INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

R E P O R T
for biennial period, 1988-89
PART II (1989)
English version

MADRID, SPAIN 1990

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

Contracting Parties (as of December 31, 1989)

Angola, Benin, Brazil, Canada, Cape Verde, Cuba, Equatorial Guinea, France, Gabon, Ghana, Côte d'Ivoire, Japan, Korea, Morocco, Portugal, Sao Tomé & Principe, South Africa, Spain, U.S.A., Uruguay, U.S.S.R., Venezuela.

Chairman of Commission

Mr. S. MAKIADI J. LOPES, Angola
(from November 23, 1987)

First Vice-Chairman of Commission

Mr. A. RIBEIRO LIMA, Portugal
(from November 23, 1987)

Second Vice-Chairman of Commission

Mr. K. SHIMA, Japan
(from November 17, 1989)

Panel Membership (as of December 31, 1989)

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

Council

No election was conducted for the 1988-89 biennial period.

Standing Committees

Standing Committees:	**Chairman**
Committee on Finance and Administration (STACFAD)	Ms. P. GARCÍA DOÑORO, Spain (from November 18, 1985)
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: O. RODRÍGUEZ-MARTÍN
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, 1988-89, Part II (1989)"***, which describes the activities of the Commission during the second half of said biennial period.

This volume contains the reports of the Eleventh Regular Meeting of the Commission, held in Madeira, Portugal, in November, 1989, as well as those of all its associated meetings of the 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 as 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.

Commission Chairman

TABLE OF CONTENTS

CHAPTER III - National Reports

CHAPTER I
Secretariat Reports

ADMINISTRATIVE REPORT 1989
COM/89/8 (Amended)*

1. Member countries of the Commission

The Secretariat has informed the member countries that Senegal has withdrawn from the Commission, effective December 31, 1988, according to the formal notice by the Food and Agriculture Organization of the United Nations (FAO), depository of the ICCAT Convention.

Consequently, the Commission is currently comprised of twenty-two (22) member countries: Angola, Benin, Brazil, Canada, Cape Verde, Côte d'Ivoire, Cuba, Equatorial Guinea, France, Gabon, Ghana, Japan, Korea, Morocco, Portugal, São Tomé & Principe, South Africa, Spain, Uruguay, U.S.A., U.S.S.R., and Venezuela.

2. Ratification of the Protocol to the Convention

FAO informed the Commission that the countries on the following list have ratified the Protocol to the Convention, approved at the Conference of Plenipotentiaries (Paris, July, 1984), for accession of the European Economic Community to the Convention.

France	October 23, 1984	U.S.S.R.	June 9, 1986
São Tomé & Principe	November 1, 1984	U.S.A.	November 10, 1986
Korea	December 7, 1984	Spain	November 21, 1986
South Africa	March 28, 1985	Equatorial Guinea	November 7, 1987
Uruguay	May 10, 1985	Portugal	April 7, 1988
Japan	June 13, 1985	Brazil	October 5, 1988
Senegal**	June 14, 1985	Ghana	December 12, 1988
Cape Verde	March 13, 1986	Cuba	January 11, 1989
		Venezuela	March 7, 1989

*The Administrative Report presented at the Commission Meeting was amended.
**See Item 1.

3. Working Group on the Calculation of Contributions

In 1987 the Commission dealt with the question of studying a method for calculating the contributions. In 1988, a working group was created to initiate the study of this subject by mail.

In order to help the members of this group, the Secretariat contacted other international fishery organizations, asking for information on the methods they use to calculate their contributions. Information was received from fifteen organizations.

Document COM/89/19 presents details on this subject and summarizes the information received.

4. Regulations/Inspection

The Secretariat informs the member countries of the date regulations adopted by the Commission enter into effect. As regards non-member countries, the matter is discussed under Section 7.

In 1982, the Commission adopted a Port Inspection Scheme to apply these measures. The Secretariat wrote the member countries to remind them that they should carry out a joint action in order to assure fulfillment of the adopted regulations and to request overall ratification of the Scheme.

5. Relations with countries which are not members of ICCAT

5.1 Fishery management

In accordance with the recommendations by the Commission in its November, 1988, meeting, the Secretariat wrote to the non-member countries which border the Atlantic or which have tuna fishing in the Atlantic, informing them of the ICCAT recommendations for the conservation of tunas and asked for their collaboration in this respect. At the same time, they were invited to join the Commission. Eleven countries answered, four of which (Colombia, Italy, Panama, Taiwan) responded very favorably.

Recognizing that some longliners with flags of convenience operated during the 1988 bluefin spawning season in the Mediterranean, special letters were sent to the countries whose flags have been used. In the letter, special concern of ICCAT on these operations was expressed with respect to the Commission's regulatory measures and asked for information on how many boats operated and what were their catches. Unfortunately no countries responded with any concrete answers.

5.2 Tuna research

The Secretariat maintains regular contacts with all of the non-member countries which fish for tuna in the Atlantic and the Mediterranean Sea. Most of them provided statistics and biological information on tunas. Particularly in 1989, closer relations were found with the Mediterranean countries as a result of our collaboration with GFCM.

6. Meetings organized by ICCAT

6.1 Final Meeting for the Yellowfin Year Program

The final meeting of the Yellowfin Year Program was held in the ICCAT Headquarters, Madrid, May 31 to June 6, 1989. Dr. A. Fonteneau chaired the meeting and scientists from eight countries, two international organizations and the Secretariat participated.

All the information accumulated during the program and the results of analysis were examined. A first version of the report (COM-SCRS/89/12) was drafted. Some analyses are still in process, hence the report will be revised again during the next SCRS meeting. The process for revision was defined; all the scientific documents and the report of the May meeting will be updated, and the publication of the results of the program is planned for the beginning of 1991.

6.2 Albacore Longline Data Preparatory Meeting

This meeting took place at the Institute of Oceanography of the National Taiwan University in Taipei, Taiwan, on July 19-26, 1989, at the invitation of the same. Dr. R. J. Conser (U.S.A.) chaired the meeting and scientists from Japan, U.S.A., and Taiwan participated. The Secretariat was represented by the Assistant Executive Secretary, who was on home-leave in his country (Japan).

The group examined all the basic longline data, particularly those of Taiwan. The report of this meeting was presented at the Albacore Workshop, which was held in September, and is also presented to the SCRS and the Commission (COM-SCRS/89/15).

6.3 Albacore Workshop

The ICCAT Albacore Workshop was held at the ICCAT Headquarters in Madrid on September 19-25, 1989. The Workshop participants included scientists from six member countries, two observer organizations and the Secretariat. In the absence of the Convener, Dr. R. J. Conser chaired the meeting. The Workshop reviewed and updated the existing data base. A catch-at-size data base was created for the North Atlantic.

Various biological parameters were studied, and fairly reliable estimates were made for length-weight relationships, growth equations and natural mortality. Stock structures were reviewed and catch and effort data were examined with respect to developing abundance indices series.

The interaction of fisheries was also reviewed and discussed. The Workshop could not complete the stock analysis, due to the lack of time. Therefore, it recommended holding another workshop in 1990. A new comprehensive research program has been drawn up for consideration of the SCRS at its coming session. The report of the Workshop was adopted and is presented as document COM-SCRS/89/16.

7. Meetings at which ICCAT was represented

7.1 General Fisheries Commission for the Mediterranean Sea (GFCM)

By decision of the SCRS, ratified by the Commission in 1988, the Assistant Executive Secretary represented ICCAT in Livorno, Italy, in the Seventh Session of the Committee on Resource Management of the GFCM (February 22-24, 1989) and in the Nineteenth Session of the General Fisheries Commission for the Mediterranean Sea (February 27-March 3, 1989).

This was an important meeting, as the GFCM had requested ICCAT assistance for stock evaluation of the large pelagic fish in the Mediterranean Sea. A paper concerning the evaluation of data availability for the Mediterranean and recommendations for data collection (SCRS/89/7) was presented by the ICCAT Secretariat at these meetings. The GFCM proposed holding a joint session of stock assessments in early 1990 with ICCAT.

For more details, see COM-SCRS/89/11.

7.2 FAO Committee on Fisheries

The Delegate of Spain was asked to represent ICCAT in the meeting of the FAO Committee on Fisheries, held in Rome on April 10-14, 1989.

7.3 Inter-American Tropical Tuna Commission

The Commission was invited by IATTC to its annual meeting held at Paris, June, 1989. The Delegate of France was asked to represent the ICCAT at the meeting.

7.4 International Whaling Commission

The Delegate of Japan was asked to represent the ICCAT at the annual meeting of the International Whaling Commission, held in May, 1989, at La Jolla, California.

8. Collaboration with other organizations

8.1 Collaboration with FAO

The close relationship was maintained with various departments of FAO, which aided the Commission in many administrative aspects as the depository body of the Convention.

Mutual collaboration between FAO and ICCAT in collecting statistics and other information continued as in other years. Following the recommendation of the World Tuna Statistics Meeting (La Jolla, May, 1987), ICCAT assisted FAO in estimating better world tuna catches.

The Assistant Executive Secretary was invited to Rome by FAO, immediately before the Livorno meeting, to collaborate in the study of Mediterranean large pelagic species and to revise several matters concerning the comparison of FAO and ICCAT data. The travel expenses were covered by FAO.

8.2 General Fisheries Commission for the Mediterranean (GFCM)

Since the joint stock assessment meeting was proposed at the GFCM sessions (see Sect. 9.1), the ICCAT and GFCM Secretariats have been in close contact to improve the data base and to organize the meeting. The ICCAT Secretariat has been acting as a technical center and contacting all the GFCM countries in order to improve their statistics. Further details are reported in COM-SCRS/89/11.

8.3 Other organizations

The Commission also maintained contact with various international organizations other than those mentioned in the previous paragraphs.

In particular, and in accordance with a decision of the Commission which requested the Secretariat to ascertain what formulas are used by other international organizations to calculate their contributions, the Secretariat contacted all international fisheries organizations; several of whom sent the requested information.

Particular mention should be made that at the invitation of the International Ocean Institute, Malta, the Assistant Executive Secretary visited the University of Malta as a special one-day lecturer for its Training Program for Mediterranean Fishery and Oceanography in October, 1989. His trip expenses were covered by Ocean Institute.

9. Coordination of Research

The coordination of research carried out by the Secretariat during 1989 is summarized in the "Secretariat Report on Statistics and Coordination of Research" (COM-SCRS/89/11). Special progress made is briefly summarized below.

9.1 Acquisition of data processing material

As recommended by the Commission at its 1988 meeting, the Commission's main computer (Micro VAX II) has been reinforced with extra real memory and an extra disc space with a controller. Details are reported in the Financial Report (COM/89/9) and in COM-SCRS/89/11.

9.2 Program of Enhanced Research for Billfish

The Program continued as planned during 1989. Details of the funds received and disbursed, as well as progress made are presented in COM-SCRS/89/13.

9.3 Mediterranean tuna data

The inadequacy of the Mediterranean tuna statistics has always been a problem for scientists to achieve any stock evaluation. The progress made this year has been significant in this aspect. Many data which were not available in past years have now been made available through the efforts of the Secretariat and the assistance of scientists of non-member countries.

9.4 Albacore stock assessments

As reported under Section 8, major efforts by the Secretariat have been dedicated to this problem. Finally most of the data problems have been solved and a catch-at-size data base has been created for the North Atlantic for 1975 through 1987 and for part of 1988.

10. Publications

The following publications were published in 1989.

-- Report for Biennial Period, 1988-89 (Part I), 1988
Commission's official report for 1988, including the Proceedings of 1988 Commission Meeting. Published in the three official languages of the Commission in May-June, 1989.

-- Statistical Bulletin, Vol. 18 (Final)
Includes statistics from 1977 through 1987. Published in May, 1989.

-- Collective Volume of Scientific Papers, Vol. XXIX
Report of the meetings held during the year (Data Preparatory Meeting for the Yellowfin Year Program and the Swordfish Workshop). Published in February, 1989.

-- Collective Volume of Scientific Papers, Vol. XXX, No. 1
1988 SCRS scientific papers on tropical species (yellowfin, bigeye and skipjack) and albacore. Published in March, 1989.

-- Collective Volume of Scientific Papers, Vol. XXX, No. 2
1988 SCRS scientific papers on bluefin tuna, billfish and general statistics. Published in March, 1989.

-- Data Record, Vol. 29
A catalog and summary of data received up to June, 1988. Published in December, 1988.

