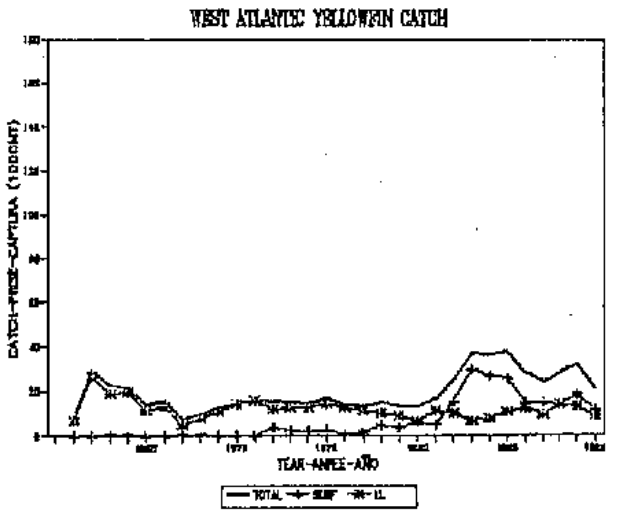
YFT-Fig. 2.
Location of fishing areas of all purse seiners operating in the Atlantic (average of the 1983-1986 period) and average size distribution of individuals caught in each area (Coll. Vol. Sci. Pap. XXXVI)



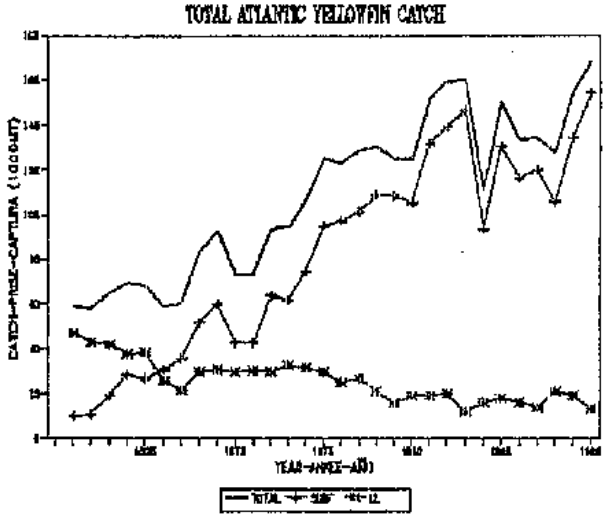
YFT-Fig. 3.
Distribution of the Atlantic yellowfin catches of the longline fisheries and the average size distribution of yellowfin for the east and west Atlantic, for the period 1983-86. The size distribution of the U.S. longline fishery corresponds to 1987.



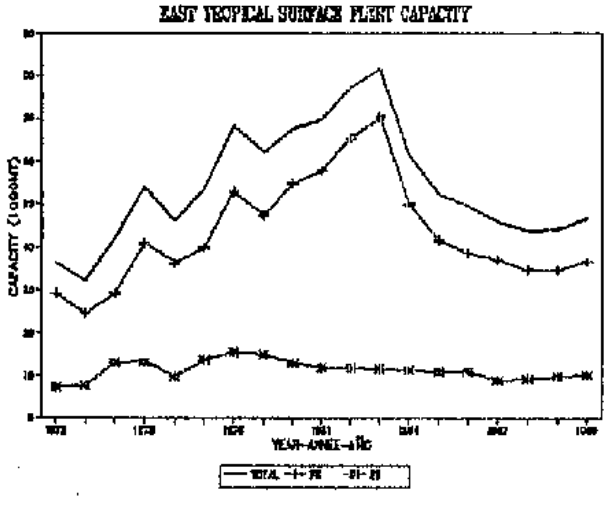
YFT-Fig. 4. Changes in surface (SURF), longline (LL) and total (TOTAL) catches of yellowfin tuna in the eastern Atlantic.



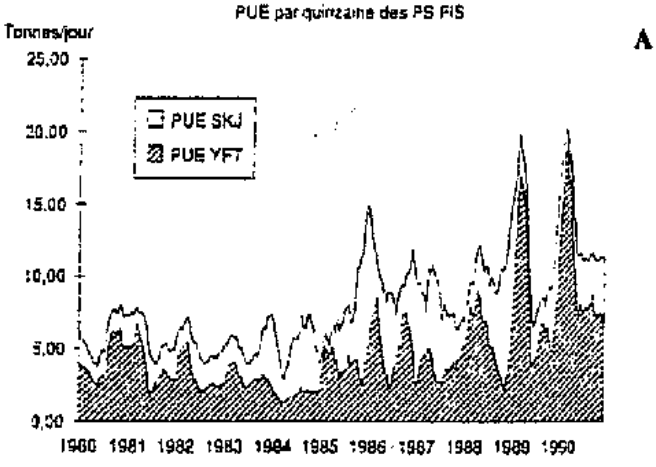
YFT-Fig. 5. Changes in surface (SURF), longline (LL) and total (TOTAL) catches of yellowfin tuna in the western Atlantic.

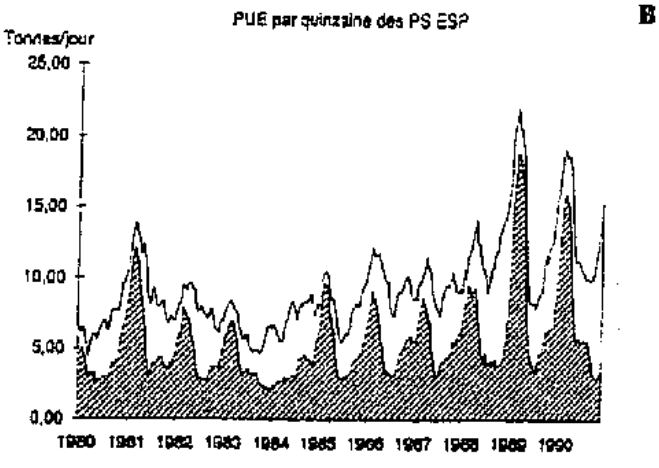


YFT-Fig. 6. Changes in surface longline (LL) and total (TOTAL) catches of yellowfin tuna for the entire Atlantic.

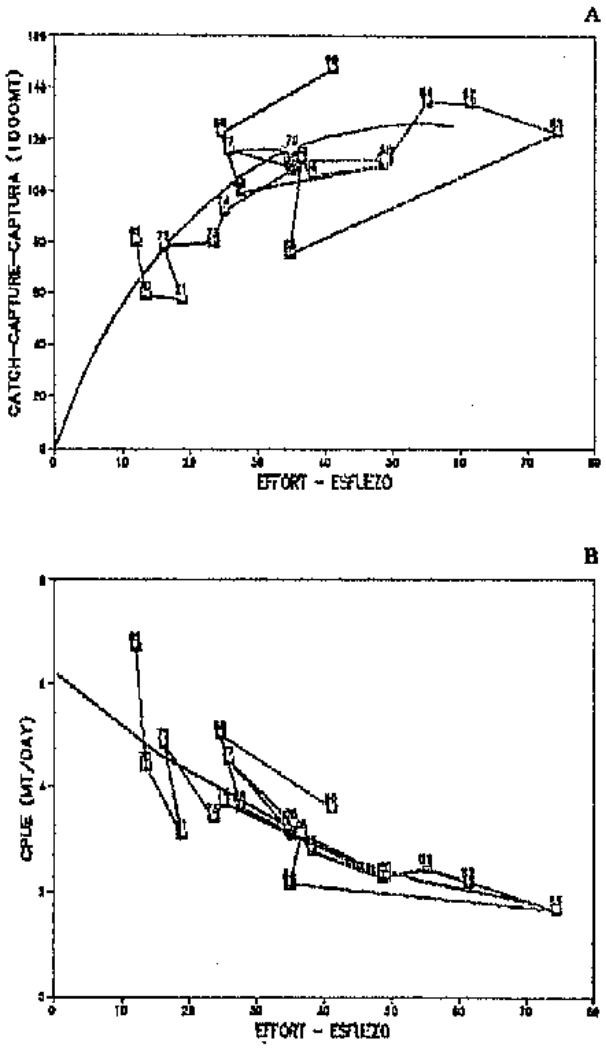


YFT-Fig. 8. Carrying capacity of the surface fleets (purse seine and baitboat) in the eastern Atlantic, 1972-1990.

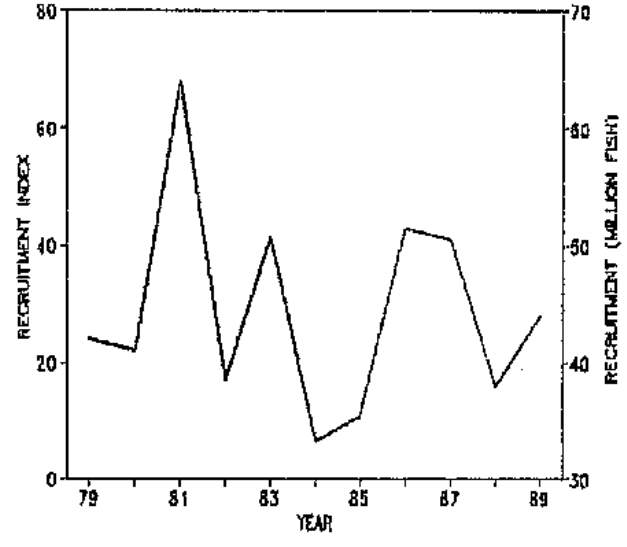




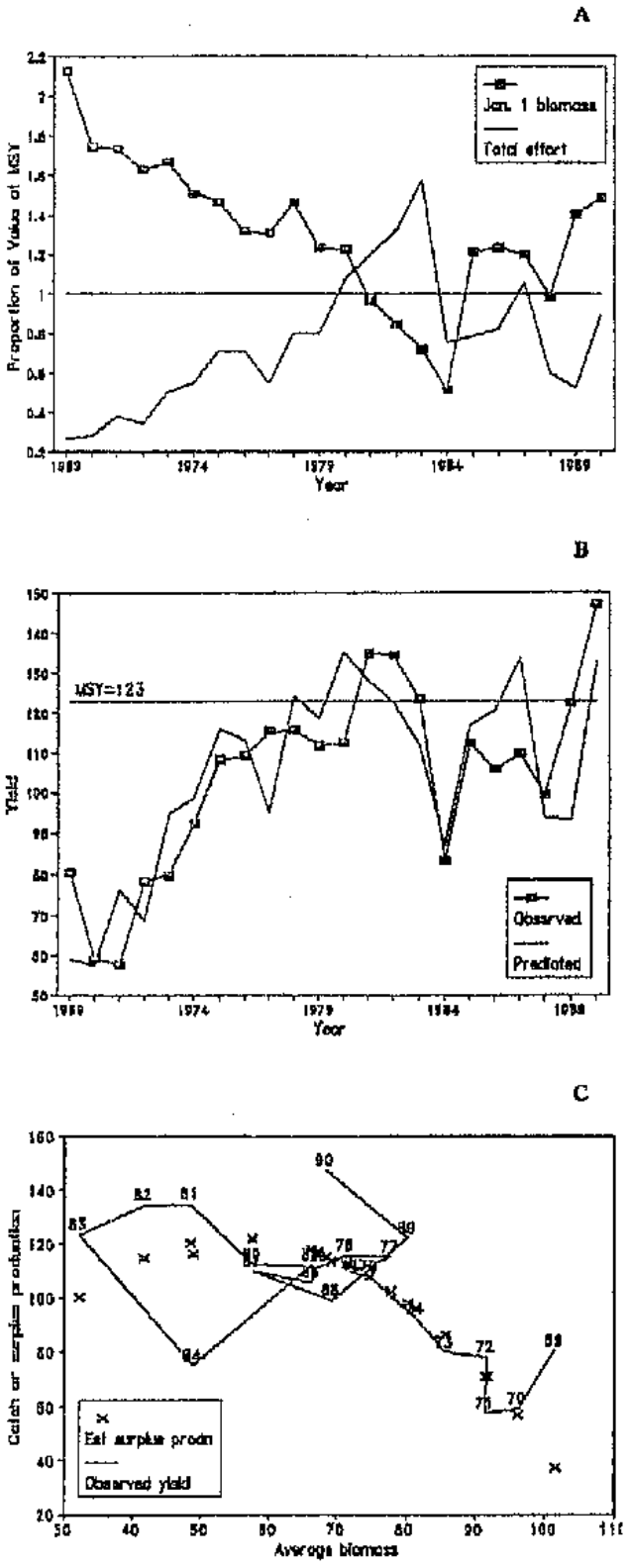
YFT-Fig. 7. Purse seine CPUE (MT per fishing day) by 15-day periods for 1980-1990. A) FIS fleet, B) Spanish fleet.



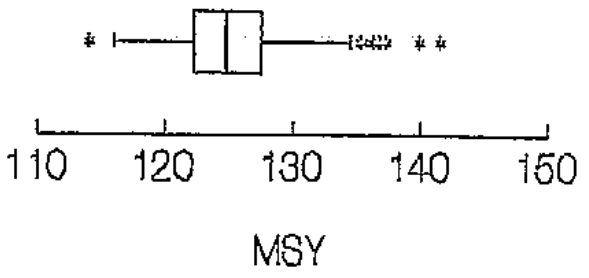
YFT-Fig. 9. Estimated curves of (A) equilibrium production and (B) relation between fishing effort and CPUE, for east Atlantic yellowfin tuna for m=1, k=4. Model fitted to nominal catch in 1000 metric tons and effort in MT per day (searching time) of FIS and Spanish purse seiners.



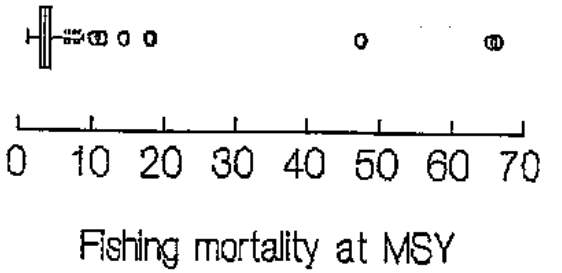
YFT-Fig. 10. Recruitment indices obtained from age-1 CPUE data.



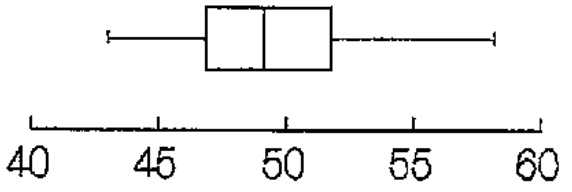
YFT-Fig 11. Results of the non-equilibrium production model (ASPIC). (A) Estimated biomass (at January 1 of each year) as a proportion of B_{opt} and observed effort as a proportion of f_{opt}; (B) Observed and predicted annual yields, with MSY reference line; (C) Estimated surplus production level (X) corresponding to mean biomass for the year; observed yields (line & numbers).



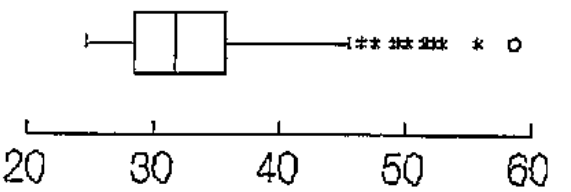
MSY



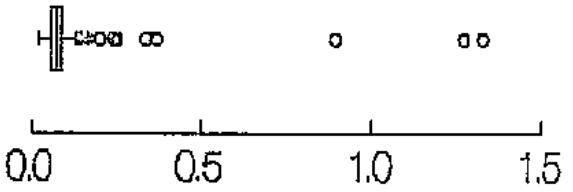
Fishing mortality at MSY



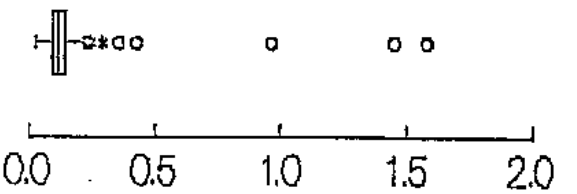
E_1 (opt. effort for 1969-1986)



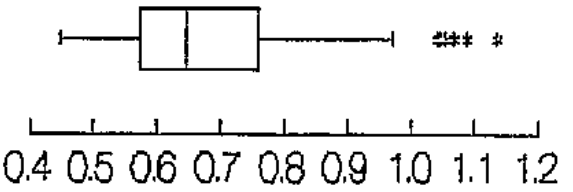
E_2 (opt. effort for 1987-1990)



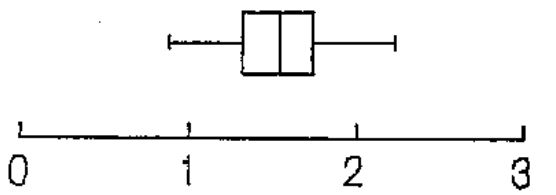
q_1 (1969-1986)



q_2 (1987-1990)

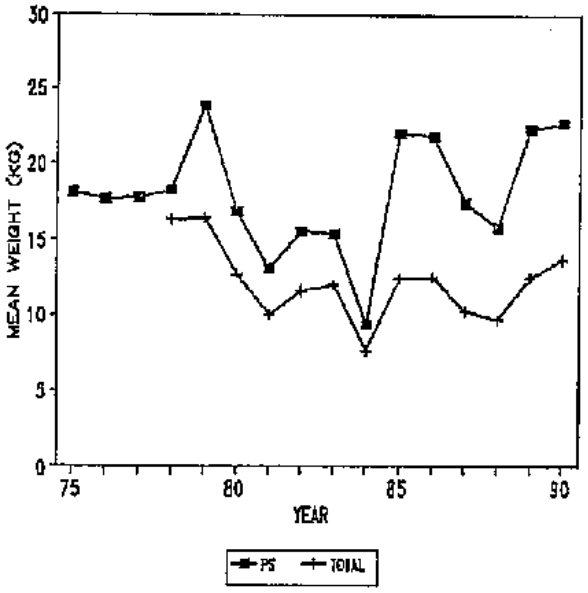


Ratio of E_2 / E_1

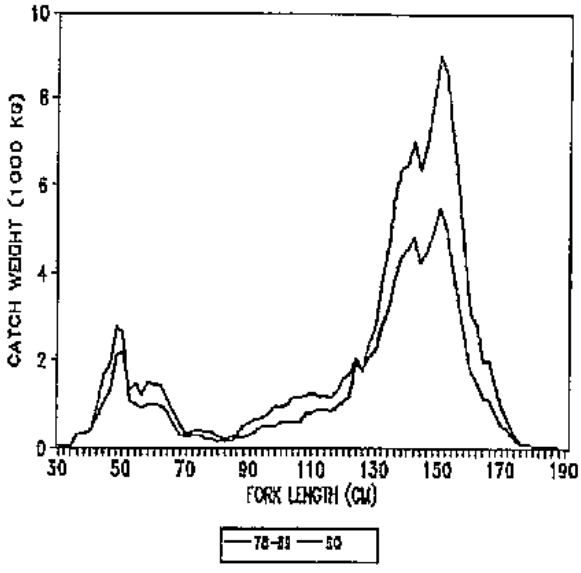


Ratio of q_2 / q_1

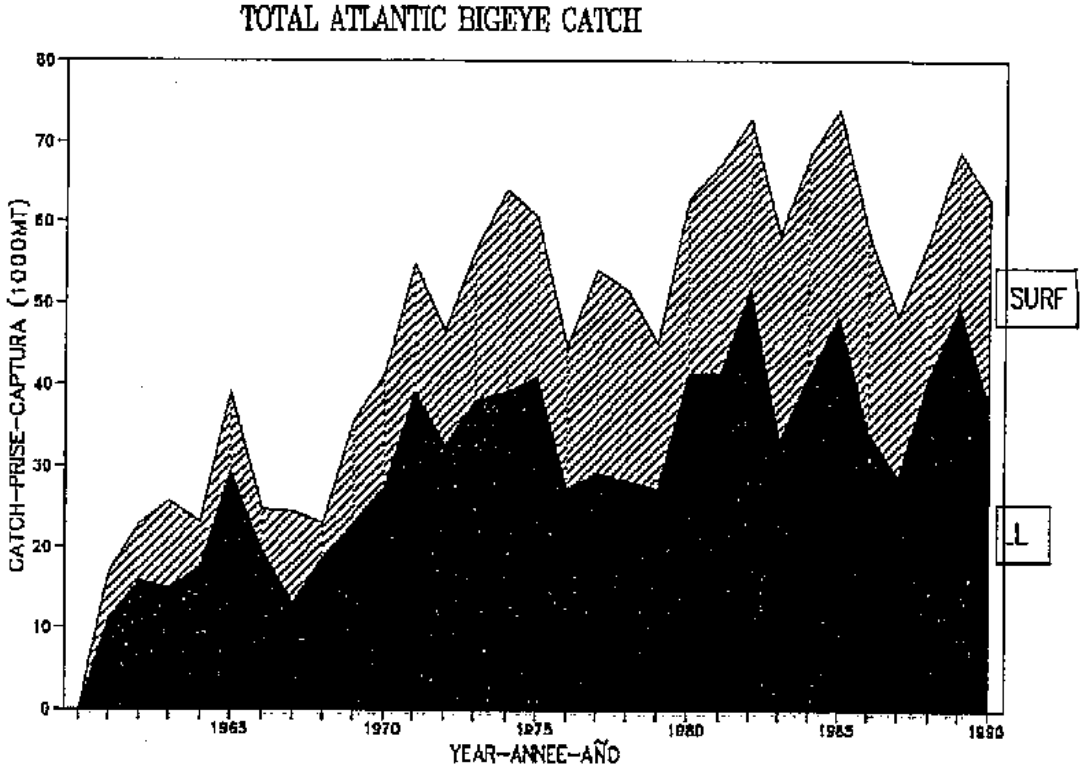
YFT-Fig. 12. Estimated parameters for the ASPIC model and its precision, estimated by the bootstrap method.



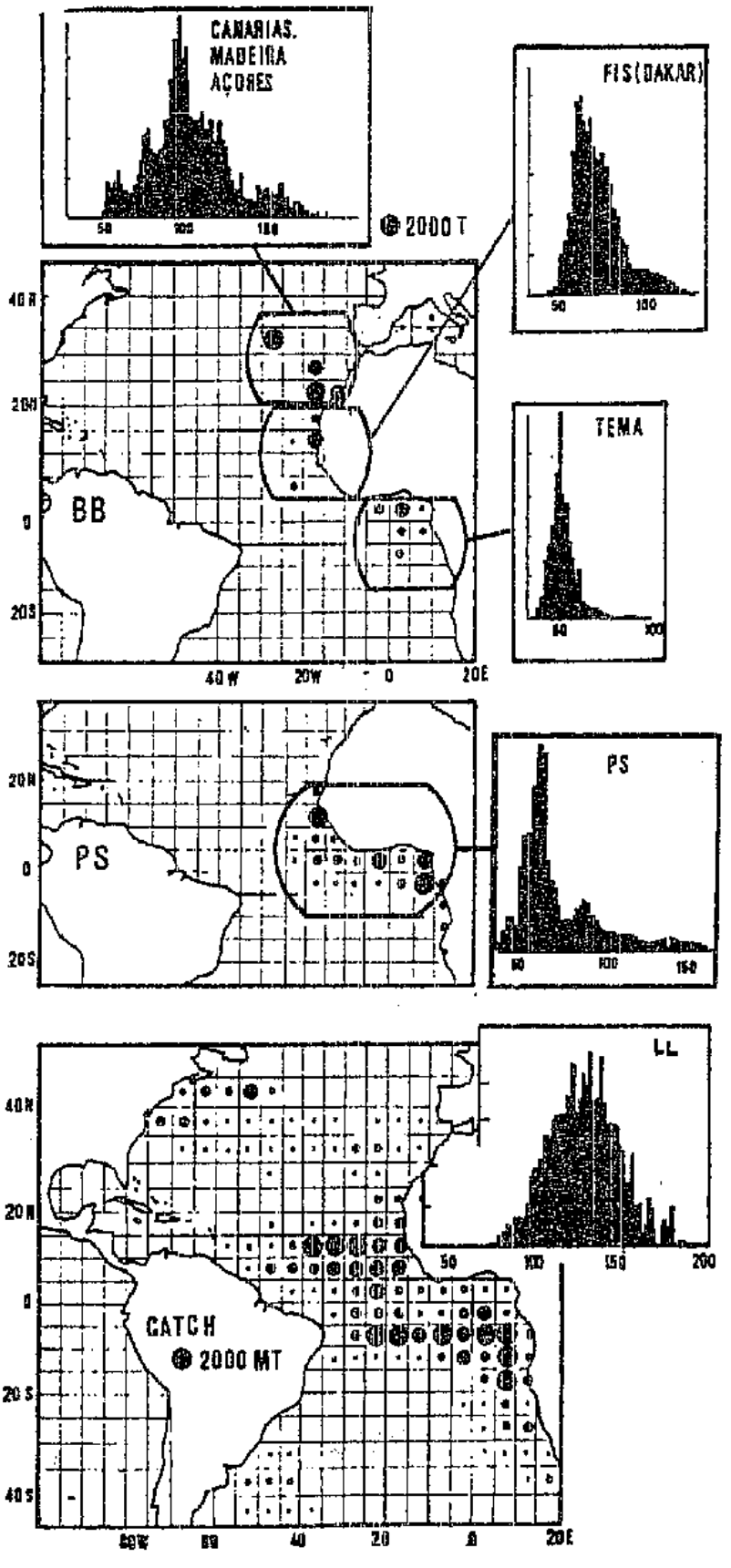
YFT-Fig. 13. Annual average weight of yellowfin caught by purse seine and by all gears, 1975-1990.



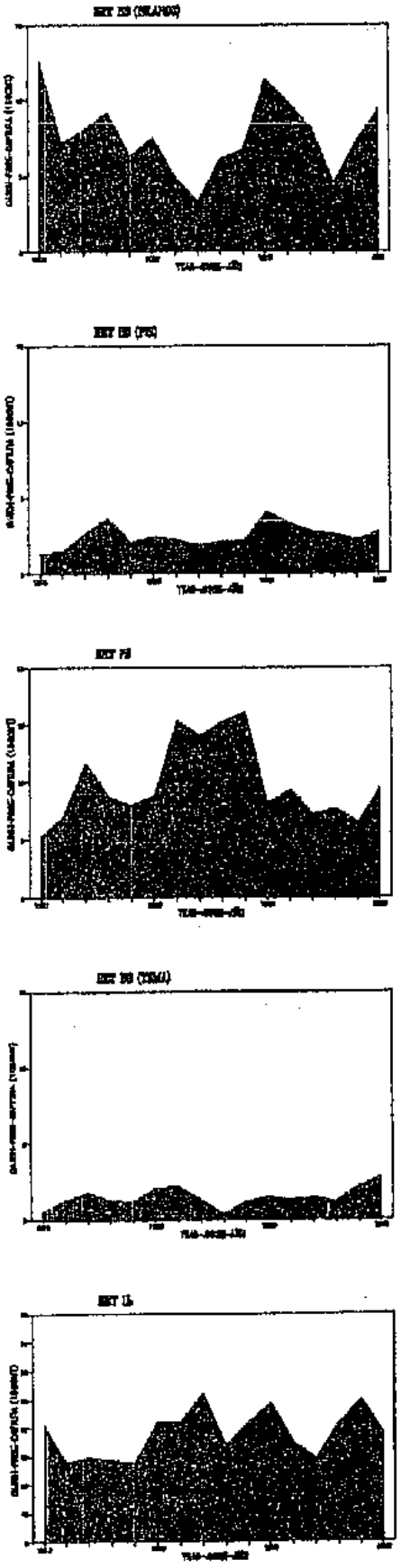
YFT-Fig. 14. Weight (in 1000 kg) by fork length (cm): average for 1978-1989 and for 1990.



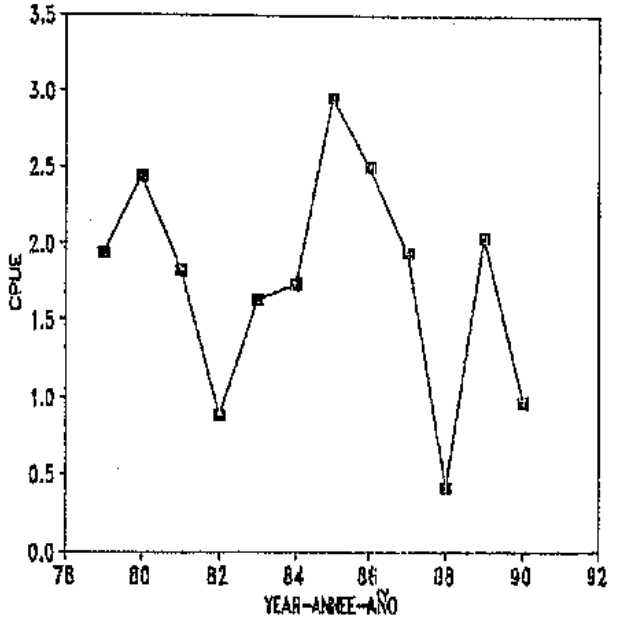
BET-Fig. 1. Total bigeye catches in entire Atlantic for surface and longline fisheries, 1950-1990.



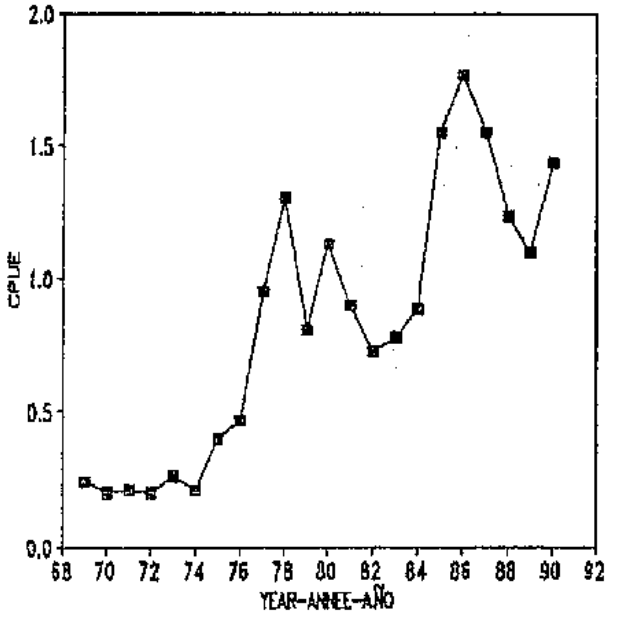
BHT-Fig. 2. Areas of operation and size frequencies of the main bigeye fisheries in the Atlantic.



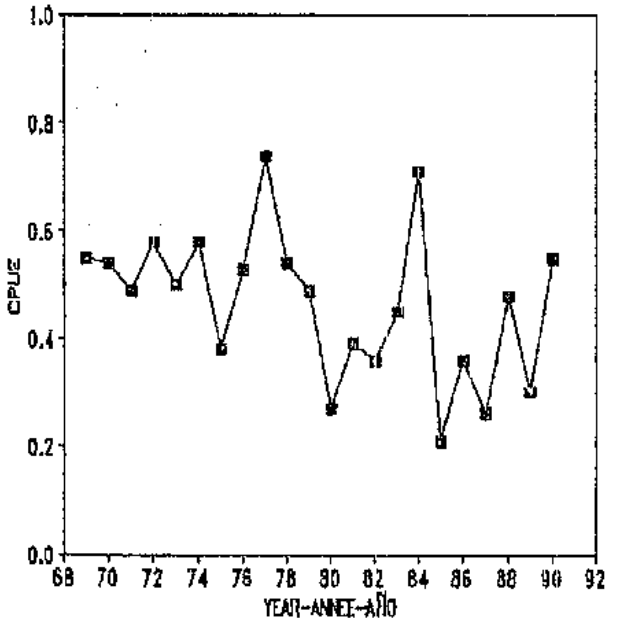
BHT-Fig. 3. Annual catches of bigeye tuna by gear, 1975-1990.



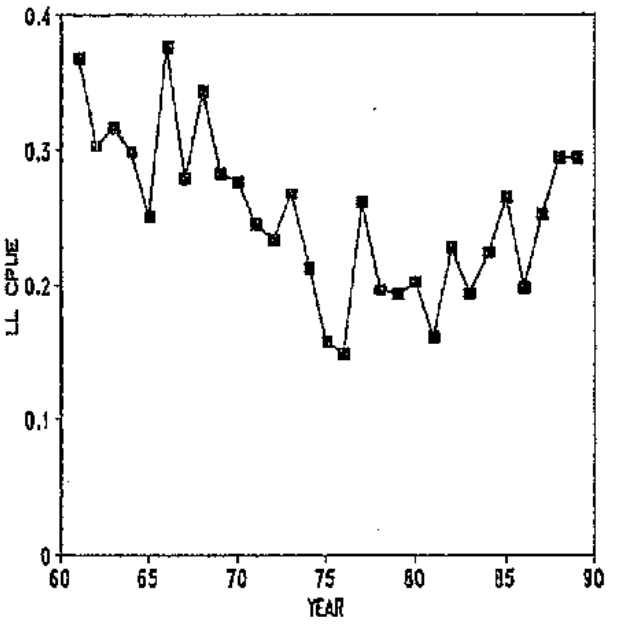
BET-Fig. 4. Bigeye CPUE trends for Azorean baitboats in the second quarter, from 1979 to 1990. (SCRS/91/110).



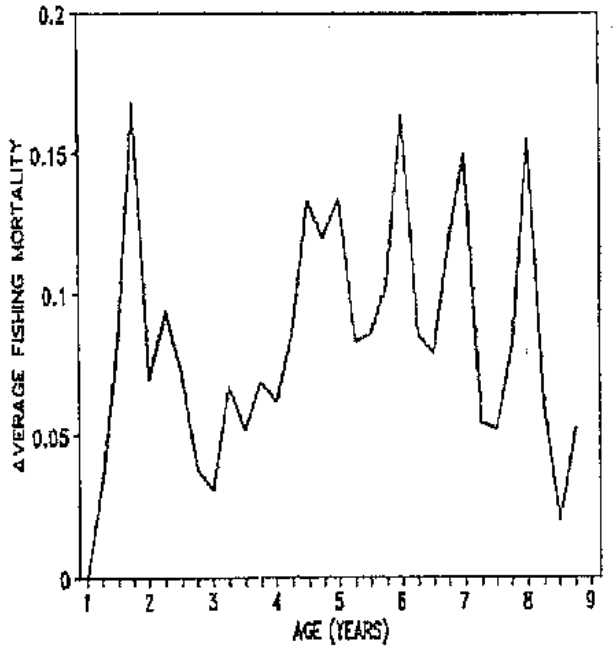
BET-FIG. 5. Bigeye CPUE trends for Dakar-based baitboats from 1969 to 1990 (SCRS/91/75).



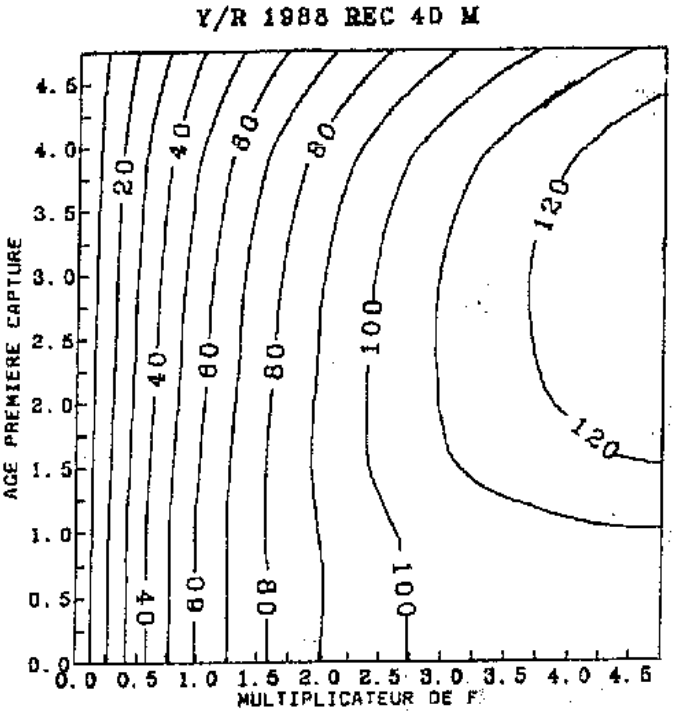
BET-Fig. 6. Bigeye CPUE trends for FIS purse seiners from 1969 to 1990 (SCRS/91/75).



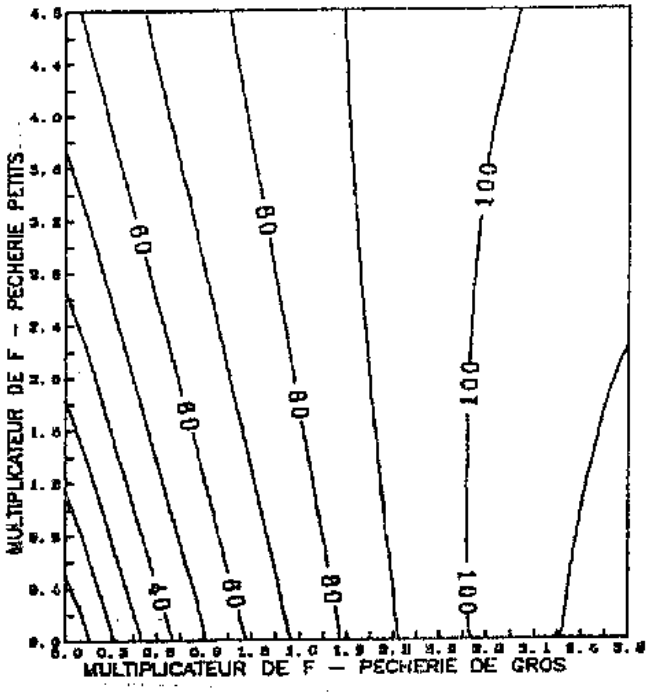
BET-Fig. 7. Annual CPUE trends for bigeye caught by Japanese longliners from 1961 to 1989. Preliminary estimates for 1989.



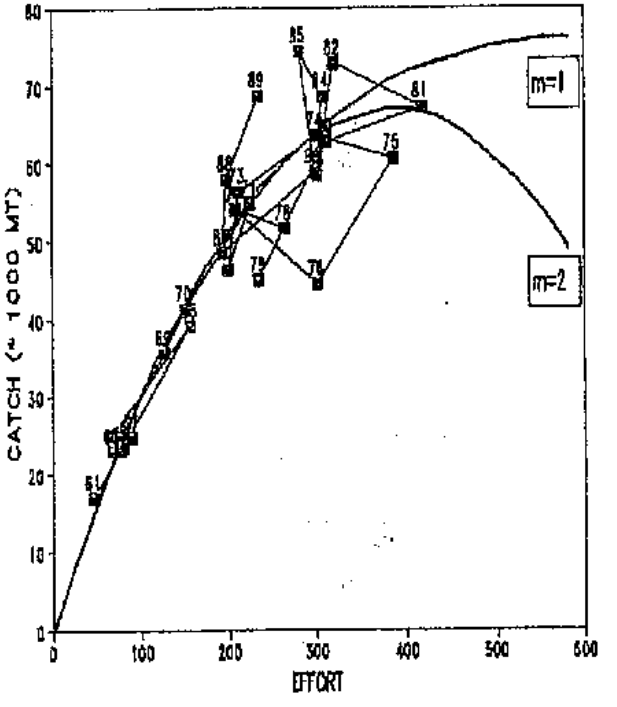
BET-Fig. 8. Fishing mortality by quarterly ages (expressed in terms of years) by cohort analysis, for fishing year 1988, all gears combined (SCRS/91/111).



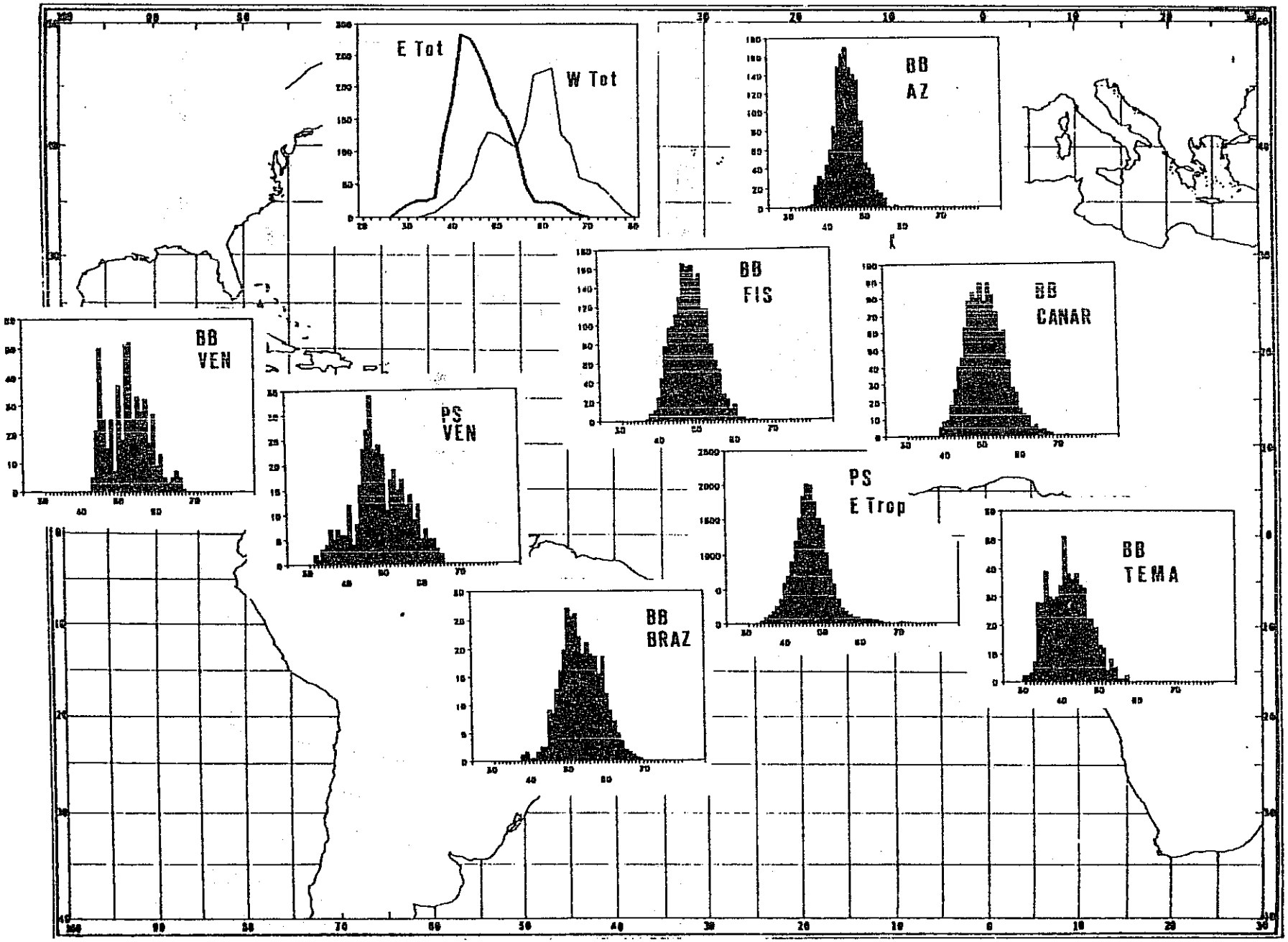
BET-Fig. 9. Yield-per-recruit curves. Yield estimated for the Atlantic bigeye tuna fishery, fishing year 1988 (SCRS/91/111).



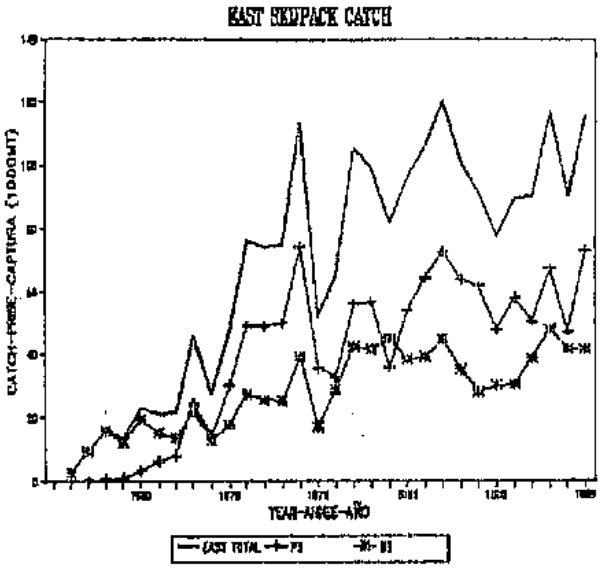
BET-Fig. 10. Multi-gear yield-per-recruit curves, fishing year 1988 (SCRS/91/111).



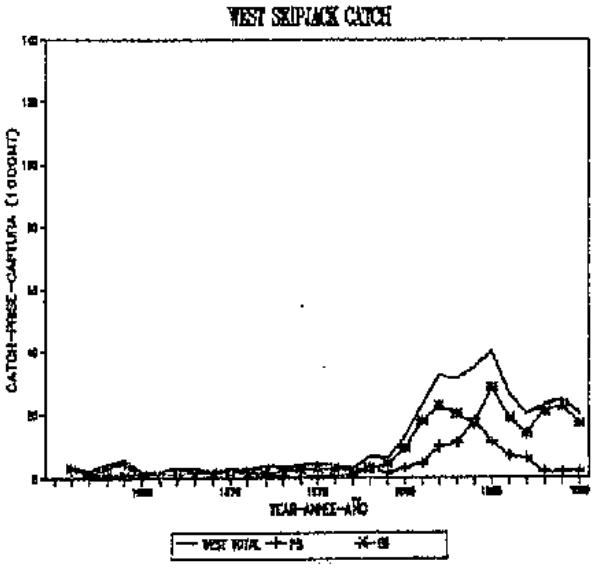
BET-Fig. 11. Yield curves from production model analysis on bigeye tuna, entire Atlantic, 1961 to 1989.



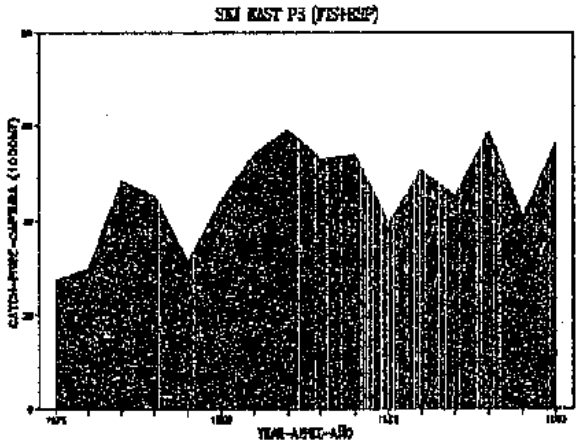
SKJ-Fig. 1. Size distribution of skipjack catches by the principal Atlantic fishery.

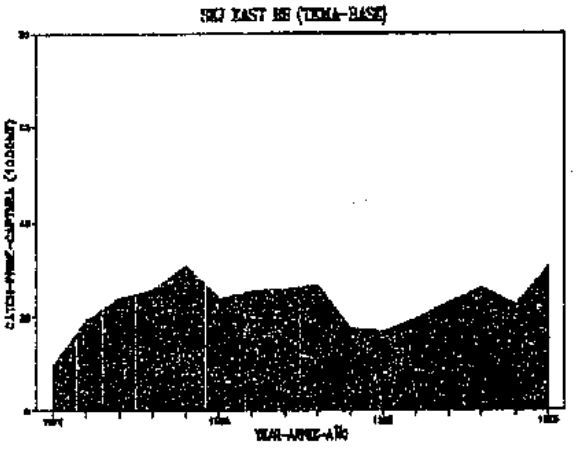


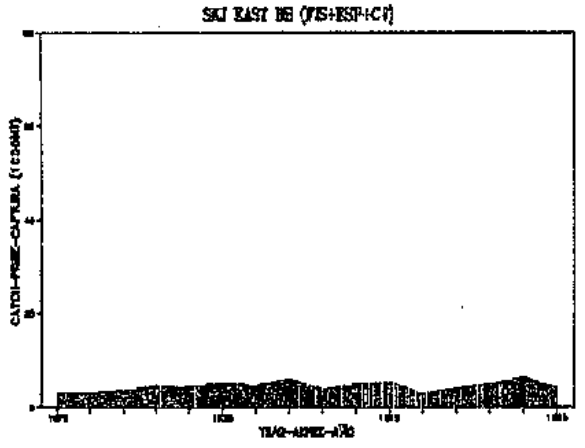
SKJ-Fig.2. Skipjack catches in the east Atlantic, by gear and by total.

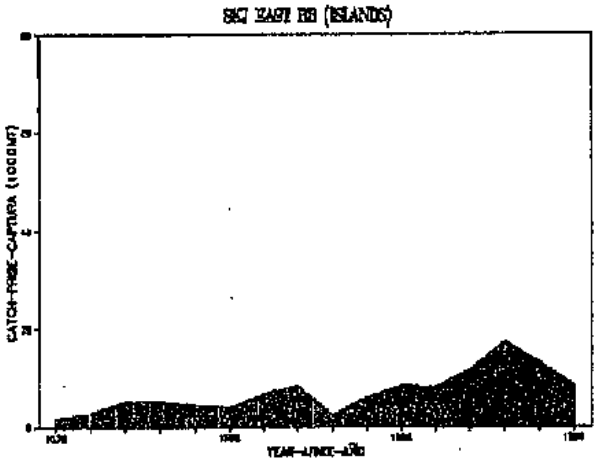


SKJ-Fig. 3. Skipjack catches in the west Atlantic, by gear and by total.

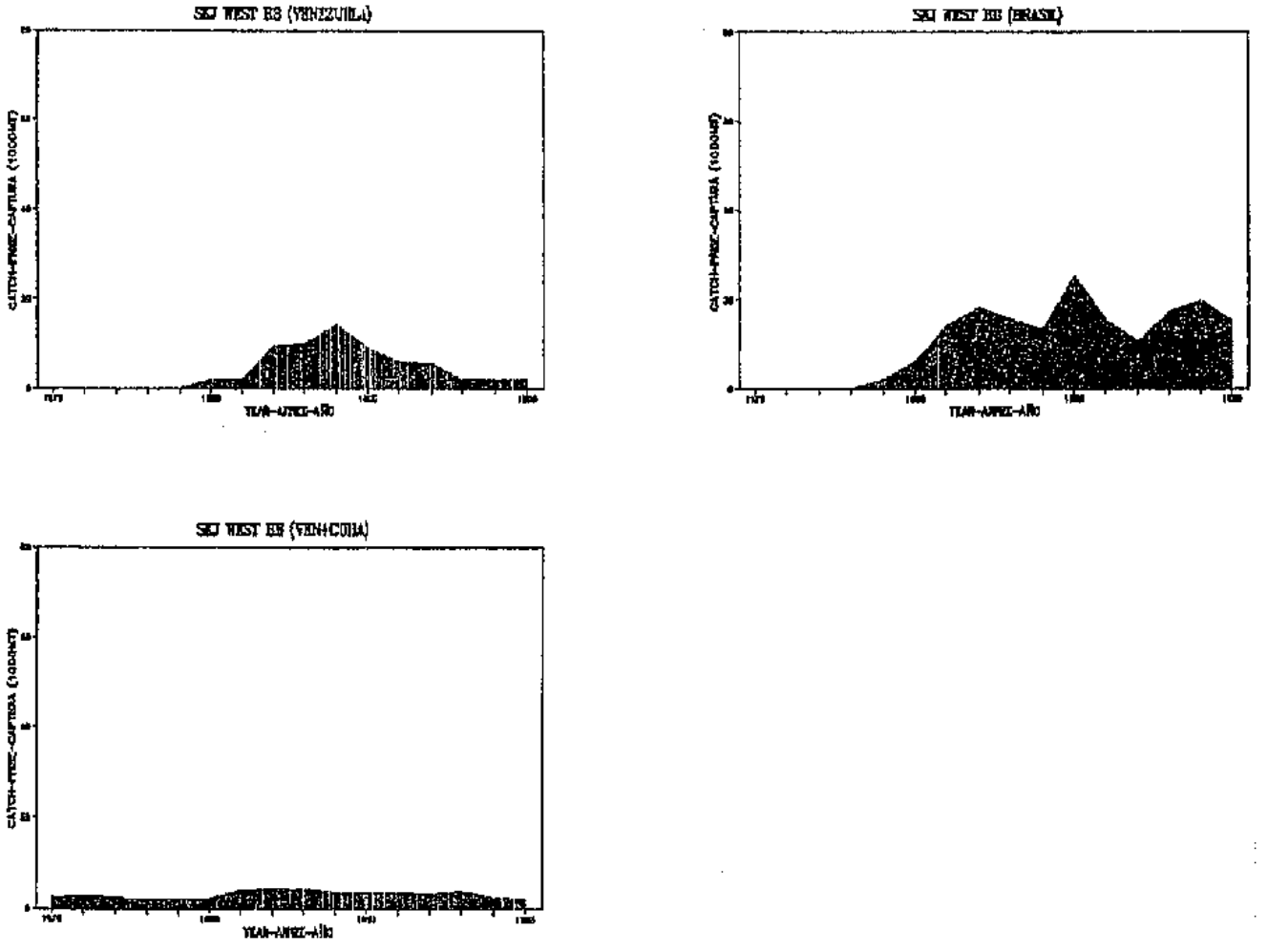




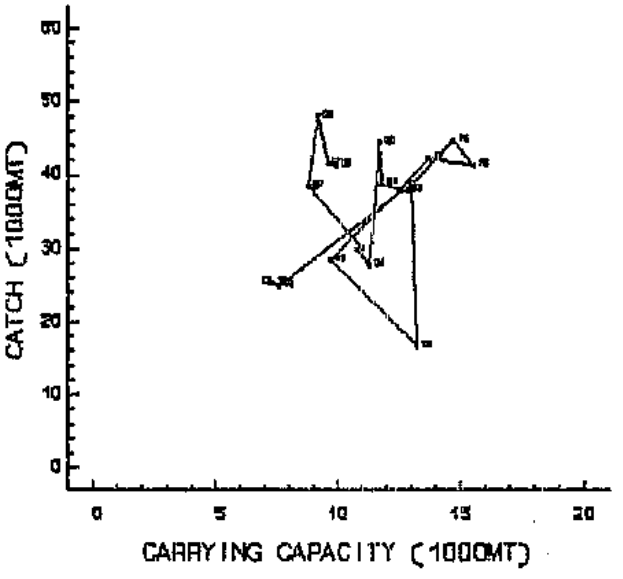




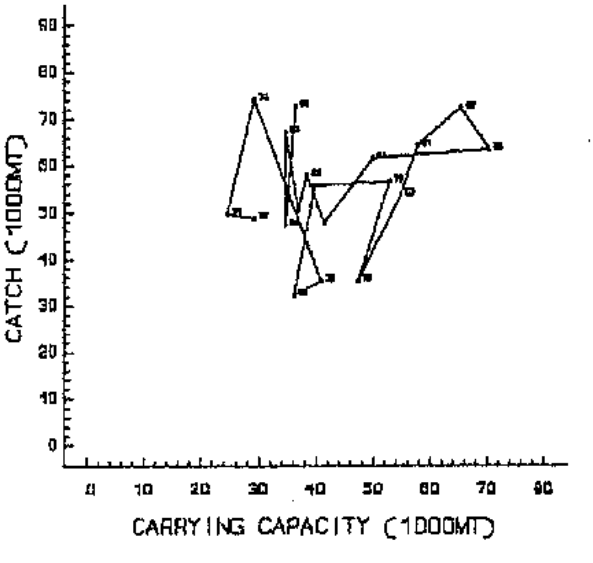
SKJ-Fig. 4. Annual catches by the principal skipjack fisheries in the east Atlantic, 1975-1990.



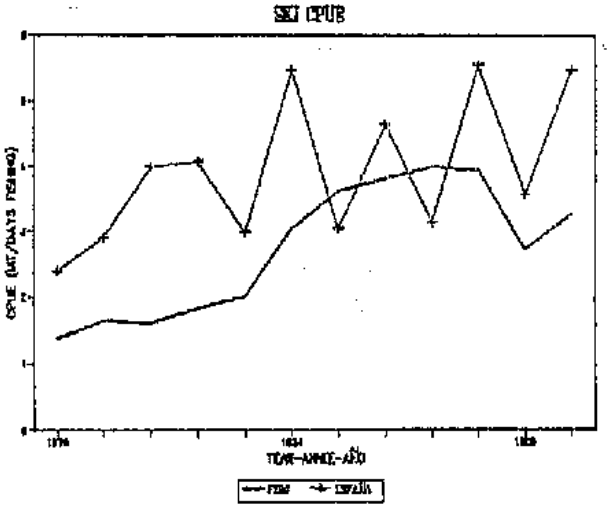
SKJ-Fig. 5. Annual catches by the principal skipjack fisheries in the west Atlantic, 1975-1990.



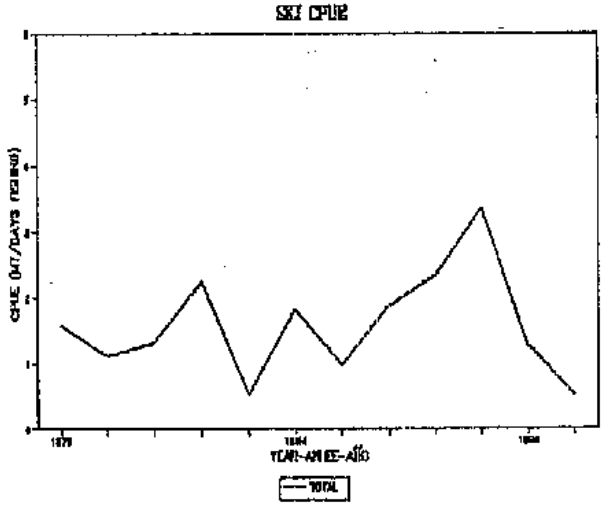
SKJ-Fig. 6. Skipjack catches vs. carrying capacity of the east Atlantic fleet.



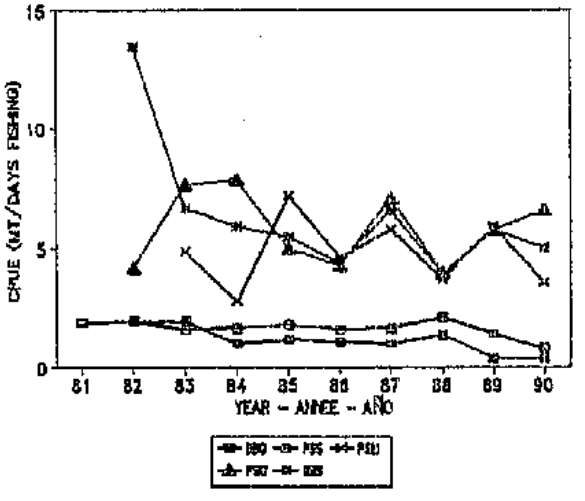
SKJ-Fig. 7. Skipjack catches vs. carrying capacity of the east Atlantic purse seine fleet.



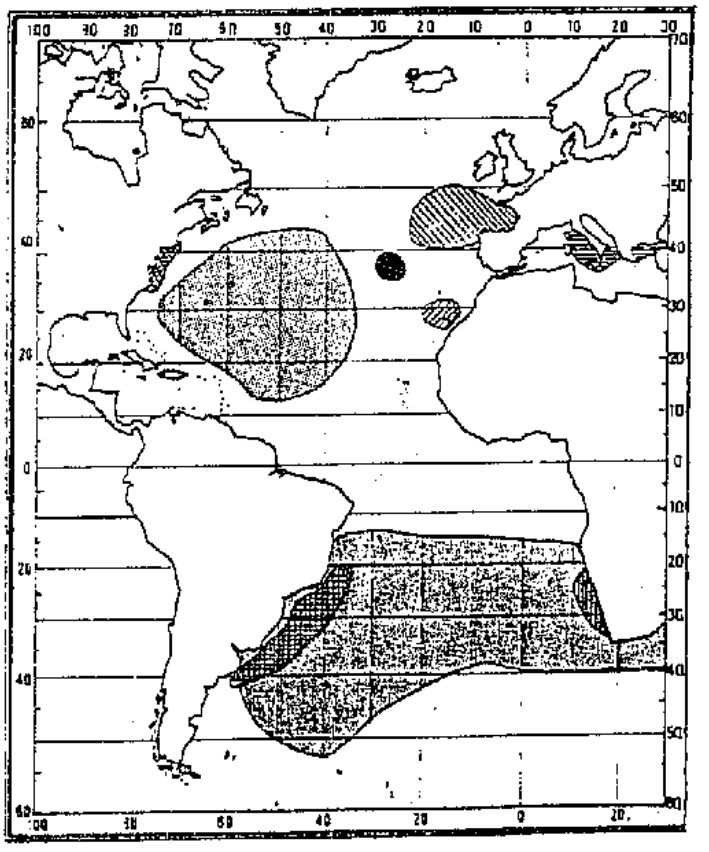
SKJ-Fig. 8. Annual CPUE (MT/fishing days) of the PISM and Spanish purse seine fleet in the east Atlantic, 1979-1990.



SKJ-Fig. 9. CPUE (MT/fishing days) of the Azores baitboat fleet during the third quarter of the year, 1979-1990.



SKJ-Fig. 10. Skipjack CPUE for the different Venezuelan fleets, 1981-1990



BB, TROL, GILL, MWTD
(summer - autumn)
BB (autumn)

BB (winter - spring)

LL

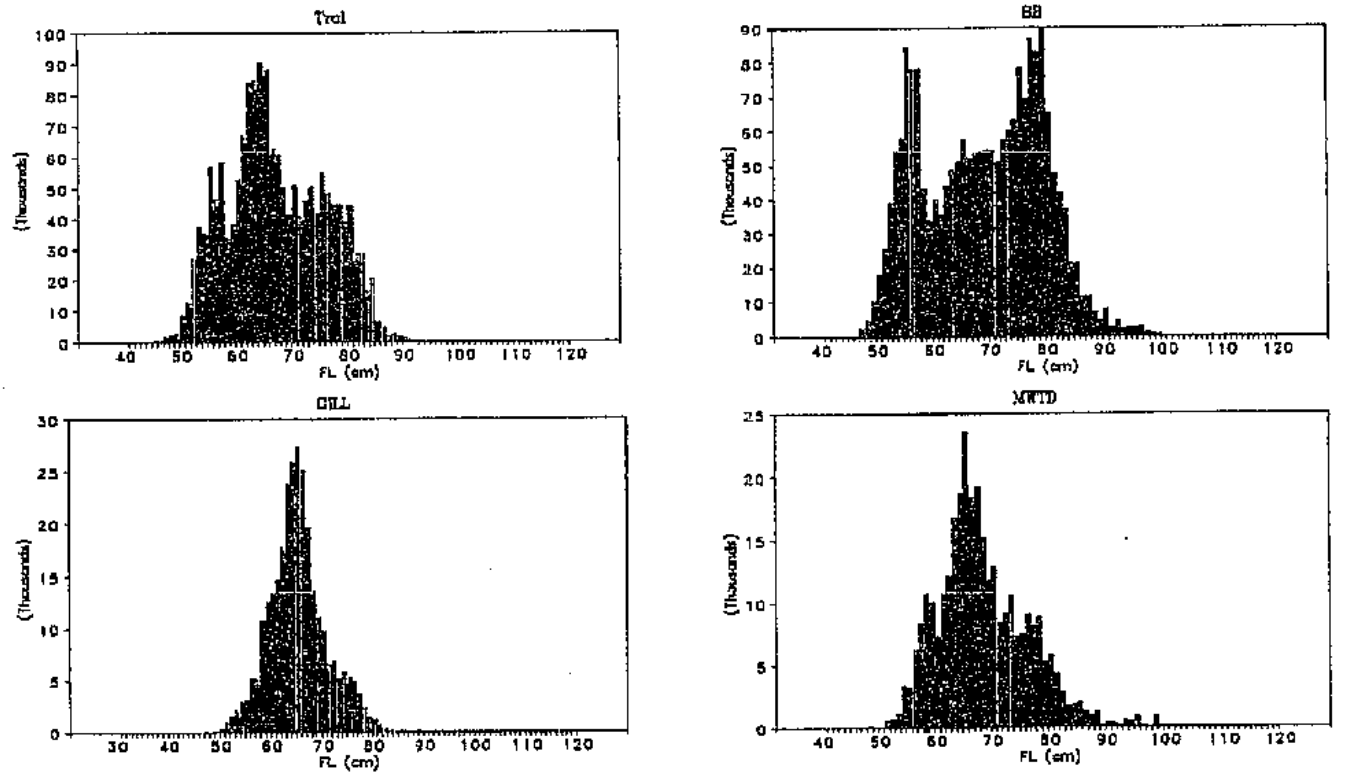
LL (coastal)

SPORT (coastal)

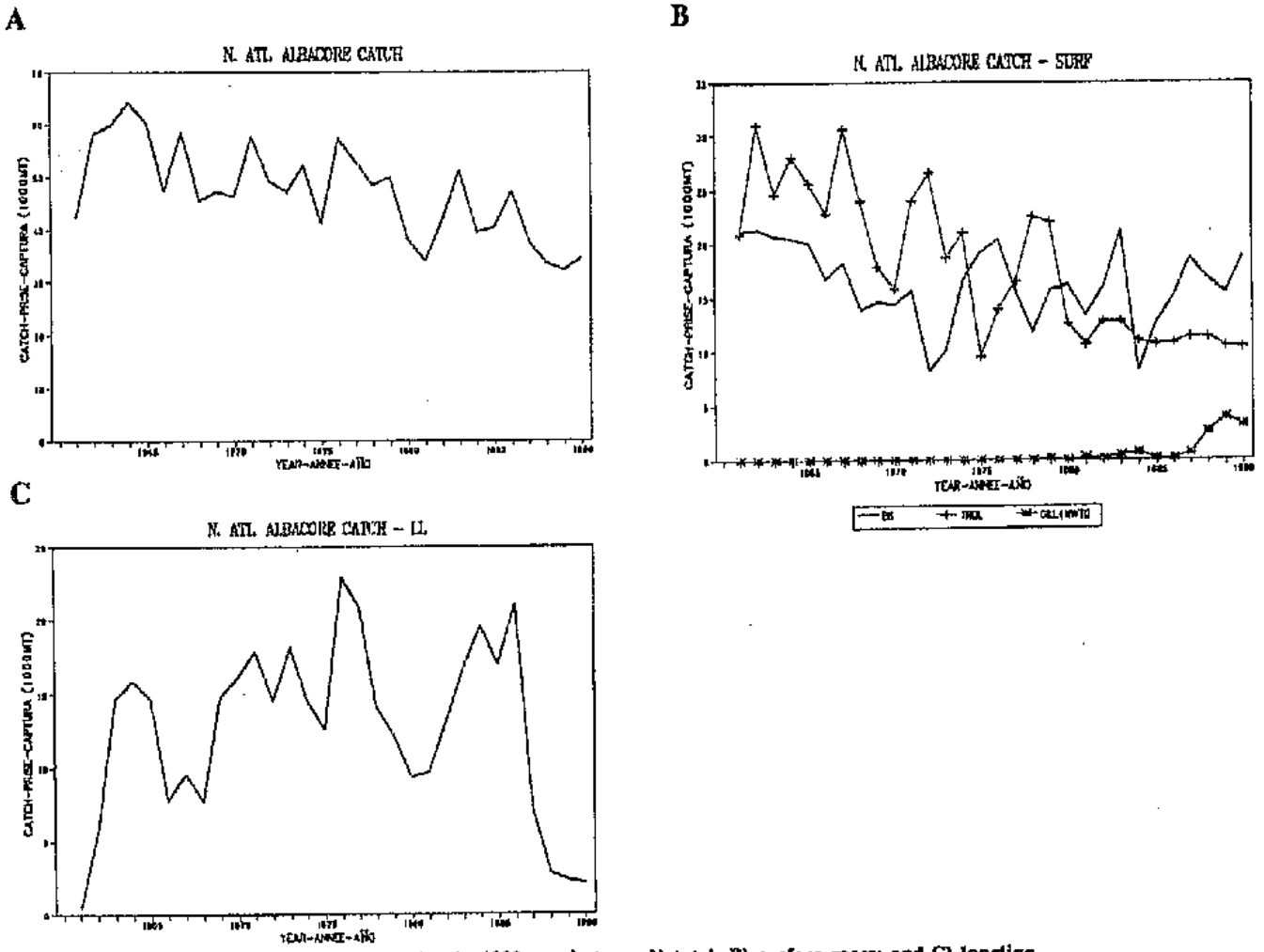
BB (South African - seasonal)

UNCL (Mediterranean)

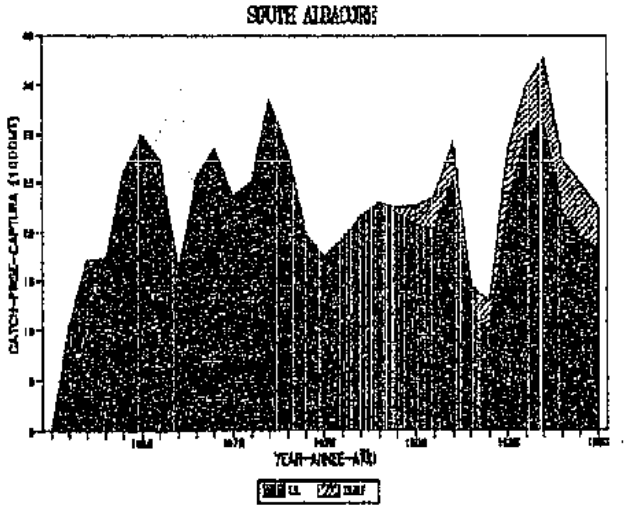
ALB-Fig. 1. Distribution of albacore fisheries in the Atlantic.



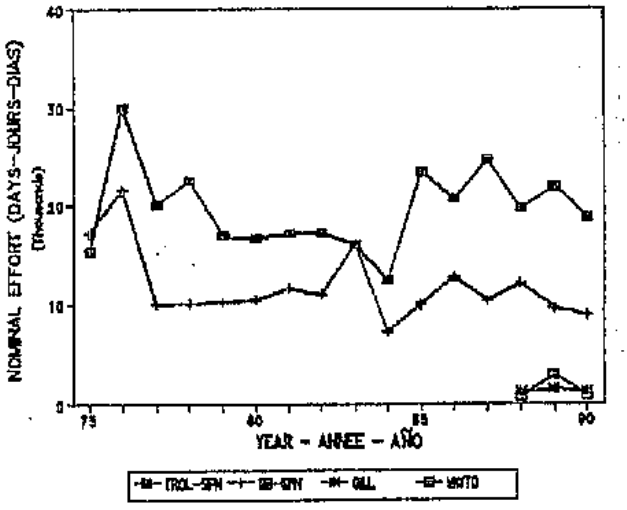
ALB-Fig. 2. Total catch at size for four main surface gears (troll, mid-water trawl, gillnet and baitboat).



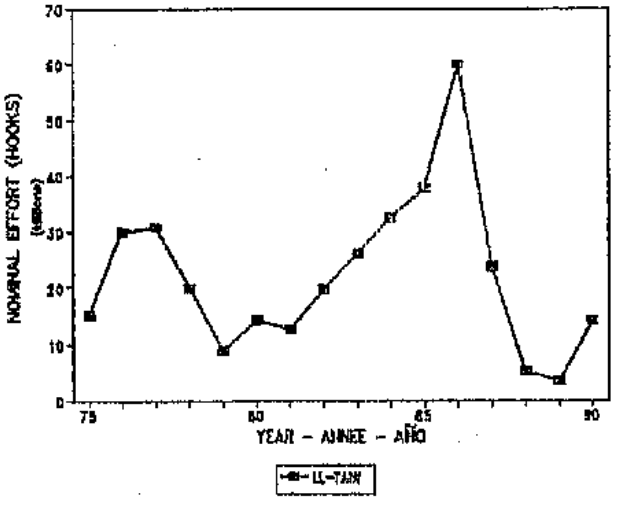
ALB-Fig. 3. North Atlantic albacore catches in 1000 metric tons: A) total; B) surface gears; and C) longline.



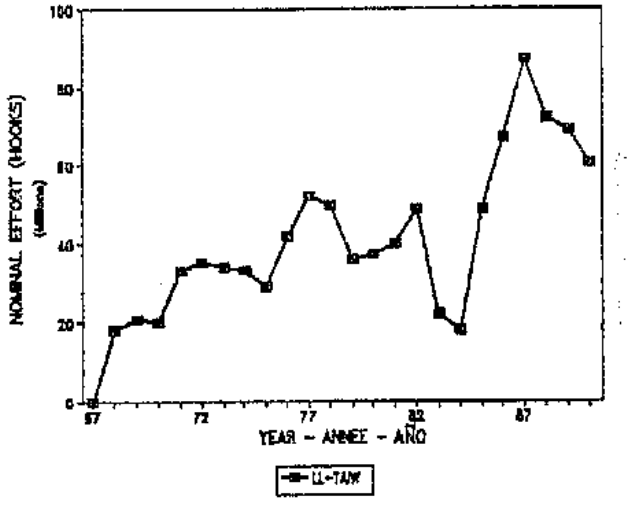
ALB-Fig. 4. South Atlantic albacore catches in 1000 MT by longline and surface gears.



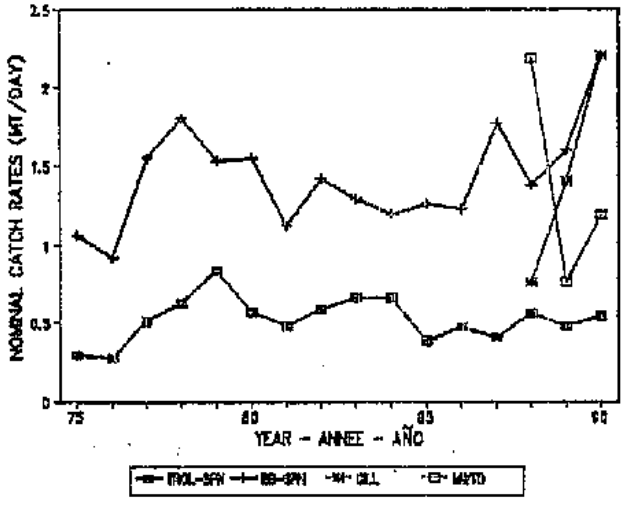
ALB-Fig. 5. Nominal albacore effort by north Atlantic surface fleets.



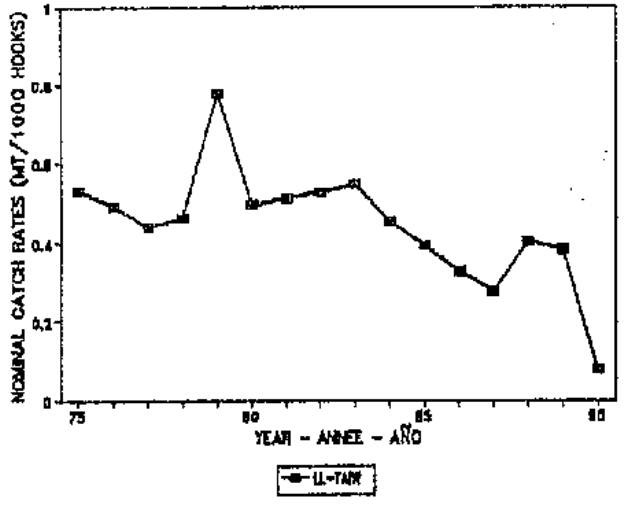
ALB-Fig. 6. Nominal albacore fishing effort (in millions of hooks) of north Atlantic Taiwanese longline fleet.



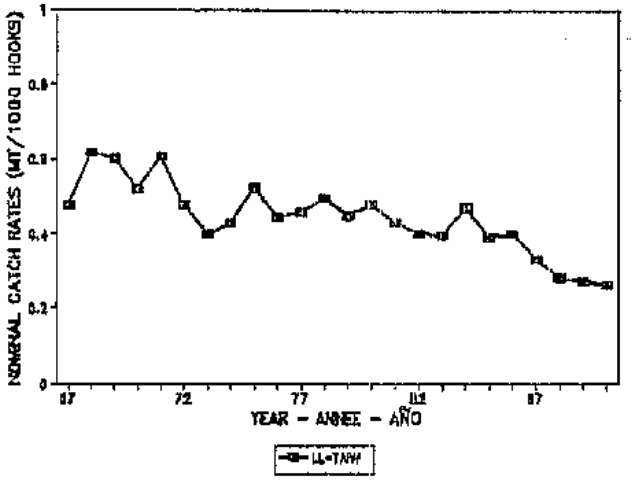
ALB-Fig. 7. Nominal albacore effort by Taiwanese south Atlantic longline fleet.



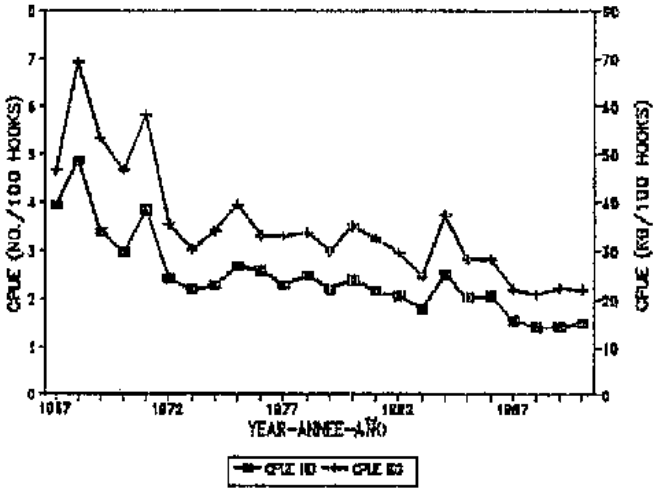
ALB-Fig. 8. Nominal albacore catch rate (MT/days) of north Atlantic surface fleets.



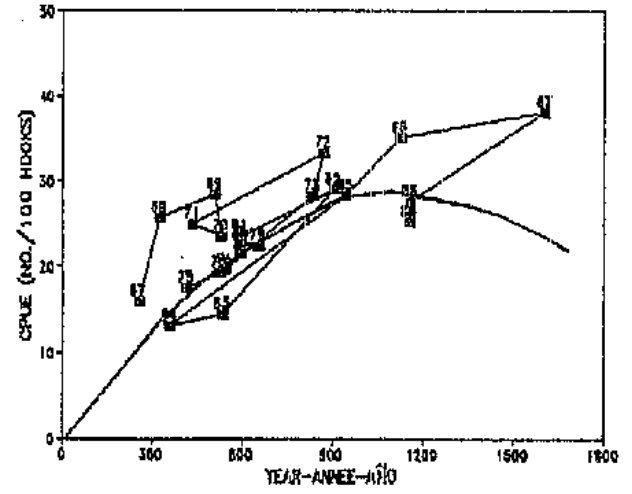
ALB-Fig. 9. Nominal albacore catch rate (MT per 1000 hooks) of north Atlantic Taiwanese longline fleet.



ALB-Fig. 10. Nominal albacore catch rate (MT/days) of south Atlantic Taiwanese longline fleet.

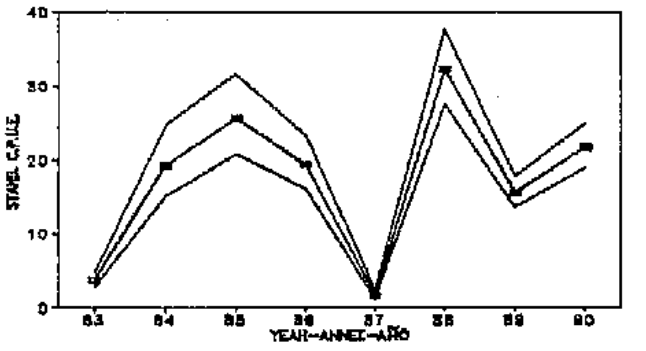


ALB-Fig. 12. Annual south Atlantic albacore CPUE trends in number of fish or weight in kg per 100 effective hooks of Taiwanese longliners.

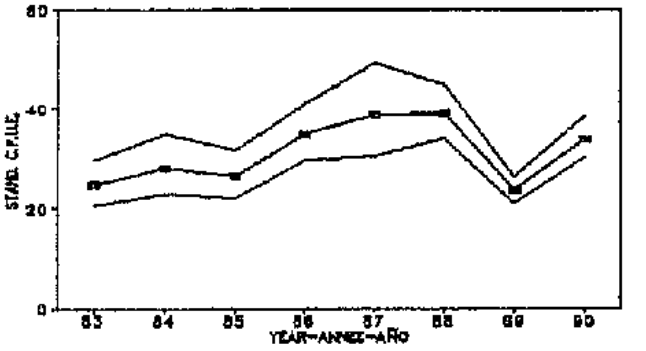


ALB-Fig. 13. Equilibrium yield curve and the observed data for south Atlantic albacore fisheries, 1967 - 1990, (SCRS/91/100).

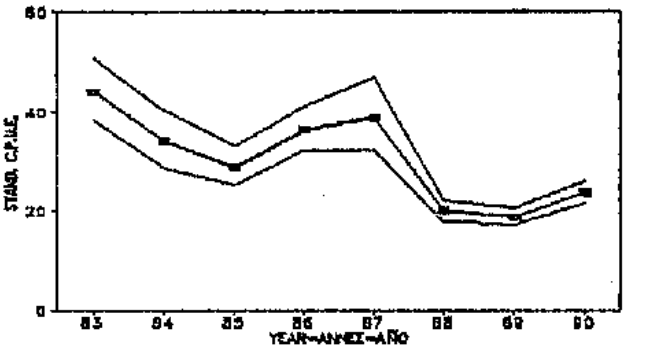
A) Age 1



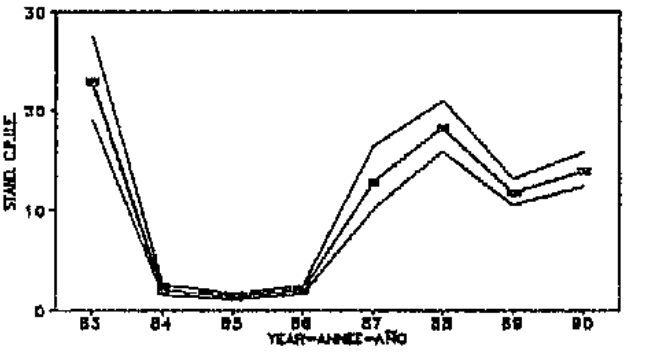
B) Age 2



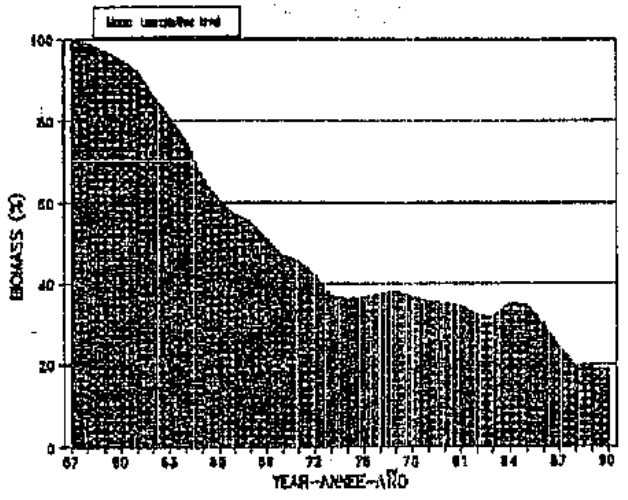
C) Age 3



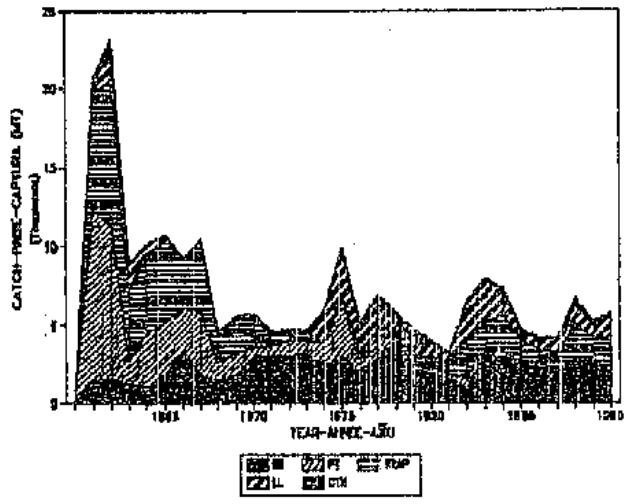
D) Age 4

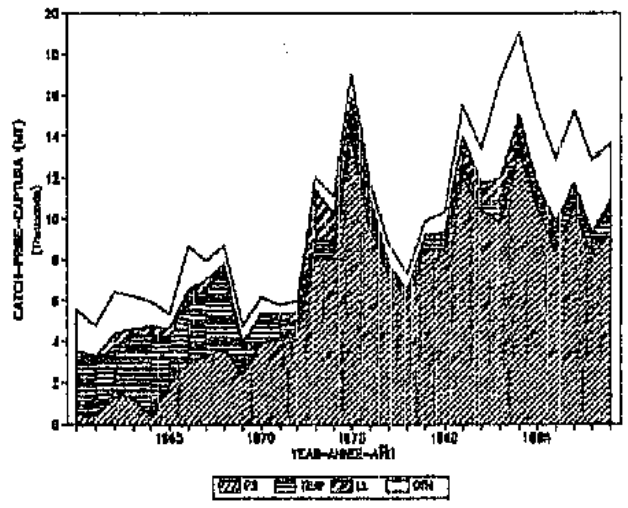


ALB-Fig. 11. Standardized Spanish surface fleet CPUE of north Atlantic albacore by age classes (SCRS/91/105).

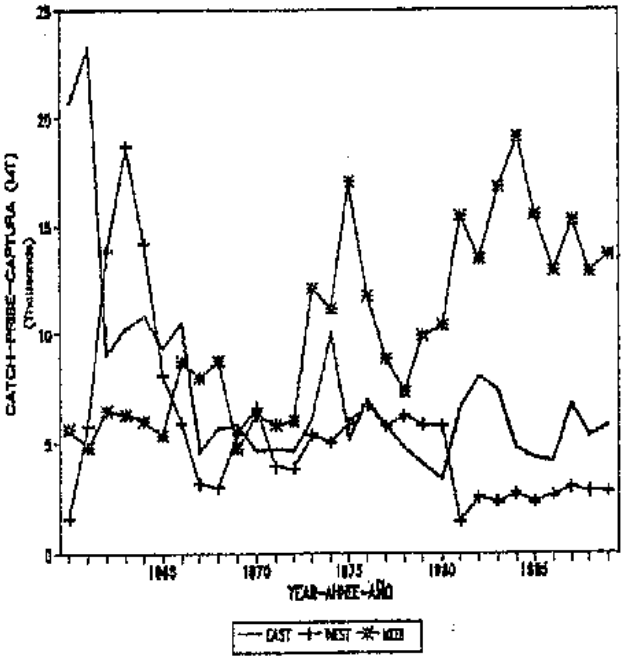


ALB-Fig. 14. Estimated exploitable biomass trajectory for albacore in the south Atlantic Ocean.

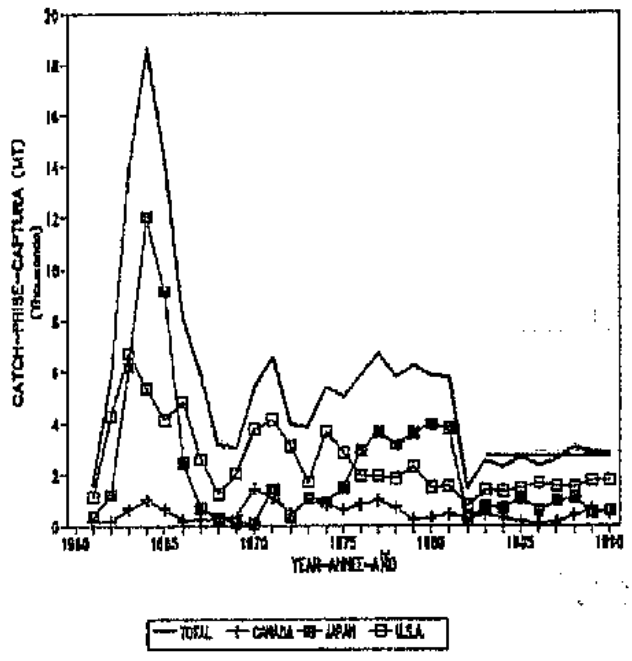




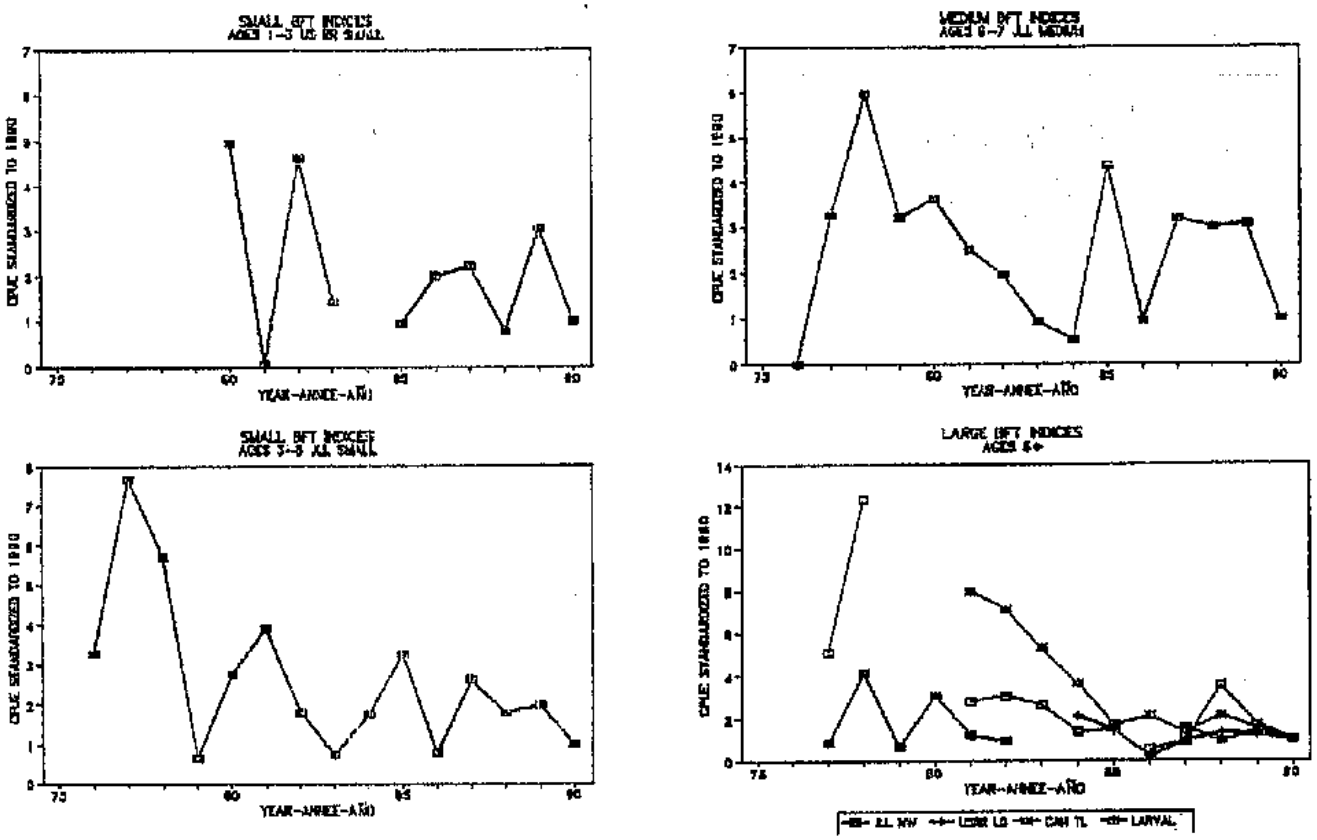
BFT-Fig. 2. East Atlantic and Mediterranean bluefin landings (in MT) by gears.