-- Data Record, Vol. 30
A catalog and summary of data received up to June, 1989. Published in September, 1989.

In order to cut costs, all of these publications were prepared at the Secretariat except for the covers and binding. The distribution of the Data Record and Collective Volume of Scientific Papers has been limited to scientists and libraries directly involved in tuna research.

The preliminary issue of the Statistical Bulletin has not been prepared, as suggested by SCRS and Commission in 1988.

Also in order to save on expenditures, almost all the ICCAT publications have been reduced in number and shipped by surface mail, except for a few occasions when urgent distribution was essential.

Some embassies collaborated in the distribution of publications to their countries´ subscribers.

13. Secretariat and Administration

There have been no changes in the Secretariat staff in 1989. 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 programmer, a statistical secretary and a clerk in the U.N. General Services Category and four locally contracted staff members.

O. Rodríguez Martín
Executive Secretary

FINANCIAL REPORT 1989
COM/89/9 (Revised)*

I. FISCAL YEAR 1988

1. Auditor's Report

The Auditor examined the books and accounts of the Commission up to December 31, 1988. 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 countries in May, 1989. An extract of this Report is included in the "Report for Biennial Period, 1988-89, Part I".

2. Financial status at the end of the first half of the Biennial Budget - 1988

Statement 1 shows the status of Cash and Bank at the end of Fiscal Year 1988. At the end of this Fiscal Year, there was a cash balance of US$ 255,029.49, including $1,507 in contributions paid in advance.

There were contributions pending payment amounting to US$ 488,932.85 at the end of Fiscal Year 1988.

II. FISCAL YEAR 1989

1. Regular Budget 1989

The 1989 Regular Budget, which amounted to US$ 750,000, was approved by the Commission at its Tenth Regular Meeting (Azores, 1987) and revised at its Sixth Special Meeting (Madrid, 1988).

2. Financial status of the second half of the Biennial Budget - 1989

Statement 2 shows the status of the member country contributions as of the end of Fiscal Year 1989.

*Updated to the end of the Fiscal Year. Changes agreed upon by the Commission have been introduced.

When the country contributions were originally calculated for Fiscal Year 1989, Senegal's contribution amounted to US$ 21,934 (STACFAD Report, Appendix 4 to Annex 8, contained in the "Report for Biennial Period, 1986-87, Part II). However, as the commissioners were informed, Senegal's withdrawal from the Commission was effective on December 31, 1988. Consequently, the potential income from 1989 contributions was reduced by about 3%, i.e., the income from contributions was reduced to US$ 728,066.

Fourteen (14) member countries paid their total contribution corresponding to Fiscal Year 1989 and two countries paid partial contributions corresponding to this same fiscal year. Income received from 1989 contributions amounted to US$ 614,623.76, or about 84 % of the total potential contributions.

On the other hand, three countries (Gabon, Ghana and Venezuela) paid past due contributions amounting to US$ 165,362. However, there are still past due contributions corresponding to 1989 amounting to US$ 113,440.24, as well as contributions pending payment from previous years which amount to US$ 323,570.85. Therefore, the total accumulated debt owed to the Commission at the end of Fiscal Year 1989 amounts to US$ 437,011.09.

Statement 3 shows the amount budgeted for 1989 and the expenditures incurred to the end of the Fiscal Year.

Chapter 1 - Salaries. This chapter includes 12 staff members: the Executive Secretary (D), the Assistant Executive Secretary (P), six multilingual secretaries (GS), one administrative aide (GS), and three auxiliary staff contracted at the local level: a telephone operator/receptionist, a photocopy machine operator and a messenger.

The budget and expenses in 1989 for staff in the Professional (D & P) Categories and General Services (GS) Category were maintained in U. S. dollars at the same level as in 1987 and in 1988. Although it appears as if staff salaries were frozen, in reality the situation was much worse. Actually, the exchange rate used to calculate staff salaries was 123, while there was a notable decrease in these staff salaries in pesetas due to the downward fluctuation in the US dollar/Peseta rate during 1989. Consequently, any exchange rate below 123 had a negative repercussion on these salaries, as occurred in both 1987 and 1988. In summary, the agreement reached by the Commission in November, 1987, to freeze salaries resulted, in effect, in a substantial decline in salaries.

Chapter 2 - Travel. Included in this chapter were the "home leave" expenses for the Assistant Executive Secretary and the Systems Analyst and their respective families.

Chapter 3 - Annual Commission Meeting. All expenses which surpassed the amount budgeted for the Commission Meeting were paid by the host country, since the budget had been approved based on holding the meeting in Madrid.

Chapter 4 - Publications. The Commission publications listed in the Administrative Report (COM/89/8) were prepared and printed by the Secretariat staff. Only the covers and binding were done by outside contract.

Chapter 5 - Office Equipment. In order to keep expenses to a minimum, the purchase of some essential office equipment was postponed until next year.

Chapter 6 - Operating Expenses. This chapter includes office material, document reproduction, mailing (of correspondence, documents and publications), telephone, fax, cable, telex, equipment maintenance contracts (excluding the VAX), auditor's fee, electricity, and office cleaning. These expenditures are shown in Statement 3.

Chapter 7 - Miscellaneous. Minor expenses are charged to this chapter, such as repairs, fire, theft and liability insurance, and other miscellaneous expenses which are not applicable to other budget chapters.

Chapter 8 - Coordination of Research.

8-a) Salaries. The salaries of four (4) staff members are charged to this sub-chapter: the Systems Analyst (P), a programmer (GS), a statistical secretary (GS), and a locally-contracted data entry clerk. The comments made in the "Chapter 1-Salaries" section also apply here.

8-b) Travel to improve statistics. Travel expenses of the Assistant Executive Secretary to Italy to improve Mediterranean statistics, as well as his participation in the CWP meeting in Paris, were charged to this sub-chapter.

8-c) Port sampling. Expenses incurred for port sampling in the Canary Islands, St. Maarten, Abidjan and Montevideo have been charged to this sub-chapter. Port sampling expenses at Cape Town were borne by the Sea Fisheries Research Institute of South Africa.

The purchase of calipers and the lottery prizes for temperate tuna species were also charged to this sub-chapter.

8-d) Biostatistical work. The major part of this work was carried out by the Secretariat staff. In accordance with an SCRS decision, travel expenses of the Assistant Executive Secretary (who was on home leave in Tokyo) to attend the Albacore Data Preparatory Meeting held in Taipei (Taiwan) were charged to this sub-chapter.

8-e) Electronic Equipment. As recommended by the SCRS and authorized by the Commission, the purchase of an additional 2 MB RAM, a hard disk (622 MB), and a controller for the Micro-VAX computer were charged to this sub-chapter. Most of this equipment was purchased in the United States, at considerable savings. Because of these savings, we were able to purchase, in accordance with SCRS instructions, an IBM compatible PC (Fujitsu S-1300, with 5-1/4" and 3-1/2" disk drives), a laser printer (Fujitsu RX7100) and a currency stabilizer.

8-f) Data processing. As had been foreseen, the major part of the expenditures charged to sub-chapter 8-f corresponds to the Micro-VAX equipment maintenance contracts. Some computer materials were also charged.

8-g) Scientific meetings (including SCRS). Expenses charged include those of the Albacore Workshop held at the Secretariat in September, the SCRS meetings (species groups, and plenary sessions with simultaneous interpretation) held at a ICCAT Secretariat and/or at the Hotel Pintor.

8-h) Miscellaneous. Funds from this sub-chapter were used to pay minor expenses which were not foreseen when the budget was prepared.

8-i) Billfish Program. Expenditures for this Program in 1989 were covered by voluntary contributions to the Billfish Trust Fund and, therefore, had no repercussion on the budget. (See Section IV of this Report.)

3. Income and Disbursements

Statement 4 shows the income received during Fiscal Year 1989, such as: member country contributions, past-due contributions, voluntary contributions, observer fees, bank interest, refund of Value Added Taxes, reimbursement for publications, etc.

It is interesting to point out that a voluntary contribution of US$ 31,048.18 was received from the Association of the Canning Industries of the Azores Islands (Portugal). The Commission would like to reiterate its appreciation for such collaboration.

This Statement also shows that total expenditures in 1989 amounted to US$ 749,914.91 and that the balance in Cash and Bank at the end of Fiscal year 1989 was US$ 355,938.49.

4. Status of the Working Capital Fund

Statement 5 shows the status of the Working Capital Fund, which at the start of the Fiscal Year showed a balance of US$ 253,522.49. Deposits to the Fund during the course of 1989 totaled US$ 236,200.15. This Fund should have shown a balance of US$ 489,722.64. However, from this amount, the difference between the contributions received towards the 1989 Budget and the total expenditures for the year have been deducted.

1989 Budget - US$ 750,000

a) Expenditures in 1989		US$ 749,914.91
b) Funds available to cover the budget:		
i) Contributions to the 1989 Budget ...	$ 614,623.76	
ii) Application of the Working Capital Fund to cover the difference between 1989 contributions received and total 1989 expenditures	135,291.15	
		US$ 749,914.91

Consequently, the amount available in the Working Capital Fund at the end of Fiscal Year 1989 was US$ 354,431.49.

5. Status of Cash and Bank at the end of Fiscal Year 1989

Statement 6 shows a balance of US$ 355,938.49 in Cash and Bank at the end of Fiscal Year 1989 and accumulated contributions pending payment which total US$ 437,011.09.

III. YELLOWFIN YEAR PROGRAM (YYP)

At its Ninth Regular Meeting (November, 1985) the Commission approved this Program with a budget of US$ 175,000, financed by the Working Capital Fund.

At the start of the Fiscal Year, the Yellowfin Program had a positive balance of US$ 19,847.89. In Fiscal Year 1989, Program activities continued and expenditures totaled US$ 11,015.50 (including bank charges), which are broken down as follows:

1) Port sampling in Dakar	$ 363.91
2) Final YYP Meeting in Madrid	1,835.92
3) YYP lottery prize	494.92
4) Age and growth study	8,320.75
Total expenses	$ 11,015.50

Consequently, the financial status of the Yellowfin Program is as follows:

Balance at start of Fiscal Year 1989	$ 19,847.89
Expenditures in 1989	11,015.50
Balance at end of Fiscal Year 1989	$ 8,832.39

IV. PROGRAM OF ENHANCED RESEARCH FOR BILLFISH (TRUST FUND)

In 1987, a Trust Fund was opened in the "Banco Exterior de España", in the Commission's name, to deposit money received from private sources for the Billfish Program. In 1989, the Secretariat administered these funds in accordance with the budget for billfish research and in close collaboration with the General Coordinator, Dr. B. Brown, and the East and West Atlantic Coordinators, Drs. T. Diouf and E. Prince, respectively.

Statement 7 shows the budget and expenditures corresponding to Fiscal Year 1989. During the Fiscal Year, US$ 19,000 were received from private sources. Program expenses in 1989 amounted to US$ 27,589.28. Therefore, at the close of the FY the balance in the Billfish Trust Fund was US$ 9,729.93. Details of the Program Budget and expenses can be found in Appendix 4 to the 1989 SCRS Report.

V. GENERAL BALANCE SHEET AT THE END OF FISCAL YEAR 1989

Statement 8 shows the general balance sheet at the end of Fiscal Year 1989.