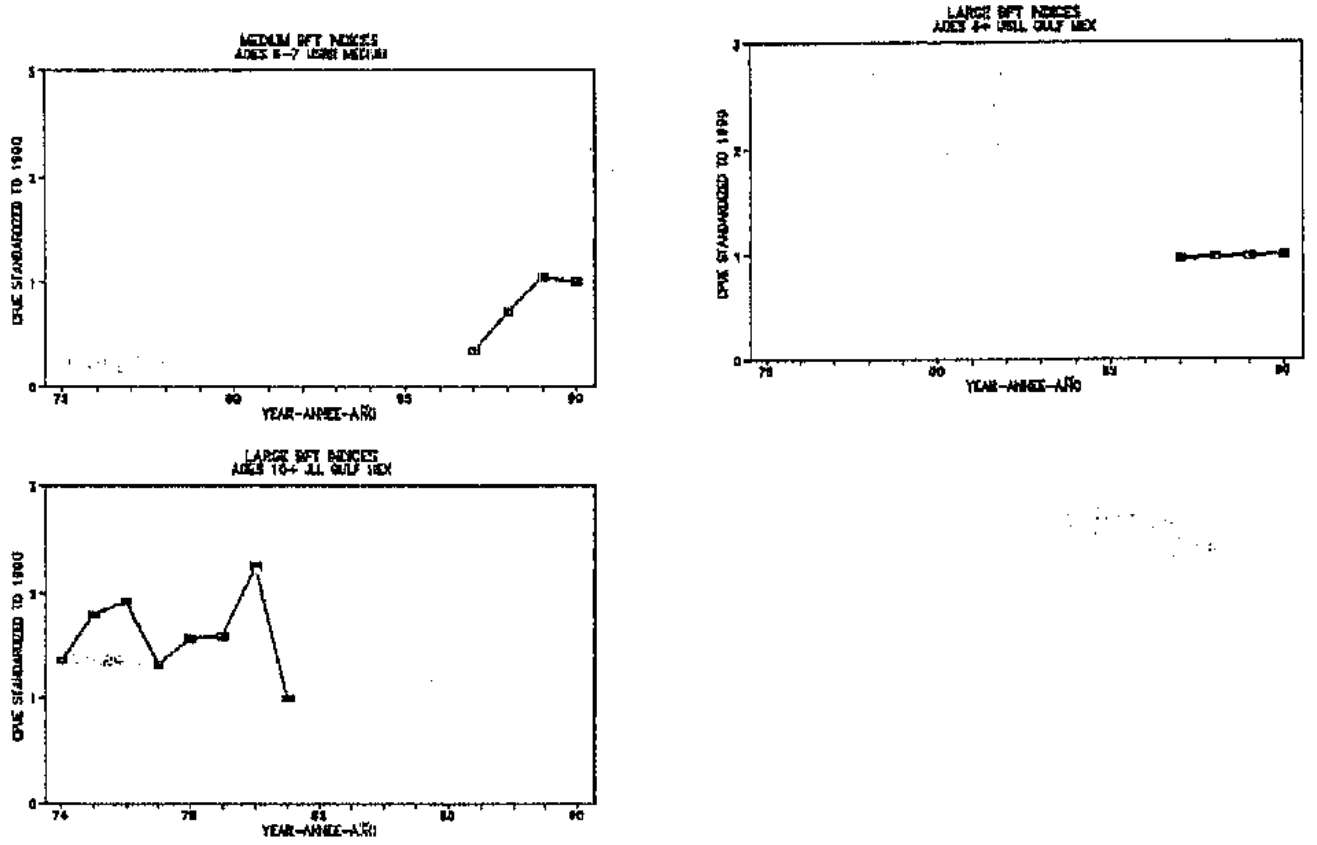
BFT-Fig. 1. Total Atlantic bluefin landings (in MT) by region.



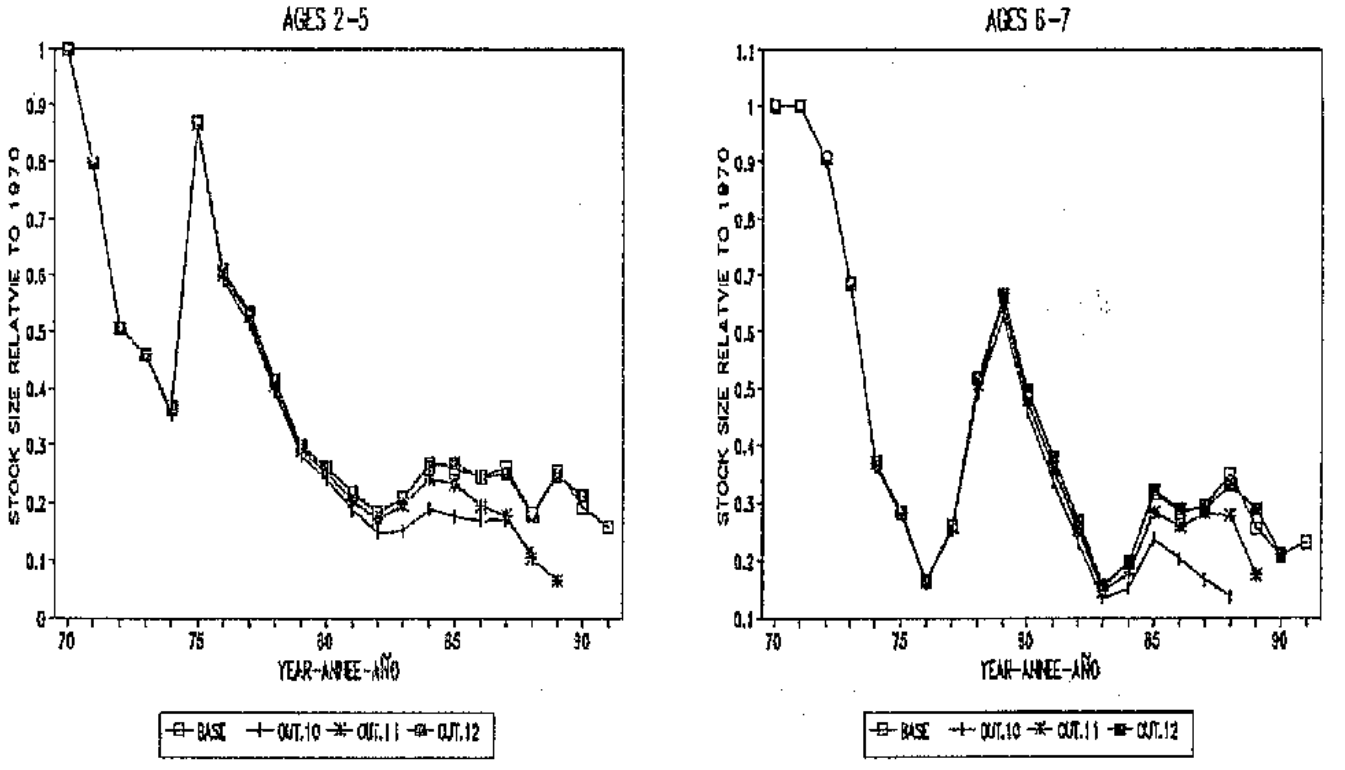
BFT-Fig. 3. West Atlantic bluefin tuna total landings and those by three major fishing nations of the west Atlantic, 1960 to 1990. The scientific monitoring quota of 2660 MT from 1983 to 1990 is indicated as a solid horizontal line.

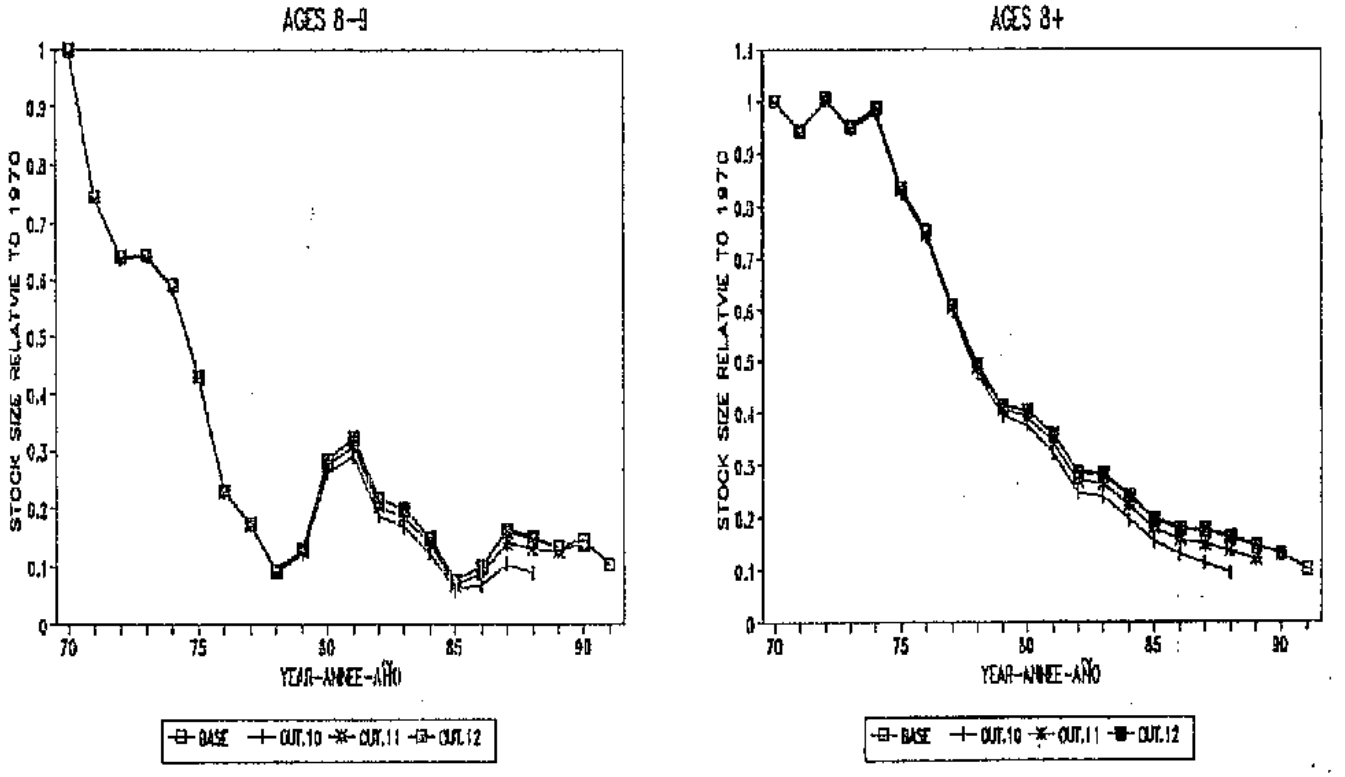


BFT-Fig. 4a. Abundance indices used in tuning the VPA and age-structured production models for west Atlantic bluefin tuna stock assessment.

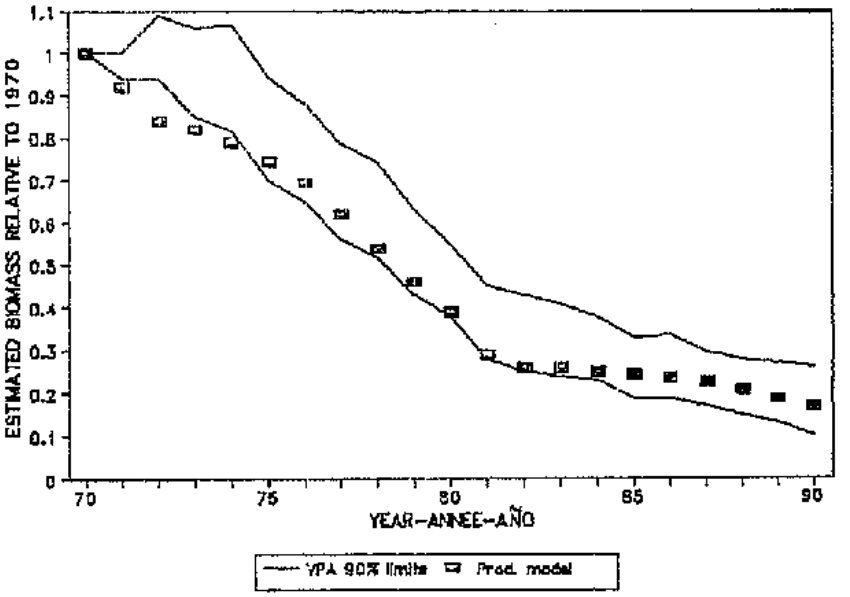


BFT-Fig. 4b. Additional indices examined by the Committee, but rejected for use in the base case assessment of west Atlantic bluefin tuna. USRR = U.S. rod and reel; JLL = Japanese longline; Canada TL = Canadian tended line; LARVAL = larval index.

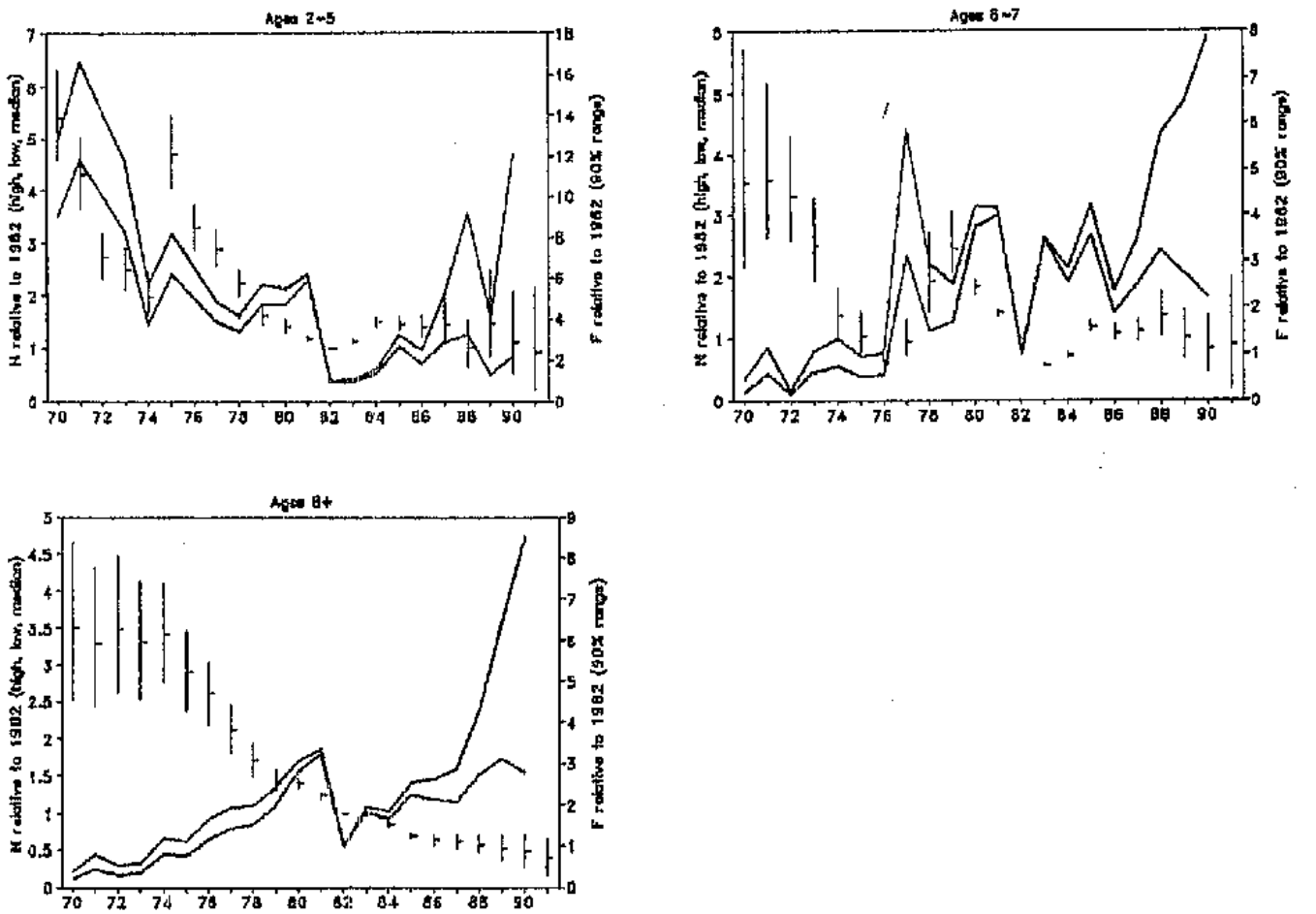




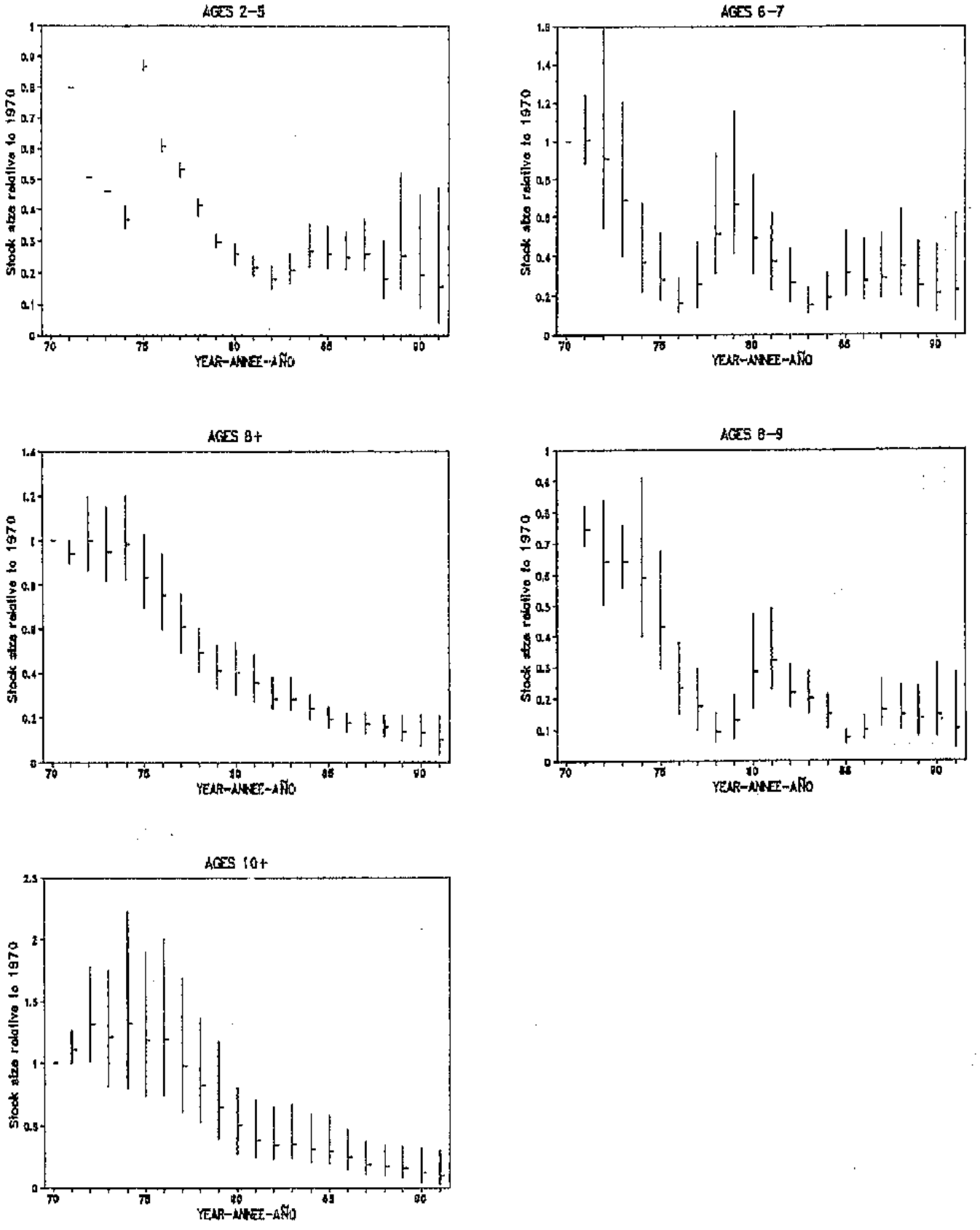
BFT-Fig. 5. Base VPA run for west Atlantic bluefin and retrospective runs. OUT.10 represents the analysis using data through 1987 only; OUT.11 represents the analysis using data through 1988 only; OUT.12 represents the analysis using data through 1989 only; Base represents the analysis using all of the data through 1990.



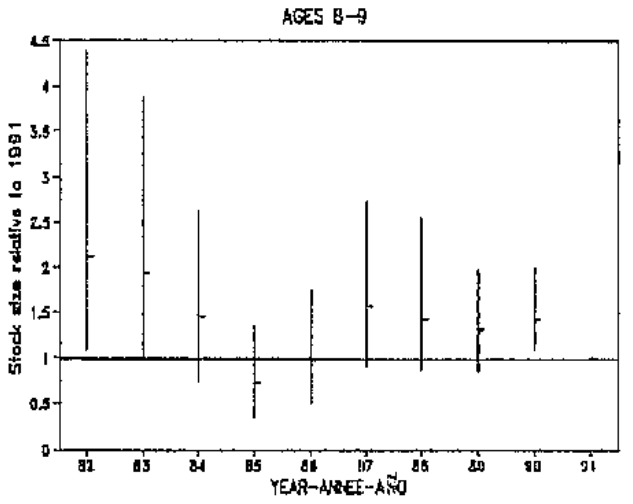
BFT-Fig. 6. Comparison between results of VPA and non-equilibrium age-structured production model.

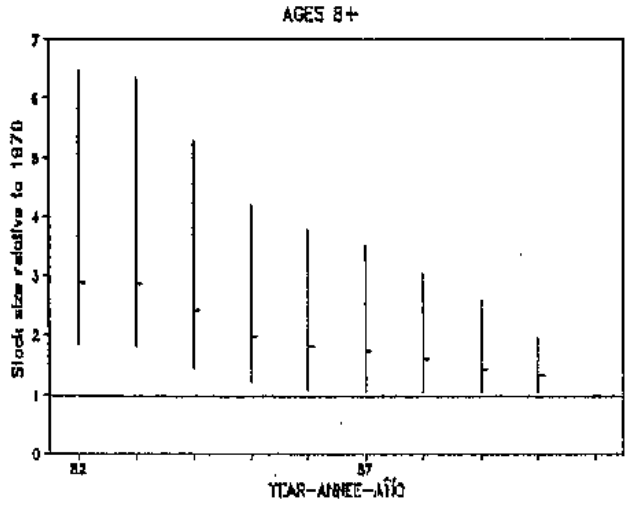


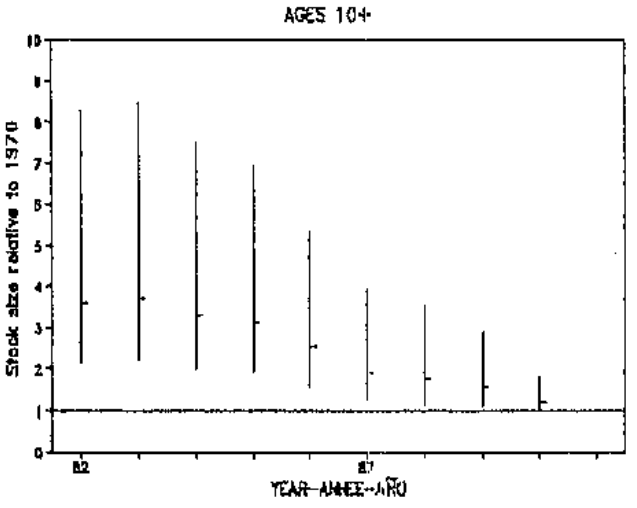
BFT-Fig. 7. Relative stock size (numbers of fish) and relative fishing mortality rate normalized to 1982. Dashed lines represent approximate 90% confidence range for F/F_{82}. Bars represent approximate 90% intervals for N/N_{82} with medians indicated.



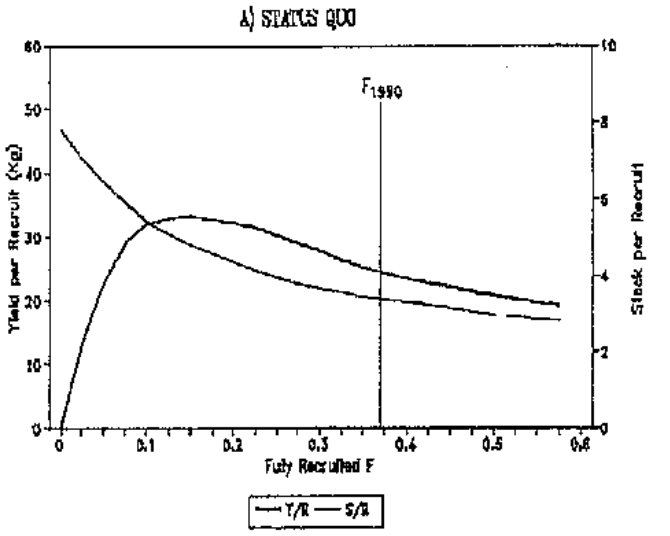
BFT-Fig. 8. Population trends for age groups of western Atlantic bluefin tuna with 90 percent confidence limits shown by vertical bars.

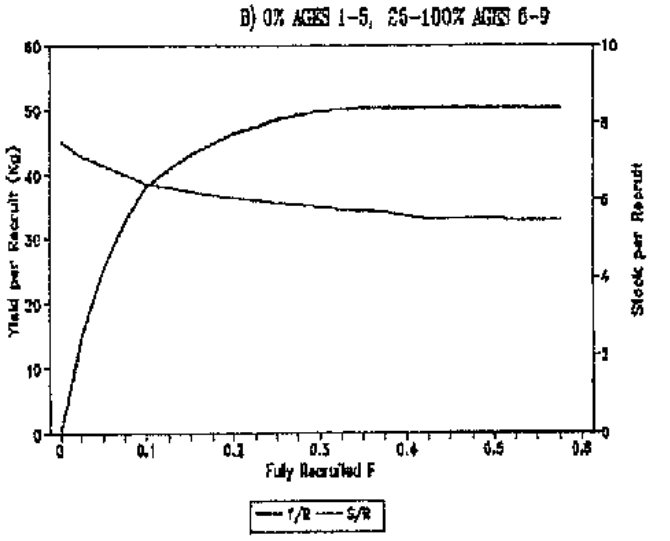


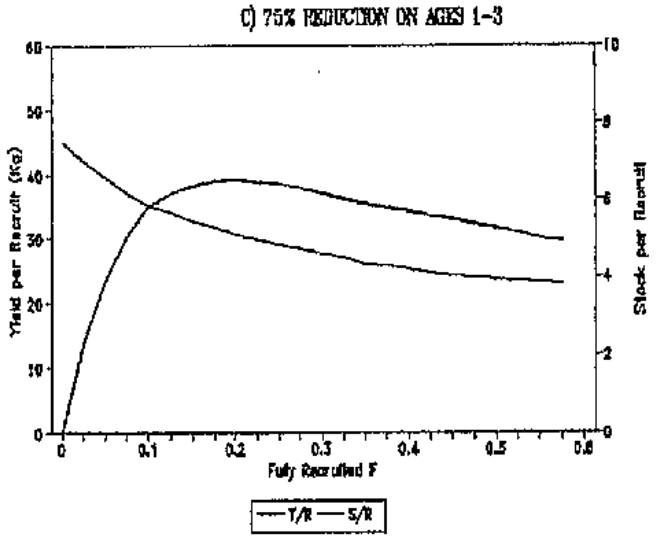




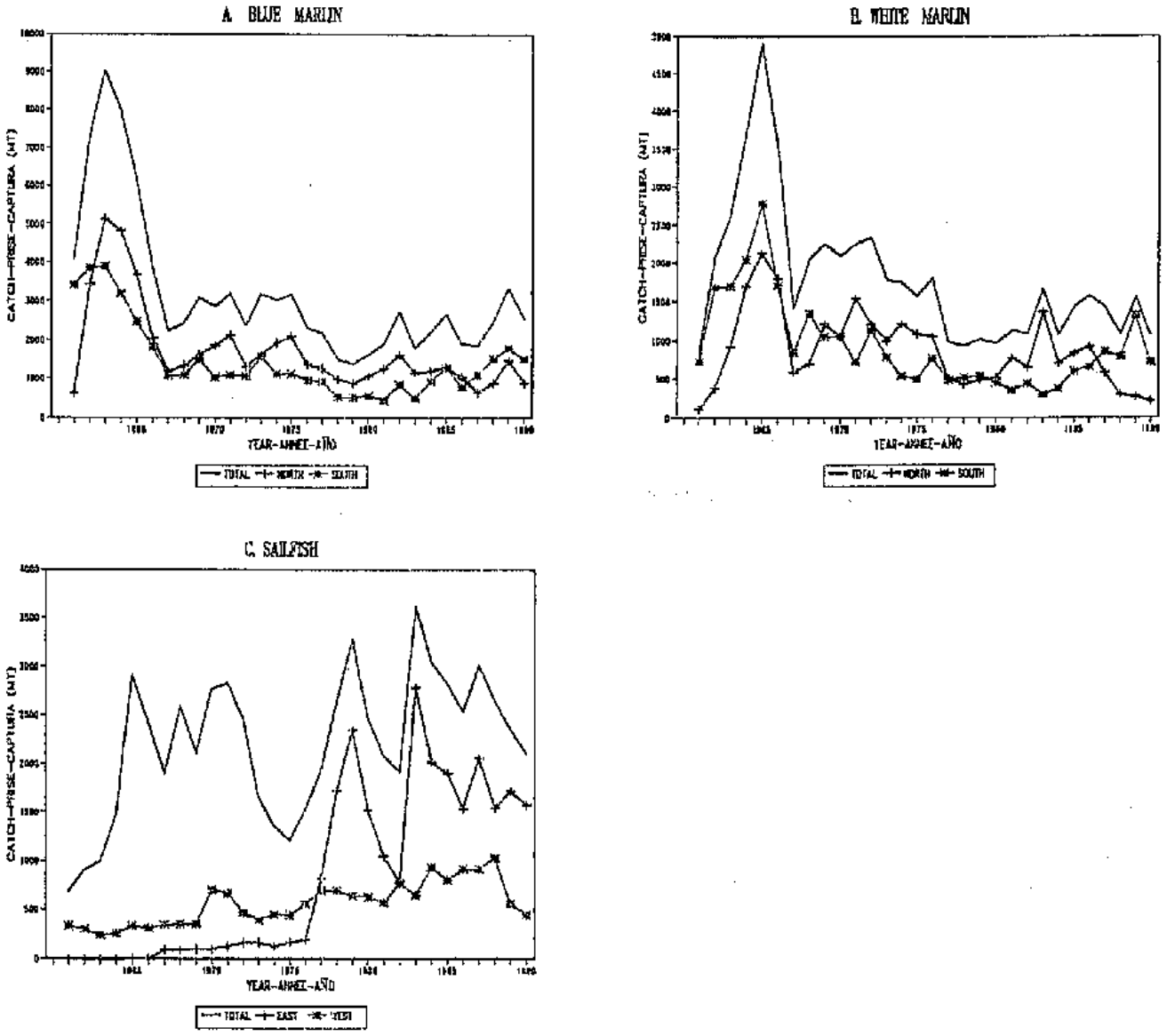
BFT-Fig. 9. Estimates of stock numbers 8-9, 8+ and 10+ expressed relative to the 1991 level.



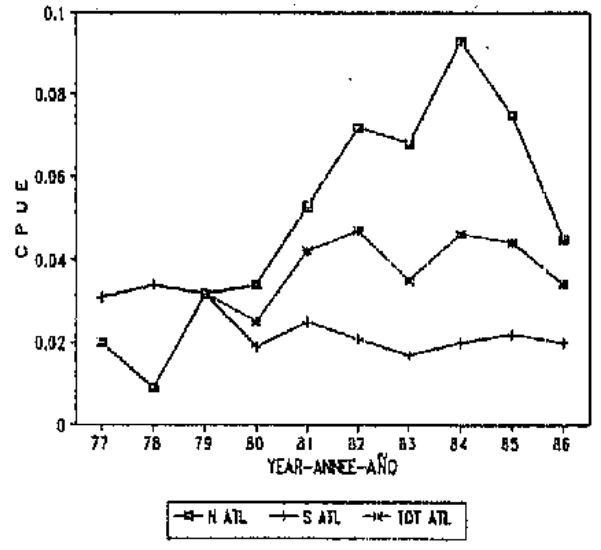




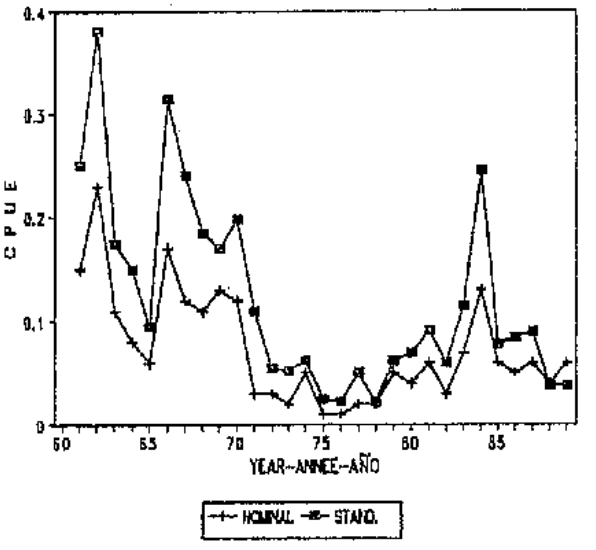
BFT-Fig. 10. Yield per recruit analysis for the status quo and two scenarios of reduced catches.



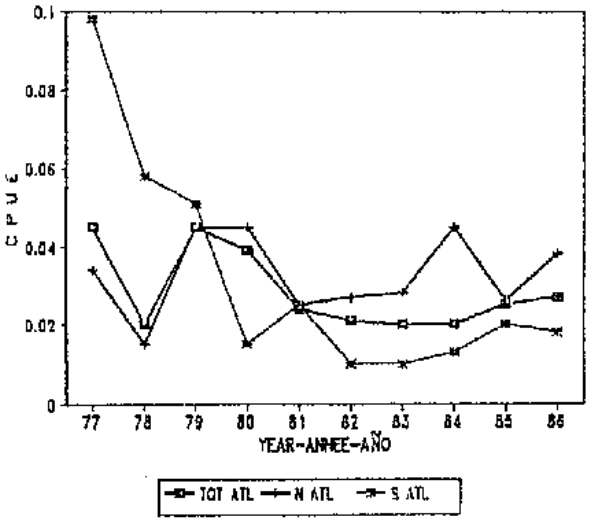
BIL-Fig. 1. Nominal landings (in MT) for blue marlin (a), white marlin (b) and sailfish (c), 1960-89.



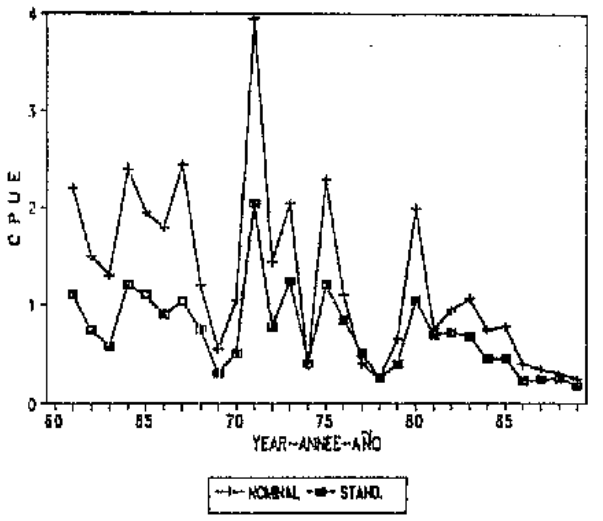
BIL-Fig. 2A. CPUE (number of fish per 1000 hooks) for blue marlin by the Japanese longline fishery in the north, south and whole Atlantic, 1977-86



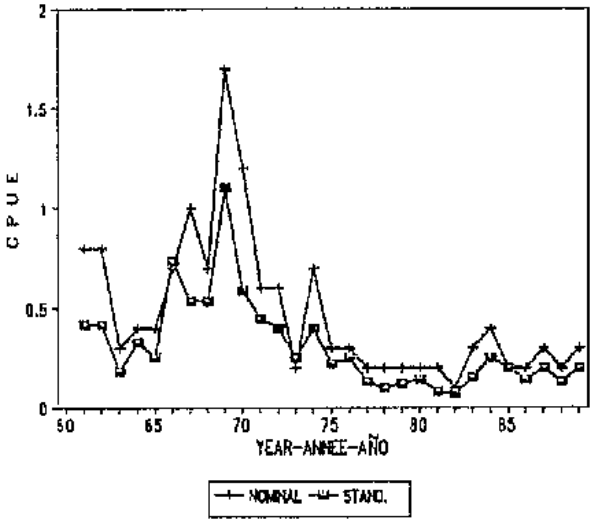
BIL-Fig. 2B. Annual nominal and standardized recreational CPUE for blue marlin from Venezuela, 1960-1989.



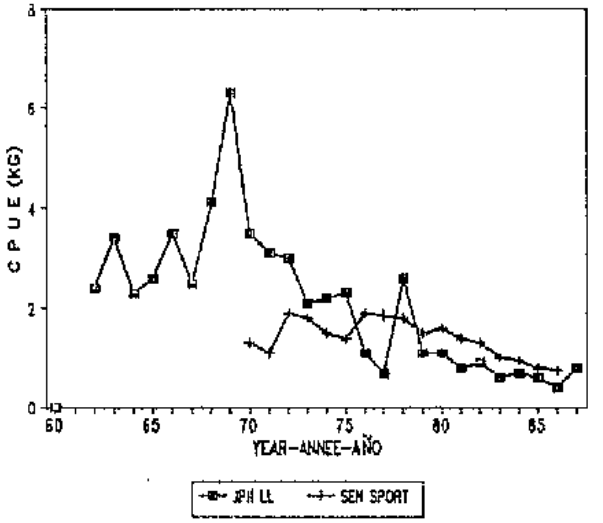
BIL-Fig. 3A. CPUE (number of fish per 1000 hooks) for white marlin by the Japanese longline fishery in the north, south and whole Atlantic, 1977-86.



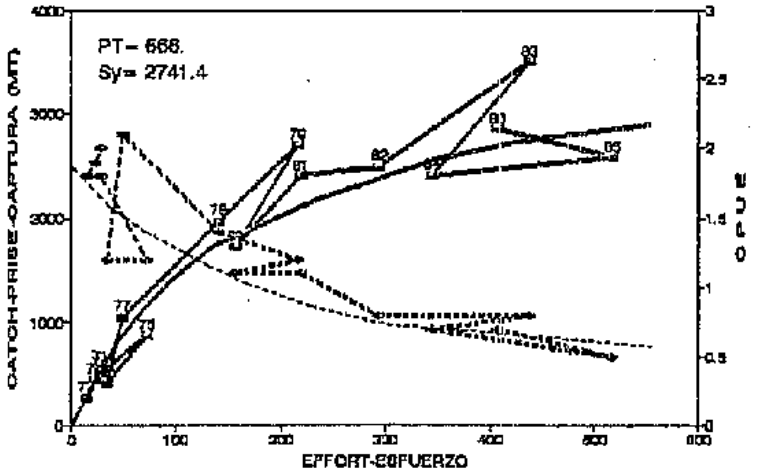
BIL-Fig. 3B. Annual nominal and standardized recreational CPUE for white marlin from Venezuela, 1960-1989.



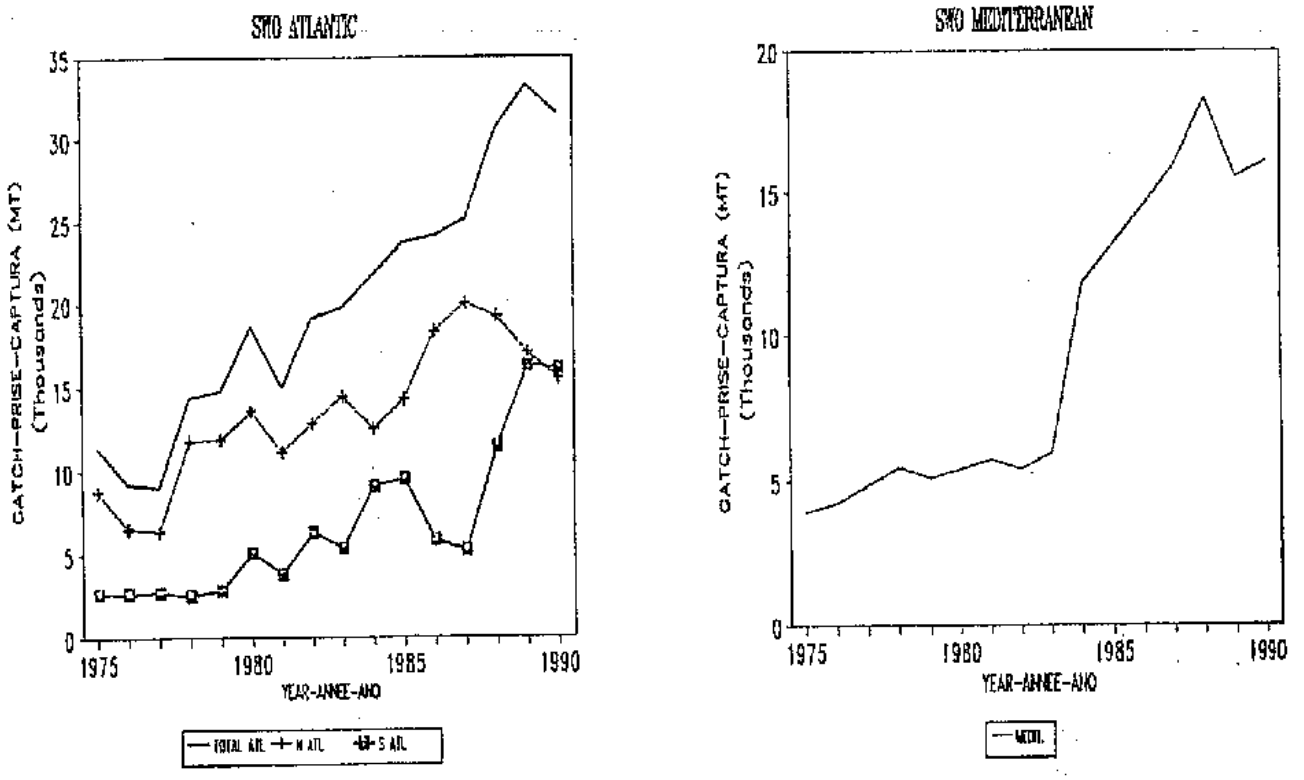
BIL-Fig. 4A. Annual nominal and standardized recreational CPUE for sailfish from Venezuela, 1960-89.



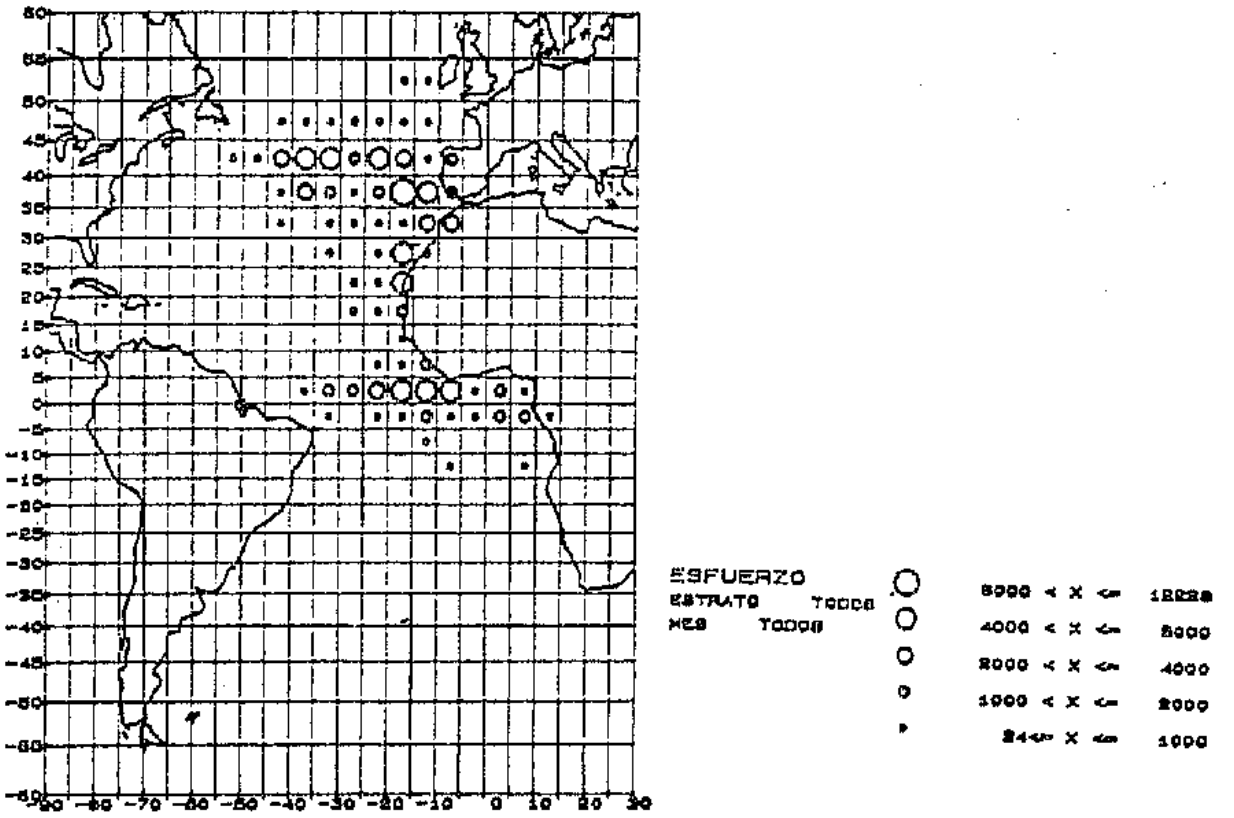
BIL-Fig. 4B. Sailfish CPUE (in Kg) calculated by the Houma method, for Japanese longline of the central and east Atlantic and for the Dakar-based recreational sailfish fishery, 1961-86.



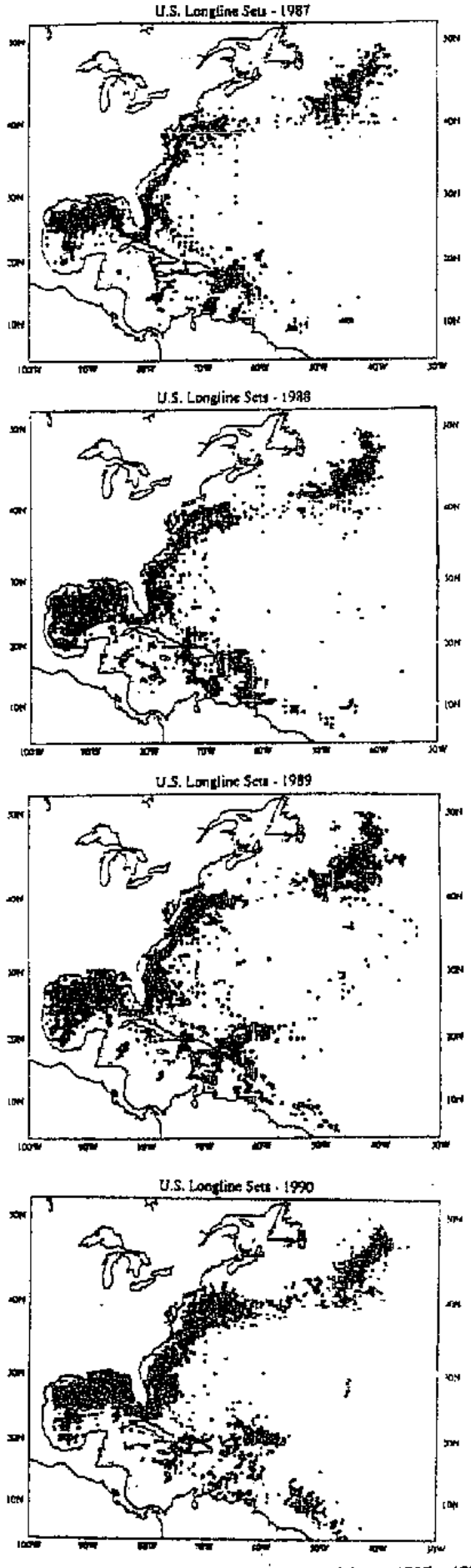
BIL-Fig. 4C. Generalized production model (Pella and Thomlinson) with best parameters for the east Atlantic sailfish, 1971-86 (M = 0.39).



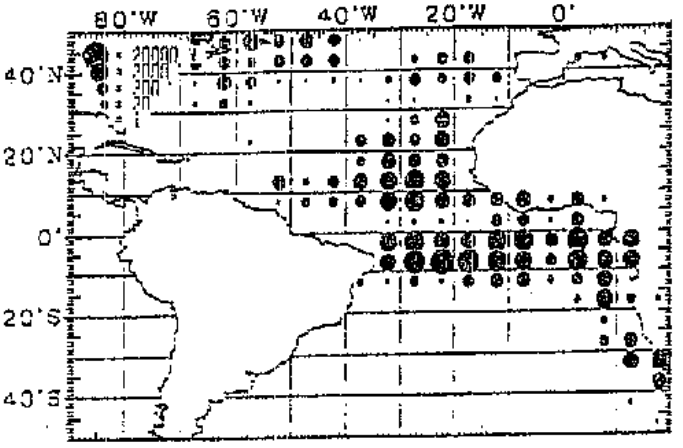
SWO-Fig. 1. Annual nominal catches of swordfish in the Atlantic and Mediterranean.



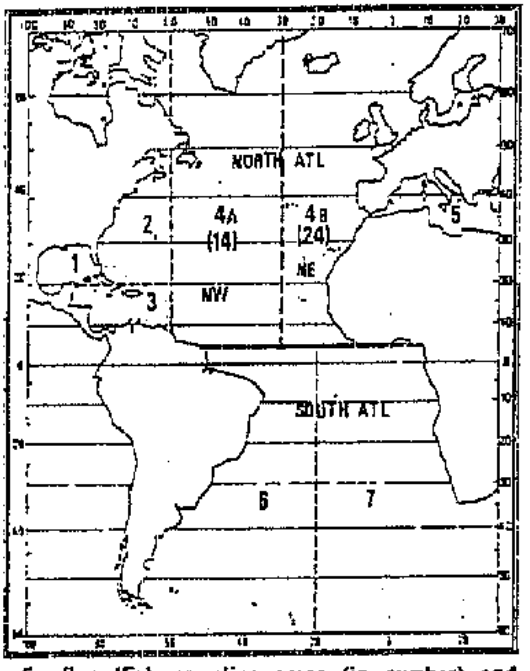
SWO-Fig. 2. Distribution of Spanish fishing effort (in thousands of hooks) by 5-degree square (1988-90 combined).



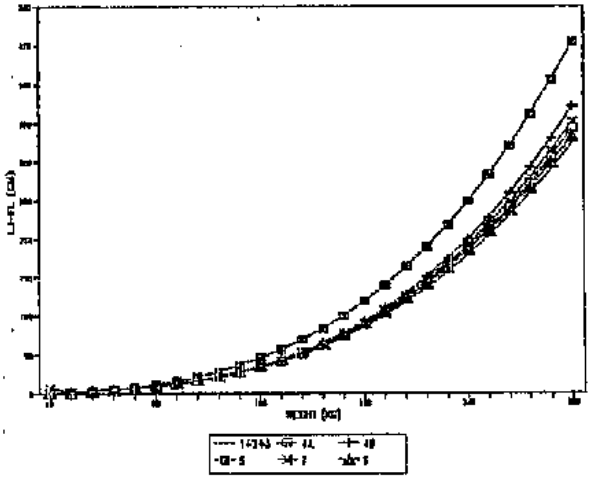
SWO-Fig. 3. U.S. swordfish longline set positions, 1987 - 1990.



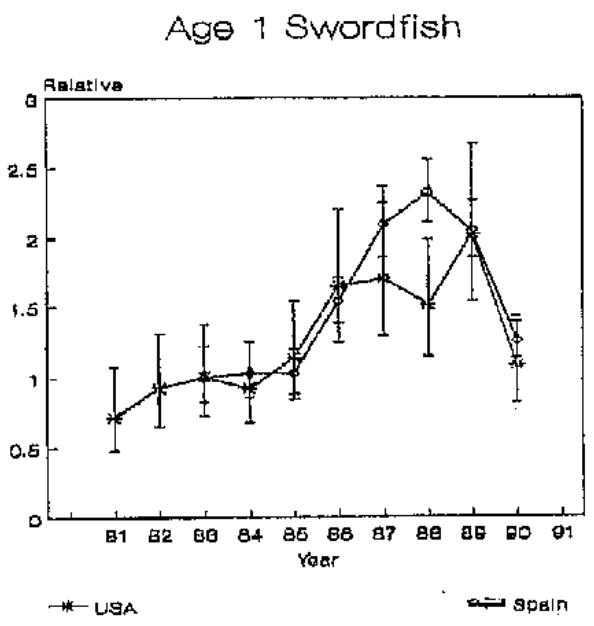
SWO-Fig. 4. Distributions of Japanese longline catch (in number) by 5-degree square in 1990. Data are provisional and presented as catch rather than effort as this is a by-catch fishery.

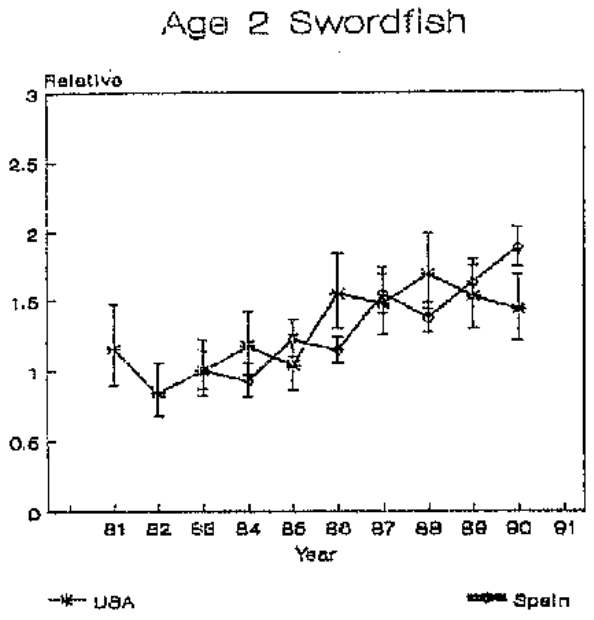


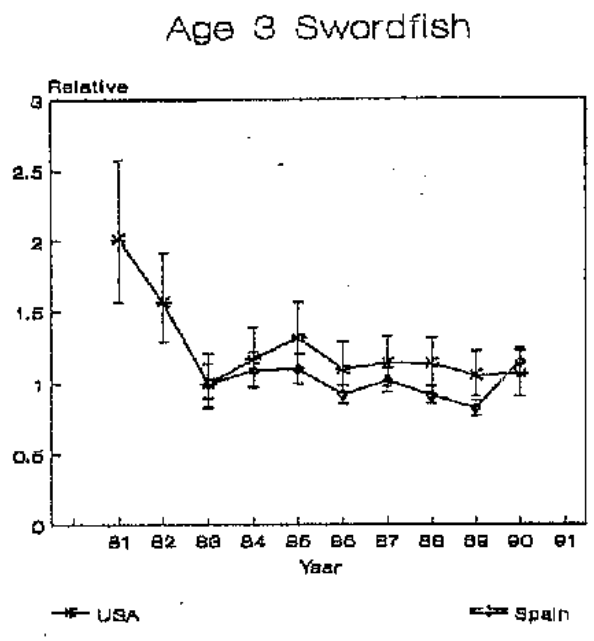
SWO-Fig. 5. Swordfish sampling areas (in number) and four scenarios for swordfish stocks.

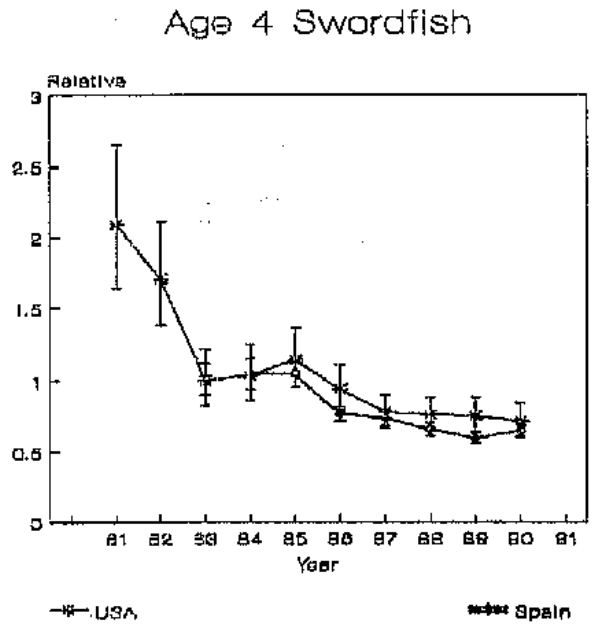


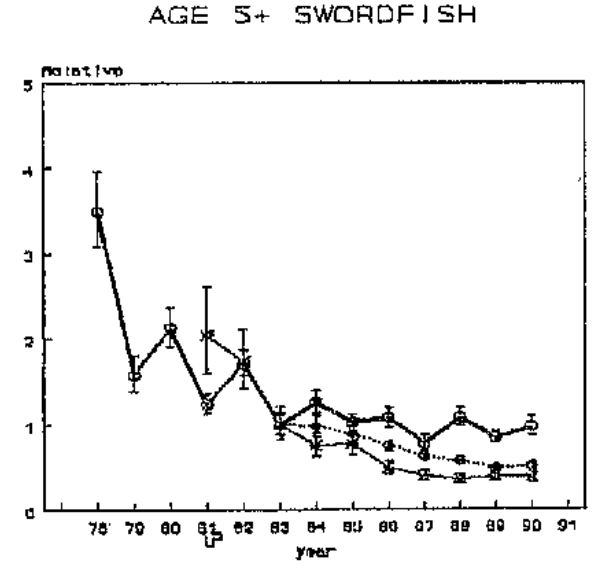
SWO-Fig. 6. Comparison of length-weight relationship adopted for each sampling area.



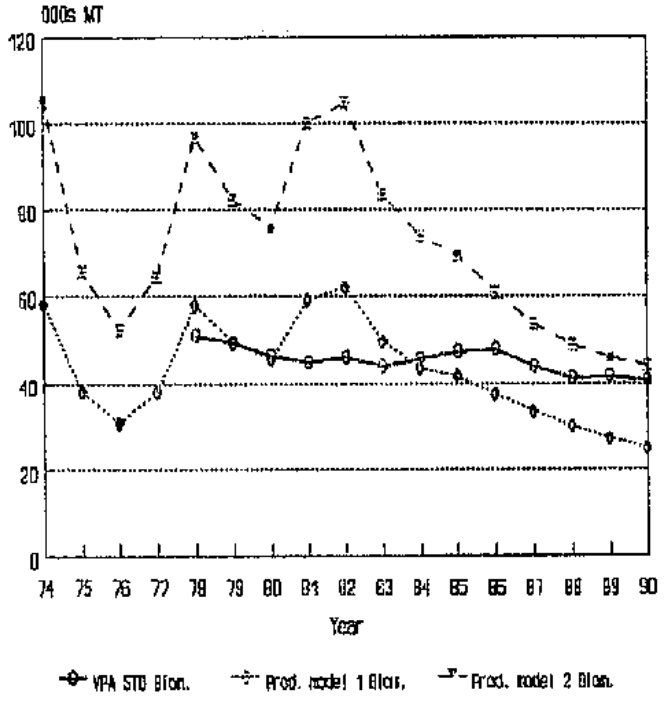




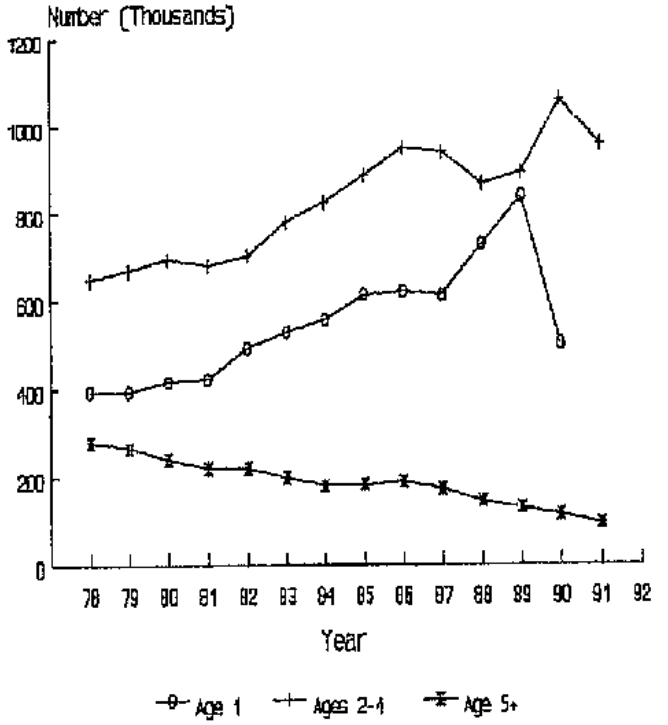




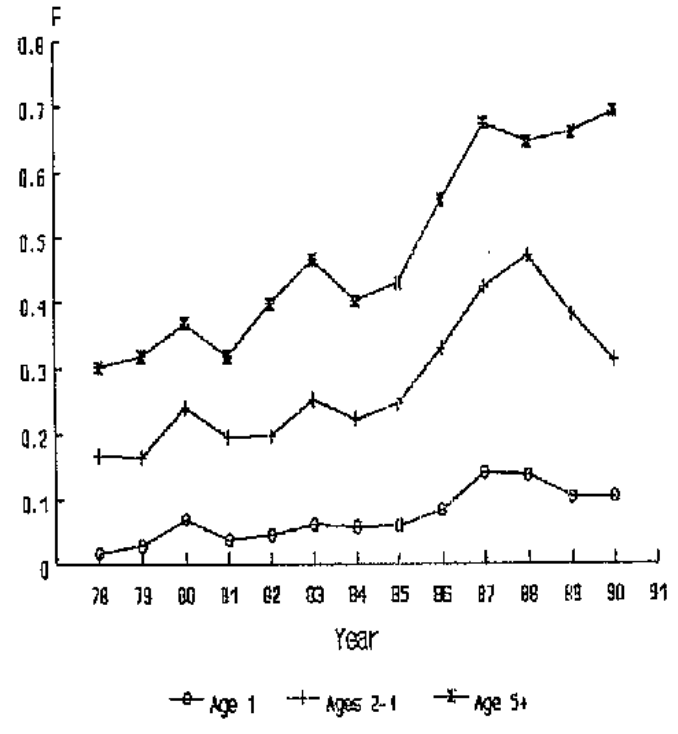
SWO-Fig. 7. Standardized CPUE indices used in the North Atlantic Swordfish VPA (Reference year = 1983).



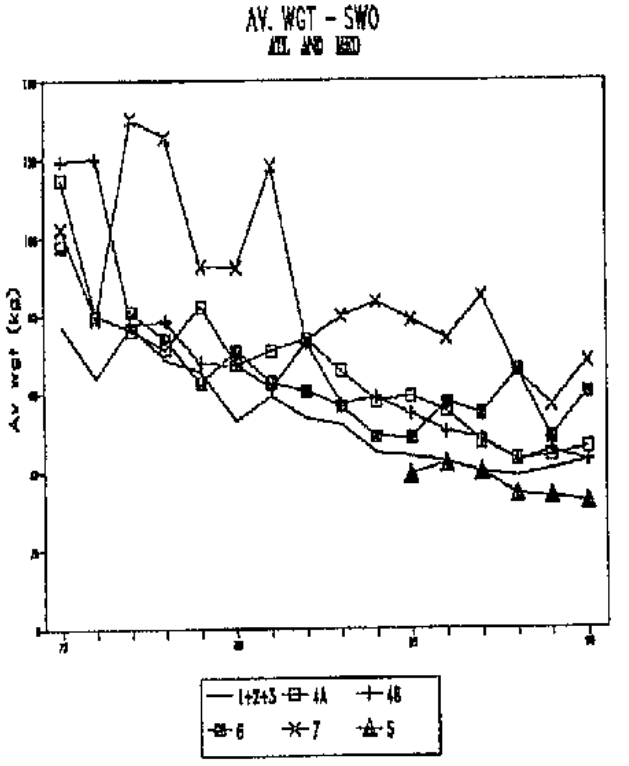
SWO-Fig. 8. Estimated north Atlantic swordfish stock biomass, as provided by the accepted VPA and SCRS/91/46 stock-production model using two different combinations of input parameters. (See Reference Paper SCRS/91/16 for production model options).



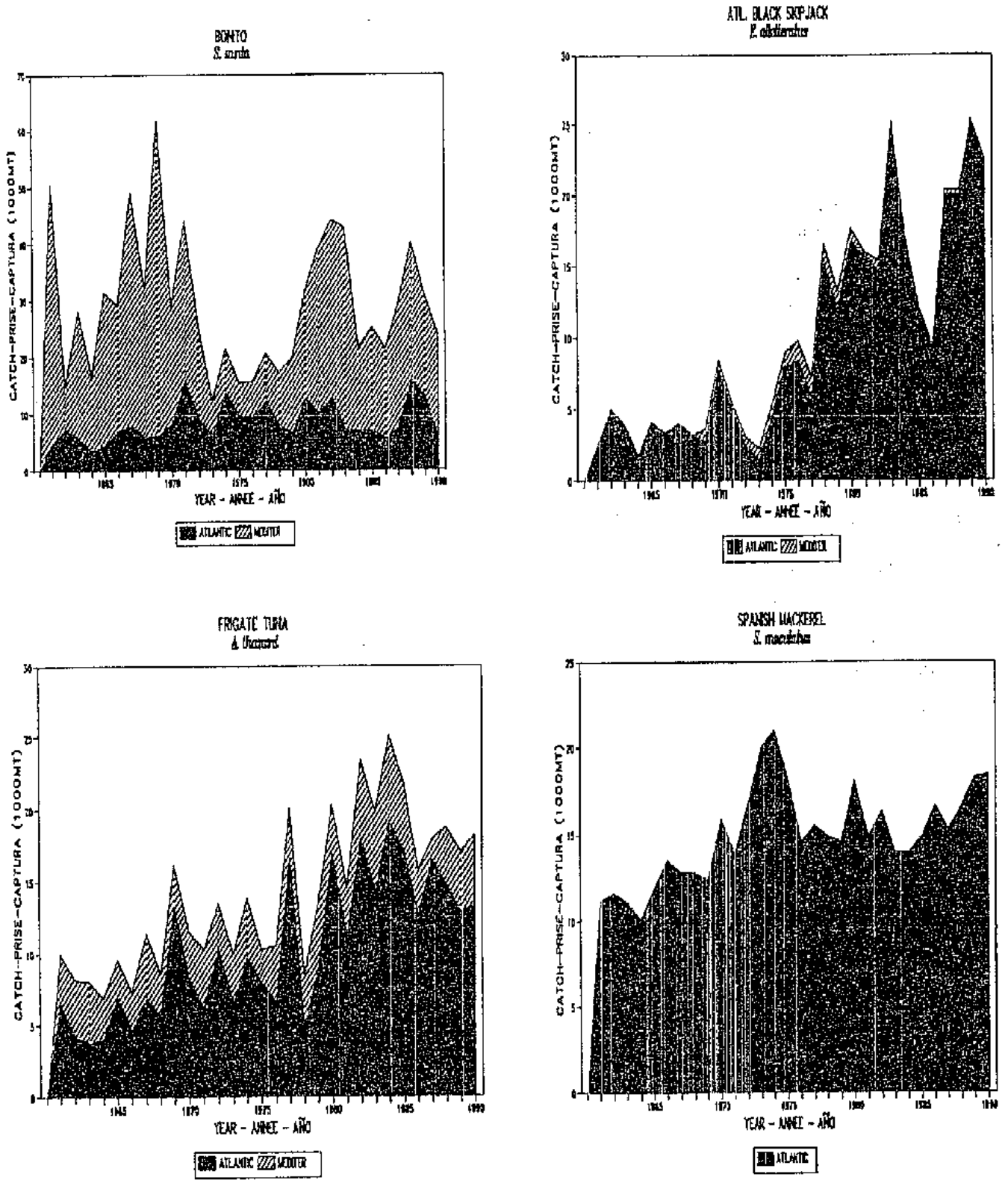
SWO-Fig. 9. North Atlantic swordfish stock size (number of fish) at beginning of year by age category, estimated by the accepted VPA.



SWO-Fig. 10. North Atlantic swordfish fishing mortality during the year by age category, as provided by the accepted VPA.



SWO-Fig. 11. Trends in average weight (kg round) in the swordfish catch, by ICCAT sampling areas (see SWO-Fig. 5).



SMT-Fig. 1. Atlantic and Mediterranean catches (in 1000 MT) of four major species of small tunas, 1961-1990.

1991 SCRS AGENDA

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of delegations
4. Admission of observers
5. Admission of scientific papers
6. Review of national fisheries and research programs
7. Report of the Working Group on Western Atlantic Tropical Tunas
8. Review of the progress made by the Albacore Research Program
9. Review of the progress made by the Program for Enhanced Research for Billfish
10. Review of conditions of stocks:
    Tropical tunas: YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack
    ALB-Albacore
    BFT-Bluefin
    BIL-Billfishes
    SWO-Swordfish
    SBF-Southern Bluefin
    SMT-Small Tunas
    MLT-Multi-species: Tropical and Temperate
11. Report of the Sub-Committee on Environment
12. Review of the ecology of tunas (e.g., association with other animals, gear selectivity, species interaction, by-catches, etc.)
13. Report of the Sub-Committee on Statistics and review of Atlantic tuna statistics and data management system
14. Review of editorial and publication policy
15. Review of future SCRS research programs and consideration of SCRS meeting procedures
    a) Organization of SCRS meeting
    b) Intersessional meetings
    c) Bluefin Year Program
    d) Other matters
16. Cooperation with other organizations
    a) IATTC
    b) FAO/GFCM
    c) IPTP
    d) CWP, NAFO, ICES, etc.
17. Recommendations
18. Other matters
19. Adoption of Report
20. Election of Chairman
21. Adjournment

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LIST OF SCRS DOCUMENTS

SCRS/91/1 Agenda of the 1991 SCRS - Secretariat

SCRS/91/2 1991 SCRS Annotated Agenda - Secretariat

SCRS/91/3 Agenda of Sub-Committee on Statistics - Secretariat

SCRS/91/4 Organization of the 1991 SCRS Meeting - Secretariat

SCRS/91/5 Document Policy - Secretariat

SCRS/91/6 Secretariat data preparation for the Meeting of the Working Group on Western Atlantic Tropical Tunas - Miyake, P. M.

SCRS/91/7 Agenda of Sub-Committee on Environment - Secretariat

SCRS/91/8 Bluefin data substitutions and raising made for 1991 SCRS - Miyake, P. M., P. Kebe

SCRS/91/9 Swordfish data substitutions and raising made for 1991 SCRS - Miyake, P. M., P. Kebe

SCRS/91/10 Albacore data substitutions and raising made for 1991 SCRS - Miyake, P. M., P. Kebe

SCRS/91/11 Secretariat Report on Statistics

SCRS/91/12 Meeting of the Working Group on Western Atlantic Tropical Tunas

SCRS/91/13 Information relating to large-scale driftnet fishing

SCRS/91/14 Proposal of Bluefin Year Program (BYP)

SCRS/91/15 Secretariat Report on the Coordination of the ICCAT Enhanced Billfish Research Program

SCRS/91/16 Reference paper on 1991 swordfish stock assessments - SCRS Swordfish Assessment Group

SCRS/91/17 Report of the Ad-Hoc Meeting on Progress in the ICCAT Albacore Research Program (Sukarrieta, 12-16 July, 1991)

SCRS/91/18 Progress of the ICCAT Enhanced Research Program for Billfish in the western Atlantic Ocean during 1991 - Prince, E. D.

SCRS/91/19 Les pêcheries d'istiophoridés en l'Atlantique est: bilan des activités de recherches en 1990-1991 - Diouf, T.

SCRS/91/20 Trends in catch, fishing effort, catch rate and length data for the Japanese longline fishery in the Atlantic Ocean, 1955-1989 - Suzuki, Z.

SCRS/91/21 Distribution, abundance, growth, mortality, and spawning dates of yellowfin tuna, *Thunnus albacares*, larvae around the Mississippi River discharge plume - Grimes, C. B., K. L. Lang

SCRS/91/22 History of the western Atlantic U.S. yellowfin fishery - Browder, J. A., G. P. Scott

SCRS/91/23 Fisheries and stocks of yellowfin tuna in the Pacific and Indian Oceans - Status and review of assessment methods - Sakagawa, G. T., P. M. Kleiber

SCRS/91/24 ASPIC - A surplus-production model incorporating covariates - Prager, M. H.

SCRS/91/25 Standardized catch rates of yellowfin tuna in the (U.S.) sport fisheries from Virginia to New York - Cramer, J., A. M. Eklund

SCRS/91/26 Standardized catch rates of yellowfin tuna, *Thunnus albacares*, from the United States longline fishery in the Atlantic Ocean - Turner, S. C., G. P. Scott

SCRS/91/27 Nota sobre los seagos entre las bitácoras y los muestreos multiespecíficos de la flota atunera venezolana de superficie - Gaertner, D., C. Castillo, X. Gutiérrez, H. Salazar, O. Rodríguez, L. Astudillo

SCRS/91/28 Relación longitud-peso para el atún aleta amarilla en el Atlántico oeste - Gaertner, D., H. Salazar, O. Rodríguez, L. Astudillo, C. Castillo

SCRS/91/29 Etat d'exploitation de l'albacore (*Thunnus albacares*) à partir des données de la flotte vénézuélienne, au 31/12/90 - Gaertner, D.

SCRS/91/30 Modeling a single Atlantic yellowfin stock with a mixing model - Fonteneau, A.

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SCRS/91/34 Trend of CPUE for swordfish caught by the Japanese longline fishery in the Atlantic Ocean - Miyabe, N.

SCRS/91/35 Possible biases in the VPA estimates of population sizes of the plus group - Hiramatsu, K.

SCRS/91/36 Length-based virtual population analysis. A review and swordfish example - Mohn, R.

SCRS/91/37 Análisis preliminar del sex-ratio por clase de talla del pez espada (*Xiphias gladius*) en el área atlántica próxima al estrecho de Gibraltar - De la Serna, J. M., E. Alot, J. Mejuto

SCRS/91/38 Análisis preliminar de la madurez sexual de pez espada (*Xiphias gladius*) en el área atlántica próxima al estrecho de Gibraltar - De la Serna, J. M., E. Alot, M. D. Godoy

SCRS/91/39 Nota sobre las actividades de marcado de pez espada (*Xiphias gladius*) en el Mediterráneo occidental durante el año 1990 - De la Serna, J. M., E. Alot

SCRS/91/40 Additional options for age-sequenced analysis - Powers, J. E., V. R. Restrepo

SCRS/91/41 Standardized catch rates for swordfish (*Xiphias gladius*) from the U.S. longline fleet through 1990 - Scott, G. P., V. R. Restrepo, A. Bertolino

SCRS/91/42 Note sur la pêche des thonidés au Maroc. Comparaison des années 1989-1990

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SCRS/91/47 Analyses of North Atlantic swordfish catch-at-age data under alternative hypotheses about growth and sex ratio - Restrepo, V. R., G. P. Scott, J. E. Powers

SCRS/91/48 Stock differentiation of Atlantic swordfish using mitochondrial DNA analyses - Alvarado Bremer, J. R.

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SCRS/91/51 Particularités de répartition et caractéristique biologique de la melva *Auxis rochei* (Risso) dans les eaux du Sahara - Grudtsev, M. E.

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SCRS/91/58 Théorie cohérente du comportement des thonidés dans leur habitat - Petit, M., J. M. Stretta

SCRS/91/59 De la synthèse écologique à l'évaluation de la ressource: les méthodes directes par télédétection - Petit, M., J. M. Stretta

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SCRS/91/61 Composición por especies de las capturas de túnidos con vara en Cuba - Carles Martin, C. A.

SCRS/91/62 Resultados de la campaña de marcado de atún rojo (*Thunnus thynnus*) realizada en el Mediterráneo Occidental en el año 1990. Condiciones ambientales observadas - De la Serna, J. M., E. Alot, M. D. Godoy

SCRS/91/63 Un análisis preliminar del sex-ratio por clase de talla del atún rojo (*Thunnus thynnus*) capturado por las almadrabas atlánticas españolas durante el período 1989-1991 - De la Serna, J. M., E. Alot, E. Rivera

SCRS/91/64 Análisis del sex-ratio por clase de talla y otros datos sobre la madurez sexual del atún rojo (*Thunnus thynnus*) en el área del Mediterráneo occidental durante el período 1988-1991 - De la Serna, J. M., E. Alot

SCRS/91/65 Análisis de las CPUEs por grupos de tallas del pez espada (*Xiphias gladius*) capturado con artes de superficie y enmalle a la deriva en el área del Estrecho de Gibraltar, durante los años 1989 y 1990. Relación con la fase lunar y otros factores ambientales - De la Serna, J. M., E. Alot, E. Rivera

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SCRS/91/92 An exploratory dynamic surplus-production analysis of the Japanese, Mexican and U.S. longline fisheries for yellowfin tuna in the Gulf of Mexico - Prager, M. H., J. A. Browder

SCRS/91/93 Bias-corrected length-weight relationships for Atlantic blue marlin, white marlin, and sailfish - Prager, M. H., D. W. Lee, E. D. Prince

SCRS/91/94 Status of Taiwanese longline fisheries in the Atlantic - Hsu, C. C., H. C. Liu

SCRS/91/95 Updated indices of larval bluefin tuna (*Thunnus thynnus*) abundance from ichthyoplankton surveys in the Gulf of Mexico - Scott, G. P., S. C. Turner

SCRS/91/96 Further analysis of tag recovery data of bluefin tuna from Miyabe and Suzuki SCRS/88/23 - Saila, S. B.

SCRS/91/97 Short-term forecasts based on standardized CPUE of western Atlantic bluefin tuna caught by the Japanese longline fishery - Saila, S. B.

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SCRS/91/99 Report of the bycatch of billfishes based on swordfish logbook data from 1987 through 1990 - Farber, M. I.

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SCRS/91/101 Sensitivity of bluefin tuna virtual population analyses and projections to uncertainty in inputs - Turner, S. C., V. R. Restrepo

SCRS/91/102 Standardized catch rates of small bluefin tuna in the Virginia (U.S.) rod and reel fishery - Cramer, J., C. A. Brown, J. A. Lucy

SCRS/91/103 Description of the rod and reel fishery for Atlantic bluefin tuna off the northeastern United States, with emphasis on medium bluefin - Eklund, A. M., J. A. Browder

SCRS/91/104 An exploratory data analysis of bluefin tuna longline bycatch reported on mandatory swordfish logbooks during 1987-1990 in the Gulf of Mexico and off the Florida east coast - Farber, M. I., S. C. Turner

SCRS/91/105 Age specific standardized indices of abundance for albacore (*T. alalunga*) from the Spanish surface fleets in the North Atlantic, 1983-1990 - Mejuto, J., R. Conser, B. García

SCRS/91/106 Identification of sailfish, *Istiophorus albicans*, with an enzyme-linked immunoassay - Rossi, E. A., S. R. Shepard, J. C. Poyer, J. X. Hartmann

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SCRS/91/116 Pesquerías nacionales de Venezuela en 1990 - Salazar, H.

SCRS/91/117 Bilan des travaux du groupe de travail IPTP sur l'albacore de l'Océan Indien - Colombo, Septembre 1991 - Fonteneau, A.

SCRS/91/118 Reference paper on 1991 bluefin tuna stock assessments - SCRS Bluefin Assessment Group

Appendix 4 to Annex 16

REPORT OF THE AD-HOC COMMITTEE ON ADMISSION OF SCIENTIFIC PAPERS

The Ad-Hoc Committee on Admission of Scientific Papers, chaired by Dr. B. E. Brown, reviewed manuscripts submitted to the 1991 SCRS Meeting.

This year, 118 documents were submitted; two additional papers were received at the Secretariat after the species assessments were conducted. The Committee decided to defer acceptance of these two manuscripts into the SCRS Reports to 1992. However, it agreed to distribute the papers at this time among the scientists involved, since the data included in the papers could be used in future stock assessment analyses.

Several papers presented this year did not have the required number of copies, however, since sufficient copies to provide the species working groups arrived prior to the assessments, the Committee accepted these papers.

The Ad-Hoc Committee recommends to the SCRS that a criterion be established that all documents must be submitted through the delegations of member countries or invited observer delegations. For this reason, one manuscript was not accepted for inclusion into the SCRS Report as it was not submitted through an appropriate delegation. However, the Ad-Hoc Committee suggested that this particular manuscript, without registration as an SCRS document, be made available to the ICCAT participants for purposes of examining its scientific value.

The Committee reiterated the criteria for admission of papers to the SCRS Report and encouraged member country and observer delegations to follow these guidelines.

COMMENTS ON THE STOCK STRUCTURE OF ATLANTIC YELLOWFIN TUNA

The existence of two independent stocks of yellowfin tuna, in the east and the west Atlantic, is an hypothesis which has been widely accepted by the Committee, as a basis for the assessments. However, this hypothesis is in contradiction with the results of the analysis of diverse information available on stock structure.

Basically, the information analyzed is as follows:

1) Catch rates
2) Size distribution of the catches
3) Data from tagging

1. CATCH RATES

1.a The longline fishery

Traditionally, the longline data have been in contradiction with the hypothesis of two independent stock units for the Atlantic yellowfin tuna. This fishery, directed at the adult component of the stock, extends in a continuous way throughout the intertropical Atlantic (YFT-Appendix-Figure 1 (SCRS/91/30)).

Honma and Hisada considered, in 1971, the existence of a migratory component of adult yellowfin, from east to west, from an analysis of the time/area distribution of the CPUE's of Japanese longliners. YFT-Appendix-Figure 2 shows the migratory model proposed by the aforementioned authors.

1.b Purse seine fisheries

An analysis of the CPUE of juveniles shows small-scale movements in a north-south direction.

On the other hand, the average CPUEs by time area strata (YFT-Appendix-Figure 3) suggest movements of the adult stock from the eastern fishing areas, where fishing takes place in December and January, towards the central Atlantic.

2. SIZE DISTRIBUTIONS OF THE CATCHES

YFT-Appendix-Figure 4 shows the size distributions of the catches of yellowfin in the east and west Atlantic. In comparing both size distributions, more small sizes (< 50 cm) are observed for the east Atlantic, there is almost a total absence of intermediate-sized fish (70-100 cm), which, on the contrary, constitute the main component of the western catches, and there are a greater number of large-size yellowfin over 150 cm.

These marked differences can be interpreted in a model of the stock with two migratory components:

East-West for intermediate sizes.
West-East for large sizes that move towards the spawning areas of the east Atlantic.

In this scheme, the greater presence of juveniles in the east Atlantic could indicate the existence of a more important spawning area that is better defined in the east than in the west Atlantic.

3. TAGGING RESULTS

Traditionally, the tagging programs carried out in the east Atlantic were directed at young fish that were recaptured in the area within a short period. However, since (Yellowfin Year Program) tagging has been carried out more recently on large yellowfin, off the North American coasts, there have been 15 transatlantic recoveries. Of these, 12 were recovered in the spawning area close to the equator (YFT-Appendix-Figure 5).

These recoveries would confirm the hypothesis of the existence of a genetic east-west migration.

The Yellowfin Year Program, in the section on stock structure, considered the hypothesis, summarized in YFT-Appendix-Figure 6, of two independent components of juvenile yellowfin, on both sides of the ocean, and an adult component with west-east migrations and with a degree of mixing that is difficult to define. This hypothesis was based on tag-recapture data.

The stock structure discussed in this Appendix goes beyond the interpretation of the size distributions, establishing two size-specific migrations (east-west and west-east).

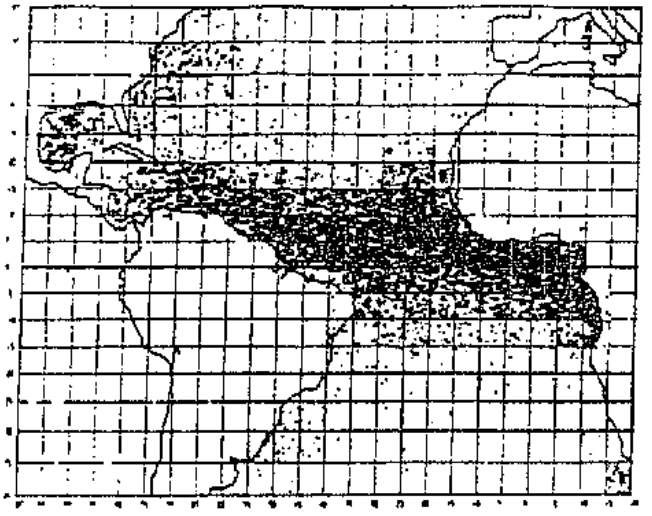
This hypothesis on the stock structure leaves several questions unanswered, such as:

-- What is the stock structure in the western Atlantic? The location of different spawning areas, the long distance that separates the

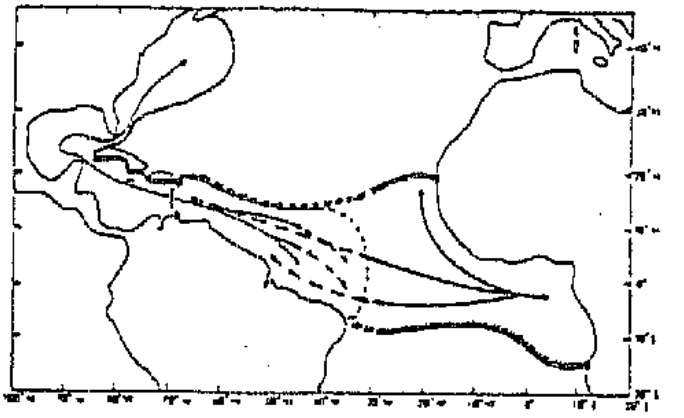
fishing areas of the different fisheries, conducted in the western Atlantic, and the differences in the size distributions of the catches (see YFT-Figures 1 and 3) could indicate the existence of more than one stock unit in the west Atlantic. However, if more than one stock units exists, their limits of distribution probably would be wide. The incoherence of the results of the model, when applied to limited areas, such as the Gulf of Mexico, indicates that only a part of the stock is being included. There are doubts concerning establishing the north-south and west-east limits of the stock.

-- Are there two stock components differentiated by depth? The lack of recoveries from the longline fleets, taking into account their wide area of distribution and since they take the same sizes as the purse seiners, could be interpreted either as a problem of misinformation on the recoveries, or as being indicative of the difference between the deep-water fish and surface fish.

-- What is the southern limit of yellowfin tuna in the west Atlantic? YFT-Appendix-Figure 7 shows the distribution of the yellowfin CPUEs from the Japanese longline fleet. The continuity of the catch rates in the Indian Ocean and the South African coasts is broken on the Atlantic side. This discontinuity could indicate an oceanographic limit of the Atlantic yellowfin stock.

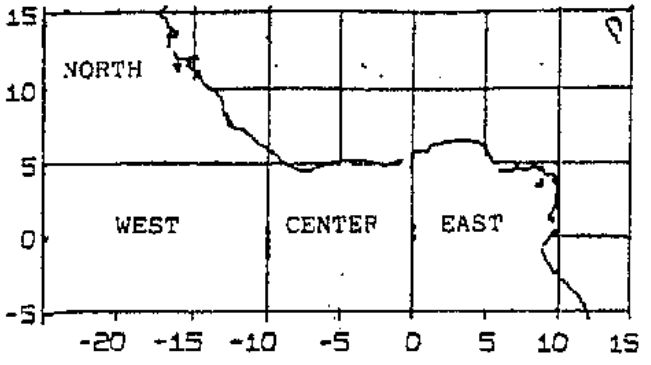


YFT-App-Fig. 1. Monthly CPUE of Japanese longliners, by 5^0 areas (plotted randomly in each area), during the period 1956 to 1980.

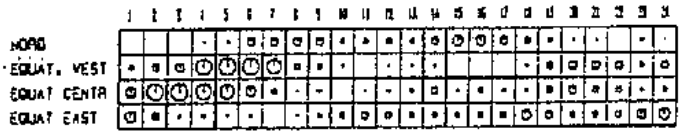


YFT-App-Fig. 2. Schematic representation of migratory routes of adult yellowfin tuna deduced from catch statistics and length composition taken by longline fishery operated in the Atlantic Ocean (Honma and Hisada, 1971)

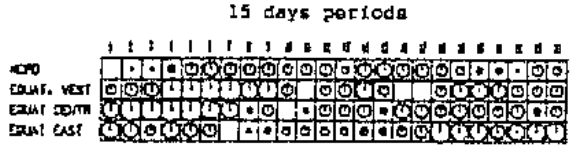
- general distributional range of the eastern group.
- general distributional range of the western group.
- migratory routes of eastern group.
- possible migratory routes of eastern group.
- migratory routes of western group.
- possible migratory routes of western group.



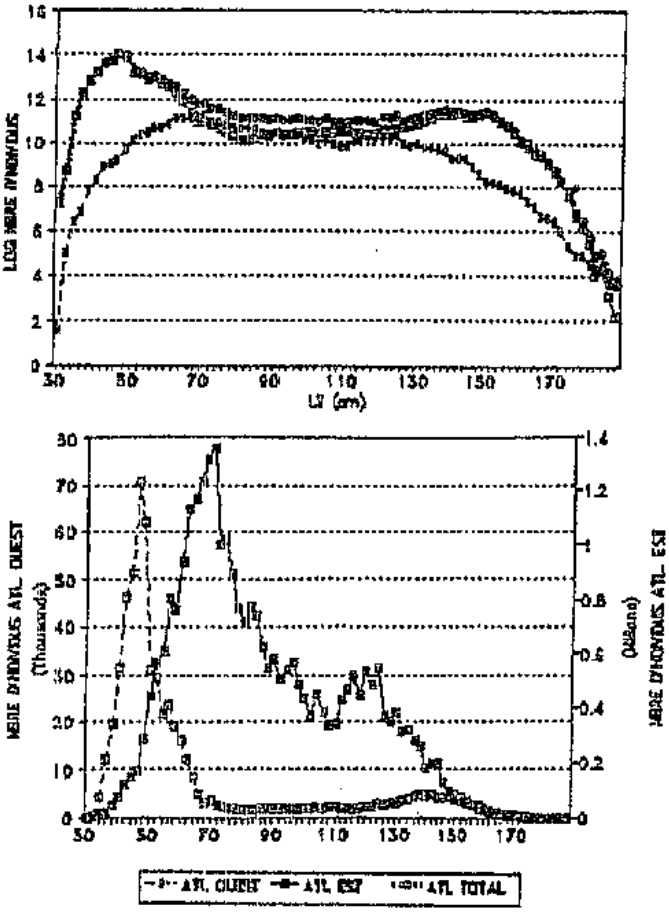
a) Catch



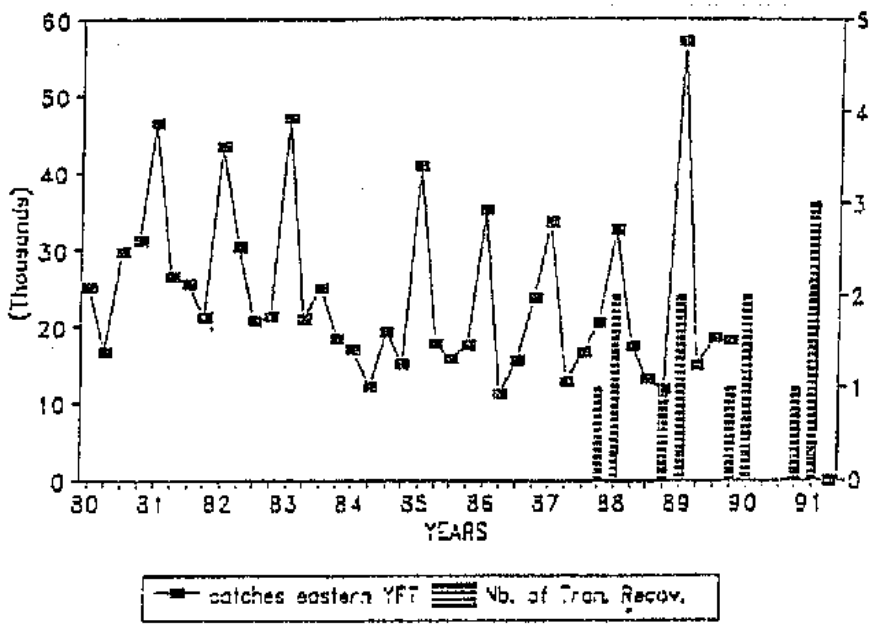
b) CPUE



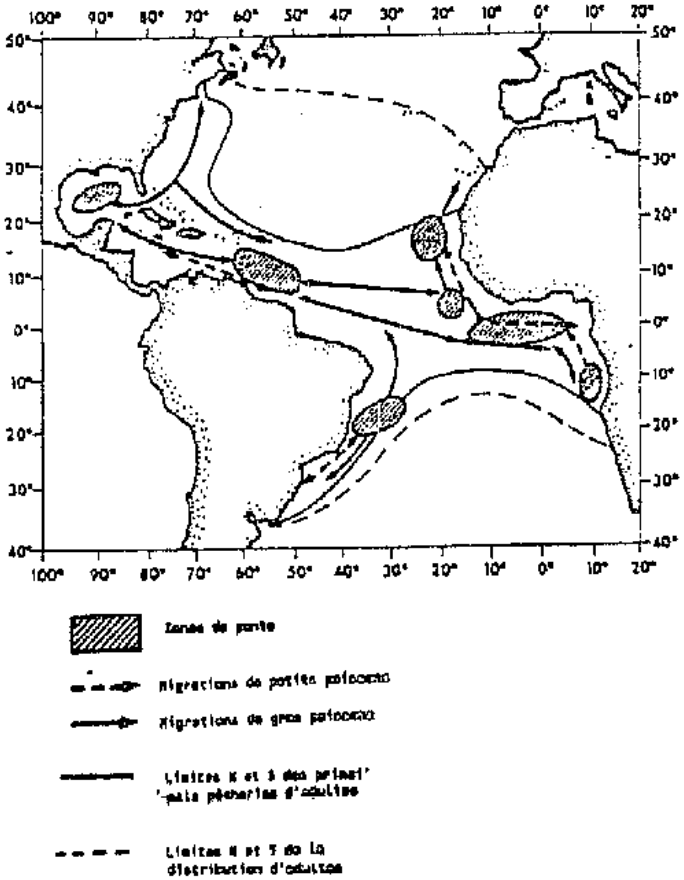
YFT-App-Fig. 3. Average catches and CPUE of large yellowfin (over 40 kg) by area for the French and Spanish purse seiners combined in the eastern Atlantic by fishing zones (in tons per 10 fishing hours), for the period 1980 to 1989.