O. Rodríguez Martín
Executive Secretary

Status of Cash and Bank - Regular Budget - at end of Fiscal Year 1988 ($USA)

SUMMARY		BREAKDOWN		
Cash and Bank	255,029.49	Available in Working Capital Fund	253,522.49	
		Advance on 1989 Budget (Angola)	1,507.00	255,029.49
Accumulated pending contributions ...	488,932.85	Contributions pending payment		488,932.85
		i) from 1983 and before	85,600.85	
		ii) from 1984	35,993.00	
		iii) from 1985	44,877.00	
		iv) from 1986	60,987.00	
		v) from 1987	98,059.00	
		vi) from 1988	163,416.00	

Status of Member Country Contributions - Regular Budget (US$) (at end of Fiscal Year 1989)

Country	Past Due at Beginning oF FY 1989	1989 Contributions	Contributions Paid Towards the 1989 Budget	Past-Due Contributions Paid	Balance Due at End of FY 1989
Angola (1).............	0.00	16,620.00	16,620.00	0.00	0.00
Benin..................	40,202.70	5,127.00	0.00	0.00	45,329.70 (2)
Brazil.................	0.00	40,947.00	40,947.00	0.00	0.00
Canada.................	0.00	17,555.00	17,555.00	0.00	0.00
Cape Verde.............	12,831.00	13,072.00	0.00	0.00	25,903.00
Côte d´Ivoire..........	30,756.00	11,606.00	0.00	0.00	42,362.00
Cuba...................	39,083.00	21,778.00	0.00	0.00	60,861.00
Equatorial Guinea......	4,750.00	4,833.00	0.00	0.00	9,583.00
France.................	0.00	55,910.00	55,910.00	0.00	0.00
Gabon..................	31,548.00	9,667.00	3,028.12	31,548.00	6,638.88
Ghana..................	220,087.27	44,131.00	0.00	100,000.00	164,218.27
Japan..................	0.00	64,738.00	64,738.00	0.00	0.00
Korea..................	0.00	32,610.00	32,610.00	0.00	0.00
Morocco................	0.00	16,127.00	16,127.00	0.00	0.00
Portugal...............	0.00	29,785.00	29,785.00	0.00	0.00
São Tomé and Principe..	0.00	4,995.00	4,955.00	0.00	40.00
Senegal................	75,860.88	0.00 (3)	0.00	0.00	75,860.88
South Africa...........	0.00	14,127.00	14,127.00	0.00	0.00
Spain..................	0.00	181,522.00	181,522.00	0.00	0.00
Uruguay................	0.00	8,141.00	8,141.00	0.00	0.00
U.S.A..................	0.00	73,500.00	73,500.00	0.00	0.00
U.S.S.R................	0.00	26,729.00	26,729.00	0.00	0.00
Venezuela..............	33,814.00	34,544.00	28,329.64	33,814.00	6,214.36
Rounding...............		2.00			
Total..................	488,932.85	728,066.00 (4)	614,623.76	165,362.00 (5)	437,011.09

(1) Overpayment by Angola of $1,507, received and accounted for in Fiscal Year 1986, to be credited to 1990 contribution.
(2) Includes Benin´s pending contribution to Skipjack Budget ($3,044.70).
(3) Senegal´s withdrawl from the Commission was officially effective on December 31, 1988.
(4) In calculating 1989 contributions (before official date of Senegal´s withdrawl was confirmed), a contribution of $21,934 corresponded to Senegal. This total represents the total budget minus this amount ($750,000 - $21,934 = 728,066).
(5) To the Working Capital Fund.

STATEMENT 3

Regular Budget and Expenditures (at end of Fiscal Year 1989) (US$)

	AMOUNT BUDGETED	AMOUNT SPENT		
Chap. 1 Salaries	395,000			
i) P and GS Staff		317,213.00		
Pension (P and GS Staff)		42,195.09		
ii) Locally Contracted Staff		24,352.87		
Spanish Social Security -Local Staff		11,852.77	395,613.73	
Chap. 2 Travel	12,000		12,033.18	
Chap. 3 Annual Meeting	22,000		23,699.74	
Chap. 4 Publications	16,000		16,623.83	
Chap. 5 Office Equipment	4,000		1,912.82	
Chap. 6 Operating expenses	62,000			
i) Office material		6,917.78		
ii) Reproduction of docs.		5,457.23		
iii) Mailing		11,778.45		
iv) Telephone		5,380.74		
v) Telex, Fax		6,498.35		
vi) Maintenance contracts		16,424.38		
vii) Honorarium-Auditor		3,077.89		
viii) Electricity		3,361.22		
ix) Office cleaning		5,187.72		
x) Other operating exp.		457.04	64,540.80	
Chap. 7 Miscellaneous	5,000		5,004.55	
Subtotal - Chapters 1-7	516,000			519,428.65
Chap. 8A Salaries	113,000			
i) P and GS Staff		89,058.70		
Pension (P and GS Staff)		11,172.00		
ii) Locally Contracted Staff		10,580.83		
Spanish Social Security -Local Staff		2,500.00	113,311.53	
Chap. 8B Travel	6,000	1,272.63		
8C Port sampling	12,000	9,460.39		
8D Biostatistical work	7,000	4,647.97		
8E Electronic equipment	36,000	38,085.46		
8F Data processing	27,000	27,765.23		
8G Scientific meetings	30,000	33,170.32		
8H Miscellaneous	3,000	2,772.73	117,174.73	
Subtotal - Chapter 8	234,000			230,486.26
TOTAL - CHAPTERS 1-8	750,000			749,914.91

STATEMENT 4

Income and Disbursements - Regular Budget - Fiscal Year 1989 (US $) (at end of Fiscal Year 1989)

I N C O M E

Cash and Bank (at beginning of FY 1989)		255,029.49
Contributions received towards 1989 Budget......................		614,623.76
Past-due Contributions Received:		
Gabon...........................	31,548.00	
Ghana...........................	100,000.00	
Venezuela.......................	33,814.00	165,362.00*
Extrabudgetary Income Received:		
Bank interest...................	26,034.37	
Refund from VAT.................	11,049.92	
Reimbursement for books..........	700.68	
Bank error in our favor..........	5.00	
Voluntary contributions:		
--Associação dos Industriais de Conservas de Peixe dos Açores	31,048.18	
--Observer fees at 1989 Meeting	2,000.00	70,838.15*
TOTAL....................................		1,105,853.40

D I S B U R S E M E N T S

Expenditures:		
Chapter 1...............	395,613.73	
Chapter 2...............	12,033.18	
Chapter 3...............	23,699.74	
Chapter 4...............	16,623.83	
Chapter 5...............	1,912.82	
Chapter 6...............	64,540.80	
Chapter 7...............	5,004.55	
Chapter 8...............	230,486.26	749,914.91
Cash and Bank...........................		355,938.49
TOTAL...........................		1,105,853.40

*To the Working Capital Fund.

Cash Available in Working Capital Fund - Regular Budget - Fiscal Year 1989 (US $) (at end of Fiscal Year 1989)

Balance at start of Fiscal Year 1989		253,522.49
Deposits:		
Past-Due Contributions Received	165,362.00	
Extrabudgetary Income	70,838.15	
Total deposited to Working Capital Fund		+236,200.15
Total of balance and deposits		489,722.64
Less: Amount to cover the difference between contributions received towards 1989 Budget ($614,623.76) and total expenditures for 1989 ($749,914.91)		-135,291.15
Available in Working Capital Fund at end of Fiscal Year 1989)		354,431.49

Status of Cash and Bank - Regular Budget - at end of Fiscal Year 1989 ($USA)

SUMMARY		BREAKDOWN		
Cash and Bank	355,938.49	Available in Working Capital Fund	354,431.49	
		Advance on 1989 Budget (Angola)	1,507.00	355,938.49
Accumulated pending contributions ...	437,011.09	Contributions pending payment		437,011.09
		i) from 1984 and before	41,062.58	
		ii) from 1985	19,022.27	
		iii) from 1986	53,156.00	
		iv) from 1987	90,228.00	
		v) from 1988	120,102.00	
		vi) from 1989	113,440.24	

Budget and Expenditures of the Program of Enhanced Research for Billfish (at end of Fiscal Year 1989) (US$)

	1989 Budget	1989 Expenditures
Species Identification Kits	4,600.00	6,646.20
Age and growth - Purchase of hard parts	1,000.00	0.00
Tagging	3,500.00	4,648.74
Statistics and sampling enhancement	20,000.00	6,672.35
Coordination	15,000.00	9,621.99
TOTAL	44,100.00	27,589.28

STATUS OF BILLFISH TRUST FUND

Balance as of January 1, 1989	$18,319.21
Received for Billfish Program in 1989	+ 19,000.00
Program Expenditures	- 27,589.28
Total in Fund (at end of Fiscal Year 1989)	$9,729.93

General Balance Sheet at end of Fiscal Year 1989 (US$)

ASSETS			LIABILITIES	
Available: (Banco Exterior de España):			Acquired holdings (gross)	330,431.46
Acct. 84-31279-Z (time deposit)		273,972.70	Less: Amorization of Fixed Assets	(194,406.46)
Acct. 82-31279-Q (US$)		48,627.55	Acquired holdings (net)	136,025.00
Acct. 30-17672-A (Ptas.)	4,725,064			
Acct. 30-17329-F (Convert. Ptas.)	3,206		Guaranty deposit	815.64
Cash on hand (Ptas.)	13,034			
(1US$ = 110 Ptas.)	4,741,304	43,102.76	Available in the Working Capital Fund	354,431.49
		365,703.01		
Difference in exchange rate		-932.13	Advance from Angola	1,507.00
		364,770.88		
			Yellowfin Year Program	8,832.39
Available in Billfish Trust Fund:				
Acct. 82-31555-N		9,729.93	Available in Billfish Trust Fund:	
			1988 Balance: 18,319.21	
Receivables:			Received: 19,000.00	
Benin	45,329.70		Spent: 27,589.28	9,729.93
Cape Verde	25,903.00			
Côte d'Ivoire	42,362.00		Contributions pending payment	437,011.09
Cuba	60,861.00			
Equatorial Guinea	9,583.00			
Gabon	6,638.88			
Ghana	164,218.27			
São Tomé & Principe	40.00			
Senegal	75,860.88			
Venezuela	6,214.36	437,011.09		
Fixed Assets:				
Acquired before 1989, in use	295,782.44			
Acquired during 1989, in use	35,409.02			
Retired during 1989	(760.00)			
	330,431.46			
Accumulated amortization	(194,406.46)	136,025.00		
Guaranty deposit		815.64		
TOTAL ASSETS		948,352.54	TOTAL LIABILITIES	948,352.54
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

SCRS/89/11 (Amended)*

I. DATA COLLECTION AND SAMPLING

1. Collection of 1988 statistics through national offices

Table 1 of the Report of the Sub-Committee on Statistics (Appendix 5 to Annex 10) shows the progress made by the national offices and by the Secretariat in the collection of 1988 statistics. As of October 10, 1989, data from the following countries had not yet been received by the Secretariat:

Task I data (total nominal catches):

> Cape Verde, France (BFT), Ghana, Japan (LL), and Senegal.

Task II catch and effort data:

> Cape Verde, France (BFT and ALB), Ghana, Japan (LL), Spain (Bay of Biscay BFT), Uruguay, Venezuela.

Task II size data:

> Cape Verde, Cuba (except BLF and SKJ), France (BFT), Ghana, Morocco, and Japan (LL, except SWO).

Catch and canning statistics:

> In order to calculate each member country's contribution to the Commission's 1990-91 Budget, catch and canning statistics were requested from the national offices. Many reminders were sent but statistics still have not been received for the following countries and the Secretariat had to estimate their statistics:
>
> Benin, Brazil, France, Guinea Equatorial, Japan, (Senegal).

2. Improvements and remaining difficulties

a) Delay in submission of Task I data

As the Secretariat sent reminders more frequently this year, less delay in reporting 1988 catches was experienced. However, the data for some important fisheries are still missing (as of October 10, 1989), such as French bluefin catch, Japanese longline catch and Ghanaian catches.

*The Secretariat Report on Statistics and Coordination of Research presented at the Commission Meeting was amended.

b) Mediterranean statistics

Although the overall quality of the Mediterranean statistics is still unsatisfactory compared with other areas, significant improvements have been made in the reporting of data. The major achievements in 1989 are:

1) Catch and size data became available for the Italian bluefin fishery (except for the Adriatic Sea) for 1986 through 1988,

2) Estimates for Greek, Maltese and Turkish bluefin and swordfish catches were improved,

3) Size data for Greece became available.

For further details, refer to Chapter IV of this report.

c) Venezuelan statistics

Total 1987 Venezuelan Atlantic tuna catches (government reports include some Pacific catches) were estimated by the Secretariat using the logbooks provided by the statistical office of Venezuela. The sampling data provided by the IATTC from the Venezuelan Atlantic catches were coded and processed at the Secretariat. These logbook copies as well as Venezuelan port sampling data have been carefully verified and reprocessed into ICCAT Task II format. The results were sent to Venezuela for their use and were also added to the ICCAT base.

3. Port sampling by the Secretariat

a) The longline fleet

Routine port sampling from longliners at various transshipment ports was carried out as usual by ICCAT, but the sampling rate was very low at the Canary Islands and at St. Maarten for the following reasons:

1) Many oriental longliners had left the Atlantic or had been converted to extremely low-temperature freezers and are no longer unloading at the Atlantic ports.

2) Due to lack of supervision through direct contacts with the samplers at ports, it is becoming difficult to control the quality of sampling.