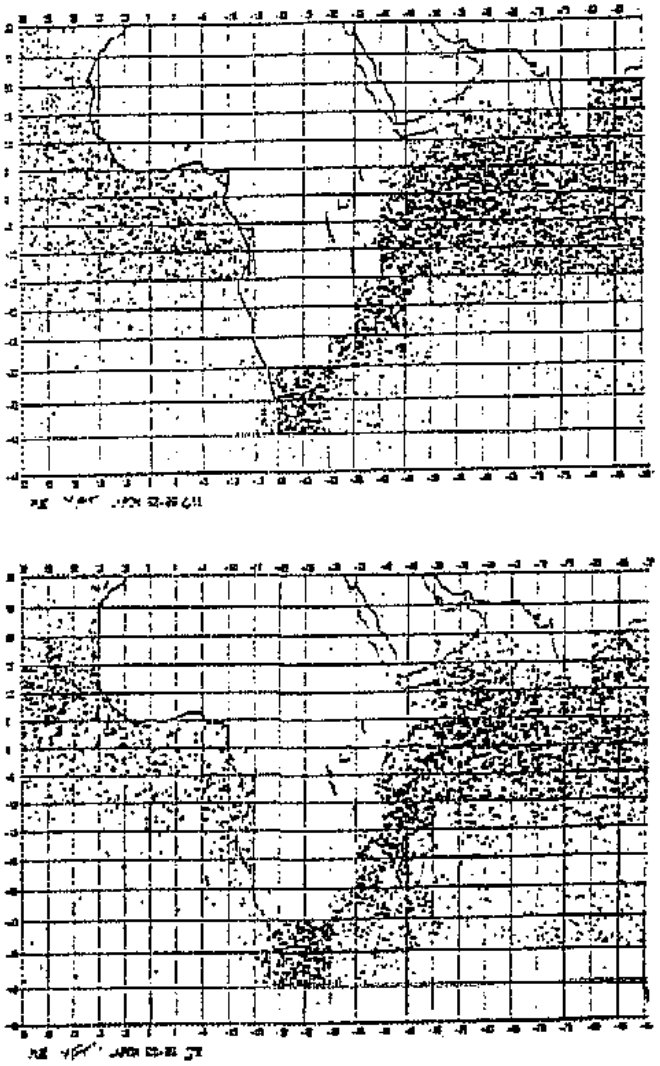
YFT-App-Fig. 4. Size distributions of east Atlantic and West Atlantic yellowfin catches. (A) logarithm and (B) normal scale.



YFT-App-Fig. 5. Quarterly catches of yellowfin in the eastern Atlantic by gears catching large yellowfin (long-line, purse seine and hand line) and corresponding transatlantic recoveries.



YFT-App-Fig. 6. Yellowfin stock structure in the Atlantic proposed following new information obtained during the research of Yellowfin Year Program.



YFT-App-Fig. 7. Monthly CPUE of Japanese longliners, by quarter, all months during the period 1962 to 1986 (random positions within each 5 degree square) in the Atlantic and Indian Oceans

ANNEX TO TROPICAL TUNAS SPECIES SECTIONS

The Committee felt that the current methodology applied to the collection and treatment of statistics for both size data and determination of the species composition of the catches) should be reconsidered.

There are various factors which indicate that current data treatment system should be changed:

a) The general development of tuna fishing associated with objects suggests that the catches obtained using floating devices should be considered separately from those taken from free schools, since data substitutions, even within the same time-area strata, would not be possible if the catches were by different fishing types (with objects and without objects). If this precaution is not taken, there will be biases in the species composition and in the size composition.

b) The existence of some area strata that correspond to sea mounts (deep emersions) or to islands, coastal areas, etc., in which peculiar catches are taken, for the same reason as indicated above, determine that these catches should be considered separately from the rest.

c) The highly migratory nature of tunas suggests that new time/area strata should be established which are larger than those presently used for data substitutions.

d) The variability in the sizes, normally linked to variability in species composition, should be taken into account when establishing the size of the stratum and the allocation of the sample.

For all of the above reasons, the Committee considered the need either to hold a special working group meeting to discuss these matters further, or that the Secretariat contract a biostatistician for the necessary time to solve these problems, or both (i.e., a special working group meeting, with the support of a biostatistician contracted by the Secretariat).

In this sense, the Group requests that the Sub-Committee on Statistics consider this proposal.

REPORT OF THE SUB-COMMITTEE ON STATISTICS

1. OPENING OF THE MEETING

The meeting of the Sub-Committee on Statistics was held in Madrid, Spain, at the Hotel Pintor on November 7, 1991. Dr. S. Turner (U.S.A.), Convener of the Sub-Committee, welcomed all the participants.

2. ADOPTION OF AGENDA AND ARRANGEMENTS FOR THE MEETING

The Tentative Agenda was adopted and is attached as Addendum 1 to this Report. Dr. P. M. Miyake (Secretariat) served as rapporteur.

3. REVIEW OF THE STATISTICAL PROGRESS MADE BY NATIONAL OFFICES

3.a National data collection and reporting

The Secretariat Report on Statistics and Coordination of Research (SCRS/91/11) was reviewed, regarding the progress made by the national offices in the collection of data. Table 1 shows the updated status on the availability of 1990 data at the time of this meeting.

The Sub-Committee noted that the reporting of data by some national offices of major fishing countries was extremely delayed this year. This, in turn, caused delays in the Secretariat's work of compiling the total catch data by species before the meeting. The Sub-Committee once again urged that the deadlines for the submission of data by the national offices be strictly observed.

Delays are not confined only to Task I data, but affect Task II catch and effort and size data as well. Document SCRS/91/11 indicates all the problem areas and the countries listed in that report should give special attention next year to solutions for such delayed reporting.

3.b Improvements to be made

A major problem has been in the reporting of Mediterranean fisheries statistics. Of the major, non-member tuna fishing countries, only Italy has provided preliminary rough estimates of bluefin catches, but no other data has been made available for 1990. (See Section 5.b for the suggested solution).

4. EXAMINATION OF PROGRESS MADE BY THE SECRETARIAT

4.a Data processing carried out in 1991

Details of the data processing carried out by the Secretariat during 1991 are contained in SCRS/91/11. The Sub-Committee recognized that the volume of data to be processed, particularly in the creation and updating of the catch-at-size data base, has been progressively increasing. However, the fact that the working group meetings were spread throughout the year (i.e., the Working Group on Western Tropical Tunas in May, the Swordfish Stock Assessment Session in September, and the west Atlantic bluefin and albacore assessments in October), made it possible for the Secretariat to complete this processing in a timely manner.

The Sub-Committee on Statistics recognized that the east Atlantic bluefin catch at size has not been updated, due to the lack of data from various major fisheries (Japan, France and Italy). It recommended that those countries (France provided data during the SCRS session) submit catch at size or at least size data to the Secretariat as soon as possible, and the Secretariat should update the catch-at-size data base to 1990 in the near future.

4.b Port sampling program

The Sub-Committee noted that port sampling activities at the transshipment ports were again minimal in 1991. The major reason is that there are now fewer longline operations and more vessels are transshipping catches at sea. At the same time, the samplers were not well supervised, due to lack of visits to sampling sites by the Secretariat staff.

The Sub-Committee expressed its appreciation to South Africa for sampling the transshipments of Asian longliners at Cape Town. The data submitted are of high quality and are very effective for checking the albacore size data measured by fishermen at sea. The Sub-Committee also appreciated the offer of Uruguay

to start stricter monitoring of the amount of transshipments made in Montevideo, and possibly to start supervising the sampling of transshipments in that port.

Considerable discussion took place regarding the catches taken by boats flying flags of convenience. Discussion is summarized in Section 6.f.

4.c Secretariat data management policy

The Sub-Committee reiterated that first data management priority of the Secretariat was to keep the basic data base updated, complete and error-free.

The Sub-Committee recognized that the software used for substitution and raising of catch-size data has been improved. However, it felt that a more sophisticated, automated system (such as the "expert system") should be developed.

The Sub-Committee clarified that according to the basic criteria agreed upon at the Standing Committee meetings in the early 1970's and according the various resolutions made at consecutive meetings, the ICCAT member countries are recommended to provide Task II catch and effort data and size data in the finest resolution possible to allow any reclassifications of data between the adopted stratification and requested to report in the strata not larger than;

- $1^{\circ} \times 1^{\circ}$ and month, in the case of surface catch and effort data;
- $5^{\circ} \times 5^{\circ}$ and quarter, for longline catch and effort data; and
- by ICCAT sampling area, for biological data.

It was also clarified that when the data requests are sent out in January of each year, these data requirements are clearly indicated.

4.d Data dissemination and publication

The Sub-Committee reiterated that since the Secretariat has practically caught up on its accumulated data requests from the national scientists working directly in ICCAT stock assessments, such requests are completed within a very short period.

The Commission's statistical publications were reviewed and approved. The general improvement in the quality of the publications was noted and the fine quality of printing and presentations demonstrated in its recent two publications of Yellowfin Year Program Report and Spanish translation of Tropical Tuna Research (joint publication with FAO) was commended.

4.e Biostatistical assignments

The Sub-Committee noted that there had been no outside contract or assistance for biostatistical work this year (See Section 6.c for additional information).

It pointed out that the French and Spanish versions of the "Field Manual" (Third Edition) had been issued in 1991.

4.f Other Matters

No other matters were discussed under this item.

5. REVIEW OF PROGRESS MADE ON RECOMMENDATIONS FOR STATISTICS AS CONTAINED IN THE 1990 SCRS REPORT

5.a Expansion of computer facilities

The Sub-Committee reported that the only new acquisitions as regards computer equipment were a PC for use as a VAX terminal, and a supplemental 100 MB hard disk for one of the PC's.

The Sub-Committee noted that the electronic mail system (E-mail) proved to be a very efficient method for transmitting data. The Secretariat was asked to update and make available the list of E-mail addresses.

The Sub-Committee recommended that, since there are many handy statistics, graphics and other software packages available that could be helpful to the scientists during meetings, the Secretariat carry out a survey among the scientists regarding which software packages would be most useful. It recommended that the Committee authorize the Secretariat to make the final decision on the most adequate software, and to purchase and install these in the PC's at the Secretariat.

5.b Improvements of Mediterranean statistics

The Sub-Committee regretted that the collaboration, initiated with Mediterranean countries and which culminated with the joint GFCM/ICCAT meeting in 1990, has not been well followed up. The stock management sub-committee of GFCM recently held a meeting, which, unfortunately, coincided with the ICCAT stock assessment sessions. It had been agreed that the GFCM countries should collaborate with ICCAT as regards the submission of data and work in stock assessments. It also suggested a second joint meeting might be held. The Sub-Committee noted the recommendation from the species groups that such a joint meeting be held, if possible, well in advance of the SCRS. It wholeheartedly reiterated these recommendations and suggested that the Secretariat contact the GFCM Secretariat to organize another joint session in the first half of 1992.

5.c Database for the Working Group on Western Atlantic Tropical Tunas

The Secretariat, using all the basic data, created the catch-at-size base for the west Atlantic yellowfin, and documented the substitutions and raising procedures. This base was very useful to the Working Group at the time of its meeting in Miami.

At the short meeting of the Working Group held during the SCRS session, it was agreed that the data base should be expanded to earlier years (Appendix 12).

6. FUTURE PLANS TO IMPROVE STATISTICS, AND RECOMMENDATIONS TO THE SCRS

6.a Program plan for improvement of data collection system in the Southwest Atlantic area.

The Sub-Committee expressed its pleasure that Uruguay had developed a plan together with Brazil and Argentina, aimed at improving the collection and analysis of statistics of tunas and tuna-like species. Additional information from that area is badly needed. The Plan is attached as Addendum 2 to this report. The Sub-Committee recommended that this important plan receive all the logistic support necessary from the SCRS. Also it noted the proposal made by the West Atlantic Tropical Tunas Working Group (Appendix 12) to hold a data preparatory meeting at a city in this area in early 1992. The purpose of this preparatory meeting is to review all the historical data for this area, as well as to review the need for an appropriate sampling system for the southwestern Atlantic. The Sub-Committee reiterated this proposal and recommended that the Secretariat start making the necessary arrangements for such a meeting as soon as the plan is adopted by the Committee. Such a meeting would serve, not only to improve the tropical tuna data base, but also the albacore and swordfish databases.

6.b Statistics on sharks

In view of the importance of pelagic sharks in the incidental catches of the tuna fishery and considering the effect of such a fishery on shark stocks and the overall ocean ecosystem, the U.S.S.R. proposed that statistics on sharks be collected by ICCAT. The Sub-Committee referred to the Commission's mandate outlined in the ICCAT Convention and concluded that the Commission does have a mandate to obtain information on species taken in association with effort directed at tunas and tuna-like species.

The Sub-Committee noted that the incidental catches of sharks by longlines and other gears are quite important. It indicated that since ICCAT has acquired considerable prestige and credibility as regards scientific research and expertise in data collection and data base maintenance, it should take the initial step in making estimates of the magnitude of shark by-catch and directed fishery catches by the time of the next SCRS session. The Sub-Committee proposed that this item be included on the Agenda of the SCRS for 1992, at which time all the information presented on the shark fisheries, shark catches and the impact of sharks on perceptions of tuna catch rates can be evaluated. It was suggested that both general descriptions and quantitative analyses would be useful for evaluating the need for and/or feasibility of collecting shark statistics.

6.c Restructuring the sampling strategy for the surface fishery

The Sub-Committee reviewed the proposal made by the tropical tunas working group (Appendix 6), concerning restructuring the sampling strategy for the surface tuna fishery. Due to the recent changes in fishing strategy (e.g., increasing sets on flotsam), it was felt that the present sampling scheme should be reviewed in depth to improve its stratifications. The Sub-Committee recognized that such work can be achieved only through the joint efforts of the biologists working on tuna fishery data and through biostatistical expertise. It considered the possibility of asking the national offices to render the services of a biostatistician to assist in this work, but found this solution to be inadequate at this time. Under the circumstances, the Sub-Committee recommended that the Commission, when possible, contract (for at least a 6-month period) a high-level biostatistician to study the overall situation and to hold a meeting with the biologists working on this fishery.

6.d Automated data substitution scheme ("expert system")

The Sub-Committee noted that the WATT Working Group requested development of automated data substitution and raising system. It noted that the Secretariat has the capability to develop such a system, once the basic guidelines for the substitutions and raising are established. It recommended that the scientists consider holding a meeting to discuss and arrive at the basic rules (in detail) to be applied in such a system.

Considering all the extra tasks assigned to the Secretariat and also the increasing need for Secretariat support in compiling data before and during the nu-

merous scientific meetings (including the preparation of graphs, etc.), the Sub-Committee recommended that the Secretariat fill the recently vacated programmer position by recruiting a fishery biologist with high-level technical knowledge of computers and data management.

6.e Logbooks

Recent correspondence concerning the adoption of a new Venezuelan logbook for the eastern Pacific Ocean was brought to the Sub-Committee's attention. The problem was raised by the Inter-American Tropical Tuna Commission (IATTC), since they felt that they were losing some information, such as the use of helicopters, sets on porpoise schools, etc., since the Venezuelan purse seiners started using the logbook designed for the Atlantic Ocean by the Venezuelan Government. The Sub-Committee noted that this logbook is almost identical to that being used in the eastern tropical Atlantic and in the Indian Ocean and that it was easy for any fisherman to use. On the other hand, there is more flexibility in using the IATTC log, although it requires more experience by the fishermen in keeping logs. IATTC is proposing that a working group be held at the time of the Lake Arrowhead Tuna Conference in May, 1992. The Sub-Committee felt that such a meeting would be useful, but that some compromise could perhaps be found through correspondence. The observer from IATTC also stated that the problem did not appear to be serious and that a solution could be found without having to change the whole logbook system.

The Sub-Committee pointed out that the logbook developed for east Atlantic baitboats through joint efforts of the scientists and the Secretariat has proven to be extremely useful, particularly since it is in English, Japanese and Korean languages. The Sub-Committee recommended that the Secretariat continue providing these logbooks, at the Commission's expense. It also recommended that the Secretariat study, with the scientists involved, the possibility of developing a standard logbook for the surface and longline fisheries, using the language(s) which the majority of fishermen use. Such a logbook might prove very useful to cover those fleets which are not covered by the national offices (vessels flying flags convenience).

6.f Unconventional fleet statistics

The Sub-Committee noted that this matter has caused several problems in the past. At present, most of the surface fleets with unconventional flags or those not covered by the national statistical offices have been adequately covered by the scientists working in their base ports in Africa, and that such catches are reported as NEI (nowhere else included). Logbooks and size samples also have been collected from these vessels.

In the past, some longliners which historically fly flags of convenience have been covered, to some extent, by the ICCAT port sampling system. However, there have been an increasing number of boats fishing in the Mediterranean Sea flying non-ICCAT country flags and those boats have not been covered by any statistical system. The Secretariat informed the Sub-Committee that it has some contact with the owners of such boats and that it may be able to collect some landing data from these boats, or at least make some estimates of their catches, if travel to the base ports involved is authorized. The Sub-Committee recommended that this work should be given high priority.

The observer from the Caribbean Community (CARICOM) indicated that his organization would try to find a way to monitor transshipments at CARICOM member states' ports.

7. OTHER MATTERS

The representative of FAO reported to the Sub-Committee on the recent Inter-Agency Consultation of the Coordinating Working Party, held at La Rochelle, France, in September, 1991, at which ICCAT was not represented.

The Sub-Committee thanked IATTC for providing biological sampling data on the Venezuelan surface fleet catches in the Atlantic.

The Sub-Committee also noted that mutual assistance in improving the tuna catch base has been continued between FAO and ICCAT and that the system is quite satisfactory. The Sub-Committee thanked FAO for providing us with data for the countries for which the ICCAT has no data.

8. ADOPTION OF REPORT

The Sub-Committee adopted the Report.

9. ADJOURNMENT

The meeting was adjourned.

Table 1. Progress made in data collection of 1990 Statistics (As of Nov. 7, 1991)

SPECIES, GEAR, & COUNTRY	TASK I Catch Date Rec'd 1990	1991	BOAT	TASK II Catch & Effort Date Rec'd 1990	1991	BIOLOGY (Size) Date Rec'd 1990	1991	REMARKS
YFT, BET, SKJ								
SURFACE - BB								
Angola	Jun 07	May 10			Jul 30			Preliminary Task I for 1990
Angola		Aug 20						Quick estimates for 1991
Brazil	Jul 04	May 13	X	Oct 10	Mar 20			Preliminary Task I for 1990
					Sep 11		Sep 11	C&E + Size for 1989
Brazil-Japan	Jul 04	May 13	X		Sep 11		Sep 11	Task I prelim. C&E, Size for 89
Cape Verde		Nov 07	X				Nov 07	Data for 1989-90
Cuba	Aug 17							
FIS	Jul 10	Jul 12		Nov 07	Jul 12	Nov 07	Jul 12	Task I, C&E for 1989-90
Ghana	Nov 05				Mar 21	Nov 05		C&E for 1989
	Nov 05					Mar 09		Estimates for 1990 Task I
Portugal (Azores)	Jun 18	Oct 10		Jun 18	Oct 10	Jun 18	Oct 10	
(Madeira)	Mar 30	Jun 06	X	Mar 30	Jun 06	Aug 06	Jun 06	
(Mainland)								
South Africa	Sep 14	Aug 08	X	Sep 14	Aug 08			
Spain (Canary Islands)	May 09	Jul 02		May 09	Jul 02	May 09	Jul 02	
				Oct 04				
(Tropical)	May 25	Oct 17	X	May 25	Oct 18	May 25	Oct 18	
Venezuela (incl. For.)	Mar 08		X		Mar 11	**	Mar 11	C&E for 1990. Size for 1989-90
					Mar 20	**		C&E for 1989
PS								
Benin								
Cape Verde		Nov 07						Data for 1989 and 1990
Cuba	Aug 17							
FIS	Jul 10	Jul 12		Nov 07	Jul 12	Nov 07	Jul 12	Task I data for 1989-90
Japan	Apr 24	Jul 22			Jul 22	Jul 24	Aug 01	
Morocco		Jun 05						
Norway								
Portugal (Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			
Spain (Tropical)	Sep 25	Oct 15	X	Oct 04				
		Oct 25			Oct 25		Oct 30	Revised data for 1986-90
U.S.A.	Aug 16	Aug 23		Aug 24	Aug 23	Aug 24	Aug 23	Rev. size 89&90. Prelim. Task I
	Oct 24							
U.S.S.R.	Jun 12	Jun 27	X			Aug 17		
Venezuela (incl. For.)	Mar 8		X		Mar 11	**	Mar 11	C&E for 1990. Size for 1989-90
					Mar 20	**	**	C&E for 1990
NEI	Jun 19	Jul 02	X					
UNCL& OTHERS								
Angola	Jun 07							
Argentina		Mar 11						Task I for 1989
Barbados		May 16						Estimated catch for 1989-90
Benin	Aug 27	Jul 30	X					
Bermuda	Jul 20							
Brazil	Oct 02							
Brazil-Japan								
Cuba	Aug 17							
Cape Verde		Nov 07					Nov 07	Data for 1989 and 1990
Ghana								
Mexico	May 31	May 02						Preliminary Task I for 1990
Morocco	May 30	Jun 05						
Portugal (Madeira)								
(Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			
St. Helena	Jul 03	Sep 30	X	Jul 03	Sep 30			
South Africa	Sep 14	Aug 08	X	Sep 14	Aug 08			
Spain (Peninsula)								
U.S.A.	Aug 16	Aug 23		Aug 24	Aug 23	Aug 24	Aug 23	Rev.Size 1990+89. Prelim.Task I
	Oct 24							
U.S.S.R.				Nov 02		Aug 17		
Venezuela						**	**	
Venezuela-Foreign						**	**	

SPECIES, GEAR, & COUNTRY	TASK I Catch Date Rec'd 1990	1991	BOAT	TASK II Catch & Effort Date Rec'd 1990	1991	BIOLOGY (Size) Date Rec'd 1990	1991	REMARKS
ALB								
SURFACE-BB								
Brazil	Jul 04	May 13	X					Preliminary Task I for 1990
Brazil-Japan	Jul 04	May 13	X		Sep 11			Preliminary Task I for 1990
France	Jul 05							
Portugal (Azores)	Jun 18	Oct 10		Jun 18	Oct 10	Jun 18	Oct 10	
(Madeira)	Mar 30	Jun 06	X	Mar 30	Jun 06	Aug 06		
South Africa	Sep 14	Aug 08	X	Sep 14	Aug 08		Oct 31	
Spain (Canary Islands)	May 09	Jul 02	X	May 09	Jul 02	May 09	Jul 02	
(Peninsula)	Aug 14	Sep 05		Aug 14	Aug 08	Aug 14	Aug 08	
Venezuela								
PS								
FIS								
France		Oct 23						
Italy								
Portugal (Mainland)		Jul 08			Jul 08			
South Africa								
Spain		Jul 02	X					
Venezuela	Mar 08							
NEI		Jul 02	X					
TROL								
France	Jul 05			Jul 05		Jul 31		
Greece				Jun 21				
Spain (Peninsula)		Aug 08		Mar 30	Aug 08	Mar 30	Aug 08	
	Aug 14			Aug 14		Aug 14		
UNCL& OTHERS								
Argentina		Mar 11						Task I for 1989
Bermuda	Jul 20							
Brazil	Oct 02							
France (Bay of Biscay)	Jul 05	Oct 02		Jul 05	Oct 04	Jul 31	Oct 04	C&E, Size, C/size
(Mediterranean)		Oct 23						
Greece	Jun 21					Jun 21		
Italy						Jun 21		
Portugal (Azores)								
(Madeira)						Aug 06		
(Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			
St. Helena	Jul 03	Sep 30	X		Sep 30			
South Africa	Sep 14	Aug 08	X	Sep 14	Aug 08			
Spain (Peninsula)								
(Mediterranean)		Jul 29			Jul 29			
U.S.A.	Aug 16	Aug 23		Aug 24	Aug 23	Aug 24	Aug 23	Rev. Size 90+89. Prelim. Task I
Venezuela								
Venezuela-Foreign								
BFT								
SURFACE-BB								
France (Bay of Biscay)	Oct 29	Oct 02						
Portugal (Azores)								
(Madeira)	Mar 30	Jun 06	X	Mar 30	Jun 06	Jun 04		
(Mainland)								
South Africa	Sep 14							
Spain (Canary Islands)	May 09	Jul 02	X	May 09	Jul 02	May 09	Jul 02	
(Bay of Biscay)	Feb 23	Jan 23		Mar 15	May 20	Feb 23	Jan 23	
PS								
France (Mediterranean)	Aug 27	Oct 23				Aug 27	Oct 22	Size and catch by size
Italy	May 22					Jun 21		
Morocco		Jun 05						
Portugal (Azores)								
(Mainland)		Jul 08			Jul 08			
Spain								
U.S.A.	Aug 22	Aug 23		Aug 24	Aug 23	Aug 24	Aug 23	Rev.size 90+89 + catch-at-size
						Oct 22		
Yugoslavia	Jun 21					Jun 21		

SPECIES, GEAR, & COUNTRY	TASK I Catch Date Rec'd 1990	1991	BOAT	TASK II Catch & Effort Date Rec'd 1990	1991	BIOLOGY (Size) Date Rec'd 1990	1991	REMARKS
TRAP								
Canada	Oct 24	Oct 17					Oct 21	
Morocco	May 30	Jun 05						
Spain (Mediterranean)	Sep 25	Jul 29		Oct 18	Jul 29	Oct 04	Jul 29	
				Oct 25				
(Peninsula)	Oct 04	Jul 29		Oct 18	Jul 29	Oct 04	Jul 29	
UNCL& OTHERS								
Argentina	Aug 07	Mar 11						Task I for 1989
Canada	Oct 24	Oct 17				Oct 26	Oct 21	
France (Mediterranean)		Oct 23						
(Bay of Biscay)	Oct 29							
Greece				Jun 21		Jun 21		
Italy	Jun 21					Jun 21		
Portugal (Azores)								
(Madeira)	Mar 30	Jun 06	X					
(Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			
Spain (Mediterranean)	Mar 22	Jul 29			Jul 29		Jul 29	
	Sep 24			Sep 24		Sep 24		
(Peninsula)	Mar 22							
U.S.A.	Aug 22	Aug 23		Aug 24	Aug 23	Aug 24	Aug 13	Rev. size 90+89 & catch-at-size
						Oct 22		
BIL (incl. SWO)								
SURFACE								
Argentina								
Benin	Aug 27	Jul 30	X				Jul 30	
Bermuda	Jul 20							
Brazil	Oct 31							
Canada	Jul 16	Apr 25		Jul 16	Jun 19	Jul 24	Jun 19	Task II + SWO catch-at-size
Cyprus		Aug 08	X		Aug 08			
France (Bay of Biscay)		Oct 02						
Ghana								
Italy						Jun 21		
Morocco	May 30	Jun 05						
Portugal (Madeira)	Mar 30	Jun 06	X	Mar 30	Jun 06	Aug 06		
(Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			
Senegal						Jun 04		
South Africa	Sep 14	May 07						
Spain (Canary Islands)	May 09	Jul 02	X	May 09	Jul 02	Aug 20		
(Mediterranean)	Sep 11	Jul 29		Sep 11	Jul 29	Sep 11	Jul 29	
(Peninsula)	Aug 20	Jul 29		Aug 20	Jul 29	Aug 20	Jul 29	
U.S.A.	Aug 03	Jul 02		Aug 24	Aug 23	Jul 17	Jul 02	SWO Task I: 89rev. + 90 prelim.
				Aug 27		Aug 24	Jul 02	SWO Size: 1989-90
U.S.S.R.				Nov 2			Jul 02	SWO catch-by-size: 89 rev.+90
SMT **- SURFACE**								
Angola	Jun 07	May 10			Jul 30			Preliminary Task I for 1990
Barbados		May 16						Estimated catch for 1989-90
Benin	Aug 27	Jul 30	X		Jul 30		Jul 30	
Bermuda	Jul 20							
Brazil	Jul 04	May 13						Preliminary Task I for 1990
Cape Verde		Nov 07					Nov 07	Data for 1989-90
Cuba	Aug 17							
FIS	Jul 10							
Ghana	Jul 16							
	Nov 05					Mar 09		Quick estimates for 1990
Greece	Jun 21							
Mexico		May 02						Preliminary Task I for 1990
Morocco	May 30	Jun 05						
Portugal (Azores)	Jun 18	Oct 10		Jun 18	Oct 10		Oct 10	
(Madeira)	Mar 30	Jun 06	X	Mar 30	Jun 06			
(Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			
Spain (Canary Islands)	May 09	Jul 02	X	May 09	Jul 02	May 09		
(Mediterranean)	Sep 25	Jul 29			Jul 29			
(Peninsula)	Sep 25	Jul 29		Jul 31	Jul 29			
	Oct 04							
(Tropical)	Sep 25	Oct 15						
U.S.A.	Aug 16	Aug 23		Aug 24	Aug 23	Aug 24	Aug 23	Rev. Size 90+89. Prelim. Task I

SPECIES, GEAR, & COUNTRY	TASK I Catch Date Rec'd 1990	1991	BOAT	TASK II Catch & Effort Date Rec'd 1990	1991	BIOLOGY (Size) Date Rec'd 1990	1991	REMARKS
U.S.S.R.	Jun 12	Jun 27	X	Nov 02		Aug 17		
Venezuela			X					
Yugoslavia	Jun 21							
NEI	Jun 18	Jul 02	X					
ALL SPECIES - LL								
Algeria		Aug 08	X				Aug 08	SWO LL only.
Brazil	Jul 04	May 13	X					Preliminary Task I for 1990
					Mar 20			C/E data for 1987-89
					Nov 07		Nov 07	C/E 85-88. YFT size for 88&91
Brazil-Japan	Jul 04	Nov 07	X		Mar 20		Mar 20	C/E for 1987-89
	Oct 02				Nov 07			C/E data for 1990
					Sep 11			Size: YFT-1988, BET-1985 & 88
Canada	Jul 16	Apr 25	X	Jul 16	Jun 19	Jul 16	Jun 19	SWO catch/size
	Oct 24	Oct 17				Jul 24	Oct 21	BFT Task I
						Oct 26		
China (Taiwan)	May 10	Mar 11	X	Oct 03	Oct 04	Oct 03	Oct 04	Task I prelim. ALB C/size
							Nov 01	ALB size data
Cuba	Aug 17	Aug 14		Aug 31				SWO Task I
Cyprus	May 03	Aug 08	X	May 03		May 03		
Greece	Jun 21			Jun 21		Jun 21		
Italy				Jun 21		Jun 21		
Japan	May 07			Jun 15		Jul 24	Apr 01	YFT catch-by-size data
		Jun 22			Jun 21	Aug 07		89 Task I + C & E
		Aug 29				Oct 02	Aug 01	SWO-90 prel.+89 Rev. C & C/size
						Oct 03	Oct 14	BFT:90 West+89 East rev. C/size
Japan-Canada-Observer								
Japan-S.Helena-Observ.	Jul 03	Sep 30	X	Jul 03	Sep 30			
Japan-U.S.-Observer								
Korea	Aug 27	Sep 10	X	Aug 27	Sep 10	Aug 27	Sep 10	
Mexico	May 31							
Morocco	May 30	Jun 05						
Panama								
Portugal (Azores)	Jun 18	Oct 10		Jun 18	Oct 10		Aug 28	Only for SWO
							Sep 11	
(Madeira)		Jun 06	X		Jun 06	Aug 06		
(Mainland)	Jul 04	Jul 08		Jul 04	Jul 08			CRE for SWO only
South Africa	Sep 14	Aug 08	X					
Spain (Mediterranean)	Sep 11	Jul 29		Sep 11	Jul 29	Sep 11	Jul 29	
	Sep 24			Sep 24		Sep 24		
(Peninsula)	Aug 20	Jul 23		Aug 20	Jul 23	Aug 20	Jul 23	For SWO only. C/size incl.
	Sep 24	Oct 11						
Uruguay	Mar 15	Aug 06	X					
U.S.A.	Aug 03	Jul 02		Aug 24		Jul 17	Jul 02	SWO 89 rev.+ 90 Incl. C/size
	Aug 16	Aug 23			Aug 23	Aug 24	Aug 23	Other species 89 rev. + 90
	Aug 22					Oct 22	Aug 23	BFT C/size
	Oct 24							
U.S.S.R.	Jun 12	Jun 27	X	Nov 02				
Venezuela	Mar 08		X			**	**	
Venezuela-Foreign						**	**	
NEI	Jul 24	Jul 02		Jul 24		Jul 24		
VARIOUS:								
FAO	May 23	Mar 06						
	Sep 17	Apr 19						
	Oct 10	Sep 04						SWO catches
	Oct 26	Oct 10						

**Field reports periodically.

Agenda
Sub-Committee on Statistics

1. Opening of the meeting

2. Adoption of Agenda and arrangements for the meeting

3. Review of the statistical progress made by national offices
   - 3.a National data collection and reporting
   - 3.b Improvements to be made

4. Examination of progress made by the Secretariat
   - 4.a Data processing carried out in 1991
   - 4.b Port sampling program
   - 4.c Secretariat data management policy
   - 4.d Data dissemination and publication
   - 4.e Biostatistical assignments
   - 4.f Other matters

5. Review of progress made on recommendations for statistics as contained in the 1990 SCRS Report
   - 5.a Expansion of computer facilities
   - 5.b Improvement of Mediterranean Statistics
   - 5.c Database for the Working Group on Western Atlantic Tropical Tunas

6. Future plans to improve statistics, and recommendations to the SCRS
   - 6.a Program plan for improvement of data collection system in the southwest Atlantic area
   - 6.b Statistics on sharks
   - 6.c Restructuring the sampling strategy for the surface fishery
   - 6.d Automated data substitution scheme ("expert system")
   - 6.e Logbooks
   - 6.f Unconventional fleet statistics

7. Other matters

8. Adoption of Report

9. Adjournment

Program for the Southwest Atlantic

Working Group on Southwest Atlantic Tunas and Tuna-like Species

INTRODUCTION

It is well known that there is a lack of information on some tuna fleets that operate in the southwest Atlantic which has impeded the correct assessment of the southern or western stocks, depending on the species. It should also be noted that the observed longline effort in some parts of this area and that foreseen for the next few years is high. Added to these reasons, the difficulties experienced by the scientists from Brazil, Uruguay and Argentina to attend regularly the ICCAT meetings led to the creation of a Working Group to obtain and analyze together the information on the fisheries of tunas and tuna-like species of the three countries. This group began to work a couple of years ago, carrying out comparative general studies on the characteristics of the longline fleets, operating methods, catches and CPUE.

Based on the data obtained and on the ICCAT recommendations for these data, a joint project on the biology and fishing of tunas and tuna-like species (mainly yellowfin, bigeye, albacore and swordfish) caught by the tuna longline fleets of the three countries has been developed. The proposal of the Group for the SCRS is that this project be considered within a Program for the Southwest Atlantic whose objective would be to correct and improve the data base for this area and to provide more information on the biology of the main tuna and tuna-like species caught. The integration process in the Southern Common Market (MERCOSUR) would help the development of this program.

GOALS AND PROPOSED ACTIVITIES

1. Catch and effort statistics

1.1 Correct and complete effort and catch data by species and by area/time strata of the tuna longline fleets of Brazil, Uruguay and Argentina.

1.2 Standardize this information.

1.3 Process and analyze.

1.4 Prepare reports for internal use and for the corresponding ICCAT meetings.

2. Information on size and biology

2.1 Review of historical data (Papers not published in ICCAT).

2.2 Unification of sampling and analytical methodologies.

2.3 Port sampling for size (fork length and/or pre-dorsal length) where permitted by the type of landing.

2.4 On-board seasonal sampling by fleet (minimum 1/season/fleet):

a) register of daily catch and effort
b) measurement of size and weight
c) determination of sex, degree of maturity, and extraction of gonad samples
d) extraction of hard parts
e) determination of stomach repletion and extraction of stomachs.

2.5 Preparation, processing and analysis of data and samples:

a) calculation of effort, catch and CPUE by $5^{o}x5^{o}$ areas
b) calculation of conversion factors
c) sex ratio and maturity index
d) age determination
e) stomach contents analysis and determination of the IRI.

2.6 Processing of information, analysis of results and presentation in corresponding ICCAT meetings.

3. Environment

3.1 Obtaining historical data of water temperatures from satellite and oceanographic column

information from institutes and marine laboratories of Brazil, Uruguay and Argentina.

3.2 Collecting background on the presence and abundance of important prey in the diet of the main tuna and tuna-like species caught.

3.3 Comparison of items 3.1 and 3.2 with the presence and abundance of the main tuna and tuna-like species.

4. Schedule

Only a long time series of such information provided through continuous monitoring will permit over the long term the correct assessment of these stocks. However, it is necessary to have immediate answers to some questions in this area, therefore, the following calendar is proposed for the short term:

Year:	1992	1993	1994	1995
Quarter:	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Activity:				
1. 1.1	------→			
1.2	---→			
1.3	-→			
1.4	--	--	--	--
2. 2.1	------→			
2.2	---→			
2.3	------→			
2.4		----------→		
2.5		----------→		
2.6	-----	----------→		
3. 3.1	------→			
3.2	------→			
3.3		----------→		

FUNDS

This project already has logistic, personnel and material support for sampling and laboratory analysis to process the data currently available in the Brazilian, Uruguayan and Argentine institutes up to the present: the National Fisheries Institute (Uruguay); Fisheries Institute (Santos, Brazil); Federal University of Pernambuco, Fisheries Department (Brazil); Oceanographic Institute of San Pablo (Brazil); Rio Grande del Sur University Foundation (Brazil); Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (Brazil); Fisheries Secretariat and INIDEP (Argentina).

However, to develop this project, it is necessary to have ICCAT support for:

-- technical advice (participation of the Secretariat and/or of a qualified scientist in the Working Group Meetings).

-- holding an ICCAT meeting on the southwestern Atlantic in one of the countries in the area.

-- funds for on-board sampling.

REPORT OF THE SUB-COMMITTEE ON ENVIRONMENT

1. OPENING

The meeting of the Sub-Committee on the Environment was held on November 6 in the Hotel Pintor, Madrid. Mr. J. Pereira (Portugal), Chairman of the Sub-Committee, welcomed all the participants and led the discussions.

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE MEETING

The Tentative Agenda was adopted and is attached to this report as Addendum 1. Dr. J. M. Stretta (France) was designated rapporteur.

3. REVIEW OF CONTRIBUTION PAPERS

As proposed last year by the Working Group on the Environment, the presentation of documents would be done in the form of a symposium. For the first time this year, twelve documents dealing exclusively or partially with tuna-environment relationships were submitted to the Sub-Committee. These documents are the following: SCRS/91/21, 45, 50, 55, 56, 57, 58, 59, 62, 65, 74, 115.

During the general discussions which followed the mini-symposium, a discrepancy was discovered between the nature of the documents presented and the expectations of the scientists working in population dynamics. The latter expect explanations of the fluctuations observed in the availability of the tuna stocks while the scientists working on the subject of the environment tend to center their attention on the description of the different ecosystems in which the tunas move about.

4. DATABASE ON THE ENVIRONMENT

It was clear to all the delegations that the role of the ICCAT Secretariat is not to collect and manage a database on the environment; however, the Secretariat was asked to centralize the information in databases existing in different parts of the world and to foresee future connections between the databases on the environment and its own bases.

France described, in general terms, the present state of its work on the modelization of the surface layer of the tropical Atlantic Ocean between 30°N and 20°S. The research program on tunas and tuna-like species of the southwest Atlantic reviewed the environmental data available for this region. The result of this study will be transmitted to the ICCAT Secretariat.

5. ANY ANOMALY IN THE OCEAN CONDITIONS IN RECENT YEARS

Around the equatorial area, in recent years, there has been observed a decrease in the extent of equatorial upwellings; however, the coastal upwellings in the Ivorian-Ghanaian maritime province have been particularly active. Spain noted that the catches of bluefin tuna in the Cantabrian Sea could be related to a thermal anomaly in the Bay of Biscay.

6. REVIEW OF STUDIES ON THE RELATION BETWEEN THE ENVIRONMENT AND TUNA ECOLOGY

The observer from the CARICOM described the work currently being carried out by that organization on tuna/environment relationships.

Moreover, the working group on tunas and tuna-like species in the southwest Atlantic plans to develop research on these relationships between the environment and tunas.

7. ASSOCIATION OF TUNAS WITH OTHER OBJECTS

Although in 1990 it was decided that the problem of the association of tunas with floating objects was not a subject to be dealt with by this Sub-Committee, it was noted that in 1991 around 80 percent of the catches by eastern tropical surface fleets were made with the help of floating objects. The purse seiners operating in the Atlantic carry platforms which are launched at sea and which are visited regularly. Other vessels help the purse seiners by monitoring these fish aggregating devices (FAD). In the Indian Ocean, considering the extent of the fishing with FAD, two types of analyses are made, the hauls made on free schools and those on FAD.

Brazil, as well as the representative of CARICOM, described the work in the area of tunas associated with floating objects.

Considering the importance of "fishing with FAD", the Sub-Committee recommended that an SCRS scientist participate in the international meeting on FAD which will be held in February, 1992, in La Jolla, sponsored by IATTC.

8. LONG-TERM WORKING PLAN FOR THE SUB-COMMITTEE

It was suggested that analyses be focused on the impact of the environment on tuna fishing, particularly on the sensitive areas found in the boundary between the tropical and temperate species distributions and on the interpretation of environmental data in the population dynamics models.

9. WORKING PLAN FOR 1992

The symposium-type meeting held this year for the presentation of documents was considered to be positive and enriching. It was suggested that this system be repeated next year.

10. RECOMMENDATIONS

Two recommendations were made during the meeting of the Sub-Committee on Environment. They were:

-- that the ICCAT Secretariat centralize the information on oceanic environmental databases and study a possible connection between these databases and the ICCAT databases.

-- that ICCAT be represented by an SCRS scientists to later inform the SCRS of the work on the fish aggregating devices at the meeting that will be held in February, 1992, in La Jolla, sponsored by IATTC.

11. OTHER MATTERS

A number of meetings are held throughout the world where problems are discussed which deal with the theme of this Sub-Committee (and also with subjects of interest to all the SCRS scientists). It would be desirable that the scientists attending the meetings report to the SCRS on the discussions.

12. ADOPTION OF THE REPORT

The Sub-Committee adopted the report.

13. ADJOURNMENT

The meeting was adjourned.

Addendum 1 to Appendix 8 to Annex 16

Agenda
Sub-Committee on Environment

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Review of contribution papers
4. Database on the environment (nature, items, how to manage data, etc.)
5. Any anomaly in ocean conditions in recent years
6. Review of studies on the relation between the environment and tuna ecology
7. Association of tunas with other objects
8. Long-term working plan for the Sub-Committee
9. Working plan for 1992
10. Recommendations
11. Other matters
12. Adoption of Report
13. Adjournment

BLUEFIN YEAR PROGRAM

I. INTRODUCTION

There has been concern about the stock status of the Atlantic bluefin tuna for more than a decade. At present, several strict fishing regulations are being imposed on the Atlantic bluefin tuna fisheries, including a monitoring quota of 2,660 MT for the western stock. On the other hand, general biological information and statistical data on Atlantic bluefin tuna are needed to improve the advice related to management of the stock(s). In retrospect, it is unreasonable that a comprehensive coordinated research program such as already successfully done for skipjack, yellowfin and albacore, has not been conducted for bluefin tuna, despite the urgency in improving the stock assessment for this stock.

To fill the gap between the need for the reliable assessment of the stock status and the need for additional biological information on the Atlantic bluefin, a steering committee was created at the 1990 SCRS meeting to investigate an applicable scientific program for Atlantic bluefin tuna, an "ICCAT Bluefin Year Program (BYP)", and the committee was assigned to report the results of the investigation at the 1991 SCRS. Two Co-Coordinators, Z. Suzuki for the western Atlantic and B. Liorzou for the eastern Atlantic including the Mediterranean, were nominated to carry out the feasibility studies for the BYP. This proposal was prepared to meet the above-mentioned request after consultation with the concerned scientists. This document lists a large number of potential research projects that may be of interest to scientists. However, it is noted as shown in summary table that some of the subjects are given a lower priority for practical reasons, such as costs, or lesser expectations in obtaining results or useful indications during the BYP.

II. RESEARCH ACTIVITIES

1. Improvement of statistics and other databases

Collection of reliable statistics on the fisheries is one of the essentially important tasks to assess the stock status. This task requires substantial numbers of skilled personnel with wide knowledge of the fisheries and the biology of the bluefin tuna. Specific attention should be paid to the bluefin fisheries in the Mediterranean where the fisheries are diverse and complicated and a significant part of the total bluefin catch in the Mediterranean comes from ICCAT non-member countries.

A. Collection of information on bluefin in the eastern Mediterranean and Black Sea

General information on Atlantic bluefin in the eastern Mediterranean is limited despite the existence of active fisheries. Intensified research with the collaboration of scientists from non-member countries will provide more information. Available statistics do not show any significant bluefin fisheries in the Black Sea. However, anecdotal information suggests that bluefin tuna occur there.

Methods

A-1) Correspondence with Turkish and U.S.S.R. scientists.
A-2) Special mission to the areas of interest if A-1) was positive.

B. Identification of non-reported catches

The actual catch may not be completely covered or reported due to several reasons. In past SCRS meetings, import/export statistics were used to correct the catches of some countries. Since the commercial value of bluefin tuna is high and the fisheries regulations have become more severe in recent years, this kind of information should be collected.

Methods

B-1) Encourage all countries, especially non-member countries, to provide catch statistics.
B-2) Cross-check import/export statistics by countries.

C. Establishing a common tag/recapture data file

Despite the high potential value of tagging data for growth, migration, stock structure and mortality studies, such studies have not been conducted

thoroughly on tagging data. This is partly due to the lack of availability of a common data file with a single uniform format which encourages further analysis.

Methods

C-1) Develop a combined tagging file for all bluefin tag/recovery data in the ICCAT database through the collaboration of national scientists.

2. Stocks

Knowledge of stock structure, especially quantitative estimation of mixing rates between the western and eastern stocks, is critical for improving the stock assessment of Atlantic bluefin tuna. CPUE data could be important as well for the assessment because they have been used to tune the VPA.

A. Stock structure and mixing rate

Presently the stock assessment of Atlantic bluefin tuna is done under the assumption of completely separated western and eastern stocks. Tagging experiments and microconstituent analysis indicate that the mixing of the east and west Atlantic bluefin is on the order of a few percent. However, the mixing rate so far available must be investigated further because of tagging results; for example, in the past, the mixing rate was not adjusted for the distribution and intensity of the fishing effort; also validation by microconstituent analysis of this assumption has not been made. Further, tagging experiments from the North American side have been reduced in recent years to a low level which discourages the study on mixing. Tagging activities in the Mediterranean were very low or non-existent in most areas although some tagging has been started recently. In addition, given the current estimates of the population size imbalance between the west and east stocks (the estimated ratio of stock size between the west and east is approximately 1 to 50), even a small mixing rate from east to west could influence our understanding of stock status.