The sampler at Las Palmas was replaced. The selection and training of the new sampler was made by Mr. J. Ariz (IEO, Tenerife), who visited Las Palmas in early 1989 at the Commission's request. His trip was covered by ICCAT funds.

b) The Ghana-based fleet

The contract between the CRO-Abidjan and ICCAT signed in early 1986 to finance biological sampling from the Ghanaian surface fleet unloading at

Abidjan was extended into 1989 since the major part of the Ghanaian fleet is still unloading there. As of the time of writing this report, the data up to and including 1988 have been received at the Secretariat.

However, these data are only a part of the total Ghanaian catch data and it is hoped that the data from Ghana will become available.

II. SECRETARIAT DATA PROCESSING

1. Facilities

HARDWARE:

Funds to purchase the expansion of real memory and the addition of a disk with a controller were approved by the Commission in the 1989 budget. The 2 MB extra real memory (RAM) and a hard disk of 622 MB with a controller were obtained to increase the efficiency and capacity of the Commission's Micro-VAX II. These purchases were made in the U.S., in order to make the most effective use of the funds available. As a result of this substantial savings, after consultation with the SCRS (1989) for the use of the remaining funds, the following equipment was purchased at the end of 1989:

- Fujitsu S-1300 (an IBM-compatible PC)
  80386 microprocessor
  40 MB hard disk
  2 MB RAM
  1 parallel port, 2 serial ports
  MS-DOS OS, version 3.3
  One 5 1/4 inch (1.2 MB) floppy
  One 3 1/2 inch (1.44 MT) floppy

- Fujitsu Laser Printer RX7100
  1.5 MB memory
  HP Laser Jet Plus standard emulation
  2 additional fonts for proportional printing

- Am-1000 - UPS offline stabilizer
  1000 watts, 240 volts
  15 minute autonomy
  for new RA82 disk

SOFTWARE:

Various scientists have provided many stock analytical programs. The ones for application on PC's have been loaded on the Compaq. Other programs to be used on the VAX were adjusted and loaded with the VAX/VMS system for the benefit of scientists during the scientific sessions. In addition, Digital Word Processing software for MS-DOS operating system was purchased.

Drs. M. Parrack, R. Conser and S. Turner assisted the Commission in these purchases and their efforts are much appreciated.

2. Data processing

a) Extra data processing

The Secretariat had to prepare the data bases for the three intersessional scientific meetings held during 1989, support the meetings with its computer system, and do much data processing (e.g., creating catch-at-size base) before, during and after each meeting (see Chapter III 3-5). Also data preparation for the Mediterranean base (see Chapter IV) has begun.

As a whole, these activities have more than doubled the computer work at the Secretariat during 1989.

b) Reorganization of the data base

The reorganized data bases have been updated. The bluefin and small tunas size data still have to be reorganized. Since so much extra computer work was requested of the Secretariat in 1989, progress on this matter has been slow.

Reorganization of the tagging file is very urgently needed, but it is doubtful that this can be done soon because of the volume of the data and some confusion on the historic tagging information. Much research through literature, and collaboration of national scientists are required.

c) Routine work

The volume of routine work has been increasing as the volume of data increases. Routine work includes 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 had to be done.

III. BIOSTATISTICAL WORK CARRIED OUT BY THE SECRETARIAT

1. Data updating and processing for the bluefin species group (SCRS/89/8)

Prior to the 1989 SCRS meeting, the Secretariat reviewed the bluefin catch-by-size data base. Because of the delay this year in the submission of some data for the major fisheries, not all the processing assignments could be completed before the SCRS meeting.

2. Updating of the swordfish data base (SCRS/89/9)

The Secretariat reviewed the swordfish catch-by-size data base, created in 1988. Because of the delay this year in the submission of some data for the major fisheries, not all the processing assignments could be completed before the SCRS meeting.

3. Data processing for the Meeting of the Yellowfin Year Program

The Secretariat prepared several tropical tuna data bases for the Meeting of the Yellowfin Year Program, held in June, 1989, at the Secretariat.

4. Data processing for the ICCAT Albacore Longline Data Preparatory Meeting

The Secretariat prepared port sampling data for this meeting, held in July, 1989, in Taipei (Taiwan). These preparations included comparison of sampling data between ports and size data from individual vessels. After the meeting, some of the errors found in the previous data set for the Taiwanese fishery had to be corrected and all the size data had to be replaced with newly submitted data.

5. Creation of albacore catch-at-size data base

After the Data Preparatory Meeting and before the Albacore Workshop (in September), the Secretariat created a catch-at-size file for the Taiwanese fleet for 1963 through 1979. During and after the meeting, the entire catch-at-size data file was created at the Secretariat for all the fisheries in the North Atlantic and started for the South Atlantic.

6. Mediterranean data

Great progress was made for the Mediterranean in obtaining data, processing them, carrying out special sampling in Italy, etc. Details are discussed in Chapter IV.

7. Tuna data comparison between ICCAT and FAO bases

The comparative study between the ICCAT data base and the FAO data base which began in 1985 has continued in 1989. ICCAT provided FAO with a new comparison computer run. In addition, ICCAT has cooperated with FAO to obtain better estimates of world tuna catches, as recommended by the World Tuna Statistics Consultation (May, 1988) by obtaining some Pacific catch data not available to FAO in the past.

8. Coordination of the Program of Enhanced Research for Billfish

The Secretariat has been involved in coordinating and administering the Program activities in collaboration with the Program Coordinators. A detailed report is presented in SCRS/89/13.

9. The 1989 tuna tagging lottery (for tag recoveries reported in 1988)

The Tuna Tagging Lottery was held at the ICCAT Headquarters on Friday, June 2, 1989. All the Atlantic tuna tag recoveries reported during 1988 were eligible for the lottery. This year, three $500 rewards were given:

one for billfishes (a special drawing for the Program of Enhanced Research for Billfish), one for tropical tunas and one for temperate tunas.

Two (one on a bluefin and one on a yellowfin tuna) out of three winning tags represented transatlantic recoveries.

10. Field Manual

As recommended by the SCRS, a draft of the revised "Field Manual for Statistics and Sampling" has been completed (in English for the time being) and distributed among the scientist for review in June, 1989. Since some of the comments received from the scientists were too significant to be settled without discussion at the SCRS, the Manual has not yet been finalized although the bulk of the book has been translated. The important suggested changes are as follows:

a) Predorsal length. The U.S. scientists indicated serious doubts on the measurement of fish by predorsal length because of its inaccuracy and poor resolution for growth studies, etc. As in the past, tropical tunas caught by the surface fleet in the east Atlantic are mostly measured by predorsal length and converted to fork length. This matter should be clarified.

b) Straight measurement of billfish. The West Atlantic Billfish Coordinator felt strongly that all the billfish measurements should be made with a tape for curved length. As many length measurements made in the past aboard longliners were straight measurements, there are some doubts whether or not this standard should be insisted upon.

11. Development of new species tables

This year's catch summary tables (so-called species tables) have been reorganized in accordance with a 1988 SCRS recommendation. The program to generate these tables is designed with sufficient flexibility so that the cut-off level of the catch, below which the fisheries are combined as "others", is an input parameter rather than an arbitrary decision.

IV. IMPROVEMENT OF MEDITERRANEAN FISHERIES STATISTICS

1. General Fisheries Commission for the Mediterranean Sea (GFCM)

As agreed by the SCRS and the Commission at the 1988 meeting, the Assistant Executive Secretary represented ICCAT at the Seventh Session of the Committee on Resource Management of GFCM (February 22-24) and the Nineteenth Session of the General Fisheries Commission (formally Council) for the Mediterranean (February 27 to March 3), both held in Livorno, Italy.

Before the GFCM meeting, a data base including all the Mediterranean statistics was prepared and the adequacy of the data was analyzed. The results were presented at the Livorno Meeting (SCRS/89/7) by the Assistant Executive Secretary.

At these meetings, a proposal previously made by the GFCM Consultation on Stock Assessments of the Eastern Mediterranean to hold a meeting on stock assessments of large pelagic species was discussed. The ICCAT representative conveyed the ICCAT SCRS' offer of all possible assistance for such a meeting and proposed holding a joint stock assessment meeting. He explained the data base problem concerning Mediterranean fisheries statistics that ICCAT has been experiencing.

The GFCM decided to hold a Joint Workshop on Large Pelagic Species in the Mediterranean (not only for the eastern Mediterranean but for the entire area), in early 1990 and asked that ICCAT collaborate in this group.

At these meetings, the GFCM recommended that:

"(1) the members of GFCM should take care before initiating new fisheries for bluefin, in view of the ICCAT recommendation that the fishing effort should not be increased; and

"(2) Administrators should, where possible, promote the gathering of data on tuna and swordfish catches."

During the meeting, contacts were renewed with representatives of all the tuna fishing nations in the Mediterranean area for further collaboration. Considerable data have been given to us, on a personal basis, regarding bluefin and swordfish catches which were used to update the TASKI data base.

2. Revision of the Mediterranean data base

In order to assure a more practical joint meeting, following the GFCM meeting, the Secretariat sent the catch and catch-at-size data base, developed by ICCAT scientists, to all countries that fish bluefin and swordfish in the Mediterranean. ICCAT has asked that the data base be reviewed for any improper data substitutions or erroneous catch data so that the base can be further improved. This is the first time that such a major effort to revise the data base has been attempted.

Several countries (Turkey, Italy, Malta and Greece) responded to this request and revised mostly the catch data. Some additional size data also became available (Italy, Greece and Turkey).

3. Meeting with Italian tuna scientists

On his trip to Italy to attend the GFCM meetings, the Assistant Executive Secretary also visited Palermo and met with various Italian tuna and swordfish researchers. This meeting was arranged by Dr. P. Arena and the participants included Dr. A. DiNatali, Dr. G. De Metrio and Ms. P. Megalofono. At this meeting, Italian and Greek statistics and sampling were carefully reviewed and many data which were previously not available to the ICCAT data base were provided. Also, the method of processing the Greek swordfish data collected by Dr. De Metrio and Ms. Megalofono was agreed upon.

4. Visit of Italian scientist to the Secretariat

Following an agreement reached at the meeting of Assistant Executive Secretary with the Italian scientists, Ms. Megalofono visited the Secretariat for two weeks in August. She processed the raw catch and size data from the Greek swordfish fishery, using the ICCAT computer system. She also learned the stock evaluation programs.

5. Bluefin tuna size sampling from the Italian fishery

At the above discussion with Italian scientists, it became clear that the biological sampling program initiated by the Italian government in 1985 had ended in 1988 and that there is no sampling plan for the large pelagic fish in 1989. Being aware that such a lack of data for 1989 would cause a serious problem in stock evaluation, the Secretariat made some minimum but necessary size sampling from the Italian bluefin fishery, through a contract with an Italian scientific institute.

This sampling was made as an emergency measure and as a favor to ICCAT by this contracted institute. It is hoped that such an emergency situation will not take place in the future. The sampling was made from purse seine, handline, gillnets, harpoon and other fisheries and 1,007 fish were measured.

6. Joint GFCM/ICCAT stock evaluation meeting on large pelagic species

Since the formal proposal for holding a joint stock analysis meeting was made by the GFCM, the ICCAT Secretariat has been in contact with the GFCM Secretary (FAO) on this matter. It was agreed that the meeting would be held in March or April, 1990. An invitation was made by the "Instituto Comunale di Biologia Marina de Nardo" to hold the meeting in Bari, Italy, and another invitation was made by the University of Crete to hold at the meting on the island of Crete, Greece. The GFCM Secretary is investigating the appropriate venue in view of the availability of the computer facilities and other factors.

It was agreed that the ICCAT Secretariat will serve as the technical data center for the work.

V. MEETINGS AND COLLABORATION WITH OTHER INTERNATIONAL ORGANIZATIONS

1. World Bluefin Meeting

The World Bluefin Meeting which was proposed by ICCAT in 1987 has not been pursued further by ICCAT. It has now been proposed again by Inter-American Tropical Tuna Commission (IATTC). The meeting is scheduled for May, 1990, at La Jolla, California. The provisional agenda prepared by the IATTC included review of all statistics of world bluefin tuna (including southern bluefin tuna), of biological parameters, stock assessments made or possible applications of various stock assessment models.

Review papers on three major populations (Pacific bluefin, Atlantic bluefin and southern bluefin) are requested for presentation at the session.

2. GFCM

Please refer to the Chapter IV of this report.

3. Others

For details on other meetings and collaboration with other international organizations, please refer to Administrative Report (COM/89/8).

VI. PUBLICATIONS

The preliminary volume of the Statistical Bulletin was not issued in 1989, as agreed upon at the 1988 SCRS meeting. All other statistical publications have been issued regularly, i.e., Collective Volume of Scientific Papers, Statistical Bulletin, and Data Record.