Methods

A-1) Intensify opportunistic and scientific tagging for small fish from the eastern and western Atlantic and Mediterranean, including double tagging to compare old and new nylon streamer tags which have lower tag shedding rates than ordinary tags.

A-2) Feasibility study on genetical approaches through electrophoretic and mtDNA methods.

A-3) Verification of micro-constituent analysis.

B. Absolute stock size for small fish

A comparative study of the world bluefin stocks (Atlantic bluefin, Pacific bluefin and southern bluefin) shows that for the western Atlantic stock, the number of recruitment of age-1 fish is extremely small, in the thousands compared to millions for all other stocks, including the eastern Atlantic stock (Mediterranean). Other independent approaches are necessary to check the estimates derived from the VPA.

Methods

B-1) Experimental design for scientific tagging

B-1a) Same as A-1).
B-1b) More publicity on tagging activities for better recovery of tagged fish, especially in the Mediterranean.

B-2) Feasibility study of a direct counting method such as aerial survey and remote sensing.

C. Development of abundance indices for spawning fish

The declining trend in the adult population size, especially for the west stock is of serious concern. However, questions exist about the credibility of available abundance indices of the adult stock. The success of coastal fisheries may be subject to environmental factors while the effect of shifting the target species may have influenced the bluefin catch rate in the high seas fisheries. Therefore, the development of refined abundance indices for the large fish population is urgently needed. In this regard, it is noteworthy to mention that one potentially reliable index of the large fish population is the historical data from the Japanese longline fishery from the mid-1970's to 1981 in the Gulf of Mexico where the spawning of the western stock takes place in a relatively small time-area stratum.

Methods (Feasibility study)

C-1) Experimental longline fishing in the Gulf of Mexico including methods compatible with existing data series.

C-2) Aerial survey in the North American fishing grounds.

C-3) Study of detecting fish schools using microwave radar in the Mediterranean.

C-4) Study of feasibility of using egg abundance as spawning stock indices.

D. Development of abundance indices for the major Mediterranean fisheries

One of the reasons for the poor knowledge on the stock status of the east Atlantic stock (including the Mediterranean) is the lack of standardized CPUE for the major Mediterranean fisheries. The refinement of the present CPUE could be made more smoothly by coordinating activities with GFCM scientists.

E. Feasibility study of restocking the bluefin population

As well documented, the bluefin stock shows large fluctuations in stock size. It may be pertinent to consider the possibility of the restocking the population or artificially raise and release juveniles when the stock size decreases to a very low level.

Methods

E-1) Review of the results of the Japanese Marine Ranching Plan for Pacific Bluefin

3. Biology

As already mentioned in the introductory part of this proposal, the stock assessment will be improved through the improvement of biological information. The following comprehensive coordinated tasks are key to improving the accuracy of the present stock assessment.

A. Inter/intra-annual sex-specific growth

Since the stock assessment of Atlantic bluefin is conducted mainly by the VPA, and since bluefin tuna live for many years, probably at least 20 years, and since except for the information from the tagged fish, little validated growth information is available, the studies related to growth should be given high priority.

Methods

A-1) Analysis of hard parts (particularly with the materials obtained from tagged fish given a tetracycline or strontium chloride injection).

A-1a) Comparison of spine and vertebra ageing methods.

A-1b) Further study with the use of marginal increment data obtained throughout the year.

A-2) Tagging experiments.

A-3) Modal progression method for younger age groups.

A-4) Micro-constituent analysis.

B. Study of reproductive biology

Little information is available so far on basic reproductive biology which is important to the stock assessment. In addition, there is a big difference in the size (age) at first maturity between the eastern and western stock: for the western stock, fish over 200 cm (assumed to be age 8 and older) and for the east stock, fish 150 cm (assumed to be age 5 and older). The size at first maturity presently known for the western stock is exceptionally larger (older) than that known of other bluefin stocks. This gap in the size at first maturity can have significant implications to the stock structure and the stock assessment.

Information on fecundity and possible multiple spawnings for Atlantic bluefin tuna could also be useful for further understanding the biology of this species.

Methods

B-1) Histological analysis of gonads from the samples from off the North American coasts and in the Mediterranean.

B-2) Plankton net survey for unsurveyed areas such as in the eastern Mediterranean Sea, the Black Sea and outside the Gulf Stream.

C. Various length and weight relationships by season and by fisheries

Due to complexities in the bluefin fisheries, several different size and weight measurements have been adopted in different areas and fisheries. Therefore, several conversion factors should be developed to have a common size unit throughout the Atlantic. Those conversion factors should also be calculated by season and fishery to account for the change in seasonal obesity mainly due to spawning.

Methods

Information on the Mediterranean conversion factors may be obtained by holding another GFCM/ICCAT Joint Meeting.

4. Environment

The CPUE used to tune the various assessment models may be significantly affected by various natural factors such as ambient temperature, ocean current systems and availability of the prey animals. It is also noted that changes in fishing strategy such as a change in target species due to socio-economic changes should be considered.

A. Relation between distribution (including CPUE) and environment

Methods and Materials

A-1) Analyses on Japanese longline data vs. hydrographic conditions, including surface temperatures in the Mediterranean.

A-2) Analyses on U.S. and Canadian surface data and Japanese longline vs. surface temperature in the west Atlantic.

A-3) Analyses on French purse seine vs. oceanographic conditions in the Mediterranean.

B. Relation between biology of very young fish and environment

Methods

B-1) Collection of biological information on very small juveniles before entering the fisheries in the Gulf of Mexico and adjacent waters as well as in the Mediterranean.

B-2) Experimental fishing of the very small juveniles using methods such as light attracting devices.

III. FOLLOW-UP OF THE WORLD BLUEFIN MEETING AND JOINT GFCM/ICCAT MEETING

The World Bluefin Meeting, held in La Jolla, California, U.S.A., in 1990 was so informative and helpful for understanding the general features of bluefin tunas that a special standing committee (World Working Group on Assessment Methods of Bluefin Tunas) was established under the sponsorship of several national and international organizations. The follow-up meeting during the BYP is expected to provide more information and improve the progress of the stock assessment methods.

In order to improve the statistics and databases for the Mediterranean, the follow-up of the joint GFCM/ICCAT Meeting held in Bari in 1990 should be held during the BYP because it has proved to be very effective for these purposes.

IV. TIME SCHEDULE OF THE PROGRAM PLAN

The BYP is proposed to start in 1992 and run for approximately three years as an ICCAT research program. However, depending on securing funds and the progress of the proposed studies, the duration and starting year remains flexible. Table 1 summarizes the time schedule, priority and approximate costs of the research activities of the BYP. It is anticipated that the studies related to tagging and experimental fishing will require a large part of the funds. However, as explained in the following section on Funds, there would be little hope of obtaining special funds for chartering boats for these surveys. For this reason, the approximate costs shown in Table 1 do not include chartering fees. The participating countries are requested to secure the boats which are being used in on-going research programs of each country.

V. FUNDS

Unfortunately, it is difficult to expect any funding by the ICCAT regular budget for this program due to stringent budget controls. Hence it should be noted that the BYP is not requesting funding by ICCAT. Therefore, each country should try to secure the relevant budget, including the sources from the private sector. The funding thus obtained should be pooled in the ICCAT special budget and redistributed for each activity as decided by the SCRS and Commission. The research activities on a country basis are coordinated under the BYP.

Table 1. Time schedule, priority and research activities and approximate costs of the BYP (Costs in US$ 1,000)*

Activity	Priority	Quarters 1, 2, 3, 4 of 1992 And Estimated Costs*	1993	1994	1995	Countries or areas of major involvement
1. IMPROVEMENT OF STATISTICS AND OTHER DATA BASES						
A. General information in the Mediterranean and Black Seas	high	3		3		Mediterranean countries
B. Estimation of non-reported catches	high	1234	1234	1234	1234	All countries involved
C. Common tag/recapture data file	high	1234	1234	1234	1234	ICCAT Secretariat with national scientists
2. STOCKS						
A. Stock structure and mixing rate						
A-1. Intensified opportunistic and scientific tagging for small fish	high	34 $50	1234 $50	1234 $50	34 $50	U.S.A., Spain, France, other Mediterranean countries
A-2. Feasibility study on genetical approaches	medium		1234 $20	1234 $20	1234	?
A-3. Verification of micro-constituant analysis	medium			1234	1234	IATTC?
B. Estimation of absolute stock size of small fish						
B-1. Experimental design of tagging						
B-1a. Intensified scientific design of tagging	high	1234	1234	1234	1234	U.S.A., Spain, France
B-1b. Publicity of tagging	high	1234 $10	1234	1234	1234 $10	All countries, especially non-members
B-2. Feasibility study of direct counting methods	medium	1234	1234	1234	1234	?
C. Development of abundance index for large fish (Feasibility study)						
C-1. Experimental longlining in the Gulf of Mexico	high	1234 $20	1234 $20	1234 $20	1234 $20	Japan, U.S.A.
C-2. Aerial survey in the North American regions	medium	1234	1234	1234	1234	U.S.A., Canada
C-3. Study of microwave radar survey	medium	1234	1234	1234	1234	France
C-4. Study of egg production method	medium	1234	1234	1234	1234	Japan?
D. Development of abundance indices for major Mediterranean fisheries	high	1234	1234	1234	1234	Through GFCM/ICCAT joint meeting
E. Information on restocking	low	1234	1234			Japan
3. BIOLOGY						
A. Inter/intra-annual sex-specific growth						
A-1a. Comparison of spine and vertebra ageing methods	high	1234	1234	1234	1234	Spain, France

*Annual costs in $US 1,000. Costs left blank denote that either they are unable to be estimated at this stage or they should be covered by national research budgets.

Activity	Priority	Quarters 1, 2, 3, 4 of 1992 and Estimated Costs*	1993	1994	1995	Countries or areas of major involvement
3. BIOLOGY (Cont.)						
A-1b. Validation of hard part method	high	1234	1234	1234	1234	Spain
A-2. Tagging	high	34	1234	1234	1234	U.S.A., Spain, France
A-3. Modal progression method	medium	1234	1234	1234	1234	U.S.A., Spain, France, other Mediterranean countries
A-4. Micro-constituent analysis	medium	1234	1234	1234	1234	?
B. Reproductive biology						
B-1. Histological analysis of gonads	high	23 $20	23 $10	23 $10	23 $10	U.S.A., Canada, Japan, Spain, other Mediterranean countries
B-2. Plankton net survey	medium	23	23	23	23	U.S.A., Japan?
C. Various length- and weight-relationships in major Mediterranean fisheries	high	1234	1234	1234	1234	Through GFCM/ICCAT joint meeting
4. ENVIRONMENT						
A. Relation between distribution and environment						
A-1. Japanese longline catches vs. surface temperature	medium	1234	1234	1234	1234	Japan
A-2. U.S. and Canadian surface and Japanese longline catches vs. surface temperature	medium	1234	1234	1234	1234	U.S.A., Canada, Japan
A-3. French purse seiners in the Mediterranean	medium	1234	1234	1234	1234	France
B. Relation between biology of very young fish and environment						
B-1. Collection of information on very small juveniles	medium	1234	1234			U.S.A., Mediterranean countries
B-2. Experimental fishing for pre-recruitment juveniles	medium		23	23		U.S.A., Mediterranean countries
B-3. Study on survival of larvae	medium	23	23	23	23	U.S.A., Mediterranean countries
FOLLOW-UP MEETING OF WORLD BLUEFIN TUNA MEETING	high			1		All concerned scientists
FOLLOW-UP MEETING OF GFCM/ICCAT JOINT MEETING	high	3			3	Major fisheries in the Mediterranean
THE BYP WORKING GROUP MEETING	high	3 $20			3 $20	
PUBLICATION OF THE BYP RESULTS	high				4 $20	
MISCELLANEOUS		1234 $2	1234 $2	1234 $2	1234 $2	
TOTAL COST (in $1,000)		$122	$102	$102	$132	Grand total - $456

PROGRAM PLAN FOR THE ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH - 1992

The original plan for the Enhanced Research Program for Billfish (SCRS 1986) included the following specific objectives: (1) To provide more detailed catch and effort statistics (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 formulated with the intention of developing the data necessary to assess the status of the billfish stocks.

It was confirmed that Dr. Brad Brown (U.S.A.) will continue to function as the general coordinator and Dr. Eric Prince (U.S.A.) as western Atlantic coordinator. Dr. Taib Diouf (Senegal) and Mr. Martin Mensah (Ghana) will continue to be the co-coordinators for the eastern Atlantic Ocean. Research results, as well as a financial summary for 1991 were presented to the 1991 SCRS and Commission meetings (SCRS/91/15, SCRS/91/18, and SCRS/91/19). The summary of the 1992 proposed budget is attached as Table 1.

Quarterly highlight reports of research activities will continue to be provided to interested parties. In addition, names and addresses of individuals receiving the reports and those involved or interested in the research program will continue to be available upon request. Each year, financial reports of the previous year's work are available in the Annual Program Progress Report and the ICCAT Financial Report. Projected funds for future research activities will be available in subsequent annual program plans.

All institutes and/or personnel receiving ICCAT funding from the Billfish Program 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. In addition, all funded participating cooperators in this program will be required to submit data (either to area coordinators or directly to the ICCAT Secretariat) collected in 1991 and in previous years, and particularly prior to the intercessional workshop in July, 1992.

INTERSESSIONAL WORKSHOP

A tentative program agenda for the proposed intersessional Billfish Workshop was circulated by the Secretariat to ICCAT scientists in June, 1991, in order to solicit input on workshop task assignments and determine the location of the meeting (SCRS/91/15). Most of the respondents indicated preference for Miami, Florida, as the meeting site since the majority of data sets on billfish are at this location. The meeting will be held July 22-29, 1992. The objectives of the meeting are to review progress on research results (including the ICCAT Enhanced Research Program for Billfish), revise billfish data bases, and prepare for an analysis of available data on the status of the billfish resources. Funding in the amount of $10,000 will be set aside in the budget for meeting expenses including travel of some participating scientists from countries who wish to attend this meeting. The final decision on the expenditures of these funds will be made through consultation among the ICCAT Secretariat and Program Coordinators.

A) Species identification kits

The report on the development of field species identification kits for istiophoridae has been encouraging (SCRS/91/106), as indicated by the demonstration of the prototype kit for sailfish at the 1991 SCRS meeting. It appears that the first prototype kit for three species of billfish (sailfish, blue marlin, and white marlin) will be available in the summer of 1992 so their accuracy can be evaluated during the upcoming sampling season. Accuracy of the prototype kits will be determined by using the kits at recreational billfish tournaments throughout the Atlantic Ocean where billfish landings are made in whole (undressed) condition. Some of the locations where these tournaments are held include: (1) southeastern U.S., Puerto Rico, and Virgin Islands, (2) Grenada, (3) Barbados, (4) Dominican Republic, (5) St. Maarten, N.A., (6) Venezuela, (7) Dakar, Senegal, and (8) Côte d'Ivoire. The research team submitted a 1992 Budget of $12,000 (U.S.); $5,000 for a research assistantship and $7,000 for material expenses in order to complete the project. Prior to January, 1992, the research team will learn if their research proposal submitted to a funding agency outside ICCAT has been approved. If this proposal is approved, the funds required from ICCAT may be reduced and their need for ICCAT funds will be re-evaluated at that time.

B) Shore-based sampling

Cumaná, La Guaira, Margarita Island, and Puerto La Cruz, 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 1992. Funding for 1992 will be $200.00 since some of this activity occurs on weekends and after normal working hours. Sampling of industrialized longline boats and the artisanal fisheries in Puerto La Cruz, Margarita Island, and La Guaira will be conducted in 1992 and the requested funding for these segments is as follows: (1) Puerto La Cruz $140.00; Margarita Island $500; and (3) La Guaira $300. Several trips by the Western Atlantic Coordinator or his designee (Mr. Freddy Arocha, U.D.O. now studying in Miami, Florida) will be necessary to organize sampling, collect data, and transport biological samples to Miami in 1992.

Caracas, Venezuela. Shore-based sampling and detailed analysis of the recreational fishery (centered in La Guaira, Venezuela) will be continued in 1992. This sampling includes coverage of 10 recreational billfish tournaments held in Playa Grande Marina and other Venezuelan locations. Since landings of recreationally caught billfish have been restricted by new laws, only catch and effort statistics will be obtained from Playa Grande Marina. Requested funding for this activity in 1992 is $1,200 since much of this sampling is conducted on week-ends. 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 FONAIAP.

Grenada. 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 (Mr. Crofton Isaac and Mr. Paul Phillip) in 1992. Shore-based sampling activities will start early in November, 1991, to coincide with the start of the pelagic fishery at this location. At-sea sampling on the new longline vessels received from a Japanese company in late summer of 1991 (SCRS/91/107) will be initiated in 1992 (see section on at-sea sampling). Requested funding for 1992 is $1,500.

Barbados. Shore-based sampling of size frequency and total landings from artisanal, small industrial, and recreational fisheries will be conducted by personal from the Bellairs Research Institute (Dr. Hazel Oxenford) in 1991. Additional emphasis will be placed on sampling catch and effort data from recreational billfish tournaments in 1992. Requested funding for 1992 is $1,000.

Jamaica. Shore-based sampling of the size frequency, and total landings from the artisanal fishery and catch and effort and size frequency from the recreational fishery will be continued by Dr. Guy Harvey. Requested funding for 1992 is $1,000.

Dominican Republic. Shore-based sampling of size frequency, sex determination, and catch and effort from the recreational fishery will be continued by Mr. Mario Delgado of MAMMA for 1992. Requested funding for 1992 is $500.

St. Maarten, Netherlands Antilles. Shore-based sampling of size frequency data for off-loaded billfish carcasses from China-Taiwan, Korean, and Panamanian longline vessels will be continued in 1992 through the Nichirei Carib Corporation. Requested funding for this activity for 1992 is $1,000. Also, starting in 1992, the annual recreational billfish tournament held in St. Maarten will also be sampled for size frequency and catch and effort data. One trip to the contractee (Nichieri Carib Corp.) will be required by the western Atlantic Coordinator to organize sampling of the longline vessels and to sample the billfish tournament (air faire and hotel accommodations will be provided by the billfish tournament).

Trinidad and Tobago. Shore-based sampling of size frequency data for off-loaded billfish carcasses from China-Taiwan and Trinidadian longline vessels will be initiated in 1992 in Trinidad, as well as Tobago by Ms. Christine Henry of the Ministry of Food Production and Marine Exploitation (Fisheries Division). Historical summaries for the years 1989-91 will also be prepared. A limited amount of at-sea sampling will also be initiated on domestic longline vessels out of Port of Spain (see section on at-sea sampling). One trip by the western Atlantic coordinator will be necessary to train samplers and assist in organizing field research activities. Requested funding for 1992 is $2,700.

Las Palmas, Canary Islands. Shore-based sampling of China-Taiwan longline vessels will be continued on an Ad Hoc basis. Requested funding for 1992 is $0.00.

U.S. and British Virgin Islands. Shore-based sampling of the recreational fishery will continue in the U.S. Virgin Islands under the direction of the Division of Fish and Wildlife, headquartered in St. Thomas. Requested funding for 1992 is $500.

Cancun, Mexico. Shore-based sampling of the recreational fishery for billfish in the Mexican Caribbean area will be initiated in 1992 and supervised from the Quintana Roo Laboratory of PESCA. Requested funding for 1992 is $0.00.

Dakar Senegal. Shore-based sampling of the Senegalese artisanal, recreational and industrial fisheries for size frequency, sex determination, and catch and effort data will be continued in 1992 by Dr. Taib Diouf, Eastern Atlantic Co-Coordinator. Requested funding for this activity in 1992 is $1,500. The Western Atlantic Coordinator may travel to Senegal in order to train samplers in taking data, on sex determination and demonstrate tagging techniques for the recreational fishery. A report summarizing size and sex frequency data, as well as reproductive and age and growth data on sailfish from the Senegalese artisanal fishery collected in 1980 and 1982 will be prepared by Ms. Claire Paris-Limouzy. Requested funding for this activity is $2,700.

Côte d'Ivoire. Abidjan shore-based sampling of the artisanal and recreational fisheries for billfish will be continued in 1992. The western Atlantic coordinator may travel to Cote d'Ivoire to train samplers in taking data on sex determination. Requested funding in 1992 is $0.00.

Ghana. Shore-based sampling of size frequency and sex determination, and catch/effort of the artisanal gillnet fisheries for billfish will be initiated in 1992 by Mr. Martin Mensah, Eastern Atlantic Co-Coordinator. Requested funding for 1992 is $0.00.

Benin. Shore-based sampling of artisanal fisheries for blue marlin and sailfish for size frequency and sex determination data at one port in Benin will be continued in 1992. Dr. Taib Diouf will supervise this research activity. Requested funding is $500.

Sao Tome and Principe. Shore-based sampling of the artisanal fisheries for billfish for size frequency, sex determination, and total landings will be initiated in 1992. The program will be supervised by J. Castel David of the Ministry of Agriculture and Fisheries. Requested funding for 1992 is $0.00.

Cape Town, South Africa. Investigate the possibility of initiating shore-based sampling of Taiwanese longline vessels that use Cape Town to transship catches. No funding is required in 1992.

Other West African countries. If proposal can be developed for specific locations, sampling can be initiated. Requested funding for 1992 is $0.00.

C) At-sea sampling

C-1 Istiophoridae

Venezuela. Ten observer trips are planned aboard industrial longline vessels targeting yellowfin tuna out of Cumaná harbor for 1992. These trips average 14-21 days at sea and more trips will be made if the opportunity arises, particularly on the larger Korean owned longline vessels sailing under the Venezuelan flag. Requested funding for 1992 is $4,800.

Port of Spain, Trinidad. Several observer trips will be initiated by the Division of Fisheries aboard Trinidadian longline vessels targeting swordfish and tuna. If successful, more trips will be attempted. The Western Atlantic Coordinator will make one trip to this location to train samplers and organize sampling plan. Requested funding for 1992 is $500.

U.S. and British Virgin Islands. Provided that U.S. longline vessels return to St. Johns and Tortola, Mr. William Tobias of the Division of Fish and Wildlife in St. Croix will supervise at-sea sampling. Requested funding for 1992 is $0.00.

St. Vincent. Between 6-8 longline vessels will be shipped to St. Vincent as a result of an agreement with Japan (similar to the situation in Grenada). Provided these vessels arrive during the sampling season, Mr. Kerwin Morris, chief fisheries officer of the Ministry of Agriculture, Industry, and Labor will supervise at-sea sampling of these vessels. Requested funding for 1992 is $500.

Grenada. As soon as the new longline vessels from Japan become operational, at-sea sampling will be initiated on as many vessels as possible (SCRS 91/107). This work will be supervised by Mr. Crofton Isaac and Mr. Paul Phillip of the Ministry of Agriculture, Lands, Forestry, and Fisheries. Requested funding for 1992 is $500.

Uruguay, Brazil, Argentina. These three countries have organized a regional effort for data collection as described in SCRS/91/67. Plans for at-sea sampling are part of the overall data collection effort. When plans are clarified during regional meetings in the winter and spring, possible funding needs will be clarified. At this time, requested funding for 1992 is $0.00.

C-2 Xiphidae

The observer program on Venezuelan industrialized longline vessels targeting swordfish (but also fishing for tuna) out of Puerto La Cruz will be continued. Billfish (Istiophoridae) by-catch data will be gathered. Biological sampling of gonads for determination of sexual maturity, and sampling of anal spines and otoliths for age and growth determination for swordfish in 1992 will be directed by Mr. Luis Marcano of FONAIAP in Cumaná. The ICCAT billfish at-

sea sampling forms C and D will be maintained by all observers. Twenty four observer trips are planned for 1992 and funding for this activity will be $8,600. Equipment needs for 1992 are as follows: a 26 cubic foot chest freezer is needed in Cumaná to store biological samples; a thermo-king freezer unit and 5.5 cubic meter freezer box for the truck are needed for transporting biological materials from Puerto La Cruz to Cumaná; and a FAX for the Cumaná laboratory is needed for better communications between Cumaná, Madrid, and Miami. Funding for this equipment is $5,500. A separate grant for this and other equipment was submitted to the Norcross Foundation by the Western Atlantic Coordinator in July, 1991. Approval of this funding is anticipated early in 1992 and therefore this item ($5,500) has not been included in the budget.

D) Historical data retrieval

A large historical billfish data base exists in Brazil but has not been updated since the 1986 SCRS. Mr. A. Ferreira de Amorim (Instituto de Pesca, Santos, Brazil) is requested to supervise the preparation of a report for the 1992 billfish workshop which updates data sets for all three billfish species, from all major fisheries, including industrial and artisanal longline fisheries and recreational fisheries for 1971-1991. Specific details of this report will be agreed upon in consultation with the program coordinator and the ICCAT Secretariat. Requested funding for 1992 is $1,000.00.

E) Billfish tagging program

The inventory of various items making up the tagging kits are in sufficient supply for the 1992 sampling season. This includes the tagging tee shirts used as an incentive for participating in the tagging program. In order to further encourage the return of tagged billfish, the two types of tagging posters will be printed in Japanese and Chinese and distributed to longline vessels from these countries. Since the offshore longline fisheries from Japan and Taiwan normally contribute a large portion of the harvested Atlantic billfish each year, presumably many tagged billfishes are also harvested and tagging posters in the appropriate languages should increase billfish tag-returns. Requested funding for printing the new posters is $2,000 for 1992 and $1,500 are required for various rewards in 1992.

F) Age and growth

Requested funds for biological samples from juvenile and very large billfish, as well as for tag-recaptured billfish, is $500 for 1992.

G) Coordination

G-1 Travel/Coordination

Experience in the western Atlantic (SCRS/90/20 and SCRS/91/18) continues to indicate that it will be necessary to make a series of trips in specific Caribbean island locations to maintain quality control of ongoing research. The purpose for this travel will be to train samplers in data collection, pick up data, assist in data analysis, hand-carry frozen biological samples back to Miami, monitor the rapidly changing pelagic fisheries, and maintain contracts with project cooperatives. In addition, travel will also be necessary from Miami, Florida, to west Africa to assist the eastern Atlantic coordinators in refining sampling programs (SCRS/91/19). Coordinators Diouf and Mensah in the eastern Atlantic will also require trips to various west African locations for the same reasons. Funding for 1992 will be $7,000. Travel will include the following areas:

- -- Cumaná, Margarita Island, and La Guaira, Venezuela
- -- Grenada
- -- Barbados
- -- Dominican Republic
- -- St. Maarten, Netherlands Antilles
- -- Trinidad and Tobago
- -- Cancún, México
- -- Ghana
- -- Dakar, Senegal
- -- Côte d'Ivoire
- -- Other west African countries

G-2 Miscellaneous/Mailing

Eastern Atlantic miscellaneous and mailing. Requested funding for 1992 is $100. Similar needs for the western Atlantic Coordinator are covered by the U.S. domestic budget.

G-3 Secretariat

Funding for mailing and shipment of materials, data management, and samples ($1,000) and for miscellaneous expenses and contingencies ($1,000) for 1992 are included. Requested funding for 1992 is $2,000.

Because of unforeseen changes in the fisheries and opportunities for sampling, it may be necessary for the General Coordinator to make adjustments in budgeted program priorities. These changes, if any, will be made in consultation with the ICCAT Secretariat and areas Coordinators. Also, implementation of the proposed budget (Table 1) is contingent upon receipt of sufficient funds. Expansion or reduction of expenses will depend, to a large degree, on the amount of funds obtained for 1992.

Table 1. Proposed Budget for the Program of Enhanced Research for Billfish, 1992.

	Total Funds	Required by ICCAT
SPECIES IDENTIFICATION KITS	12,000.00[1]	0.00
AGE AND GROWTH		
Purchase of hard parts	500.00	500.00
TAGGING		3,500.00
Tag rewards	500.00	
Lottery rewards	500.00	
Hard part rewards	500.00	
Printing posters in Japanese/Chinese	2,000.00	
STATISTICS AND SAMPLING ENHANCEMENT		31,140.00
West Atlantic Research		
Shore-Based Sampling		
Venezuela		
Cumaná	200.00	
Puerto La Cruz	140.00	
Margarita Island	500.00	
La Guaira	1,500.00	
Grenada	1,500.00	
Barbados	1,000.00	
Jamaica	1,000.00	
Dominican Republic	500.00	
Trinidad port-sampling	2,700.00	
U.S. & British Virgin Islands	500.00	
St. Maarten	1,000.00	
Las Palmas	0.00	
Mexico	0.00	
At-Sea Sampling		
Venezuela		
Cumaná	4,800.00	
Puerto La Cruz	8,600.00	
Trinidad	500.00	
St. Vincent	500.00	
Grenada	500.00	
U.S. & British Virgin Islands	0.00	
Uruguay, Brazil, Argentina	0.00	

Table 1. (continued)

	Total Funds	Required by ICCAT
East Atlantic Research		
Shore-Based Sampling		
Dakar, Senegal	4,200.00	
Côte d'Ivoire	0.00	
Ghana	0.00	
Benin	500.00	
Sao Tome and Principe	0.00	
South Africa	0.00	
Other West African countries	0.00	
Historical Data Retrieval		
Brazil	1,000.00	
COORDINATION		19,100.00
Travel by Coordinators	7,000.00	
Travel/meeting expenses for ICCAT workshop	10,000.00	
Mailing and miscellaneous--E. Atl.	100.00	
Secretariat support (data management, mailing, etc.)	2,000.00	
GRAND TOTAL		54,240.00

[1] If proposal to granting agency outside ICCAT is approved, then these funds may not be needed. A decision will be made by January 1, 1992.

REPORT ON THE PROGRESS OF THE ALBACORE RESEARCH PROGRAM

1. MEETINGS HELD DURING 1991

The 1991 an Albacore Research Program meeting was held in Sukarrieta, Spain, in the AZTI laboratory from July 12-16. The members of the Albacore Research Program especially thanked the AZTI director for his cooperation and for the computer facilities provided. French and Spanish scientists involved in the Program research participated in the meeting. Document SCRS/91/17 presents the results of this meeting.

The meeting of the albacore species group in the ICCAT Headquarters devoted a half-day session on October 31, to reviewing the Program. The following items were discussed.

2. SUMMARY OF PROGRESS MADE

2.a Observer data

In 1989 and 1990 cruises were made with observers on board vessels of the Spanish and French surface fleets, financed with ICCAT and EEC funds assigned to the Albacore Program. France also obtained information from the EEC logbooks. Time/area strata of 2°x2° and 15-day periods were established for the analysis of the CPUE by gear and the size distribution of the catches of each fleet. A data base corresponding to 1989 and 1990 is available, which will be analyzed by the IEO and IFREMER scientists. The definitive results will be included in the final report of the Albacore Research Program.

2.b Catch-at-size table

The catch-by-size table was obtained for the north stock (surface and longline) for the years 1975-1989, applying the stochastic method MULTIFAN developed by Fournier and Sibert, 1990. The process followed is explained in documents SCRS/91/69 and SCRS/91/17. The data corresponding to 1990, and 1991 if possible, will be incorporated to the table.

2.c Abundance Indices - North Stock

Surface fishery

In 1991 the standardization of the abundance indices of the Spanish troll and baitboat fleets for 1983-1990 was carried out by the GLM method (SCRS/91/105). The series for 1991 will be incorporated in the future.

Longline fishery

There are files of catch and effort in time/area strata of 1 month and 5°x5° in the ICCAT database which will be examined to determine if they can be used to standardize the abundance indices through the application of the GLM.

2.d Fishing Power

It was confirmed that the introduction of sonar in the Spanish surface fleet in the mid-1970s caused an increase in fishing power. A form has been designed to survey the main ports concerning the technical changes introduced.

The changes in the fleets will be studied as regards improvements in navigational systems and fish detecting methods.

2.e Study of hard parts

North Atlantic

Progress made in this area are presented in document SCRS/91/17 and SCRS/91/85. Exhaustive sampling was done June to December, 1991. Sex samples were collected on adult fish (> 90 cm).

2.f Tagging

North Atlantic

During 1989, 1990 and 1991 intensive albacore tagging has been carried out in the Bay of Biscay. The number of fish tagged was 2,669, 4,481 and 4,400, respectively.

Document SCRS/91/79 presents a review of the recoveries obtained up to December, 1990, classified by time/area strata and by size classes.

In 1991, during the tagging cruise in the Bay of Biscay, part of the fish were marked with tetracycline.

Tagging with tetracycline will serve to validate the growth study on this species by reading the hard parts.

The tag/recovery data base is updated to 1991. New recoveries will be added to this base.

All the data available on tagging of albacore (ISTPM files) should be reported in order to incorporate them to the current data base. At present a tuna (bluefin and albacore) tagging cruise is being carried out in the Mediterranean.

South Atlantic

In the South African sport fishery for albacore, various vessels participated in the tagging of this species, having released around 200 fish.

2.g Review of the data base

North Atlantic

In 1991, some biases were detected in the size samples from the Spanish baitboat catches (1987-1989). These data will corrected and replaced. Consequently, MULTIFAN will have to be applied again and a new catch-by-size and age table will be obtained. At the same time, the standardization of the indices of abundance by age will have to be redone for the surface fleets: troll and baitboat (1983-1991). The Secretariat will be informed of the changes during the first quarter of 1992, so that they can be incorporated to the databases.

South Atlantic

Considerable improvements were made in data from the surface fishery. For the first time size samples of catches from the South Atlantic surface fishery become available.

3. FUTURE ACTIVITIES

It is recommended to complete the samples from throughout the year by adding samples from the winter fisheries in the Canary Islands and Azores, if such catches are made in 1992.

South Atlantic

There seems to be a possibility of obtaining samples of spines from the Taiwanese catches that are transshipped in Cape Town (South Africa). The South African scientists have offered to collaborate in this sampling in 1992.

Similar work in the collection and analysis of hard parts of albacore in the Mediterranean are encouraged. In fact, the comparison of hard parts coming from the different stocks could bring about important progress in the understanding of the mechanism of the formation of lines indicating a slowing down of growth. All the hard parts collected will be analyzed by the so-called "image analysis" computer technique.

It was proposed that observers continue to be placed on board vessels of the surface fleet (troll, baitboat, driftnet and pelagic trawl) in 1992. In 1992, albacore offloaded in the ports of Bermeo (baitboat fleet) and Burela (troll fleet) and other ports in France will be sampled. The purpose is to obtain information on the catches of albacore injured by drift nets: number, size and degree of injury.

4. NORTH ATLANTIC STOCK ASSESSMENT

A preparatory meeting of Spanish and French scientists will be organized for the second quarter of 1992 to determine whether the data required for updating the catch-at-size table are available. The data will be sent to the Secretariat as definitive information so that the Secretariat may carry out the pertinent substitutions and prepare the final catch-at-age table for the north stock.

Once all the data necessary for applying an analytical model for the north stock assessment are examined, an Albacore Workshop will be held in 1992. The date of this meeting is tentatively set for the beginning of October. During this Workshop, assessment of the north stock will be made through the use of one or more recommended methods ("ad hoc" VPA, ADAPT, etc.), particularly applied to the 1983-1991 series (for which there are indices of standardized abundance).

Finally, it is proposed that the Albacore Research Program (PSG) end in 1993 by holding a Symposium to analyze and conclude all the information gathered from 1990 to 1992.

WORKING GROUP ON THE WESTERN ATLANTIC TROPICAL TUNAS

During the first meeting of the Working Group on Western Atlantic Tropical Tunas, convened in Miami, Florida, U.S.A. in May, 1991, it was recommended that a meeting be held during the 1991 SCRS session to define and assign priorities to future research activities. The Working Group met shortly during the 1991 SCRS, chaired by the Coordinator, Dr. B. Brown, to review the progress made since its last meeting and to discuss the immediate future plans.

The Group concluded the following:

1) Priority must be given to the task of improving the catch, effort, and size data collecting and reporting systems for all species with attention to the western and southern areas. To facilitate this task, it was suggested that:

   a) ICCAT recognize the meeting organized by the tripartite group (Argentina, Brazil and Uruguay) in Montevideo in December, 1991, concerning longline catch statistics and sampling of these three countries as an important in part of the effort to improve overall statistics database for Western Tropical Tunas. The importance of providing technical direction to this meeting was supported by the group.

and

   b) The SCRS organize a special data preparatory meeting during 1992 in one of these three countries involved. The focus of this meeting would be to examine all catch, effort, and size data, and consider appropriate data substitutions for creating catch-at-size data base for both the western and southern areas. This task would provide the database from which future assessments would come.

2) Collaboration among national scientists during 1992 was strongly encouraged for the purposes of integrating all important research prior to the 1992 SCRS sessions.

CHAPTER III
NATIONAL REPORTS

NATIONAL REPORT OF BRAZIL*

by

J. H. Meneses de Lima

1. STATUS OF THE FISHERIES

1.1 Fleet development

Table 1 shows the annual number of tuna boats operating in Brazilian waters, for the period 1979-1990. The 1990 Brazilian longline tuna fleet was comprised of 21 boats, 11 based in Santos (SP) and 10 in Natal (RN). The increase in fleet size, which started in 1989, was mainly due to the development of the longline fishery in the northeastern region of Brazil. Some increase in fleet size was also observed for the traditional longline fleet based in Santos (SP).

Data for 1991 shows in the first half of the year only three boats operating in the northeast while the fleet based in Santos increased to 13 boats.

With the exception of two boats less than 50 GRT, all of the boats of the Brazilian fleet are in the 51-200 GRT category.

The foreign longline tuna fleet operating under charter to Brazilian firms consisted of five boats with Japanese flags (in the 201-500 GRT category) and a small longliner with Honduran flag (in the 51-200 GRT category). For 1991, seven longliners with Chinese flags were incorporated to this fleet.

The Brazilian baitboat fleet consisted of 51 boats, showing that the fleet size has continued its increasing trend started in 1986, when only 42 boats were operating and which represented less than half of the maximum number of boats in operation in 1982 (97 boats). Besides increasing in size, the fleet has also shown an increase in average vessel characteristics. It is expected that fleet size will continue to increase, as there are nine fishing boats being built in Brazilian shipyards.

The foreign chartered baitboat fleet was comprised of seven boats with Japanese flags. Only one boat operated all year round. Four boats stopped operation by the end of the first semester and two boats started operating during the second semester of the year.

Fishing for small tunas is carried out by the artisanal fleet in the northeastern region of Brazil, with most landings occurring in Ceará state. The main species in the catches are king mackerel (*Scomberomorus cavalla*) and Spanish mackerel (*S. brasiliensis*), which are caught by trolling and gillnets.

There are no data available on the number of boats operating in this fishery. In the last few years some traditional sailboats were substituted by boats propelled by engine.

1.2 Fishing areas

There has been no modification in fishing areas where the fleets operate, in relation to last year.

1.3 Catches

Catches of tuna and tuna-like species taken by longliners in Brazilian waters are shown in Table 2. Total catches amounted to 3,488.9 MT. Brazilian catches (1,714.5 MT) were approximately the same as foreign catches (1,774.4 MT).

Although the same species are caught by all longline fleets, there are remarkable differences in percentage composition, by species, in the catches taken by each fleet. For the Brazilian fleet based in Santos,

*Original report in English.

sharks are the main component of the catches (around 56 percent in weight) with swordfish being the second most important species. For the fleet operating in the northeast of Brazil, yellowfin represents 60 percent of catches in weight and sharks 24 percent. The foreign longliners show a predominance of swordfish in their catches (31.3 percent) followed by bigeye (24.7 percent).

Table 3 shows catches taken by Brazilian baitboats and by Japanese-leased baitboats, for the period 1979-1990. From a total catch of 21,262.5 MT, in 1990, 67.8 percent were taken by Brazilian baitboats. Skipjack, the most important species, represented 94.2 percent of catches in weight. After a maximum catch of 25,052 MT, in 1985, skipjack catches showed a decrease until 1987 (16,153 MT), recovering since then to a level around 20,000 MT in the last two years. Preliminary estimates of skipjack catches for January-June of 1991 are 15,629.3 MT.

There is a lack of information on catches taken by the artisanal fishery because the statistical system for data collection (based on census) has been discontinued in the majority of the states, due to its high operational costs.

2. RESEARCH

The principal organizations which conduct research programs on tunas are IBAMA (Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renovaveis), Instituto de Pesca and FURG (Fundacao Universidade do Rio Grande). Regional units of IBAMA participating in research works are CEPSUL (Centro de Pesquisa e Extensao Pesqueira das regio Nordeste).

The collection of tuna statistics and size sampling of the main species continued, being extended to longline fisheries developed by Brazilian boats in the northeast, where 1,225 yellowfin were sampled in 1991. A total of 5,054 skipjack were sampled for size from landings of baitboats in the southeastern area of Brazil. The data are routinely sent to the ICCAT Secretariat.

The problems of poor statistical coverage on landings from artisanal fisheries are expected to be solved as a new statistical system for collecting data, based on stratified sampling, has now been developed and tested, successfully, in Ceará state and should be applied to other states to give estimates of the landings.

Table 1. Annual number of tuna boats operating in Brazilian waters, 1979-1990

Type of Fishery	Fleet	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Longline	Brazilian	5	5	5	7	12	12	10	11	11	3*	17	21
	Leased	5	3	4	5	4	3	3	6	5	5	5	6
Baitboat	Brazilian	7	39	66	97	57	47	50	42	43	46	47	51
	Leased	-	-	4	5	4	6	5	6	5	5	5	7
Purse seine	Leased	-	-	-	1	3	2	-	-	-	-	-	-

*Does not include the longline fleet based in Santos

Table 2. Catches (MT) of tunas and tuna-like fishes taken by the Brazilian and Japanese longline fleets, 1979-1990

Species	Fleet	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Yellowfin tuna	Brazilian	553	236	459	322	337	344	223*	349	231	366	410	481.4
	Leased	381	283	727	514	505	132	276	676	409	476	634	121.9
	Total	934	519	1186	836	842	476	499	1025	640	842	1044	603.3
Albacore	Brazilian	151	185	63	173	191	171	66	63	61	57	68	119.9
	Leased	216	204	187	517	472	280	226	436	262	328	372	355.5
	Total	367	389	250	690	663	451	292	499	323	385	440	475.4
Bigeye tuna	Brazilian	167	174	102	188	127	136	43	67	55	54	36	47.6
	Leased	405	393	341	452	378	522	364	789	691	885	471	534.4
	Total	572	567	443	640	505	658	407	856	746	939	507	582
Swordfish	Brazilian	213	1125	405	613	471	341	321	417	469	555	554	777.1
	Leased	200	409	223	321	283	122	227	304	511	470	241	679.3
	Total	413	1534	628	934	754	463	548	721	980	1025	795	1456.4
Billfishes	Brazilian	71	125	77	84	83	148	219	356	189	214	283	276.4
	Leased	142	47	10	74	47	28	63	68	61	86	61	73.2
	Total	213	172	87	158	130	176	282	424	250	300	344	349.6
Others	Brazilian	205	303	34	46	2	8	8	37	21	12	9	12.1
	Leased	170**	2	3	3	5	6	3	7	1	3	6	10.1
	Total	375	305	37	49	7	14	11	44	22	15	15	22.2
TOTAL	Brazilian	1360	2148	1140	1426	1211	1148	880	1289	1026	1258	1360	1714.5
	Leased	1514	1338	1491	1881	1690	1090	1159	2280	1935	2248	1785	1774.4
	Total	2874	3486	2631	3307	2901	2238	2039	3569	2961	3506	3145	3488.9

*Includes albacore and bigeye.
**May include sharks and dolphins (Coriphaena hippurus).

Table 3. Catches (MT) of tunas and tuna-like fishes taken by the Brazilian and Japanese-leased baitboat fleets, 1979-1990

Species	Fleet	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Skipjack tuna	Brazilian	1818	6070	13620	16299	11673	7379	14038	14322	9359	9963	14218	13291
	Leased	-	-	-	1714	3660	5708	11014	8220	6794	7264	6332	6735
	Total	1818	6070	13620	18013	15333	13087	25052	22542	16153	17227	20550	20026
Yellowfin tuna	Brazilian	117	392	910	1027	1737	1169	1890	624	1379	1446	1331	862
	Leased	-	-	-	4	40	129	286	127	180	149	45	92
	Total	117	392	910	1031	1777	1298	2176	751	1559	1595	1376	954
Others*	Brazilian	169	384	45	146	325	589	463	446	643	342	184	267.5
	Leased	-	-	-	43	14	41	57	19	-	3	1	15.0
	Total	169	384	45	189	339	630	520	465	643	345	185	282.5
TOTAL	Brazilian	2104	6846	14575	17472	13735	9137	16391	15392	11381	11751	15733	14420.5
	Leased	0	0	0	1761	3714	5878	11357	8366	6974	7416	6378	6842
	Total	2104	6846	14575	19233	17449	15015	27748	23758	18355	19167	22111	21262.5

*Includes albacore, bigeye and small tunas; data for the period 1979-1983 may include dolphins (Coriphaena hippurus) and other species.

NATIONAL REPORT OF CANADA*

by

Douglas Clay** and Julie M. Porter***

1. STATUS OF THE FISHERIES

1.1 Bluefin tuna

The Canadian nominal catch of Atlantic bluefin tuna for the calendar year 1990 was 2,245 fish weighing 421.8 tonnes (round). This is a decrease of a third from the catch of the calendar year 1989 (633.6 tonnes). The major fisheries took place off southwest Nova Scotia (N.S.) (between Browns Bank and the northeast peak of Georges Bank - averaging 155 kg (round)) and the Virgin Rocks area (central Grand Banks of Newfoundland - averaging 305 kg (round)). Although these fisheries have only a four year history, bluefin have been known to frequent those areas in the past. A combination of local shortages in other traditional fisheries and increased prices paid for bluefin has stimulated interest in these two nearshore (< 200 km) fisheries.

One of the two Canadian offshore longline vessels ceased operation in 1990 resulting in only 131 bluefin (22.7 tonnes) being landed. This fishery is operating as a longline fishery directing towards non-regulated tuna species (ie. bigeye, albacore and yellowfin). They have been allowed a 35 tonne per vessel by-catch limit for bluefin tuna. The bluefin landed in this fishery were larger than those reported for 1989 (average weight 175 kg - round weight). The percentage composition that bluefin make up of the offshore longline catch has increased from 7 percent in 1987 to 50 percent in 1990. The catches (in tonnes and numbers of fish) for this offshore large pelagic fishery from 1987 to 1990 are indicated in Table 1.

Only five bluefin were harvested in the St. Margaret's Bay, Nova Scotia, trap fishery (1 fish was lost before harvest).

The mean weight of bluefin caught in the Gulf of St. Lawrence in 1990 was 458 kg (round), the same as in 1989.