For details on the publications issued in 1989, please refer to the Administrative Report (COM/89/8).

CHAPTER II
Records of Meetings

PROCEEDINGS
OF THE ELEVENTH REGULAR MEETING
OF THE COMMISSION

Madeira, November 13-17, 1989

TABLE OF CONTENTS

FIRST PLENARY SESSION
November 13, 1989

Item 1. OPENING OF THE MEETING

1.1 The Eleventh Regular Meeting of the Commission was held in Funchal, Madeira, Portugal, at the Hotel Savoy, under the chairmanship of Mr. S. Makiadi J. Lopes (Angola). He introduced the head table: Dr. A. J. Jardim (President of the Regional Government of Madeira), Dr. J. Godinho (Secretary of State for Fisheries of Portugal), Eng. Perry Vidal (Regional Secretary of Agriculture and Fisheries of Madeira), Dr. A. Ribeiro Lima (Regional Secretary of Agriculture and Fisheries of Azores), Dr. J. A. T. Ornelas (Regional Director of Fisheries of Madeira), Dr. E. Oliveira (Regional Director of Fisheries of Azores), Mrs. P. García Doñoro (STACFAD Chairman), Dr. J. L. Cort (SCRS Chairman), and Dr. O. Rodríguez Martín (ICCAT Executive Secretary).

1.2 In his opening address, Dr. J. Godinho, the Secretary of State for Fisheries of Portugal, welcomed all the ICCAT delegates to Funchal and wished them a pleasant stay. He pointed out the avid interest his country has in the Commission's work. He noted that there is an abundant quantity of tuna in Madeiran waters. He commended the high quality of ICCAT's work, which is recognized by the international scientific community. He noted that adequate solutions should be sought to the Commission's financial difficulties so that ICCAT can continue its work. (Dr. Godinho's speech is included in Annex 4, Opening Addresses.)

1.3 Dr. A. J. Jardim, the President of the Regional Government of Madeira, also welcomed the delegates to Funchal and added that it was an honor to have the Commission meet here. He pointed out that the study and conservation of Atlantic tunas began in serious only after ICCAT was formed. He noted that the fishing sector is a vital part of the Madeiran economy and that this sector relies on the scientific information provided by the Commission. He asked the Commission to pay particular attention to the problems of environment which have an effect on tuna fishing. (See Annex 4, Opening Addresses.)

1.4 In his opening remarks, Mr. S. Makiadi J. Lopes, the Commission Chairman, welcomed the delegates to Madeira. On behalf of the Commission, he expressed his gratitude to the Portuguese authorities for hosting this year's meeting. He added that this demonstrates Portugal's keen interest in tuna fisheries and the work of the Commission.

1.5 Mr. Makiadi also briefly summarized the Commission's activities during these past two years that he has served as Chairman. In particular, he noted the high quality of the scientific work carried out and the excellent coordination of this work by the Secretariat. He cited the highly successful Yellowfin Year Program, the recently held Albacore Data Preparatory Meeting and the Albacore Workshop, the management measures recommended by the Commission, the Inspection Scheme currently in effect, the Program of Enhanced Research for Billfish, etc. He also commented on the financial difficulties of the Commission due to the accumulated pending contributions. (Mr. Makiadi's speech is also included in Annex 4, Opening Addresses.)

1.6 The head delegate of each member country introduced his respective delegation. The List of Commission Participants is attached as Annex 2.

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

2.1 The Commission reviewed and adopted the Tentative Agenda, attached as Annex 1.

2.2 It was decided that Agenda Items 4, 6-19, 29, 31-33 would be referred to the Standing Committee on Finance and Administration (STACFAD). Items 26 and 27 were referred to the Infractions Committee and Item 28 was referred to the Panels. No subsidiary bodies were appointed. The List of Documents presented to the Commission is attached as Annex 3.

Item 3. ADMISSION OF OBSERVERS

3.1 The observers, representing several countries and international organizations, introduced themselves. All the observers were admitted and welcomed by the Chairman (see Annex 2, List of Participants).

SECOND PLENARY SESSION
November 13, 1989

Item 21. REPORTS OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)

21.1 Dr. J. L. Cort, the newly-elected Chairman of the SCRS, presented his Committee's Report to the Second Plenary Session of the Commission and summarized the scientific findings.

21.2 He reported that the previous SCRS Chairman, Mr. A. González Garcés, had resigned for personal reasons and that a new election had been held on the first day of the SCRS Plenary Sessions.

21.3 Dr. Cort reported on the results of the two albacore meetings which took place in 1989, a Data Preparatory Meeting held at the National Taiwan University (Taipei, Taiwan) and the Albacore Workshop held at the ICCAT headquarters in Madrid.

21.4 He also reported on the Final Meeting of the Yellowfin Year Program held at the ICCAT headquarters. The report was drafted and the procedures for publication of the Program results were agreed upon.

21.5 The SCRS Chairman further 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 describes the changes in fishing patterns, stock structure, stock assessments, and evaluations of the effects of current regulations. He also referred to all the recommendations which the Committee made for each species regarding statistics, research and regulations.

21.6 Dr. Cort also reported that the Sub-Committee on Statistics had evaluated the progress made in the collection of statisticas by the member countries and by the Secretariat, and referred to the recommendations regarding the improvement of statistics (Appendix 5 to the SCRS Report). Addendum 2 to the Sub-Committee's Report lists the priorities recommended by the Sub-Committee regarding the purchase of computer equipment and travel by the Secretariat staff.

21.7 The SCRS held a half-day session dedicated to the study of the environment in relation to the fisheries. Recognizing the importance of the environment as related to the understanding of tuna stocks, the Committee decided to establish a Sub-Committee on Environment at the 1990 SCRS Session, and formed a working group to draw up terms of reference for this Sub-Committee as well as to organize a special session on this theme at the 1990 SCRS Meeting.

21.8 The Committee recommended holding its 1990 meeting prior to the Commission meeting, which would include five working days for the SCRS plenary sessions, and three working days for species stock assessment work, except for the bluefin and swordfish species groups, which would meet for five working days, prior to the SCRS plenary sessions. Recognizing that some stock assessment results did not become available to the plenary sessions until almost the end of this year's meeting, the Committee decided that for 1990 the first draft must be submitted to the Secretariat, at the latest, on the first day of the plenary sessions, unless the Committee decides to postpone this deadline. It also established a small group to study the general procedure of future SCRS meetings. This group will work through correspondence.

21.9 The progress made by the Program of Enhanced Research for Billfish was also reported by the SCRS Chairman. The 1990 Program Plan (Appendix 4 to the SCRS Report) was presented along with the proposed budget, which will be covered by private funding.

21.10 The Committee recommended that the following intersessional meetings be either organized by the Commission or strongly supported and participated in by the Commission scientists and Secretariat staff:

- GFCM/ICCAT Joint Working Group for Assessment of Large Pelagic Species in the Mediterranean Sea, probably to be held in May or June in Bari, Italy.

- World Bluefin Meeting (hosted by IATTC), starting on May 25 in La Jolla, California.

- West Atlantic Tropical Tuna Stock Assessment Meeting to bel held in early September, at one of the west Atlantic coastal countries.

- Albacore Workshop to be held in late September at the ICCAT headquarters.

21.11 The SCRS Chairman referred to the new four-year Albacore Research Program, proposed by the Committee (Appendix 6 to the SCRS Report). The Committee recommended that the Commission give serious consideration to this comprehensive research program designed to increase our knowledge of albacore in the Atlantic. The Program includes a proposed budget to be funded by the Commission for the four years.

21.12 Mr. Makiadi thanked the SCRS Chairman for the work carried out by his Committee and for his presentation to the Commission of the results of the SCRS Meeting.

21.13 The Delegate of Spain praised the excellent progress made by the scientists. She especially commended the fact that, in accordance with the recommendations made at the Sixth Special Meeting of the Commission, an ambitious, multi-year program for albacore was approved. Within this Program, the evaluation of the stock of this species have high priority. She indicated that the introduction of new elements in the fishery of a resource that has not been evaluated caused her deep concern, because the impact they could cause on the behavior of the species cannot be measured. She pointed out once again the necessity to begin as soon as possible the Program approved by the SCRS to study the status of albacore and the effects of the interaction between gears, which are still to be determined and which cause still more concern.

21.14 As regards swordfish, the Delegate of Spain reiterated the concern expressed at the 1988 meeting. She indicated the necessity of under-taking a comprehensive study on this species which would clarify the great uncertainties existing on basic aspects of its biology which significantly affect the results of any evaluation.

21.15 The Delegate of France also congratulated the SCRS Chairman for his clear presentation and for the advancement of research made by the scientists. France also noted the importance of the Albacore Research Program, since albacore catches have dropped in recent years due to the decline in fishing effort and ICCAT should carefully investigate the status of this stock. He also felt that the swordfish stock requires very careful monitoring.

21.16 The Commission Chairman proposed adoption of the SCRS Report and referral of the financial aspects of all the recommendations to the STACFAD, and that the recommendations on management be considered by the appropriate Panels. The U.S. Delegate supported the proposal made by the Commission Chairman, as did the Spanish delegation.

21.17 The Report of the Standing Committee on Research and Statistics was adopted and is attached as Annex 8.

THIRD PLENARY SESSION
November 17, 1989

Item 5. RATIFICATION OF THE PROTOCOL TO THE CONVENTION

5.1 The Executive Secretary presented the Administrative Report (COM/89/8). It was confirmed that 17 countries have ratified the Protocol for adherence of the European Economic Community to the Commission, although one of these countries is Senegal, which is no longer a member of ICCAT. In 1989, Venezuela and Cuba ratified the Protocol. The six countries which have not yet informed FAO of ratification of the Protocol are Angola, Benin, Canada, Cote d'Ivoire, Gabon and Morocco.

5.2 The Delegate of Angola stated that his country has completed all the necessary steps for ratification and has only to deposit the official ratification with FAO.

5.3 The Delegate of Spain, while congratulating all the countries which have ratified or are in the process of ratifying the Protocol, asked that the remaining countries take the necessary action as soon as possible. The Delegates of France and Portugal also thanked the countries which have already ratified the Protocol and requested that prompt action be taken by the remaining countries.

5.4 The Observer from European Economic Community (EEC) thanked the countries which have ratified the Protocol, particularly Cuba and Venezuela which did so during 1989, and also asked each country to inform the Community as soon as ratification has been achieved. He emphasized that the EEC's full participation in ICCAT as a member of the Commission is most desirable at all levels.

Item 20. REPORT OF THE SIXTH SPECIAL MEETING OF THE COMMISSION

20.1 The Executive Secretary presented the Report of the Sixth Special Meeting to the Commission, contained in the "Repport for Biennial Period, 1988-89, Part I".

Item 23. REPORTS OF PANELS 1 TO 4

23.1 The Reports of the Panels were presented by the Chairman of each Panel (Mr. S. Makiadi J. Lopes for Panel 1, Mr. D. Silvestre for Panel 2, Mr. L. J. Weddig for Panel 3, and Mr. V. V. Ovchinnikov for Panel 4). The Commission adopted the reports of Panels 1 through 4 together with all the recommendations they contained. They are attached as Annex 5.

Item 24. REPORT OF THE INFRACTIONS COMMITTEE

24.1 Mr. B. García Moreno (Cuba), Chairman of the Infractions Committee, presented the Report of his Committee to the Commission. The Report dealt with the implementation of current regulations and the inspections carried out during the year by the member countries. The Report was adopted and the Commission reiterated all the recommendations included therein. It is attached as Annex 6.

Item 25. REPORTS OF SUBSIDIARY BODIES APPOINTED BY THE COMMISSION FOR THE MEETING

25.1 There were no subsidiary bodies established by the Commission.

Item 26. REVIEW OF THE IMPLEMENTATION OF REGULATIONS RECOMMENDED BY THE COMMISSION REGARDING YELLOWFIN, BIGEYE, AND BLUEFIN TUNAS

26.1 The Commission noted that this Agenda Item was referred to the Infractions Committee and had been dealt with by that Committee. The Commission endorsed all the recommendations concerning this Item.

Item 27. PORT INSPECTION

27.1 The Commission noted that this Agenda Item had also been referred to the Infractions Committee and had been dealt with by that Committee. The Commission endorsed all the recommendations concerning this Item.