1.2 Swordfish

The Canadian nominal catch of swordfish in 1990 was 911 tonnes (round weight), taken mainly by longline with smaller catches by the harpoon fishery (92 tonnes; Table 1). The mean weight (round) of longlined and harpooned swordfish caught in the Canadian fishery was 61 kg and 138 kg, respectively (Table 1).

Only 11 percent of the Canadian catch by number in 1990 was considered small fish by the new (1991) ICCAT recommendations for regulatory measures (25 kg round; Table 2).

2. RESEARCH STUDIES

2.1 Bluefin tuna

No biological sampling was conducted on the traditional inshore rod and reel or tended line fisheries, however there was extensive sampling carried out on both the offshore Canadian and the Japanese longline fisheries while within the Canadian EEZ.

Individual dressed weights were recorded for all fish landed in the traditional fisheries and observers collected length and round weight frequencies (to the nearest cm and kg) from over half of the fish caught in the offshore longline fisheries. A review of the historical Canadian bluefin tuna fishery (1910-1990) was conducted and is being developed for publication.

An analysis of log records (Table 3) collected from inshore vessels in 1990, indicated that the CPUE

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*Original report in English.

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for the traditional fishery off Prince Edward Island decreased from 0.04 fish per reported vessel day in 1989 to 0.03 fish per reported vessel day (this CPUE index was calculated for fishermen that submitted logs documenting at least 10 days of fishing).

A multiple mark-recapture tagging study was initiated by staff of the St. Andrews Biological Station on bluefin of the Browns Bank fishing grounds. Sixty-two fish were tagged, with one unconfirmed recapture. The purpose of this study was to estimate the size of the Browns Bank school of fish and to study their movements and behavior after tagging.

2.2 Swordfish

The scientific research program based in St. Andrews, N.B., was as follows:

1) At-sea sampling on commercial harpoon and longline boats for the duration of the fishery (July-October); hard parts for ageing and growth studies, fecundity data, morphometrics and stomach contents.

2) Department of Fisheries and Oceans swordfish longlining cruise to collect the above data, as well as data on bait robbing, attraction to artificial lures and bycatch. Collaborative studies on metabolism in large pelagic fishes and growth and population structure in swordfish conducted with the University of Guelph, Ontario and the Royal Ontario Museum.

3) Department of Fisheries and Oceans conducted a study to determine the influence of hook size on the size of swordfish captured by longline.

4) Improved catch and individual weight data collection from the commercial swordfish fishery.

3. MANAGEMENT

3.1 Bluefin tuna

The regulations for the Atlantic bluefin tuna fishery contain several broad conservation provisions detailed in the Canadian National Report for 1988 (ICCAT Biennial Report, 1989).

In 1990, 747 licenses were issued to fishermen participating in the inshore and nearshore bluefin fisheries (this does not include the two offshore longline operations).

There have been no new licenses issued since the implementation of quotas by ICCAT in 1982, although twelve temporary licenses have been issued since 1988 to fishermen in Newfoundland. The distribution of licenses by province and by Department of Fisheries and Oceans (D.F.O.) administrative region are as reported in the Canadian National Report for 1990 (ICCAT Biennial Report, 1991).

In 1989 a new quota management system based on the "quarterly performance" of the fishery in each bluefin management area was adopted for the inshore and nearshore fisheries. This system was employed with some minor refinements for the 1990 fishing year.

The two offshore longline operations were again limited to a by-catch allocation of bluefin tuna that was not to exceed 35 tonnes each.

3.2 Swordfish

Swordfish longline licenses were issued to 70 vessels in 1990, unchanged since 1987. On the edge of the Nova Scotia Shelf and the Grand Banks of Newfoundland where the swordfish fishery occurs, there were 50 active longline licenses. Harpoon licenses were issued to 640 vessels (some also have longline licenses), though less than 100 were active.

The swordfish fishery on the Atlantic coast was subject to the following management measures in 1990 (no change from 1988):

1) quota of 3500 tonnes;
2) allowance for the harvest of all tunas with the exception of bluefin;
3) no gillnetting of swordfish permitted;
4) number of longline licenses limited (since 1984) to a maximum of 70 (strict vessel replacement restrictions apply);
5) establishment of a 60 tonne (maximum) swordfish quota for both of the Canadian offshore developmental longline vessels; and
6) a limit of 125 tonne of swordfish (not within the Canadian quota) taken by Japanese longline vessels within the Canadian EEZ.

4. SPECIAL MEETINGS

The 1991 ICCAT swordfish stock assessment working group was hosted by the Department of Fisheries and Oceans at the Biological Station, St. Andrews, New Brunswick from the 10 to 17 of September, 1991.

5. PRELIMINARY INFORMATION FOR 1991

5.1 Bluefin

The nominal Canadian landings as of October 22, 1991 were approximately 435 tonnes (round weight) from the inshore and nearshore fisheries. To date no bluefin landings have been made by the offshore longline fishery although an allocation of 35 tonnes is still available.

No bluefin were caught in the St. Margaret's Bay trap fishery in 1991. Some incidental fish were caught in herring weirs around Grand Manan Island, New Brunswick (Bay of Fundy). This is the first year for a long time that bluefin have been reported from this area, it is unknown if it is due to some variation in environmental factors or some other factor.

Reported sightings of small to medium tuna were frequent during 1990 and 1991, this implies some improvement in the western bluefin stock as a result of the restrictive management in place since 1982. It must be born in mind that this could also be the result of fluctuations in local environmental conditions.

An histological study of gonad anatomy and maturity has begun as a cooperative study between the Department of Fisheries and Oceans and Acadia University, Wolfville, Nova Scotia. This study is designed to provide a scientific basis upon which to calculate the proportion of the bluefin population contributing to the spawning stock biomass. At present, the age of maturity used for the west Atlantic stock is 8 years (200 cm), other estimates indicate it could be as low as age 4 or 5 (< 130 cm). These two estimates are probably the range of age of maturity, with the true value somewhere between.

The multiple mark-recapture tagging study begun by staff of the St. Andrews Biological Station in 1990 was continued and 71 fish tagged, making a total of 133 tagged fish in 2 years of study. Preliminary results indicate: 1) fish remain vigorous after tagging, 2) there is considerable movement through the area during a particular season, and 3) fish return to seasonal feeding areas year after year.

5.2 Swordfish

The 1991 Atlantic Swordfish Fishing Plan management measures are as follows:

1) Quota: A quota of 2000 t assigned for 1991 broken down as follows:

TAC	2,000
Bycatch for Canadian tuna vessels	120
Canadian longline and harpoon	1,880

2) Bycatch: i) longline vessels directing for swordfish are permitted to catch and retain tuna other than bluefin; ii) establishment of a 60 tonne (maximum) swordfish quota allowance for each (two) offshore Canadian tuna vessels;

3) Area: A condition of license will appear on all swordfish licenses: "Valid for NAFO Convention Subareas 3, 4 and 5 only, excluding Fishing Zones 1 and 2 of Canada" (Gulf of St. Lawrence and Bay of Fundy).

4) Limited Entry: Swordfish longline licenses and swordfish harpoon licenses are available only to fishermen who held such licenses in 1988, 1989, or 1990.

5) Drift Nets: There is a ban on Canadian vessels using high seas drift nets for fishing large pelagic species.

6) Small Fish: There is a prohibition on the taking and landing of swordfish less than 25 kg (live weight). A length equivalent for this measure will be 125 cm from the fork of the tail to the tip of the lower jaw. Vessels are limited to 15 percent tolerance of the number of fish per landing.

7) Opening Date: The opening date for swordfishing is May 1 for the 1991 season.

In 1991, 55 longline and 726 harpoon licenses were issued. Records to date (17 October 1991) indicate the fishery has landed more than 585 tonnes and is still in progress. The scientific research program is as follows:

1) At-sea sampling on harpoon and longline boats for the duration of the fishery (June-October); hard parts for ageing studies, fecundity data, morphometrics and stomach contents.

2) Department of Fisheries and Oceans swordfish longlining cruise to collect the above data, as well as data on bait robbing, attraction to artificial lures and bycatch. Collaborative studies on growth and population structure in swordfish conducted with the Royal Ontario Museum.

3) Improved catch and individual weight data collection from the commercial swordfish fishery.

Table 1. Catches (in MT and numbers of fish) of the offshore large pelagic fishery, 1987-1990

	1987		*1988*		*1989*		*1990*	
	mass	*/number*	*mass*	*/number*	*mass*	*/number*	*mass*	*/number*
BFT*	33	332	104	1490	53	870	23	131
BET	144	3942	95	2584	31	884	10	333
ALB	21	811	47	1856	22	1226	6	432
YFT	40	1022	30	771	7	290	7	186
SWO*	15	163	16	261	6	131	3	100

*Species regulated by Canadian quota regulations.

Table 2. Summary of 1988-90 swordfish catch, average weight of fish (round weights) and percentage small fish* in catch

	1988	*1989*	*1990*
Number of boats			
Longline	39	52	50
Harpoon		Undetermined number	
Catch (MT)			
Longline	869	1097	819
Harpoon	25	146	92
Total	894	1243	911
Average weight (kg)			
Longline	50	52	61
(# sampled)	(1315)	(3902)	(10280)
Harpoon	--	129	138
(# sampled)	(0)	(637)	(164)
% of catch sampled	7	23	71
% of catch small fish* (by number)	--	--	11

* <25 kg round weight, calculated only for 1990 landings.

Table 3. **Four indices of bluefin tuna abundance from the west Atlantic expressed as fish caught per day. Rod and reel (R&R) and tended line (TL) are the only two gears utilized in these series. The rod and reel pre-1981 are not considered comparable to the rod and reel post-1981 - see SCRS/88/71.**

	P.E.I.		*Nova Scotia*		*New Brunswick*		*Quebec*	
Year	*Rod & Reel*	*Tended Line*	*Rod & Reel*	*Tended Line*	*Rod & Reel*	*Tended Line*	*Rod & Reel*	*Tended Line*
75	.09		.01		.20			
76	.125				.21			
77	.09		.01		.22		.18	
78	.09		.04		.06			
79	.07				.13			
80	.07		.06		.19			
81		.21	.05			.03		
82	.06	.19	.09	.05	.10	.07		.03
83	.08	.13	.01	.03	.29	.38	.04	.06
84	.03	.09	.15	.01	.12	.08		.04
85	.02	.05				.05		
86	.02	.05				.04		.03
87		.04				.04		
88		.06				.00		
89		.04						
90		.03						

NATIONAL REPORT OF FRANCE*

1. STATUS OF THE FISHERY

1.1 General view

French catches of tunas rose to 73,600 MT in 1990, which was a record catch for the last ten years. These catches are broken down in Table 1.

1.2 Bluefin tuna

In the Mediterranean, during the 1990 fishing season, 24 purse seiners operated, taking 4,660 MT of bluefin tuna. In the Atlantic Ocean, the catches for the same year remained at a low level of less than 400 MT. These catches are divided between baitboats and by-catches of other gears targeting albacore (drift nets and pelagic trawls).

1.3 Albacore

In the Atlantic, albacore fishing was carried out during the summer of 1990 by 41 gillnet vessels and 25 pairs of pelagic trawls which took 2,100 and 900 MT of albacore, respectively. The traditional trollers were only used as auxiliary vessels for the gillnet vessels and the trawlers (taking around 300 MT). In the Mediterranean, the 24 purse seiners incidentally took 91 MT in 1990.

1.4 Tropical tunas

Catches of tropical tunas in 1990 by French tuna vessels reached a high level of 65,100 MT. Of this total, 43,800 MT were yellowfin, in spite of a stable fishing effort (20 purse seiners and 12 baitboats). These high catches are explained by the exceptionally high catch rates of the purse seiners taking large yellowfin observed during the first quarter of 1990.

2. RESEARCH

2.1 Bluefin tuna

Sampling of the landings of bluefin tuna from purse seiners operating in the Mediterranean continued. In 1990, the rate of sampling, taken from commercial data, covered more than 94 percent of the total catch. Two meetings between the Mediterranean countries which are members of the EEC were held to define the joint research tasks to be carried out on bluefin tuna and on other large pelagics.

2.2 Albacore

For the north Atlantic, research on albacore was carried out within the framework of the ICCAT Albacore Research Program. This research concerned the development of ageing methods for large albacore in view of the improved analytic stock assessments. Important assistance was obtained from the EEC. Experiments on the immersion of drift nets were carried out, in order to decrease the incidental catch of marine mammals. These experiments follow the recommendations made by ICCAT, the U.N. and FAO.

In the Mediterranean, two cruises, financed by the EEC, around the Balearic Islands (June 1991) and off the Gulf of Lyon (September 1991) have made it possible to continue the study begun five years ago on Mediterranean albacore. More than 900 fish were tagged and released. This makes around 3,000 the number of fish tagged by France in the Mediterranean. Around 30 of these fish have been recovered up to the present by professional fishermen, but no movement into the Atlantic has yet been indicated.

2.3 Tropical tunas

As for the tropical tunas, fishery statistics are collected and research is carried out in close collaboration with research centers in Côte d'Ivoire, Senegal and Venezuela, where French scientists are working.

Detailed fishery statistics for the French intertropical fleets were submitted in sufficient time to ICCAT. Research on tropical tunas was carried out in the following fields:

- Help in finalizing the publication on the results of the Yellowfin Year Program.

*Original report in French.

- Statistical analysis of purse seine data (catch, fishing effort and size): a working group met in France in July, 1991, on this subject and a detailed report of the meeting will be submitted to the Sub-Committee on Statistics in 1992.

- Participation in the Working Group on Western Atlantic Tropical Tunas which met in Miami.

- Research on the relationships between tunas and the environment.

- Different work in the field of assessment of intertropical tuna resources.

All this research was the subject of 15 documents submitted to the SCRS in 1991 by French scientists.

Table 1. Catch (MT) of tunas by French vessels in 1981-1990

	1981	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
YFT	40.6	29.2	31.9	5.8	9.8	16.6	16.6	21.6	30.6	43.8
SKJ	27.2	26.1	20.5	13.2	8.5	11.7	15.1	16.3	15.6	16.4
BET	0.4	3.0	6.0	2.1	4.4	4.6	3.4	3.8	2.8	4.9
ALB	3.3	3.6	3.0	2.9	2.2	1.2	2.0	2.8	3.7	3.4
BFT	2.4	5.0	4.1	4.2	5.6	3.8	4.9	6.2	4.9	5.2
TOTAL	73.9	66.9	65.5	28.2	30.5	37.9	42.0	50.7	57.6	73.7

NATIONAL REPORT OF GABON*

Tuna fishing in Gabon is usually carried out by foreign vessels with fishing rights. The technique used by these tuna vessels is the purse seine. The main species found in the catches are yellowfin tuna, skipjack and bigeye tuna.

In 1991, 38 vessels licensed to fish for tuna in Gabon; of these 19 were French tuna vessels and 19 were Spanish.

The total fishing effort for the 38 vessels was 2,111 fishing days broken down as follows:

	No. of vessels	*Fishing effort (Days fishing)*
French	19	811
Spanish	19	1,300

The migratory phenomenon of tunas is usually the reason for the seasonality of tuna fishing; in fact, each year three fishing seasons are reported:

- -- from May to June;
- -- July-August-September; period in which a large concentration of vessels is recorded in the Cape López area;
- -- from October to November.

The catches are the same as those shown in the ICCAT statistics taken from FIS and Spanish logbooks. Gabon would like these tuna vessels to report their catches directly to Gabon.

*Original report in French.

NATIONAL REPORT OF GHANA - 1990*

1. THE FLEET

The Ghanaian tuna fishery has been dominated by a fleet of baitboats. In 1990, 33 of such baitboats operated; the gross tonnage of these vessels ranged between 250 and 500. Only one purse seiner with a gross tonnage of 898 operated--it made only two trips in the year. All the fleet were Ghana flag vessels.

2. THE FISHERIES

The area of operation did not change; the fleet operated largely in the traditional ICCAT quadrants 1 and 4. As usual, skipjack continued to be the dominant species caught, followed by yellowfin and bigeye. The landings are tabulated below; however, the quantities are not the adjusted values based on multispecies sampling.

Due to unexpected problems, the processing of the raw data to obtain Task II effort and biological information has been delayed.

Species	*Landings (in MT)*
Yellowfin tuna	7,710.1
Skipjack tuna	29,498.6
Bigeye tuna	98.0
Atlantic black skipjack tuna	3,496.2
Total	40,802.9

3. RESEARCH AND STATISTICS

Port sampling for multispecies estimation and observation of biological parameters continued throughout the year. A total of 16,064 yellowfin, 37,862 skipjack and 4,772 bigeye were measured for length frequency distribution during the year. All these data and other necessary information are being processed for submission to ICCAT on the relevant forms.

*Original report in English.

NATIONAL REPORT OF JAPAN*

by

National Research Institute of Far Seas Fisheries

1. FISHING ACTIVITIES

The Japanese tuna fishery has operated recently in the Atlantic with two types of gears: longline and purse seine. The 1990 Japanese catch of Atlantic tunas and billfishes is estimated to amount to 55,831 metric tons (MT), 92 percent of which was taken by the longline fishery (Table 1). The same value compared to the 1989 catch was ascribed mainly to the catch of the longline fishery. The purse seine catch in 1990 was a little less than 4,400 MT. In 1990, no substantial change in fishing pattern of either fishery has been reported.

1.1 The longline fishery

The number of Japanese longliners operating widely in the Atlantic in 1990 was 235, slightly less than that of 1989 (Table 2). The longline catch in 1990 was estimated to be about 51,500 MT, which resulted in a small change (about a 12 percent decrease) from the 1989 catch (Table 3). Although the 1990 catch of bigeye tuna decreased slightly to 33,000 MT (64 percent of the total), the predominance of the species in the total longline catch has been unchanged for more than a decade. Regarding other species of the longline catch, important catches were made of swordfish, yellowfin and followed by bluefin. The yellowfin tuna catch decreased from 7,000 MT in 1989 to 5,727 MT in 1990. In 1990, up to now, the operational pattern of the longline fleet was reported to be almost the same as the 1989 pattern except for the operations in the higher latitude of central north Atlantic (30°W-50°W) for bigeye and bluefin tunas where longlining was not so common previously.

1.2 The purse seine fishery

Two Japanese purse seiners operated in the Gulf of Guinea in 1988. The operational pattern of this fishery has been stable in recent years. The catch in 1990 was 4,361 MT, which was almost exclusively composed of skipjack and yellowfin tuna (Table 4), reflecting the nature of a tropical tuna fishery. In 1990, only one purse seiner was operating.

2. ICCAT REGULATIONS

Since the initiation of the fishery regulations set by the International Commission for the Conservation of Atlantic Tunas (ICCAT) for bluefin, yellowfin, and bigeye tunas, Japanese fishermen have been concurrently under national regulatory measures. To comply with bluefin tuna regulations, the area closure has been in effect in the Mediterranean Sea during May 21-June 30 since 1975 and in the Gulf of Mexico throughout the year since 1982. These closures have been effective in reducing the fishing mortality on the spawning stock. In recent years, the respective entry of longliners in the northeast Atlantic and Mediterranean Sea has been limited to certain numbers.

In addition, the bluefin catch has been monitored in the western and eastern Atlantic, respectively. To patrol the longline fleet, a governmental boat was dispatched to the Atlantic Ocean, especially in the Mediterranean Sea during the closure periods of 1988 and 1989 but not in 1990 due to the Gulf War. The tropical purse seine fleet has also been under national regulations in accordance with the ICCAT 3.2 kg size limits for yellowfin and bigeye tunas.

3. RESEARCH ACTIVITIES

The National Research Institute of Far Seas Fisheries (NRIFSF) has been in charge of the collection and compilation of Atlantic fishery data necessary to conduct scientific research on Atlantic tuna and billfish stocks. All the statistical data have been routinely reported to the ICCAT Secretariat and results of scientific research have also been presented at the

*Original report in English.

regular meetings and intersessional workshops of the Standing Committee on Research and Statistics (SCRS).

3.1 Fishery data

The NRIFSF reported final 1989 catch, catch/effort and size frequency data (Task I, II and biological sampling) of the longline fishery to the ICCAT Secretariat. The compilation of the same data for 1990 are in progress. The preliminary 1990 catch estimates are given in this report. The size data for swordfish and bluefin tuna in 1990 were prepared and presented to this SCRS meeting. The quick reporting system of logbooks and size data by on-board sampling at a port of call has been continued since into inception in April, 1984. The Task I and II data from the purse seine fishery for 1990 were finalized and reported to ICCAT.

3.2 Tuna biology and stock assessment

The biological and stock assessment studies carried out by the NRIFSF on Atlantic tunas and billfishes have been continued. Among several papers presented at the 1991 SCRS meeting including this national report, one paper is on the Japanese longline fishery, one paper is on swordfish and four papers are related to bluefin stock analysis.

This year the NRIFSF scientists participated with the ICCAT meeting of the Working Group on Western Atlantic Tropical Tunas and the 1991 SCRS Stock Assessment Session on Swordfish.

4. PAPERS PREPARED FOR THE 1991 SCRS

Documents presented to the SCRS in 1991 are listed in Appendix 3 to Annex 16 and/or are published in the Collective Volume of Scientific Papers, Vols. XXXVIII and XXXIX.

Table 1. Japanese catches (MT) of tunas and tuna-like fishes by type of fisheries, in the Atlantic Ocean and Mediterranean Sea, 1985-1990

Type of fishery	*1985*	*1986*	*1987*	*1988*	*1989*	*1990**
Total	53,731	39,046	34,471	53,213	62,967	55,831*
Longline (Home-based)	48,505	33,241	29,300	47,326	58,514	51,470*
Pole-and-line	--	--	--	--	--	--
Purse seine	5,226	5,805	5,171	5,887	4,453	4,361

*Preliminary.

Table 2. Annual number of Japanese tuna boats operating in the Atlantic Ocean, 1985-1990

Type of fishery	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
Longline (Home-based)	208	190	146	183	239	235
Pole-and-line	--	--	--	--	--	--
Purse seine	2	2	2	2	1	1

Table 3. Catches (MT) of tunas and tuna-like fishes taken by the Japanese longline fishery, 1985-1990. (1990 figures are preliminary.)

	1985	*1986*	*1987*	*1988*	*1989*	*1990*
Atlantic						
Albacore	1,467	1,209	851	1,128	1,214	1,365
Bigeye tuna	31,602	22,800	18,575	31,664	39,419	32,724
Bluefin tuna	1,517	1,323	1,860	2,278	2,396	2,027
Southern Bluefin	1,468	389	1,120	548	625	600
Yellowfin tuna	5,308	3,404	3,364	5,982	6,971	5,727
Swordfish	4,309	2,653	2,294	4,051	5,592	7,181
Blue marlin*	1,090	508	438	823	1,555	1,115
White marlin	126	129	134	144	146	69
Sailfish**	122	99	43	79	78	83
Others	468	378	341	366	390	370
Atlantic Subtotal	47,477	32,892	29,020	47,063	58,386	51,261
Mediterranean						
Bluefin tuna	1,006	341	280	258	127	207
Swordfish	14	7	3	4	1	2
Bigeye tuna	--	1	--	--	--	--
Mediterranean Subtotal	1,020	349	283	262	128	209
TOTAL	48,497	33,241	29,303	47,325	58,514	51,470

*Includes minor amount (less than 30 MT) of black marlin.
**Includes shortbill spearfish.

Table 4. Catches (MT) of tunas taken by the Japanese Atlantic purse seine fishery, 1985-1990

	1985	*1986*	*1987*	*1988*	*1989*	1990
TOTAL	5,226	5,805	5,171	5,887	4,453	4,361
Bigeye tuna	10	1	--	14	38	13
Yellowfin tuna	2,789	3,152	3,010	2,221	1,873	1,671
Skipjack tuna	2,427	2,652	2,161	3,652	2,542	2,677
Albacore	--	--	--	--	--	--

NATIONAL REPORT OF KOREA*

by

National Fisheries Research and Development Agency

1. FISHING ACTIVITIES

The number vessels in the Korean tuna fleet fishing in the Atlantic Ocean has continuously decreased since 1977 and was comprised of 17 longliners in 1990 (Table 1).

The total Korean commercial catch of tunas and tuna-like fishes amounted to 4,268 MT in 1990, which showed a decrease of 66 percent compared to the 1989 catch (Table 2).

The catch composition by major species is as follows:

Bigeye -- 2,690 (63 percent of the total catch)
Yellowfin -- 808 (19 percent of the total catch)

There have been no significant changes in fishing pattern and grounds for the Korean tuna longliners in recent years. Bigeye tuna is one of the major species since Korean deep longline was introduced in 1980 in the Atlantic Ocean (Table 3).

2. RESEARCH ACTIVITIES

The National Fisheries Research and Development Agency (NFRDA) collected catch and effort data as well as size data on tunas and related species from the commercial fishing vessels as in the past. Catch, catch/effort (Task I, II) and size frequency data for 1990 were regularly sent to the ICCAT Secretariat.

Original report in English.

Table 1. Number of Korean tuna vessels in the Atlantic Ocean, 1977-1990

Type of Gear	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Longline	120	97	66	54	56	52	53	51	45	28	29	29	33	17
Pole and line	15	20	18	16	8	4	4	1	1	--	--	--	--	--
Total	135	117	84	70	64	56	57	52	46	28	29	29	33	17

Table 2. Korean catches (MT) of Atlantic tunas and tuna-like fishes by type of gear, 1977-1990

Type of Gear	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Longline	38,849	29,094	20,069	18,952	22,306	21,033	16,224	14,785	17,454	9,965	7,625	7,801	12,507	4,268
Pole and line	6,202	10,364	17,188	9,901	9,529	3,503	1,697	969	250	--	--	--	--	--
Total	45,051	39,458	37,257	28,853	31,835	24,536	17,921	15,754	17,704	9,965	7,625	7,801	12,507	4,268

Table 3. Nominal catches (MT), by species, of tunas and tuna-like fishes taken by the Korean Atlantic longline fishery, 1977-1990

Year	BFT	YFT	ALB	BET	SKJ	SWO	BUM	WHM	SAI	Other bill-fishes	Others	TOTAL
1977	3	16,347	9,345	7,610	9	1,240	164	202	141	449	3,339	38,849
1978	-	11,512	4,418	9,182	42	1,333	177	79	29	111	2,211	29,094
1979	2	6,997	3,875	7,305	2	606	95	13	20	96	1,058	20,069
1980	-	5,869	1,487	8,963	4	683	9	1	5	167	1,764	18,952
1981	-	6,650	1,620	11,682	47	447	81	13	11	171	1,584	22,306
1982	-	5,872	1,889	10,615	21	684	17	24	16	114	1,781	21,033
1983	3	3,405	1,077	9,383	530	462	65	20	4	51	1,224	16,224
1984	-	2,673	1,315	8,943	29	406	61	5	3	423	927	14,785
1985	77	3,239	901	10,691	20	344	54	1	105	729	1,293	17,454
1986	-	1,818	694	6,084	11	82	15	-	62	106	1,093	9,965
1987	-	1,457	401	4,438	6	75	17	-	-	183	1,048	7,625
1988	-	1,368	197	4,919	3	123	-	-	-	409	782	7,801
1989	-	2,535	107	7,896	6	162	-	-	-	857	944	12,507
1990	-	808	53	2,690	-	101	-	-	-	446	170	4,268

NATIONAL REPORT OF MOROCCO*

Tuna fishing is carried out in Morocco by small longline and purse seine vessels while coastal purse seiners have incidental catches of tunas.

The use of traps as a method of catching tunas is regaining importance and this fishery is developing in the North Atlantic and in the Mediterranean Sea.

The total catches of tunas made in 1990 are estimated to be 4,844 MT, of which 72.2 percent are caught by the coastal fleet and 27.8 percent by the traps.These figures indicate an increase of 18.6 percent in total weight compared to 1989.

Table 1 summarizes the national yield of tunas by species and fishing area for the years 1989 and 1990.

The migratory character of tunas explains the seasonality of tuna fishing. If fact, each year two migratory periods are noted: the first during April-June from the Atlantic towards the Mediterranean and the second in August-September in the opposite direction.

1. MEDITERRANEAN TUNA LANDINGS

1.a Coastal fishery

The landings for the coastal fleet for 1990 are 1,282 MT, which is an increase of 18 percent compared to 1989.

The dominant species in this fishery is frigate tuna with 97 percent, compared to 0.1 percent of bluefin tuna.

1.b Traps

The yield of the two Mediterranean traps in 1990 is estimated at 825 MT (of which 78 percent is bluefin and 22 percent is frigate tuna), which is an increase of 130 percent compared to 1989.

2. LANDINGS OF ATLANTIC TUNAS

2.a Coastal fishery

Landings from the Atlantic have also increased by 52 percent with a tonnage going from 1,451 MT in 1989 to 2,212 MT in 1990.

The dominant species are frigate tuna and Atlantic bonito with 68 percent in 1989 and 82 percent in 1990.

2.b Traps

In spite of the fact that the number of Atlantic traps has gone from one to three between 1989 and 1990, there has been reported only a slight increase in tonnage, estimated at over 24 percent.

The dominant species are bluefin and frigate tuna:

	1989	*1990*
Bluefin tuna	304 MT (72%)	228 MT (26%)
Frigate tuna	113 MT (43%)	238 MT (45%)

3. CANNING

The tonnages of canned tuna for the last three years are the following:

1988	297 MT
1989	210 MT
1990	285 MT

4. CONCLUSION

The national fishery statistics indicate that tunas represent around 1 percent of the total yield of fish, which shows that this remains a secondary activity and that it is far from being a true tuna fishery.

Morocco does not have a specialized fishing fleet for catching tunas. As mentioned above, the national yield of tunas mainly comes from incidental catches of the coastal purse seine fleet targeting small pelagics and from the traps which are in the process of resuming their activities after not operating for more than twenty years.

*Original report in French.

Table 1. Total yield of tunas in Moroccan fisheries during 1989-1990

	Species	Mediterranean		Atlantic		Total	
		1898	1990	1989	1990	1989	1990
Catches by traps (MT)	BFT	286	640	304	228	590	868
	BON	--	--	3	7	3	7
	FRI	70	185	113	238	183	423
	Sarda	--	--	4	52	4	52
	TOTAL	356	825	424	525	780	1350
Incidental catch by national coastal fleet (MT)	BFT	6	2	13	4	19	6
	BON	25	10	565	1420	590	1,430
	FRI	1,057	1,248	427	402	1,484	1,650
	Sarda	--	--	30	25	30	25
	SKJ	--	--	282	250	282	250
	LTA	1	22	134	111	135	133
	TOTAL	1,089	1,282	1,451	2,212	2,540	3,494
	GRAND TOTAL	1,445	2,107	1,875	2,737	3,320	4,844

NATIONAL REPORT OF PORTUGAL*

1. THE TUNA FISHERY

Portuguese tuna fishing takes place mostly in the Azores and in Madeira, where the local baitboat fleets seasonally catch tunas with live bait. Off continental Portugal, tunas are taken incidentally by different gears, such as longline, purse seine and driftnets.

The surface longline fisheries, targeting swordfish, operate around continental Portugal and the Azores. Part of the longliners based in Portugal fish in the Azores area.

Catches of tunas and tuna-like species reached 13,299 MT in 1989 and 13,345 MT in 1990. The stability of the catches in 1989 and 1990 especially reflects the low skipjack catches in the Azores in 1989 and 1990.

Tables 1 and 2 summarize the catches of tunas and tuna-like species made in the Azores and Madeira during the last few years. The catches by species and gear, made in the continental Portuguese EEZ are given in Table 3.

Preliminary estimates of catches made during the first three quarters of 1991 indicate a catch of 5,562 MT in Madeira and 5,300 MT in the Azores.

2. THE TUNA FLEET

The Portuguese tuna fleet is comprised of baitboats in the Azores and Madeira, 20-25 longliners based in continental Portugal, and some longliners in the Azores.

The number of baitboats, classified by gross tonnage (GRT), which comprise the fleets of the Azores and Madeira is shown in Tables 4 and 5.

The Azorean baitboat fleet has developed during the last few years in that the boats have more autonomy and refrigeration capacity, which allows them to extend the duration of the cruises and the fishing areas. Since 1984, several new baitboats have entered the Azorean fishery: 3 in 1986, 6 in 1987, 7 in 1988, 4 in 1989, 5 in 1990, and 3 in 1991.

As concerns the sport fishery, the Azorean fleet is presently comprised of a dozen speed boats.

3. RESEARCH

The main organisms participating in research programs on tunas are the Department of Oceanography and Fisheries of the University of Azores, the Fisheries Research Laboratory in Madeira, and the National Institute of Fisheries Research (INIP) in continental Portugal.

The collection of tuna statistics and size sampling of the main species continued. Since 1989, the number of tunas sampled in the Azores has increased considerably, due to an increase in the coverage of sampling points. The data are sent regularly to ICCAT and the scientific results are also presented to the SCRS and working group meetings.

The developing sport and longline fisheries in the Azores, which target swordfish, are closely monitored. Scientific activities include the collection of catch, effort and biological data.

For several years, satellites maps of surface temperatures have been distributed regularly to the baitboats in Azores and Madeira.

In 1989 and 1990, an experiment with a longliner targeting swordfish was carried out in Madeira. This experiment was monitored by Madeiran scientists, and detailed data were collected, especially on the sizes of swordfish caught and on the catch rates of the fishery.

Some attempts were made to catch skipjack using live bait in southern continental Portugal. Monitoring of these experiments by INIP scientists included the collection of biological data on the species caught, the catch rates of the fishery, and the relationship between fishing and environmental conditions.

*Original report in French.

Table 1. Catches of tunas and tuna-like species (MT) made in the Azores, 1986-1990

	1986	*1987*	*1988*	*1989*	1990
Bigeye tuna	5,453	3,877	764	2,758	3,447
Skipjack	5,032	7,932	13,751	5,921	2,252
Albacore	436	401	142	127	3,135
Yellowfin tuna	34	--	--	1	1
Bluefin tuna	151	58	--	--	267
Others	170	393	236	135	
TOTAL	11,276	12,661	14,893	8,942	9,102

Table 2. Catches of tunas and tuna-like species (MT) made in Madeira, 1986-1990

	1986	*1987*	*1988*	*1989*	1990
Bigeye tuna	1,698	593	1,395	2,189	2,455
Skipjack	329	79	357	1,752	1,666
Albacore	13	29	29	39	47
Yellowfin tuna	10	44	93	3	42
Bluefin tuna	1	3	29	3	12
Others	41	12	7	10	20
TOTAL	2,092	760	1,910	3,996	4,243

Table 3. Catches of tunas and tuna-like species (MT and gilled and gutted weight), by gear, made in the EEZ of continental Portugal in 1990

	LL	*PS*	*UNCL*	*TOTAL*
Bigeye tuna		3.0	48.0	51.0
Skipjack tuna		++	33.0	33.0
Albacore		++	3.0	3.0
Yellowfin tuna		++	2.0	2.0
Bluefin tuna		++	14.0	14.0
Bonito		148.0	99.0	247.0
Atl. black skipjack		2.0	77.0	79.0
Frigate tuna		24.0	3.0	27.0
Swordfish	296.0	2.0		298.0
Others			1.0	1.0
Total	296.0	179.0	280.0	755.0

Table 4. Distribution of the Azorean baitboat fleet by gross registered tonnage (GRT), 1984-1990

GRT	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
< 50	11	11	12	14	8	5	5
50-100	18	19	19	19	18	15	13
101-150	1	1	4	7	11	11	17
> 150	0	0	0	3	4	8	4
TOTAL	30	31	35	43	41	39	39

Table 5. Distribution of the Madeiran baitboat fleet by gross registered tonnage (GRT), 1984-1990

GRT	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*
< 50	17	21	26	19	22	20	22
50-100	5	5	6	7	10	10	7
101-150						1	6
> 150						4	2
TOTAL	22	26	32	26	32	35	37

NATIONAL REPORT OF RUSSIA*

by

V. Z. Gaikov, M. E. Grudtsev, K. Ya. Batalyants**

1. FISHERIES

In 1990 the total catch of tunas and related species amounted to 16,331 MT, including 3,615 MT of yellowfin tuna, 3,635 MT of skipjack, 3,634 MT of bullet tuna, 2,739 MT of frigate tuna, 667 MT of Atlantic black skipjack, 95 MT of bigeye tuna, 1,240 MT of Scomberomorus unclassified, 706 MT of Atlantic bonito.

The catch taken by purse seiners amounted to 8,466 MT, including 3,425 MT of yellowfin tuna, 3,635 MT of skipjack, 667 MT of Atlantic black skipjack, 541 MT of frigate tuna and 198 MT of bullet tuna.

The catch was distributed by fishery areas as follows: from the area of Sierra Leone, 6,912 MT (33% of yellowfin tuna, 47% of skipjack, 10% of Atlantic black skipjack, 7% of frigate tuna, 3% of bullet tuna); from Sao Tome and Principe area, 666 MT (51% of yellowfin tuna, 43% of skipjack, 5% of frigate tuna, 1% of Atlantic black skipjack), from the open part of the central-east Atlantic, 888 MT (87% of yellowfin tuna, 12% of skipjack, 1% of frigate tuna).

The longline tuna catch out of the 200-mile economic zone of the central-east Atlantic amounted to 285 MT, including 190 MT of yellowfin tuna and 95 MT of bigeye tuna. The longline fishery has ceased. In the western Sahara area, the catch yielded by middle-water amounted to 7,570 MT, including 3,429 MT of bullet tuna, 2,198 MT of frigate tuna, 703 MT of Atlantic bonito, 1,240 MT of Scomberomorus unclassified. The catch from the southeast Atlantic amounted to 10 MT (7 MT of bullet tuna and 3 MT of Atlantic bonito).

The data on the tuna fishery for 1990 by fishing ground, period and fishing gear, number of vessels and effort are given in Table 1 and the preliminary data for the first half of 1991 are presented in Table 2.

Purse seine catches appeared to increase in comparison with those in 1989; skipjack catches mainly contributed to this increase, along with some increase in Atlantic black skipjack, frigate tuna and bullet tuna catches, in spite of a slight drop in yellowfin catches. Low longline catches were the result of the short fishery period during February-April and the cessation of the Russian fishery.

2. RESEARCH

Size composition of 5,056 specimens of tuna, sampled from purse seine, longline and trawl catches, was determined as well as the age of 750 specimens and biological data of 2,760 specimens.

During the first half of the year, bigeye tuna (*Thunnus obesus*) was represented in the longline catches by the pre-spawning and post-spawning specimens 63-183 cm in length (128.1 cm on the average) at the age of 3-5.

Yellowfin tuna (*T. albacares*) was represented in the longline catches from the equatorial zone by specimens 64-180 cm in length (138.6 cm on the average). During February-April the specimens with gonads in pre-spawning maturity stage predominated and some spawning and post-spawning specimens also occurred. In purse seine catches from the Sierra Leone zone tuna length varied from 33 to 173 cm (87.9 cm on the average) and the age group 1-4 was the most common one.

The length of skipjack (*Katsuwonus pelamis*), fished by purse seiners in the Sierra Leone zone constituted 28-60 cm (46.7 cm on the average). During April-first half of May the ripening specimens were observed, and during the second half of May-June pre-spawning and post-spawning specimens occurred. Since the second half of June, immature tuna with modal length of 23-31 cm were observed. The prevailing age group was represented by tuna at age of 2-3. In the western Sahara trawl fishery, the specimens of greater length (47-58 cm, 51.4 cm on the average) occurred as an insignificant by-catch.

Atlantic black skipjack (*Euthynnus alletteratus*) was represented in purse seine catches from the Sierra

*Original report in English.

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Leone zone by specimens 42-55 cm in length (46.7 cm on the average) at the age of 2-5. Pre-spawning specimens prevailed.

Frigate tuna (*Auxis thazard*) was represented in purse seine catches from the Sierra Leone zone by a broader size range. The tuna length varied from 27 to 49 cm (39.4 cm on the average), at ages 2-5 (age 3 prevailing).

Bullet tuna (*Auxis rochei*) was represented in Sierra Leone catches by the length range of 27-35 cm (29.3 cm on the average) and the tuna length in trawl catches of western Sahara was 27-39 cm (32.0 cm on the average).

The analysis of hydrometeorological conditions during the fishery period in the Sierra Leone zone revealed the most favorable fishery conditions occurred in the inner area of two interacting meso-scale eddies of cyclonic and anticyclonic patterns and in zones of the high temperature gradients, located between the eddies and their periphery.

The reproduction of tunas and related species was investigated. The estimates of the length at first spawn for yellowfin and bigeye females and males were obtained. Oocyte diameter was determined before and in the process of preovulatory changes. The spawning frequency and the batch fecundity were estimated. For Atlantic black skipjack, frigate tuna and bullet tuna the spawning period and grounds on the western African Shelf were determined. For swordfish, sailfish and wahoo, the continuous asynchronity of oocyte development was confirmed as a precursor of female multiple spawning with short intervals between batches of eggs. The data on a batch fecundity of those species were obtained.

In the purse seine fishery, the hypothesis of a comfortable pattern of tuna association with floating objects was tested. It was supposed that the physiological correlate of comfortable conditions was a high stomach filling in predators associated temporally with floating objects. The results of the analysis confirmed the high stomach filling in some sharks, yellow-tail and dorado from the hauls in floating objects, although the stern objects were absent in the floating objects ichthyofauna except small tunas.

Unlike sharks and other by-catch species, tunas eructated food at the final stages of catching by a purse seine, during fish unloading into the deck and on the deck of the vessel. Fish dissection revealed food only in a few stomachs, however, the deck of the vessel at unloading site was covered with a layer of small fish, eructated by tunas. Those fishes revealed very slight (if any) traces of digestion. We consider those observations to confirm the comfortable pattern of tuna association with floating objects. The most successful hauls in floating objects occurred early in the morning and in the afternoon, indicating the reasonability of considering a comfortable condition as an element of diurnal activity. Our observations revealed the availability of the most significant tuna catches in floating objects during the days when "boiling shoals" occurred.

3. WORK AT SEA

Three observers worked on board commercial vessels in 1990. No research cruises were carried out.

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Table 1. Tuna catches by species and fishing effort in the Atlnatic Ocean in 1990 by areas, periods and fishing gears

Area	Gear	No. of vessels	Period	Fishing effort in days at sea	CATCHES (MT) YFT	SKJ	BET	LTA	BLT	FRI	TOTAL
Sierra Leone	PS	6	Feb.-June	575	2,312	3,239	--	661	502	198	6,912
Sao Tome & Principe	PS	6	June-Sept.	303	337	288	--	6	35	--	666
Open central-tropical Atl.	PS	6	June-Nov.	378	776	108	--	--	4	--	888
Open central-tropical Atl.	LL	1	Feb.-Apr.	83	190	--	95	--	--	--	285
Western Sahara	Trawl	--	Jan.-Dec.	--	--	--	--	--	2,198	3,429	5,627
Southeast Atl.	Trawl	--	Jan.-Dec.	--	--	--	--	--	--	7	7
TOTAL					3,615	3,635	95	667	2,739	3,634	14,385

Table 2. Soviet catches (MT) of tuna and other species in the first half of 1991

Yellowfin tuna	2,140
Skipjack	449
Black skipjack	592
Frigate tuna	485
Bullet tuna	500
Atlantic bonito	36
Scomberomorus spp.	170
Total	4,372

NATIONAL REPORT OF SOUTH AFRICA*

by

A. J. Penney**

1. THE TUNA FISHERY

The total reported South African tuna catch decreased by 28 percent during 1990 to 4,832 tons (see Table 1). Almost 90 percent of this total was reported only on dealer returns and not reflected on returns from commercial baitboats. This confirms indications that catches are under-reported on commercial returns and that catch totals reported prior to the introduction of the dealer return system in 1989 are low.

Albacore caught on poles off the northwest coast contributed 87 percent of the total catch and reduced catches resulted principally from reduced availability of this species. By-catches of yellowfin, bigeye and skipjack tunas also decreased as a result of decreased effort expended in the albacore fishery. Closure of the hake and kingklip longline fishery and prohibition of directed catches of swordfish prevented all swordfish catches. There was no directed tuna longline or purse-seine effort.

2. TUNA RESEARCH

2.1 Catch and Effort Data Collection

Catch and effort data were collected on monthly returns from 107 tuna vessels and 2,960 other linefishing vessels. The dealer return system for major tuna dealers was further improved and summaries of these returns indicated a total catch approximately 90 percent higher than that reported on commercial returns. Attempts are therefore being made to obtain historical dealer information to correct past catch totals.

2.2 Length-Frequency Sampling

On behalf of ICCAT, South Africa continued to monitor and sample tuna caught by Taiwanese vessels and transshipped in Cape Town harbour. Foreign vessel activity remained low and 3,452 albacore were measured from 39 Taiwanese longliners transshipping 4,122 tons of albacore and 107 tons of other species. Continued staff shortages curtailed sampling of South African catches, only 823 albacore being measured from 8 landings.

Table 1. Total reported South African tuna catches in the ICCAT Convention area during 1989 and 1990.

Species	Catch (tons) 1989	1990
Albacore	5,524	4,215
Yellowfin tuna	664	338
Bigeye tuna	378	261
Skipjack tuna	103	18
Bluefin tuna	1	--
TOTAL	6,670	4,832

*Original report in English.

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NATIONAL REPORT OF SPAIN*

Instituto Español de Oceanografía

1. STATUS OF THE FISHERIES

Spanish catches of tunas and tuna-like species amounted to 176,037 in 1990, which represents an increase of 10 percent with respect to the average of the last four years (1986-89). This increase is caused mainly by the catches of the tropical species (125,500 MT) which increased by 15 percent over the average in this same time period.

The Spanish catches of tunas are broken down by species in Table 1.

2. FISHERIES AND RESEARCH BY AREAS

2.1 Temperate area

2.1.a Bluefin tuna

The 1990 catches in the Bay of Biscay (1,493 MT) showed a decrease of 21.2 percent in relation to the average of the last four years (1,895 MT in the period 1986-89), while the fishing effort remained stable. This figure is the lowest obtained since 1982.

In the south Atlantic region and the Mediterranean Sea, the 1990 catches (2,950 MT) increased by 26 percent compared to the previous year. The largest increases were in the trap fishery which, with the same fishing effort, was able to duplicate (in the Mediterranean) or significantly increase (in the Atlantic) its catches (1,174 MT in 1989; 1,911 MT in 1990).

During the autumn of 1990 a tagging cruise for juvenile bluefin (age class 0) was carried out in the western Mediterranean Sea (off the Spanish coast). Five hundred thirty-nine individuals of an average size of 44 cm (1.9 kg) were tagged. Fishing poles with bait was the system used.

2.1.b Albacore

The 1990 catch is similar to that of the last few years. Almost all was obtained in the northeast Atlantic; live bait was the fishing method which took the majority of the total catch (15,303 MT, equivalent to 59.5 percent). The troll fishery took 10,342 MT (40 percent), and only a small amount (< 100 MT) was taken in the Mediterranean Sea.

Fishing effort decreased by 21.5 percent for the entire fleet, which with 500 trollers and 250 baitboats, remained at the same level as the previous year.

In 1990 an autumn-winter fishery began to operate near the Azores. The fleet was comprised of 15 baitboats that centered their activities on catching adult albacore between 85 and 120 cm. The catch obtained was 1,281 MT in 271 effective fishing days.

In 1990 an observer program, financed by ICCAT through the Albacore Research Program (PSG), was carried out on board baitboats and trollers. The data from this activity will be included in the final report of the Albacore Program in 1992.

2.1.c Swordfish

In 1990, 13,959 MT of swordfish were taken in the Atlantic (north+ south+ Mediterranean), practically all by surface longline. The catch and effort levels were similar to those of the previous year, with a slight decrease in the catch in the south Atlantic. The fleet, in general, remained in the same fishing areas with a small movement in the tropical areas towards the west.

During 1990, around 100,000 individuals were sampled, continuing the sampling for sex by time-area strata. Likewise, the information from logbooks increased considerably.

The catches in the Mediterranean Sea (1,407 MT) as well as fishing effort increased slightly in comparison to the previous year.

2.2 Canary Islands

2.2.1 Baitboat fishery

The overall catches (10,333 MT) increased by 15 percent over the catches of 1989. As regards the different species caught, yellowfin increased two-fold over

*Original report in Spanish.

the 1989 catches; bigeye increased nearly 50 percent, but skipjack, however, decreased by 20 percent.

The fleet increased slightly in 1990 to 354 vessels operating around the islands.

In July, 1991, a tagging program was effected in the waters of Gomera in which 779 skipjack and 6 yellowfin were tagged.

2.3 Tropical area

2.3.a Baitboat fishery

Three vessels based in Dakar caught 793 MT of tropical species during 1990.

2.3.b Tropical purse seine fishery

In 1990 the same number of purse seiner operated in the inter-tropical area as the previous year (35). Although the fishing effort, expressed in searching days and fishing days, decreased by 7 percent with respect to the previous year, the catches reached the highest value in the history of this Spanish fishery: 117,129 MT.

The carrying capacity of the purse seiners decreased slightly in comparison to the previous year: 19,717 MT in 1990.

Table 1. Catches (in MT) by Spain of tunas, by species, 1986-90

Species	*1986*	*9987*	*1988*	*1989*	*1990*
Yellowfin	61,198	62,943	46,517	61,640	68,414
Skipjack	42,183	37,757	52,188	35,300	47,511
Bigeye	11,390	7,342	7,083	7,660	9,575
Albacore	24,587	29,013	27,735	25,447	25,931
Bluefin	3,340	3,392	5,708	5,012	4,596
Swordfish	11,119	12,269	15,954	16,485	13,959
Small tunas	5,616	5,281	7,730	5,077	6,051
Total	159,433	157,997	162,915	156,621	176,037

NATIONAL REPORT OF THE UNITED STATES: 1991*

by

National Marine Fisheries Service**

1. INTRODUCTION

The National Marine Fisheries Service (NMFS) has the responsibility for U.S. fishery statistics and for research on Atlantic tunas and other large oceanic pelagic species in support of the ICCAT Convention. Research responsibilities are solely those of the Southeast Fisheries Center (SEFC), Miami, Florida. The activities related to these responsibilities in 1990-91 are described in this report.

2. FISHERIES MONITORING

The NMFS monitors U.S. Atlantic tuna fisheries for yellowfin and skipjack tunas, the principal tropical species; for bluefin and albacore, the principal temperate species; and for bigeye tuna, which occurs in both tropical and temperate waters (included under tropical tunas below). Fisheries for blue marlin, white marlin and sailfish, and other scombrids are also monitored. Additionally, significant effort is expended in monitoring the commercial swordfish fishery. These activities include: the design of sampling programs, the collection of catch, effort and biological data, and maintaining and summarizing fishery data bases for analyses, as well as for dissemination to ICCAT and other management organizations. Historical catches of Atlantic tunas by U.S. fishermen (1967-90) are presented in Table 1.

2.1 Tropical Tunas

Yellowfin tuna again dominated the catch of tropical tunas by U.S. vessels in the Atlantic, but the 1990 catch by longliners in the Gulf of Mexico was much lower than in recent years. The total U.S. yellowfin catch was 4,692 MT in 1990, as compared to 7,381 MT in 1989 and 9,361 MT in 1988. The Gulf of Mexico longline catch was 3,055 MT in 1990, as compared to 5,724 MT in 1989 and 7,764 MT in 1988.

The U.S. Atlantic bigeye catch was also lower in 1990 than in the two previous years (583 MT, as compared to 762 MT in 1989 and 702 MT in 1988). Total 1990 catches of other tropical tuna species were as follows: 238 MT of skipjack, 101 MT of bonito, 173 MT of little tunny, 54 MT of wahoo, 46 MT of blackfin tuna, and 164 MT of undifferentiated tuna. These totals include the recreational rod and reel catch along the U.S. east coast north of Cape Hatteras (35°N). No reliable estimates are available for the U.S. recreational catch along the east coast south of 35°N, the Gulf of Mexico, or the Bahamas and Caribbean.

The contributions to the total U.S. yellowfin and bigeye catches (MT) by area and by commercial (COMM) and recreational (REC) gears are given in Table 2.

Purse seine catches were higher in 1990 than in the previous two years and included a Caribbean catch for the first time in three years. In addition to reported landings obtained from the National Marine Fisheries Service (NMFS), Washington, D.C., catch data were collected directly from tuna purse seine vessels operating along the eastern coast of the United States.

The Caribbean longline catch was estimated based on logbook reports of the number of fish hooked and dealer reports of size distributions.

NMFS samples the size frequency and species composition of foreign catches of Atlantic tuna transshipped from Abidjan to U.S. canneries in Mayaguez, Puerto Rico. The purpose of the sampling is to evaluate the catch of small yellowfin and to estimate the relative number and weight of bigeye in the catch classified as yellowfin by vessel operators and at the cannery.

Abidjan is the transshipment port for tuna vessels fishing in the Gulf of Guinea. The tuna catch from that area consists principally of yellowfin, bigeye, and skipjack. NMFS representatives from the IATTC

*Original report in English.

**Prepared by staff members of the Southeast Fisheries Center, Miami, Florida.

(Inter-American Tropical Tuna Commission) measured 3,373 yellowfin, 141 bigeye, and 2,928 skipjack from Abidjan this year. They sampled roughly 33% of the combined yellowfin and bigeye and 34% of the skipjack transshipped from Abidjan to Mayaguez canneries. The flags of four nations --Ghana, Japan, Spain and Norway-- were responsible for this year's sampled catch.

Bigeye represented 3% and 4% of the total yellowfin-classified catch by number and weight, respectively. This is a much lower percentage of the yellowfin-classified catch than in previous years (e.g., 29% by number and 21% by weight in 1989). Bigeye were a component of the yellowfin-classified sampled catch only in the months of December, February, and March. No bigeye were found in the samples from September, October, or November or in samples from Spanish or Norwegian purse seiners, for which we had samples only for these three months.

The distribution of the 1990 sampled catch of yellowfin by size-breakdown category is given in Table 3.

Large yellowfin (> 9.1 kg) were a relatively minor component of the catch by number (5%), but were the principal component by weight (41%). Roughly 41% of the catch by number and 17% by weight were under 1.8 kg (4 lbs.). This distribution is very similar to last year's in which large yellowfin (> 9.1 kg) made up 8% by number and 44% by weight of the sampled catch.

2.2 Temperate tunas

The U.S. bluefin tuna fishery continues to be regulated by quotas, limits on catches per trip, and size limits. To varying degrees these regulations are designed to restrict the total U.S. landings, to preserve the monitoring nature of the fishery, and to direct effort at large bluefin (> 196 cm SFL).

In the northwest Atlantic in 1990, mortality of bluefin tuna caused by U.S. vessels is estimated at 1,837 MT, of which 1,704 MT were landed. Those landings represent increases of 214 and 414 MT from the amounts landed in 1989 and 1988, respectively. The 1990 landings by gear were: 384 MT by purse seine, 129 MT by harpoon, 210 MT by handline, 161 MT by longline (of which 137 MT were from the Gulf of Mexico), 819 MT by rod and reel (of which 543 MT was the estimated catch of the small bluefin fishery from off the northeastern U.S.), and 1 MT was taken by other gears. The estimated catch of small bluefin was the highest on record, exceeding the next highest estimated catch of 401 MT made in 1987 by 142 MT and exceeding the 1987-1989 average by 250 MT. In addition to the landed catch, an estimated 931 bluefin (about 133 MT) were released dead by U.S. longline vessels. Of those discards, 200 fish (about 45 MT) were estimated to have been caught in the Gulf of Mexico.

Uncertainty about the estimated number of small fish caught by rod and reel was calculated by incorporating variability in the samples used in the estimation. A thousand independent estimates of the total catch were made, the median of the estimates was 28,573 fish (543 MT), and 95% of the estimates of the total catch were between about 26,020 and 31,736 fish.

U.S. catches of albacore by U.S. vessels totaled 381 MT in 1990. This is a substantial increase from 260 MT in 1989 and 115 MT in 1988. Almost all the catch came from off the northeastern U.S. coast (north of 35°N). Recreational rod and reel fishermen caught 201 MT and longliners caught 134 MT. Gillnetters caught 19 MT, trollers 8 MT, and handliners 6 MT. Longline landings in the Gulf of Mexico, 3 MT, and Caribbean, 9 MT, accounted for the balance of the U.S. albacore catch in the Atlantic, except for < 1 MT for other gears.

2.3 Swordfish

U.S. vessels landed 5,385 MT of swordfish in 1990, a 16% decline from the revised landings figure of 6,385 MT for 1989. This decline was partly due to tuna and swordfish longliners departing the N.W. Atlantic region to fish in the Pacific or elsewhere. Based on mandatory logbook reports, nominal longline effort (hooks fished) in 1990 was approximately 6% lower than the 1989 reported effort (6.8 million hooks in 1990 versus 7.3 million hooks in 1989). The landings by ICCAT area for 1990 (compared to 1989) were: 504 MT (1,049 MT) from the Gulf of Mexico (Area 91); 2,947 MT (2,846 MT) from the northwest Atlantic (Area 92); 1,059 MT (949 MT) from the Caribbean Sea (area 93); and 875 MT (1,541 MT) from the north central Atlantic (Area 94A). U.S. swordfish landings are monitored and tracked from reports submitted by dealers, vessel owners and captains, NMFS port agents, and mandatory daily logbook reports submitted by U.S. vessels permitted to fish for swordfish.

As part of the U.S. fishery monitoring system for swordfish and other large pelagic fisheries, individual weights of dressed (headed, gutted and tailed) swordfish caught on longlines by United States fishermen were obtained from trip weigh-out receipts collected by state and university biologists from 1978 to 1983. In 1984 this database became the responsibility of the Southeast Fisheries Center (SEFC) located in Miami, Florida. Sales receipts for each trip consist of the dressed weight of each fish sold. Vessel captains/owners and fish dealers voluntarily submitted these trip receipts for use in scientific investigations of the fishery. Beginning in 1986, the SEFC recorded

all species provided on the trip receipts. The individual dressed weights of the other species that were listed on the trip receipts for the earlier years have now been recorded.

Information from each sales receipt is entered into the master fishery monitoring database. Each database record includes a vessel code, date of off-loading, state and port landed, dealer (if known), gear, information source, fishing area, hooks fished, days fished, number of sets, and a species code followed by up to 32 individual dressed weights (lb). All records from a unique trip are identified by their respective vessel codes and date of landing. Annual data are maintained in separate computer files and updated as new information is received. Although our database is primarily from the pelagic longline fishery, other data from gillnet and harpoon gear are also included.

The total weight of swordfish sampled for sizing the landings in 1989 by longline, gillnet, and harpoon gear was 4,103 MT, 393 MT and 12 MT, respectively, as compared to 3,106 MT, 281 MT and 6 MT in 1990. In 1989, the weight of the sampled swordfish landings represented 70%, 75%, and 45% of the U.S. total reported annual landings for longline, gillnet and harpoon gears, respectively, whereas 1990 sampled swordfish landings were 64%, 55%, and 84% of the U.S. total reported annual landings of swordfish by gear, respectively.

2.4 Billfishes

Blue marlin, white marlin and sailfish are landed by recreational rod and reel fishermen and are a major by-catch of the U.S. commercial tuna and swordfish longline fisheries. This year (1990) represents the second full year of compliance under the regulations of the U.S. Fisheries Management Plan for Atlantic Billfishes which was implemented in October, 1988. The Plan allows that billfish, caught by recreational gear (rod and reel), may only be landed if the fish are larger than the size limit specified for each species covered by the Plan. Recreational landings of each billfish species are estimated using two data sources: (a) the Large Pelagics Recreational Survey conducted by the NEFC provides estimates of total billfish catch from waters along the northeastern U.S. (north of 35°N latitude); and (b) the SEFC Recreational Billfish Survey which provides numbers of billfish caught during tournaments held along the southeastern U.S. coast (south of 35°N latitude), in the U.S. Gulf of Mexico, and U.S. Caribbean Sea regions (i.e., U.S. Virgin Islands and Puerto Rico).

In addition to restrictions on U.S. recreational harvest, the Management Plan also imposed regulations on commercial fisheries by prohibiting retention and sale of the three species at U.S. ports. For this reason, no official U.S. commercial landings are reported for any of the three Atlantic species. However, estimates of by-catch mortality in the U.S. longline fleet are made using the data from mandatory pelagic logbooks by U.S. captains and vessel owners in which numbers of billfish species caught and kept or discarded at sea are reported. The proportion of billfish caught and retrieved dead on longline gear were estimated in 1990 from observer trips taken on various vessels (SCRS/90/86) and is used in estimating by-catch mortality of billfish on longlines, based on species and geographical area.

The estimates of 1990 U.S. recreational catches for these billfish species, combining the geographical areas of the Gulf of Mexico (Area 91), the northwest Atlantic west of the 60°W longitude (area 92) and the Caribbean Sea (Area 93) are 25 MT for blue marlin, 17 MT for white marlin, and 1.2 MT for sailfish. The estimates for 1989 were 122 MT, 16 MT, and 2 MT, respectively, for the three species. Preliminary estimates of billfish that were discarded by-catch in the U.S. longline fishery for 1990 in Areas 91, 92, 93 and 94A (the North Central Atlantic), and presumed to be dead, were 205 MT for blue marlin, 39 MT for white marlin, and 21 MT for sailfish. These represent the estimated 1990 U.S. commercial longline by-catch kill of billfish. The estimated 1989 U.S. commercial landings and by-catch kill of billfish (which did not include an estimate for Area 94A) were 214 MT, 36 MT, and 16 MT, respectively, for the three species. It is believed that all estimates of billfish catches represent underestimates of the true billfish mortality.

3. RESEARCH ACTIVITIES

In addition to monitoring the various fisheries, scientists from the SEFC continued research activities on bluefin tuna, swordfish, and billfishes designed to increase biological knowledge of these species and to provide information for management to east coast Fishery Management Councils and ICCAT. This research includes continued updating and revision of databases, preparation of software and analyses in support of domestic and ICCAT goals, and participation in special working groups.

3.1 Bluefin Tuna Research

Monitoring of catch and effort in U.S. rod and reel and handline fisheries for bluefin tuna was continued through a dockside and telephone survey. These data are used to estimate total catches of small bluefin and to develop indices of abundance. Substantial effort was expended to improve the survey database and to

provide easier access to interested researchers by developing standard formats. The indices of abundance for large and small bluefin from fisheries off the northeast U.S. were revised. In addition, the possibility of developing an index for medium bluefin from those fisheries was studied.

Since October, 1986, the U.S. has obtained logbooks from U.S. longline vessels fishing in the Atlantic and adjacent seas. Longline catch rates of bluefin caught in the yellowfin tuna and swordfish fisheries in the Gulf of Mexico and off the Florida east coast were used to investigate development of a new index of abundance for large bluefin.

Annual ichthyoplankton surveys in the Gulf of Mexico during the bluefin spawning season were continued. As in recent years two transits of the sampling grid were made in late April and May in both 1990 and 1991. The results from the 1990 survey are available, and were used to revise the larval index. In response to recommendations by a panel of experts which reviewed these surveys and the index, sampling was conducted in June in both 1989 and 1990. The June sampling in 1989 was conducted only with neuston nets at the end of the month because of time constraints, while in 1990 two full transits of the normal survey track were made using both bongo and neuston nets. No bluefin larvae were caught in June of 1989. In June of 1990 no bluefin larvae were caught in bongo nets, though some larvae were caught in neuston nets.

3.2 Swordfish Research

In response to ICCAT recommendations, the NMFS, SEFC began a research project directed primarily at determining the reproductive biology (sex determination, sex-at-size, sex ratio, and fecundity) of Atlantic swordfish. This project was initiated in January, 1990, and has continued. Sex ration at size data on Atlantic swordfish have been collected since 1989 by NMFS, Miami Laboratory. Initially, swordfish sampling began in January, 1990, with several captains and owners of U.S. longline vessels willing to cooperate with NMFS scientists in swordfish research efforts. In addition, data collection was continued in 1990 through contracted observers placed on-board U.S. gillnet vessels. During 1991, efforts were initiated to collect swordfish data by ICCAT-sponsored Venezuelan observers aboard Venezuelan longline vessels fishing in the Caribbean Sea. Collection of morphometric length measurements consisted of lower jaw to fork of tail (LJFL, cm or inches) and cleithrum to anterior rise of caudal keel (CK, cm or inches), in addition to dressed weight (DWT - head, gills, viscera, and external fins removed) which was collected during off-loading of the catch (lb converted to kg). The sampling of gonadal tissue was required to confirm sex identification, as well as for reproductive analyses. In some cases, skeletal hard parts (anal fins and heads containing the otoliths) were also collected to aid in other aspects of biological analyses (e.g., age and growth, and stock identification).

Sampling on-board the U.S. commercial fleets since 1990 has furnished sex-at-size data which may provide a basis for stratifying swordfish landings by sex and size, as well as a large supply of tissues for reproductive analyses. In total, observations of CK, LJFL, DWT, and sex identification were collected by cooperating captains and crews on 1,228 swordfish during 35 trips from the U.S. longline fishery, while observations on 500 swordfish samples were collected by the observer program during 12 U.S. gillnet trips. To date, Venezuelan observers have provided data from one trip on which 21 swordfish were sampled from the Caribbean Sea. The morphometric observations were used to develop equations to allow conversion from carcass length (CK) to LJFL and CK to DWT and whole weight. The prime research activities to be carried out using the gonadal material will include determination of the gonadosomatic index based on weight of ovary and fish size for each month of the year, as well as derive fecundity estimates from mature ovary samples. For these purposes, over 416 paired ovaries sampled from the longline fishery and 174 pairs collected from the gillnet fishery are available for reproductive analyses. To date, nine months of the year are represented, with no samples for February, March, and December.

Continued effort was spent in reviewing and correcting the 1986 through 1990 mandatory swordfish logbook database. The first annual newsletter describing the logbook database was distributed to fishermen and other interest parties. A second annual newsletter will be distributed in 1991. Over 18,000 mandatory swordfish logbook records were collected in 1990. A year-end audit flagging inconsistencies within trips was developed in addition to batch audits. The additional audit has increased the accuracy of current year data and will decrease the need to update past year estimates. Based on experience gained from this new procedure, additional software is being developed to streamline and improve the process in 1991.

Considerable effort was also made evaluating the potential costs and benefits of alternative management measures as well as providing analytical support for implementing U.S. management measures in response to ICCAT recommended regulations for the Atlantic swordfish fishery. Management measures, imposed to achieve the ICCAT recommendations, include a 1991 Total Allowable Catch (TAC) for the U.S. fleet of 4,173 MT, and a 25 kg minimum size (no more than 15% of the total number of swordfish landed may be less than the minimum size).

A total of 7 working documents were prepared by the U.S. scientific delegation for the 1991 ICCAT swordfish species group meeting held in St. Andrews, New Brunswick, Canada. One document described further research effort undertaken in the analysis of sexually dimorphic growth hypotheses and the potential effects of dimorphic growth assumptions on stock assessment results. One document described the available data on swordfish catch at size by sex. A document updated the U.S. longline CPUE information used in tuning virtual population analysis. Additional analytical options for age-sequenced analysis were described in one document, which has general application to ICCAT species groups. Also, a document was prepared describing a methodology for applying non-equilibrium production models to swordfish data.

3.3 Billfish Research and Monitoring

Routine sampling of recreational billfish tournaments continued along the U.S. east coast, Gulf of Mexico, Bahamas, and Caribbean Sea. A total of 151 billfish tournaments were sampled in 1990, representing over 96,962 hours of fishing effort. This represented an increase of 11 tournaments over the 1989 level. Additionally, recreational billfish fishermen were surveyed at 9 docks in the northern Gulf of Mexico; 7 docks were sampled in 1989. Morphometric measurements of sexed billfish landings were also taken in conjunction with the ICCAT Enhanced Research Program for Billfish. a summary of these efforts has been documented in a report on SEFC billfish research.

NMFS, SEFC, again played a substantial role in the ICCAT Enhanced Research Program for Billfish in 1991, with SEFC scientists acting as general coordinator and coordinator for the western Atlantic Ocean. Major accomplishments in 1991 include the following: (1) Successful completion of 5 at-sea observer trips aboard Venezuelan industrial longline vessels out of Cumaná since the last SCRS; (2) initial work started on the swordfish observer program in Venezuela and recreational shore-based and observer sampling in the U.S. and British Virgin Islands; (3) continuing shore-based sampling in St.Maarten, Venezuela, Barbados, Jamaica, Grenada, Dominican Republic, Senegal, Ivory Coast, Las Palmas, and Benin; (4) distribution of ICCAT billfish tagging kits, associated tagging posters, new T-shirts with the ICCAT billfish logo, and Japanese and Chinese translations of tagging posters; (5) receipt of first test kits for field identification of billfish carcasses (sailfish only); (6) continuation of recreational shore-based sampling in Venezuela; (7) developing plans for 1992 shore-based sampling in Trinidad, at-sea sampling in Grenada and St. Vincent, and initiating a research report on the historical sex at size of sailfish landings in Senegal; and (8) making plans for the ICCAT billfish workshop to be held in July, 1992.

3.4 Tagging

Cooperators in the NMFS, SEFC tagging program tagged and released 6,970 billfish and 1,256 tunas in 1990, increases of 30% and 134%, respectively, over 1989. Among billfishes releases, there were 3,309 sailfish, 1,274 white marlin, 1,993 blue marlin, and 394 swordfish. There were 415 bluefin tuna releases, 597 yellowfin tuna, and 244 releases of other tuna species.

There were 82 billfish recaptured in 1990. Of these, 55 were sailfish, 11 white marlin, 8 blue marlin, and 8 swordfish.

There were 18 bluefin tuna recaptured in 1990, 6 by commercial fishermen, 10 by recreational fishermen, and 2 by unspecified gear. All 18 recaptures were of fish released off the mid-Atlantic states; 14 were recaptured in the same general area as released, 2 were recaptured off the northeastern United States, 1 off the Canadian coast (south of Cape Sable, Nova Scotia), and 1 in the central Gulf of Mexico. There were 2 recaptured from previous years reported in 1990, one from 1986 and one from 1989. The longest time at large for a bluefin tuna was 5,123 days.

There were 8 yellowfin tuna recaptured in 1990, 3 by commercial fishermen and 5 by recreational fishermen. Five recaptures were of fish released off the mid-Atlantic states, 3 were recaptured in the same general area as released, and 2 were recaptured off the west coast of Africa. One yellowfin released near Louisiana in the Gulf of Mexico was recaptured in the same area as released. One released off Bermuda was recaptured near Puerto Rico. There was one yellowfin recapture, south of Montauk, New York, for which no release information was available. The longest time at large for a yellowfin tuna was for one of the transatlantic movements, 1,295 days, covering the longest distance traveled, approximately 5,250 nautical miles. There were 10 recaptures of other tuna species.

An annual newsletter will be distributed to program cooperators in late 1991.

3.5 Fishery Observers

3.5.1 Domestic Longline Observer Project

The SEFC, Miami Laboratory, continued operation of a limited domestic longline observer project through contract with the state of Louisiana employing researchers from Louisiana State University. Observers were placed aboard cooperating domestic longline vessels. The vessels fished in the Gulf of Mexico and primarily were targeting yellowfin tuna. The ob-

servers collected catch, effort, size frequency, and environmental data.

3.5.2 Foreign Fishery Observer Project

The NMFS, Northeast Fisheries Center (NEFC), has coordinated a program to place observers on foreign fishing vessels, including Japanese longline vessels fishing within the EEZ since 1982. The information collected by the observers is processed and maintained by the SEFC, Miami Laboratory. The Japanese longline fleet has not fished in the U.S. EEZ since 1988. Although no foreign longlining was observed in the U.S. EEZ in the past year, the NEFC attained complete observer coverage of foreign fishing along the U.S. east coast. Foreign fishing off the U.S. east coast EEZ involved East Germany, Poland, and the Soviet Union. These foreign vessels were involved in the Atlantic mackerel (*Scomber scombrus*) fishery, either directly catching fish or engaging in at-sea transfer of U.S.-caught fish.

3.5.3 Swordfish Drift Gillnet Fishery Observer Project

In 1989, the NMFS, NEFC, initiated an observer project to place sea sampling personnel aboard swordfish drift gillnet vessels operating off the northeastern U.S. coast to collect data and biological samples. At total of 13 trips made from August through November, 1989, by nine different commercial fishing vessels were observed. In May, 1990, a total of 14 trips were made on 10 different vessels from May through November. Swordfish data from 12 gillnet trips have been used in updating the available sex ratio at size database as well as other morphometric databases for this species.

3.6 Special Working Groups and Scientific Meetings

3.6.1 42nd Tuna Conference

Three SEFC scientists participated in the 42nd Annual Tuna conference held at Lake Arrowhead, California, during 20-23 May, 1991, hosted by the Inter-American Tropical Tuna Commission and the U.S. National Marine Fisheries Service. The focus of the meeting was "Ecological Patterns and Diversity Among Ecosystems". Of special interest to SEFC scientists were the papers on spatial and temporal distribution of tunas and genetic studies on billfish and tuna. Mitochondrial DNA techniques are under consideration as possible tools in bluefin tuna and swordfish stock analysis.

3.6.2 1991 Atlantic Large Pelagics Research Meeting

The Atlantic Ocean pelagic resources are wide ranging and highly migratory. This species complex is prosecuted by both U.S. and international commercial fishing fleets as well as U.S. and foreign recreational anglers. Domestic fisheries for these species range throughout the northwestern Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Because of their highly migratory nature and ocean-wide distributions, both national and international management bodies are concerned with conservation of these resources. The SEFC has lead research responsibility in the U.S. for stock assessments of the Atlantic Ocean large pelagic resources. These assessments provide the scientific basis for national and international management of the fisheries utilizing these resources. In order to be most effective at a national level, the research must be coordinated with other NMFS Science Centers, NMFS Regional Offices and NMFS Headquarters, as well as NOAA's Office of the Deputy Under-Secretary for International Interests. In addition, coordination with the fishing industry (commercial and recreational) is also required to assure greatest confidence in the basic data and to provide a means of understanding and addressing concerns relating to the stock assessments. Research planning and coordination meetings serve as a clearing house for ideas, and represent cost-effective means to reduce unnecessary overlap and redundancy in research expenditures.

A meeting to review and plan 1991 Atlantic large pelagic research activities was convened at the SEFC Miami Laboratory on 13-14 February, 1991. The meeting served to focus discussions held between NMFS and NOAA research and fishery management staff relating to 1991 research needs for Atlantic large pelagic assessments. The report of the meeting serves as a planning document for current year (1991) research activities. This document will be made available to interested individuals and groups outside of NOAA for the purpose of advertising research plans and soliciting views on these and alternative approaches for addressing Atlantic Ocean resource assessments.

3.6.3 Atlantic Large Pelagic Constituency Meeting

A meeting between Atlantic large pelagic constituency groups and the scientific staff of the Southeast Fisheries Science Center (SEFC) was held at the SEFC Miami Laboratory on 5 March 1991. The purpose of this meeting was to review the 1991 Atlantic large pelagic research plans developed by the SEFC in collaboration with other NMFS research offices as well as NMFS fisheries management staff.

Representatives from commercial and recreational fishing concerns were in attendance at the meeting. Near-term (1991) and longer-term (out-year) research needs were identified and discussed by the group. Comments on the planned research received from the group were incorporated into current research plans, where appropriate. A list of potential areas for collaboration between NMFS scientists and constituency groups was identified and discussed. As a result of this meeting, several intensified research items on bluefin and swordfish were initiated. These included: review of U.S. large and small bluefin abundance indices; investigation of potential methods for indexing bluefin abundance from spotter pilot information; improvement in methods for reporting of U.S. purse seine landings of large pelagic species; steps to develop a consolidated Atlantic large pelagic data reporting form that accommodates protected species reporting requirements and multiple gear types; investigation of further development of biological specimen sampling for maturity, fecundity, age and growth analyses, and stock identification studies; increased collaboration with the longline fleet in cooperative tagging efforts through Blue Waters Fishermen's Association; investigation of methods to address the hypothesis of a swordfish unit stock boundary at 5°N latitude; development of methods to attempt to reconstruct a catch and effort time series for swordfish prior to 1978 for production modelling; and examination of the association between swordfish CPUE and surface thermal fronts off the northeastern U.S. coast. A report of this meeting is available upon request.

3.6.4 ICES Working Group on Methods of Fish Stock Assessments

NMFS scientists participated in the meeting of the working Group on Methods of fish Stock Assessments, held in St. John's, Newfoundland, Canada, on 20-27 June, 1991. The meeting was sponsored by the International Council for the Exploration of the Sea (ICES), and was attended by scientists from numerous countries on the North Atlantic. A number of technical and scientific issues were discussed, including the proper disaggregation of CPUE data; the use of validation techniques to confirm the results of assessment models; and the question of why, for some stocks, tuned catch-at-age methods tend to give overly optimistic assessments of stock condition in the most recent year. The group concluded that this last problem is stock-specific, being absent for certain stocks or very strong in others, regardless of the assessment method used, and that further research is needed to determine what factors lead to such patterns.

3.6.5 Meeting of NMFS Bluefin Tuna Review Group

A meeting of stock assessment scientists from NMFS and from outside the agency met at the Miami Laboratory from 4-6 September, 1991. The purpose of this meeting was to discuss the present status of the western Atlantic stock of bluefin and to provide advice to the SEFC and NMFS headquarters. The *ad hoc* review group agreed that the SEFC and ICCAT's SCRS used state-of-the-art methodology and their assessment analyses are generally of high quality. The panel did feel that the SEFC and SCRS were relying on a single methodology for bluefin assessment, namely virtual population analysis using the ADAPT procedure, and that it would be useful to explore other treatments of the data, since there was some concern that the age-structured method employed may be relying on weak information in the age composition of the catch. The panel felt that other methods are likely to corroborate the analysis already done, potentially making the results more easily interpreted by industry and managers.

Some problems in the analysis used by the 1990 SCRS were identified. These largely related to the development of indices of abundance for tuning the VPA. Some corrections are needed and in several cases, these problems were already addressed by SEFC staff; in other cases, some additional analysis is needed to objectively evaluate potential sources of bias. However, the general conclusion of the panel was that while corrections to, and additional work on, abundance indices was warranted on technical grounds, changes in results of the assessment potentially attributable to change in abundance indices applied, are not statistically or biologically significant in the evaluation of the status of the resource. The panel noted that, in statistical terms, given the size of the confidence limits for stock size estimates, the point estimates cannot be interpreted by themselves, but that it is the pattern over several years given by the envelope encompassing the confidence regions that indicates whether the stock is likely to recover to higher levels in the future. The panel recommended that a risk analysis of various management scenarios be carried out for this resource.

3.6.6 ICCAT Swordfish Stock Assessment Meeting

The ICCAT Swordfish Stock Assessment Meeting was held at the Biological Station, St. Andrews, New Brunswick, Canada, during 10-17 September, 1991. The species group included participants from the U.S., Spain, Japan, Canada, and the ICCAT Secretariat. The U.S. delegation submitted 7 working documents for consideration by the group. The group analyzed swordfish catch and effort information through 1990. Al-

though the report of the group has not yet been reviewed and accepted by the SCRS, the working group's results were generally compatible with last year's analysis. The species group reported that in the North Atlantic, the catch and effort directed at swordfish indicated a continuous increase from 1978-1987. Since the historic high of 19,959 MT in 1987, the catch has declined continuously to 15,424 MT in 1990, mainly due to a significant shift of Spanish effort to south of 5°N starting in 1988, an increase in Japanese catch south of 5°N in recent years and a shift of some U.S. effort to the Pacific in late 1990. Because of the rapid increases in catch and effort in the South Atlantic area (S of 5°N), and the recent assessment information for the North Atlantic swordfish resource, there was concern expressed for the total Atlantic swordfish resource, indicating that closer monitoring and possible additional management measures may be needed in that area as well.

In regard to the North Atlantic stock hypothesis, the group concluded that sensitivity analyses and retrospective VPAs produced a comprehensive picture of the status of the resource. Fishing mortality has been much higher in recent years than in the early and mid-1980's. Sustained high levels of yield can be achieved in the long-term under lower mortality rates.

3.6.7 Meeting of the ICCAT Working Group on Western Atlantic Tropical Tunas

The first meeting of the ICCAT Working Group on Western Atlantic Tropical Tunas was held in Miami, Florida, at the National Marine Fisheries Services's Southeast Fisheries Center during 17-24 April, 1991. The Group Coordinator, Dr. Bradford Brown, opened the meeting by welcoming participants. The member countries in attendance included: France, Japan, Spain, and the United States. The Food and Agriculture Organization (FAO) attended in an observer capacity and the ICCAT Secretariat staff also participated in the meeting. The meeting was chaired by Dr. G. Scott.

This represented the first meeting of its kind to address information and data on tropical tunas solely from the western Atlantic region. The focus of this meeting was to prepare a common, agreed upon database for conducting a stock assessment for west Atlantic yellowfin and to identify appropriate methods for conducting the assessment in the future. Twelve (12) scientific papers were presented which dealt with various aspects of yellowfin tuna research. Of these, 6 of the documents were prepared by U.S. scientists. The Working Group was quite satisfied with the substantial progress made at the first meeting and thought that more was achieved than at any first ICCAT species working group meeting directed toward stock assessment. The Working Group identified additional work needed on the database, biological parameters, and sensitivity testing before analytical stock assessments can be conducted.

3.7 Mackerels

King and Spanish mackerel research continued through the collection of catch and catch-per-unit-effort data, size and age frequencies, stock- and sex-specific growth rates, and stock identification data. These data were used in stock assessments of king and Spanish mackerel taken by U.S. fishermen in the Gulf of Mexico and the Atlantic Ocean. Recovery of the Gulf of Mexico stocks of king mackerel continues. Atlantic king mackerel catches have been relatively stable in recent years at adequate levels. Atlantic and Gulf of Mexico Spanish mackerel populations are recovering and are nearing maximum sustainable levels.

3.8 Sharks

Shark landings in the southeastern states declined from the all-time high landings of 6,919 kgs (15,254,026 lbs) in 1989 to 5,639 kg (12,432,000 lbs) in 1990, suggesting that the peak of the southern shark fishery was reached in 1989. The "Secretarial Fishery Management Plan for Sharks of the Atlantic Ocean" is now complete and its implementation is expected in early 1992. The plan will impose limits on commercial and recreational shark fishing. A commercial quota and a recreational bag limit are expected to begin a rebuilding of the Atlantic shark stocks that have been considerably depleted by overfishing. Research on shark biology and on the use of nursery areas by sharks continues at the SEFC. A guide for the identification of sharks and shark carcasses by fishermen, fish dealers, and fishery personnel is currently being prepared by the SEFC.

Table 1. Catches and landings (MT) of Atlantic tunas and tuna-like fishes, excluding billfishes, by by United States fishermen, 1967-1990[1]

Year	BFT[2]	YFT[3,4]	ALB	BET[3]	LTA	SKJ[3]	BON	SWO[5]	SSM[6]	KGM[6]	OTH[7]	TOTAL[8]
1967	2,320	1,136	0	0	7	493	22	474	3,577	2,767	10	10,806
1968	807	5,941	0	18	6	3,314	43	274	5,342	2,813	2	18,560
1969	1,226	18,791	0	148	7	4,849	98	171	4,952	2,814	1	33,057
1970	3,327	9,029	0	195	158	11,752	83	287	5,506	3,050	-	33,387
1971	3,169	3,764	0	544	5	16,224	90	35	4,713	2,571	50	31,165
1972	2,138	12,342	10	212	212	12,290	24	246	4,863	2,213	-	34,550
1973	1,294	3,590	0	113	20	21,246	261	406	4,437	2,710	-	34,077
1974	3,638	5,621	13	865	51	19,973	92	1,125	4,990	4,747	1	41,116
1975	2,823	14,335	1	67	67	7,567	117	1,700	5,288	3,095	19	35,079
1976	1,931	2,252	0	28	5	2,285	23	1,429	6,385	4,053	30	18,421
1977	1,956	7,208	2	331	53	6,179	268	912	5,453	3,837	71	26,270
1978	1,848	9,747	9	248	113	8,492	224	3,684	3,310	2,507	31	30,213
1979	2,297	3,182	11	212	12	3,102	502	4,618	2,926	6,293	11	23,166
1980	1,505	2,118	21	202	88	3,589	195	5,624	5,429	10,726	513	30,010
1981	1,530	1,866	54	152	97	5,373	333	4,529	2,748	12,565	200	29,447
1982	812	883	126	377	87	731	209	5,086	3,747	9,863	962	22,883
1983	1,394	226	18	255	107	589	253	4,801	2,784	7,069	453	17,949
1984	1,320	1,252	25	408	41	817	217	4,538	3,904	7,264	883	20,669
1985	1,423	6,259	17	353	74	1,786	109	4,618	3,984	6,010	247	24,880
1986	1,680	5,775	162	747	103	1,004	83	5,100	5,957	5,682	337	26,630
1987	1,561	6,993	270	1008	118	650	130	5,160	5,071	5,628	386	26,975
1988	1,500	9,361	115	702	204	36	88	6,129	5,094	6,380	430	30,039
1989	1,732	7,381	260	762	128	56	278	6,385	4,426	3,994	334	25,736
1990	1,837	4,692	381	583	173	238	101	5,385	3,384	4,403	264	21,441

1 Estimates of recreational catches off the northeast U.S. are included for all years for bluefin tuna and for all other tunas since 1986.
2 Includes estimated bluefin dead discards since 1986. (The 1986 estimate covered only some times and areas.) Catch revised for 1986-89.
3 Prior to 1981, figures include some catches of purse seiners flying other flags (Bermuda, Netherlands Antilles, Nicaragua, and Panama.
4 Includes small quantities of bigeye tuna prior to 1975.
5 Swordfish landings revised for 1989.
6 Does not include Spanish mackerel (1967-83) and king mackerel (1967-78) caught by recreational fishery. Landings revised for 1989.
7 Includes blackfin, wahoo, and other unclassified tunas.
8 Total revised for 1986-89.

Table 2. Total U.S. yellowfin and bigeye catches (MT) in 1990, by area and by commercial (Comm.) and recreational (Rec.) gears

		YFT Comm.	*YFT Rec.*	*BET Comm.*	*BET Rec.*
NW Atlantic:	Longline	558		422	
	Rod & reel		269		56
	Troll	278		5	
	Purse seine	52		0	
	Gillnet	25		5	
	Handline	20		5	
	Other	1		0	
Gulf of Mexico:	Longline	3,055		22	
	Other	1		0	
Caribbean Sea:	Longline (est.)	218		68	
	Purse seine	215		0	
	Totals	4,423	269	527	56

Table 3. Distribution of the 1990 sampled catch of yellowfin, by size-breakdown category

Weight Category (kg)	*% of Total Number*	*% of Total Weight*
< 1.4	7	2
1.4 - 1.8	34	15
> 1.8 - 3.4	43	27
> 3.4 - 9.1	11	15
> 9.1	5	41

NATIONAL REPORT OF URUGUAY*

by

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1. INTRODUCTION

The number of vessels in the Uruguayan tuna fleet began to decrease in 1985; in 1990 there were two vessels and at present only one of them is in operation. However, in 1991 several investment projects have been presented for the fishing of tunas and swordfish with longline. If these projects are approved, there would be an increase in the number of vessels around the end of the year and the beginning of 1992. Some vessels are already operating with foreign flags in the international waters next to the Uruguayan EEZ.

2. CATCH AND CPUE

The total catches of tunas and tuna-like fishes obtained by the Uruguayan longline fleet in 1989 and 1990 were 616 and 413 MT (live weight), respectively (Table 1). The percentage of swordfish has increased in the last few years, reaching the level of 73 percent of the tunas and tuna-like species caught in 1990, while the percentage of yellowfin and bigeye tuna decreased (Table 2).

After the high CPUE value of tunas and tuna-like species reached in 1988 (1,229 kg/1,000 hooks), a decline was observed (in 1990, 905 kg/1,000 hooks) mainly caused by the decrease in the CPUE of yellowfin and bigeye. These changes could be the reason for variations in the distribution and direction of the fishing effort, which is centered more and more in swordfish. However, these fluctuations in the CPUE are not greater than those noted since 1983.

3. STATISTICS AND RESEARCH

Effort and catch data from logbooks continue to be processed and sent to ICCAT. Also, sampling of landings by vessels with Uruguayan flags continues, in which the pre-dorsal length of bigeye, yellowfin and albacore is taken. In contrast, no on-board sampling could be accomplished.

A couple of years ago a joint program was initiated with scientists from Brazil, Argentina and Uruguay, whose objective is to provide more and better information on the southwestern Atlantic for the assessment of the southern stocks. For this, a Working Group was formed with the immediate objective of holding two meetings, the first to draft a project on the biology and fishing of the species caught by the tuna longline fleets of the three countries, and the second to standardize and process the existing data.

4. REFERENCES

The documents on swordfish and albacore presented at the ICCAT meetings in 1990 were published in volumes XXXIV and XXXV (2) of the Collective Volume of Scientific Papers.

In 1990 a paper was also presented on the Scientific Symposium of the Maritime Front that was held in Mar del Plata, Argentina, which summarizes the research carried out up to the present and analyzes the state of the Uruguayan tuna fishery up to 1989.

*Original report in Spanish.

Table 1. Effort, Catch and CPUE of tunas and swordfish taken by the Uruguayan longline fleet in the period 1987-90*

	1987	1988	1989	1990
No. of boats	5	4	3	2
Thousands of hooks	1,115	671	594	456
MT (live weight):				
SWO	698	427	414	302
BET	204	121	55	38
YFT	109	177	64	18
ALB	178	100	83	55
kg/1,000 hooks:				
SWO	626	636	697	662
BET	183	181	92	83
YFT	97	263	108	39
ALB	160	149	140	121

*The catches of bluefin tuna (Thunnus thynnus) and billfishes are less than one ton.

Table 2. Percentage of catch in weight

	1987	1988	1989	1990
SWO	59	52	67	73
BET	17	15	9	9
YFT	9	21	10	4
ALB	15	12	13	13

NATIONAL REPORT OF VENEZUELA*

MAC - Dirección General Sectorial de Pesca y Acuicultura

1. FISHERIES

The Venezuelan fisheries for tunas and tuna-like speices in the Atlnatic amounted to 24,007 MT in 1990, declining by 29.7 percent in comparison to the amount taken in 1989 (Table 1).

2. RESEARCH

The research program for tunas and tuna-like species was financed by the Venezuelan Government and international organizations such as ORSTOM and ICCAT. Research begain in 1972, but mainly developed since 1984. It has expanded progressively, incorporating items such as billfishes in 1987, small tunas in 1988 and swordfish in 1991.

2.1 Tunas

Research on tunas fishing in the Caribbean Sea and the Atlantic has been comprised mainly of studies on fishing effort, the magnitude and composition of the catches and studies on reproduction. Sampling has been carried out in the ports of Cumaná and Carúpano, Sucre State, where the purse seiners, baitboats and longliners unload. In addition, sampling has been effected in the tuna canning factories.

2.2 Small tunas

The catch of Scomberomorus unclassified and wahoo (*Acanthocibium solandri*) is made principally by artisanal fishermen in different areas of the country, using handline and gillnets. Research has consisted of sampling the fishing communities, recording the amount of catches as well as the composition, size structure, and collecting biological data on reproduction from logbooks.

2.3 Billfishes

The billfish program encompasses the national, industrial and sport fisheries. The artisanal fishery is carried out with gillnets from sites near La Guaira and on Margarita Island, where daily sampling of the landings (composition, size and sex structure and reproduction) is made.

The industrial fishery is carried out by tuna longliners which operate from Cumaná and Carúpano, Sucre State, incidentally catching billfish. Port sampling is made during the unloading of the vessels. This program was intensified since 1989 with observers on board the longline vessels.

The catches made by the sport fishermen are evaluated during the tournaments which take place in different areas of the country. They are the main source of complete data on billfish species (except swordfish). During the current year, the tagging program was extended to the sport fishing boats, mainly those rented by tourists who come to Venezuela to catch marlins. The collection of information recommenced on the catch and fishing effort from Club Playa Verde, La Guaira, which had been interrupted in 1990 after 29 years of records.

2.4 Swordfish

Since 1987 a longline fleet targeting swordfish has developed, whose center of operation is Puerto La Cruz. The research program includes the study of the fishery and biology of this species, with sampling being done by observers on board the boats as well as sampling of the landings in the ports.

3. ACHIEVEMENTS AND LIMITATIONS

Up to now, the six trips planned for 1991 on board longline vessels have been carried out; the number trips could have been increased if the necessary funds had been available. The trips had a duration of approximately 15 to 20 days.

Of the seven sport fishing tournaments planned in Venezuela for 1991, four were held. Sampling was done in two of these tournaments. Fifty boats participated in these two tournaments (36 and 14, respec-

*Original report in Spanish.

tively), catching 6 sailfish and 16 blue marlin. Up to the present, 300 marlins have been tagged from sites near La Guaira. Three companies which rent boats to sport fishermen and a sport club participated in this program. During 1990 600 marlins were tagged by one of the boat rental companies.

Four of the twenty planned cruises on board longliners targeting swordfish were made. Difficulties were encountered for the low number of vessels operating (5) and restrictions concerning having observers on board. It is expected that before the end of the year the number of vessels will increase to seven, which will facilitate making the observer cruises since the companies dedicated to exploiting this resource in Venezuelan waters have promised to cooperate and participate in the program.

Table 1. Venezuelan catches (MT) in the Atlantic

	1989	1990
YFT-Yellowfin tuna	15,100	11,106
SKJ-Skipjack	6,965	3,215
ALB-Albacore	1,105	10
BET-Bigeye tuna	11	95
SWO-Swordfish	57	158
Others	10,896	9,423
Total	34,134	24,007