Item 28. OTHER POSSIBLE REGULATORY MEASURES TO BE CONSIDERED

28.1 The Commission noted that the Panels had not proposed and changes in the existing regulations for yellowfin, bigeye tunas or for bluefin size limits and for total Atlantic bluefin (fishing mortality). It also noted that Panel 2 recommended that the bluefin tuna regulatory measures adopted for the west Atlantic be extended until they are reviewed again at the next Regular Meeting of the Commission. No other regulatory measures were recommended by any Panels. The Commission endorsed the Panel 2 recommendation of extending the bluefin regulation for 1990 and 1991 in the west Atlantic.

28.2 The Delegate of the United States stated that full discussions had taken place in Panel 4 on possible regulatory measures for swordfish. The U.S. delegate was disappointed that the Panel was unable to come forward with any recommendation that might satisfy the need for measures dealing with the management of North Atlantic swordfish. The U.S. Delegate asked that the record so reflect this and he pointed out that the U. S. will continue to pursue the matter with the other delegations and hoped that the Commission would, in the near future, be in a position to manage these resources.

28.3 The Delegate of Spain stated that, as was pointed out on numerous occasions, her delegation is concerned about swordfish and to some degree they share the sense of distress, but perhaps from a different point of view. She recalled that a detailed study on stocks was requested by the Spanish delegation last year. She considers that research is necessary and that the SCRS should study this species in depth since this would be very useful to all the countries.

Item 30. COLLABORATION OF NON-MEMBER COUNTRIES TOWARDS THE OBJECTIVES OF THE COMMISSION

30.1 The Commission noted that this Agenda Item had been fully discussed by the Infractions Committee and by the Panels.

FINAL PLENARY SESSION
November 17, 1989

Item 22. REPORT OF THE STANDING COMMITTEE ON FINANCE AND ADMINISTRATION (STACFAD)

22.1 The Chairman of the Standing Committee on Finance and Administration, Mrs. P. García Doñoro, presented the Committee´s report and emphasized its most important points. This report was adopted by the Commission and is attached herewith as Annex 7.

22.2 In adopting the STACFAD Report, the Commission noted that all the Agenda Items referred to the Committee had been dealt with and completed by the Committee.

Item 4. COMMISSION AND PANEL MEMBERSHIP
Item 6. COORDINATION OF RESEARCH
Item 7. RELATIONS WITH OTHER ORGANIZATIONS
Item 8. COMMISSION PUBLICATIONS
Item 9. MEETINGS DURING THE YEAR
Item 10. OTHER ADMINISTRATIVE MATTERS
Item 11. AUDITOR´S REPORT - 1988

Item 12. FINANCIAL STATUS OF THE 2ND HALF OF THE BIENNIAL BUDGET - 1989
Item 13. PENDING CONTRIBUTIONS OF THE MEMBER COUNTRIES, AND THEIR REPERCUSSION ON THE FINANCES OF THE COMMISSION
Item 14. REVIEW OF THE WORKING CAPITAL FUND
Item 15. FINANCIAL STATUS OF THE YELLOWFIN YEAR PROGRAM
Item 16. TRUST FUND FOR THE PROGRAM OF ENHANCED RESEARCH FOR BILLFISH
Item 17. ADOPTION OF THE BUDGET FOR THE BIENNIAL PERIOD 1990-1991
Item 18. MEMBER COUNTRY CONTRIBUTIONS TO THE 1990-1991 BUDGET
Item 19. PROGRESS OF THE WORKING GROUP ON THE CALCULATION OF COUNTRY CONTRIBUTIONS

Item 29. RECOMMENDATIONS FOR RESEARCH AND STATISTICS

29.1 The Commission recognized that the financial implications of the recommendations made by Standing Committee on Research and Statistics had been well studied and that the necessary funding arrangements were made by the Standing Committee on Finance and Administration. It endorsed all these financial decisions.

29.2 The Commission also reiterated all the recommendations made by the SCRS as well as Panels for research and statistics.

Item 31. DATE AND PLACE OF THE NEXT MEETING OF THE COUNCIL OR SPECIAL MEETING OF THE COMMISSION

31.1 The Commission noted that the STACFAD proposed holding a Special Meeting of the Commission in 1990 instead of the Council meeting, since many important decisions have to be made at that meeting. The Commission also noted that major decisions have to be made on fishing regulatory measures at the next meeting. Therefore, it concurred with the proposal made by STACFAD and decided to hold a Special Meeting of the Commission in 1990.

31.2 The Commission decided that the next Special Meeting would be held in Madrid, from November 12 to 16, 1990, as recommended by STACFAD. Therefore, the 1990 SCRS Plenary Sessions will be held from November 5 to 9, while the species groups will meet from October 29 for bluefin and swordfish and from October 31 for the rest of the species.

Item 32. ITEMS TO BE CONSIDERED BY THE COUNCIL AT ITS NEXT MEETING

32.1 As a Special Commission Meeting will be held in 1990, there was no need to discuss this Agenda item.

Item 33. DATE AND PLACE OF THE NEXT REGULAR MEETING OF THE COMMISSION

33.1 The Commission concurred with the opinion of the STACFAD that this matter should be discussed at the 1990 meeting.

Item 34. ELECTION OF THE CHAIRMAN OF THE COMMISSION

34.1 The Delegate from São Tomé & Principe proposed that the current Chairman of the Commission, Mr. S. Makiadi J. Lopes, be re-elected for another biennial term. This proposal was seconded by Portugal, and all the members participating in the session expressed their support for this proposal. Mr. Makiadi (Angola) was unanimously elected Chairman of the Commission for the 1990-91 biennial period.

34.2 Mr. Makiadi accepted the Chairmanship, and thanked the participants for their continuous trust in him. He noted the importance of the Commission and its work and recognized the responsibilities of the Chairman, and promised to do his best to fulfill his obligations.

Item 35. ELECTION OF THE VICE-CHAIRMEN OF THE COMMISSION

35.1 The Delegate of Spain proposed that Mr. A. Ribeiro Lima (Portugal) continue as First Vice-Chairman for another biennial term. The proposal was seconded by France and all the other members present at the Session expressed their support for the proposal. Mr. A. Ribeiro Lima was unanimously elected First Vice-Chairman of the Commission for the 1990-91 biennial period.

35.2 Mr. Lima expressed his appreciation for the support given to him and promised that he will continue working as First Vice-Chairman, in support of the Chairman.

35.3 The U.S. Delegate then proposed Mr. K. Shima (Japan) as Second Vice-Chairman of the Commission. This proposal was seconded by Spain and all the other members present. Mr. Shima was unanimously elected Second Vice-Chairman of the Commission.

35.4 Mr. Shima accepted the responsibility and expressed appreciation for the support given to him and promised that he would do his best in this position.

Item 36. ELECTION OF COUNCIL MEMBERS

36.1 As the Council will not meet in the next biennial period, no election of Council members was carried out.

Item 37. OTHER MATTERS

37.1 No other matters were discussed.

Item 38. ADOPTION OF REPORT

38.1 The Commission reviewed the draft proceedings of the First and Second Plenary Sessions of the Commission. Some modifications were made and the draft proceedings were adopted.

38.2 Recognizing that there would not be enough time to draft the proceedings for the Third and Final Plenary Sessions, the Commission decided to adopt these sections by mail as soon as possible after the meeting.

38.3 All the Annexes were also reviewed and adopted together with the Proceedings.

Item 39. ADJOURNMENT

39.1 The Chairman thanked all the delegates for their collaboration, and the Secretariat staff and the interpreters for their hard work which helped make the Commission meeting a success.

39.2 The Commission meeting was adjourned.

COMMISSION AGENDA

Procedure of the meeting

1. Opening of the meeting
2. Adoption of Agenda, arrangements for the meeting and appointment of subsidiary bodies
3. Admission of observers

Administration

4. Commission and Panel membership
5. Ratification of the Protocol to the Convention
6. Coordination of research
7. Relations with other organizations
8. Commission publications
9. Meetings during the year
10. Other administrative matters

Finance

11. Auditor's Report - 1988
12. Financial status of the 2nd half of the biennial budget - 1989
13. Pending contributions of the member countries, and their repercussion on the finances of the Commission
14. Review of the Working Capital Fund
15. Financial status of the Yellowfin Year Program
16. Trust Fund for the Program of Enhanced Research for Billfish
17. Adoption of the budget for the biennial period 1990-1991
18. Member country contributions to the 1990-1991 budget
19. Progress of the Working Group on the calculation of country contributions

Reports to the Commission

20. Report of the Sixth Special Meeting of the Commission
21. Report of the Standing Committee on Research and Statistics (SCRS)
22. Report of the Standing Committee on Finance and Administration (STACFAD)
23. Reports of Panels 1 to 4
24. Report of the Infractions Committee
25. Reports of subsidiary bodies appointed by the Commission for the meeting

Measures for the conservation of stocks

26. Review of the implementation of regulations recommended by the Commission regarding yellowfin, bigeye, and bluefin tunas
27. Port inspection
28. Other possible regulatory measures to be considered
29. Recommendations for research and statistics
30. Collaboration of non-member countries towards the objectives of the Commission

Other matters

31. Date and place of the next meeting of the Council or special meeting of the Commission
32. Items to be considered by the Council at its next meeting
33. Date and place of the next regular meeting of the Commission
34. Election of the Chairman of the Commission
35. Election of the Vice-Chairmen of the Commission
36. Election of Council members
37. Other matters
38. Adoption of Report

Adjournment

39. Adjournment

LIST OF COMMISSION MEETING PARTICIPANTS

MEMBER COUNTRIES

ANGOLA

MAKIADI J. LOPES, S.*
Chefe de Departamento de Relaçoes
Economicas Internacionais
Ministerio das Pescas
C. P. 83
Luanda

DA COSTA, A.
Ministère des Affaires Etrangères
Luanda

N'DOMBELE, A.
Dept. de Relations Internationales
Ministère des Pêches
C. P. 83
Luanda

CANADA

BELLEFONTAINE, N.*
Regional Director
Dept. of Fisheries & Oceans
Scotia Fundy Region
P. O. Box 550
Halifax, Nova Scotia B3J 2S7

ALLEN, C. J.
Senior Adviser
Foreign Fishing Policy
Atlantic Operations Directorate
Dept. of Fisheries & Oceans
200 Kent St.
Ottawa, Ontario K1A OE6

BENNETT, S.
North Lake
Prince Edward Island COA IKO

CLAY, D.
Marine Fisheries Division
Dept. of Fisheries & Oceans
P. O. Box 5030
Moncton, New Brunswick E1C 9B6

MURRAY, R. J.
52 Toronto St.
St. John's, Newfoundland A1A 2T4

STEINBOCK, R.
International Fisheries Relations
Officer
International Directorate
Dept. of Fisheries & Oceans
200 Kent St.
Ottawa, Ontario K1A OE6

COTE D'IVOIRE

KOUAKOU, K. J.*
Direction des Pêches
B. P. V-19
Abidjan

CUBA

GARCIA MORENO, B.*
Dirección Relaciones Internacionales
Ministerio de la Industria Pesquera
Barlovento, Santa Fé, Munic. Playa
La Habana

FRANCE

SILVESTRE, D.*
Chargé de Mission pour
les Conventions internationales
Ministère de la Mer
3, Place de Fontenoy
75007 - Paris

*Head Commissioner.

DION, M. C.
Syndicat National des Armateurs
de Thoniers Congélateurs
Criée - B. P. 127
29181 - Concarneau, Cédex

FONTENEAU, A.
Centre de Recherches
Océanographiques
B. P. 2241
Dakar (Senegal)

LEVIEIL, D.
CCPM
11, Rue Anatole de la Forge
75017 - Paris

L'HELGOUALCH, I.
President du Comité du Thon Blanc
Criée, Porte Est, Bureau no. 8
29110 - Concarneau

MENDIBURU, G.
Syndicat des Marins
Quai P. Elissalt
64500 - Ciboure

OLAZABAL, J.
Cooperative Maritime L'Artean
Av. Jean Poulon
B. P. 307
64503 - Ciboure Cédex

PARRES, A.
Délégué Général de l'Union des
Armateurs à la Pêche de France
59, Rue des Mathurins
75008 - Paris

JAPAN

SHIMA, K.*
Assistant Deputy Director General
Fisheries Agency of Japan
1-2-1 Kasumigaseki, Chiyoda-Ku
Tokyo 102

AOKI, Y.
Ministry of Foreign Affairs
2-2 Chome, Kasumigaseki, Chiyoda-Ku
Tokyo 102

CAMPEN, S. J.
Consultant
Federation of Japan Tuna Fisheries
Cooperative Associations
1800 Birch Road
McLean, Virginia 22101 (U.S.A.)

IKEDA, S.
Federation of Japan Tuna Fisheries
Cooperative Associations
2-3-22 Kudankita, Chiyoda-Ku
Tokyo 102

MURAKAMI, K.
Fisheries Agency of Japan
1-2-1 Kasumigaseki, Chiyoda-Ku
Tokyo 102

OZAKI, E.
Federation of Japan Tuna Fisheries
Cooperative Associations
2-3-22 Kudankita, Chiyoda-Ku
Tokyo 102

SHINOMIYA, M.
Federation of Japan Tuna Fisheries
Cooperative Associations
2-3-22 Kudankita, Chiyoda-Ku
Tokyo 102

SUENAGA, Y.
Deputy Director
Fisheries Agency of Japan
1-2-1 Kasumigaseki, Chiyoda-Ku
Tokyo 102

WATANABE, T.
Federation of Japan Tuna Fisheries
Cooperative Associations
2-3-22 Kudankita, Chiyoda-Ku
Tokyo 102

YONEMORI, T.
Far Seas Fisheries Research Lab.
Fisheries Agency of Japan
5-7-1 Orido
Shimizu 424, Shizuoka Pref.

YOSHII, M.
Federation of Japan Tuna Fisheries
Cooperative Associations
2-3-22 Kudankita, Chiyoda-Ku
Tokyo 102

KOREA

SONG, S. Ch.*
Director
Deep-Sea Fishery Production Div.
National Fisheries Administration
5 Ga Nam, Dae Moonro, Jung-Ku
Seoul

HONG, S. H.
Deputy Director, Science Technology
and Resources Division
Ministry of Foreign Affairs
Seoul

PORTUGAL

RIBEIRO LIMA, A.*
Secretario Regional
de Agricultura e Pescas
Governo Regional dos Açores
Rua Consul Dabney
9900 - Horta, Faial

AMORIM, A.
Direcção de Serviços de Estudos
e Investigação das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

CARVALHO, D.
Directora de Serviços de Estudos
e Investigação das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

DORIA, M.
Director de Serviços de
Desenvolvimento
Administração das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

DRUMOND, J. A.
Presidente da Associação Armadores
Pesca Atum O.E.
Rua D. Carlos I, 45-B
9000 - Funchal, Madeira

FARIA, G.
Chefe de Divisão de Biologia
Pesqueira
Direcção Regional das Pescas
Estrada da Pontinha
9000 - Funchal, Madiera

FERNANDES, A.
Deputado à Assambleia Regional
da Madeira
Av. Comunidades Madeirenses
9000 - Funchal, Madeira

FISCH, G.
Direcção Regional das Pescas
Rua Consul Dabney
9900 - Horta, Faial

FOLQUE SOCORRO, M.
Associação da Industria
Conservas Peixe Açores
Av. de Vasco da Gama, 29
Lisboa

GOUVEIA, L.
Chefe de Divisão de Técnicas e
Artes de Pesca
Direcção Regional das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

MONTEIRO, E.
Subdirector Geral das Pescas
Direcção Geral das Pescas
Av. de Brasilia
1400 - Lisboa

NEVES, J. E.
Armador de Pesca de Tunídeos
Calçada da Conceição, 39
9900 - Horta, Faial

OLIVEIRA, E.
Directora Regional das Pescas
Governo Regional dos Açores
Rua Consul Dabney
9900 - Horta, Faial

ORNELAS, J. A.
Director Regional das Pescas
Governo Regional da Madeira
Estrada da Pontinha
9000 - Funchal, Madeira

PEREIRA, J.
Universidade dos Açores
Departamento de Oceanografia
e Pescas
9900 - Horta, Faial

PINTO, A. R.
Direcção de Serviços e Estudos
da Investigação das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

QUARESMA, O. G.
Conselheiro Governo Regional
dos Açores
Secretaria Regional de Agricultura
e Pescas
Rua dos Mercadores 19, 2º
9500 - Ponta Delgada, Sao Miguel

RODRIGUES, V.
Delegação do Instituto Portugues
de Conservas e Pescado na Madeira
Rua D. Carlos I, 47
9000 - Funchal, Madeira

SANTOS, J. A.
Chefe de Divisão
Direcção Geral das Pescas
Av. de Brasilia
1400 - Lisboa

SILVA, A.
Chefe de Divisão de Planeamento
e Estatistica
Direcção Regional das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

SILVA, F.
Secretaria Regional da Agricultura
e Pescas
Gabinete de Coordenação Frio
Estrada da Pontinha
9000 - Funchal, Madeira

SOUSA, J. L.
Chefe de Divisão Entrepostos
Frigorificos
Direcção Regional das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

TAVARES, A.
COFACO
Presidente C. Administração
Vila Real Sto. Antonio
Apartado 19
Ponta Delgada, Sao Miguel

VIEIRA, M.
Director de Serviços de Recepção
de Pescado
Direcção Regional das Pescas
Estrada da Pontinha
9000 - Funchal, Madeira

SAO TOME & PRINCIPE

DOS PRAZERES, A.*
Director das Pescas
Direcção das Pescas
C. P. 59
Sao Tomé

SANTOS, M.
Direcção das Pescas
C. P. 59
Sao Tomé

SOUTH AFRICA

STANDER, G. H.*
Sea Fisheries Institute
Private Bag X-2
8012 - Rogge Bay

PENNEY, A. J.
Sea Fisheries Institute
Private Bag X-2
8012 - Rogge Bay

VAN LANGELAAR, J.
Chief Directorate Nature and
Environmental Conservation
Private Bag X-9086
8000 - Cape Town

SPAIN

GARCIA DOÑORO, P.*
Directora General de Relaciones
Pesqueras Internacionales
Secretaría General de Pesca Maítima
Calle Ortega y Gasset, 57
28006 - Madrid

CADENAS DE LLANO, M. C.
Jefe de Negociado de Organismos
y Conferencias
Secretaría General de Pesca Marítima
Calle Ortega y Gasset, 57
28006 - Madrid

CORT, J. L.
Instituto Español de Oceanografía
Apartado 240
39080 - Santander

GARAY GABANCHO, A.
Presidente
Organización de Productores de
Pesca de Bajura de Vizcaya
Calle Bail n, 7 bis
48003 - Bilbao (Vizcaya)

MEJUTO GARCIA, J.
Instituto Español de Oceanografía
Apartado 130
15080 - La Coruña

OLAIZOLA, E.
Organización de Productores de
Pesca de Bajura de Guipúzcoa
Calle Miraconcha, 7 bajo
2007 - San Sebastián

ROBLES, R.
Director
Instituto Español de Oceanografía
Avda. del Brasil, 31
28020 - Madrid

SALAS, E.
Subdirector General de Ordenación
Marítimo-Pesquera
Secretaría General de Pesca Marítima
Calle Ortega y Gasset, 57
28006 - Madrid

SOTO, C.
Subdirectora General de Relaciones
Pesqueras Internacionales-Z. Norte
Secretaría General de Pesca Marítima
Calle Ortega y Gasset, 57
28006 - Madrid

ULLOA, A.
Asociación Nacional de Palangreros
Congeladores (ANAPA)
Asociación Provincial de Palangreros
(ARPOAN)
Puerto Pesquero Edf. Vended. Ofc. 1-6
Apartado 1078
36200 - Vigo

URBIETA, J. M.
Presidente
Organización de Productores de Pesca
de Bajura de Guipúzcoa
Calle Miraconcha, 7 bajo
2007 - San Sebastián

URESBERUETA, A.
Director
Organización de Productores de Pesca
de Bajura de Guipúzcoa
Calle Miraconcha, 7 bajo
20007 - San Sebastián

UNITED STATES

BLONDIN, C. J.*
Deputy Assistant Secretary
for International Interests
U. S. Dept. of Commerce - NOAA
14th & Constitution Aves N.W.
Room 5811
Washington, D.C. 20230

ABRAMS, G.
Fresh Water Fish Co.
145 Northern Ave.
Boston, Massachusetts 02210

BORDEN, D.
38 D Mullin Hill Road
Little Compton, Rhode Island 02837

BOWLAND, J.
2040 Harbor Island Drive
San Diego, California 92101

BROADHEAD, G. C.
P. O. Box 1427
Rancho Santa Fe 92
California

BROWN, B. E.
NMFS
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, Florida 33149

FINK, B.
Van Camp Sea Food Co.
11555 Sorrento Valley Road
San Diego, California 92014

FOLEY, P. F.
President
Boone Bait Co., Inc.
P. O. Box 4009
Winter Park, Florida 32793

GENOVESE, M.
600 Shunpike Road
Cape May Court House
Cape May, New Jersey 08210

HADER, W. F.
Mid-Atlantic Fisheries Management
Council
P. O. Box 508
Montauk, New York 11954

HALLMAN, B.
Deputy Director
Office of Fisheries Affairs
OES/OFA
Department of State
Washington, D.C. 20520

JOHNSON, G.
RFD no. 1
P. O. Box 321
South Harpswell, Maine 04079

JOSEPH, E. B.
Director Marine Resources
South Atlantic Fisheries
Management Council
P. O. Box 12559
Charleston, South Carolina 29412

McCALLUM, J.
H2-545
U. S. House of Representatives
Washington, D.C. 20515

McHUGH, J.
Mid-Atlantic Fisheries
Management Council
P. O. Box 7033
Hampton, Virginia 23666

S. Monsanto
Chairman
Caribbean Fisheries Management
Council
P. O. Box 7513
St. Thomas, Virgin Islands 00801

MONTGOMERY M. B.
215 N. Marengo (2nd Fl.)
Pasadena, California 91101

PIKE, J.
Fisheries and Wildlife
Sub-committee
U. S. House of Representatives
Washington, D.C. 20515

RODRIGUEZ, K.
NMFS
14 Elm St.
Gloucester, Massachusetts 01938

ROOTES, R. S.
NOAA-F/IA1, Room 7306
1335 East-West Highway
Silver Spring, Maryland 20910

STANLEY, S. W.
Executive Director
Department of State
OES/EX
23 C Street
Washington, D.C. 20520

STOKES, J. F.
Stokes Enterprises
4th Street Plum Island
Newbury, Massachusetts 01950

STONE, R.
Recreational Fisheries Officer
NOAA/NMFS (F/C M3)
1335 East-West Highway
Silver Spring, Maryland 20910

WEDDIG, L. J.
2000 M Street N.W.
Suite 580
Washington, D.C. 20036

U.S.S.R.

TSOUKALOV, V.*
Fisheries Department
Ministry of Fisheries
12, Rozdestvensky Bvd.
Moscow, K-45

GOVORIN, N.
Ministry of Fisheries
12, Rozdestvensky Bvd.
Moscow, K-45

OVCHINNIKOV, V. V.
AtlantNIRO
5, Dmitrij Donskogo
Kaliningrad

VENEZUELA

NOVOA, D.*
Director General Sectorial
de Pesca y Acuicultura
Ministerio de Agricultura y Cria
Parque Central, Torre Oeste 10^{o}
1010 - Caracas

******

OBSERVERS

Non-member countries

MEXICO

SOSA, F.
Subdirector de Políticas y Acuerdos
Internacionales
Dirección General de Asuntos
Pesqueros Internacionales
Alvaro Obregón, 269 8^{o}piso
06700 - Mexico, D.F.

UNITED KINGDOM

FLOOD, T. S.
c/o Mrs. J. Hooton (CAD/ODA)
Room E630, Eland House, Stag Place
London SW1

SIM, G.
c/o Mrs. J. Hooton (CAD/ODA)
Room E630, Eland House, Stag Place
London SW1

International Organizations

EEC

STRANIERO, G.
EEC
200, rue de la Loi
1049 - Brussels (Belgium)

BRINKMANN, W
EEC
200, rue de la Loi
1049 - Brussels (Belgium)

REY SALGADO, J. C.
EEC
200, rue de la Loi
1049 - Brussels (Belgium)

ICES

ROBLES, R.

IWC

SILVESTRE, D.

NEAFC

REY SALGADO, J. C.

******

RANGEL CASTELAZO, F.
Vice-President
The Billfish Foundation
International
International Affairs
Londres, 250 - Col. Juarez
09830 - Mexico, D.F.

Interpreters

M. Casanova
L. Faillace
J. Jeelof
M. Lemos Peixoto
C. Lord
V. Marques Pereira
I. Meunier
T. Oyarzun

ICCAT Secretariat

O. Rodríguez Martín
P. M. Miyake
P. Kebe
M. E. Carel
M. A. F. de Bobadilla
S. Martin
G. Messeri
J. A. Moreno
P. M. Seidita
G. Stephens
G. Turpeau

LIST OF COMMISSION DOCUMENTS

COM/89/1	1989 Commission Agenda
2	1989 Annotated Agenda
3	Program of the 1989 Commission Meeting
4	Agenda of the Standing Committee on Finance and Administration (STACFAD)
5	Panel Agenda
6	Agenda of the Infractions Committee
7	Panels
8	1989 Administrative Report
9	1989 Financial Report
10	Estimated Regular Budget 1990-1991
11	Secretariat Report on Statistics and Coordination of Research
12	Final Meeting of the Yellowfin Year Program (Madrid, Spain, May 31 to June 1, 1989)
13	Progress of the ICCAT Enhanced Research Program for Billfish During 1989 - B.E. Brown, E.D. Prince, T. Diouf, P.M. Miyake
14*	Proposed Plan for Special Albacore Program
15	Report of the Albacore Longline Data Preparatory Meeting (Taipei, Taiwan, July 19-26, 1989)
16	Report of the 1989 Albacore Workshop (September 19-25, 1989 - Madrid, Spain)
17**	Program Plan for the ICCAT Enhanced Research Program for Billfish - 1990
18	Considerations on the Financial Situation of the Commission
19	Information on the Formulas Used by Other International Fisheries Organizations to Calculate Their Member Country Contributions
20	Status of the Measures Adopted by the Commission for the Conservation of Yellowfin, Bigeye and Bluefin Tuna Stocks
21	ICCAT Port inspection
22	Relations with Countries That Are Not Members of ICCAT

*Included herewith as Appendix 6 to Annex 8.

**Included herewith as Appendix 4 to Annex 8.

OPENING ADDRESSES

OPENING ADDRESS BY DR. J. GODINHO, SECRETARY OF STATE FOR FISHERIES OF PORTUGAL

Mr. President of the Regional Government of the Autonomous Region of Madeira, Mr. Regional Secretary of Agriculture and Fisheries of the Autonomous Region of Madeira, Mr. Regional Secretary of Agriculture and Fisheries of the Autonomous Region of Azores, Mr. Chairman of ICCAT, Delegates, Observers, Ladies and Gentlemen:

Portugal, a country with a strong fishing tradition, is very proud to host the International Commission for the Conservtion of Atlantic Tunas.

The Autonomous Region of Madeira, in whose adjacent waters tuna resources are abundant, and constitute one of the important areas of the fishing fleet based on the Island. Through the initiative of its Regional Government Madeira has had notable progress towards a better exploitation of these resources. The Island will surely offer the adequate atmosphere to carry out your work, for which I wish you success.

The Commission was created in May, 1966, with the ojective to maintain the stocks of tuna and tuna-like species in the Atlantic Ocean at levels which permit their catch with a constant optimum yield. ICCAT has known, throughout these years, how to maintain the prestige which affords it an unequal position among organizations of its kind.

I would also like point out in the scope of ICCAT, the work carried out in the Commission by the Standing Committee on Research and Statistics, within the framework of the Commission.

The work which this Committee is entrusted to carry out, such as estimating the state of conservation of the tuna and tuna-like stocks, and making recommendations aimed at the correct management of these stocks, is particularly complex.

It involves, in effect, administering a fishery which tragets highly migratory species, which are subject to very sophisticated fishing techniques, based on remote detection methods and on the compilation of data on thermic fronts.

These new and powerful searching and fishing methods, combined with the fact that tuna are highly migratory species subject to continuous fishing effort, currently exert great pressure on exploitation, which makes ICCAT involvement decisive in the formulation and implementation of an international policy, duly harmonized, of rational management and long-lasting conservation of tuna resources in the Atlantic.

Besides, the activities related to tuna fishing are very widespread and have considerable economic repercussions, since they not only involve fishing for fresh consumption, but also provide the primary material for the canning industry. This industry is particularly important in several countries, among them Portugal, and especially in the Autonomous Regions of Madeira and Azores.

The quality of work which ICCAT has been carrying out is unamimously acclaimed, not only by the member countries, but also by other international organizations with whom it collaborates, and by the diverse countries which are represented here by observers. This widespread consensus is one of the reasons for the success of the Commission.

In effect, the objectives of the Commission can only be attained if we gain the respect of an ever-growing number of countries, including non-members, for the management measures recommended by ICCAT.

I am aware of the current problems, which the Commission is experiencing as regards the payment of member country contributions. It would be too bad, however, if because of these problems, the work which the Commission has carried out throughout all these years is endangered or reduced, thereby jeopardizing its work in the future for the benefit of all those who utilize the Atlantic tuna resources.

It is urgent that an adequate solution be found to provide the Commission with the necessary financial means and, at the same time, unite the member countries in a common effort, developed for the benefit of future generations.

The response to these new challenges which the Commission must face, lies, in my estimation, in the completion by the member countries of the process to ratify the Protocol to the Convention which would permit the adherence of the European Economic Community to the Commission.

In the same way, let me present for your consideration the hypothesis of extending the number of official languages of the Commission.

The adoption of Protuguese as an official language is justified, from our point of view, since this languages is spoken by five of the 22 ICCAT member countries.

Even though, due to the financial problems mentioned earlier, a decision on this matter cannot be made in the immediate future, I do not want to lose this opportunity, especially since Portugal is hosting this meeting, to reiterate our hopes that the Portuguese language becomes, in the future, one of the official languages of this organization.

Ladies and Gentlemen:

Our contact with other cultures dates back to the Fifteenth Century to the heroic exploits of the discoveries whose Fifth Centenary we are now celebrating. These exploits developed in the Portuguese people a recognized ease of relation with and knowledge of the seas.

Therefore, we pride ourselves in being good hosts for the high quality events such as the Eleventh Regular Meeting of the ICCAT, and I am pleasred to express this to all of you.

The presence at this opening ceremony of the Honorable President of the Regional Government of Madeira which, I would like to point out, is significant of the great importance which this meeting has, and of the distinction which the Authorities of the Autonomous Region of Madeira wanted to attribute to it.

The initiative of offering this warm reception and the hospitality which the Government of the Autonomous Region of Madeira has reserved for you will also contribute, I am sure, to the success of the work to be carried out during these days and to the continuance of the prestigous work of the International Commission for the Conservation of Atlantic Tunas.

Many thanks.

OPENING ADDRESS BY DR. A. J. CARDOSO GONCALVES JARDIM, PRESIDENT OF THE REGIONAL GOVERNMENT OF MADEIRA

Mr. Chairman of ICCAT, Mr. Secretary of State for Fisheries of the Portuguese Republic, Messrs. Regional Secretaries of Agriculture and Fisheries of the Autonomous Regions of Azores and Madeira, Mr. Executive Secretary of ICCAT, Ladies and Gentlemen:

On behalf of the Autonomous Region of Madeira, I would like to welcome all of you and I want to express the honor it represents for us to have here present all these dignitaries and the representatives of the countries who are gathered at this ICCAT meeting. I would also like to emphasize that you are all considered friends here.

It is for us a great honor to host the ICCAT meeting in Madeira, not only since this year marks the twentieth anniversary of the Commission, but, especially because of the international prestige that this Organization has gained due to its activities. New organizations are created practically every year, but international prestige is only attained by those whose work deserves such universal acceptance, those which deserve scientific recognition, and those which deserve the recognition of their respective categories. Herein lies the secret and reality of the prestige attained by ICCAT.

The serious, scientific management of Atlantic tunas for the benefit of all the Atlantic countries began with the start of the activities of your organization. Therefore, on behalf of an area which is Atlantic, which has African latitude, which is currently taking its first steps in the European Economic Community, which is an Autonomous Region (politically endowed with its own Government and Parliament), which has a high population density (330 people per square kilometer), and which --as you will see for yourself once you give us the pleasure of getting to know our Island-- one-third of its territory can be occupied by economic activities, there is no doubt that the fishing sector is one in which we have to make more and more effort to improve. This meeting may also play an important part in the development of our economy.

We want to study various problems with you; we want to learn various things with you. Since the political autonomy which this territory gained with democracy in Protugal, we have made a great effort to renovate our fishing fleet which was almost totally artisanal. In our land, the private sector and Government have made a joint effort to improve our fleet, besides creating new infrastructures for and in support of the fishing sector. It is in this sense that we will be shortly starting the construction of an important fishing port at the eastern tip of the Island, in the area of Caniçal. This fishing port, equipped with by freezer facilities and other essential installations, will also have the technical support of a ship builder. The port which will sustain, not only the Madeiran fleet, but, and I want to inform all the countries here present, it will also be at your disposal for the necessary support of your countries' fleets.

I feel that, at this time, there is another problem, which I would like to see tackled by a prestigious international organization such as ICCAT and that is the relationship between certain environmental parameters, particularly, fishing.

The problem of tuna seems to be closely related to the defense and protection of the environment. There are here present, represented at this Commission, countries which have voiced their concern in various international fora for the defense of the environment. I feel that all of you will be motivated to point out to the world as well, this aspect of the existing interrelationship between environment and fish availability. You will be in a position to point out precise and concrete solutions for the protection of the environment and the species.

Mr. Secretary of State, I would like to thank you for your kind words. I also want to thank you again for your presence here in Madeira, and I would like, here before the honorable delegates of all these countries, our friends, to give testimony to the excellent relationship which exists between the Government of the Republic and the Regional Government, also in fisheries matters. I feel that it is not due to the written rules, nor to the decrees and laws - no matter how detailed they are - which establish efficient relations. I think that, in the first place, this is due to the capacity of understanding among men. You have developed with this Autonomous Region such a capacity of understanding which I publicly point out, and which I publicly acknowledge.

I also have a few special words also for a great friend of this land, the Honorable Regional Secretary of Agriculture and Fisheries of the Azores, who has done outstanding work, not only in his Region, but whose carries work is recognized in the entire country.

Ladies, Gentlemen, once again, many thanks for your presence here. I wish this meeting, and the Commission as a whole, the greatest success, successes which will be reflected in our country. I ask you all to come back again soon to Madeira, not only to discuss tuna-related matters, but to discuss other matters as well, or to enjoy some leisure time here maybe even to do some sport fishing.

Thank you.

OPENING ADDRESS OF MR. S. MAKIADI J. LOPES, ICCAT CHAIRMAN

Honorable Delegates, Observers, Ladies and Gentlemen:

I am delighted to have you all here present in this room, which indicates to me an act of recognition towards an organiation which deserves the consideration such as we have accorded to the International Commission for the Conservation of Atlantic Tunas.

It is a great pleasure see you again and to be all united here, to discuss the problmes of the future of our organization, in spite of the few days which we have available to us.

As Chairman of the Commission, it is with pleasure that I extend a welcome to all the participants to the Eleventh Regular Meeting of the ICCAT.

Also, on behalf of the Secretariat of the Commission and myself, I wish to express my gratitude to the Authorities of Madeira who have honored us with their presence at this opening ceremony. This demonstrates their interest and the vocation of these islands for all matters concerning tuna fishing in the Atlantic Ocean.

I would like to take this opportunity to thank once again the authorities of this magnificent island of Madeira for the excellent meeting conditions, as well as for all the facilities offered to our Commision, to hold for the second time, a meeting in this beautiful city of Funchal. We have such fond memories of our 1982 meeting here in Madeira.

Ladies and Gentlemen:

In December, 1969, ICCAT held its first meeting at the FAO headquarters. Among those here present, only one delegate, Mr. George Stander, was also in Rome at that first meeting, and was testimony to the hopes on which the Commission was founded. That meeting was held without infrastructure or staff, and without any scientific equipment.

Now in November 1989, which is exactly 20 years later, ICCAT has the means and the scientific support which has allowed it after many years to prove its efficiency. The results lie in the amount of information accumulated and distributed through its publications, and in the recommendations it formulates for the the conservation of the different species.

I would like you to give me your kind attention as I briefly summarize the two years of my term in which you have so honored me by placing your confidence in me to carry out the job of Chairman of the International Commission for the Conservation of Atlantic Tunas.

If effect, the Commission continues to demonstrate its remarkable qualities thanks to the incessant activities in research within our Standing

Committee on Research and Statistics, under the perceptive coordination of our Secretariat.

I note with satisfaction that the Yellowfin Year Program which has been carried out successfully and is about to come to a close. As concerns albcore fishing by longline, the scientists of the countries which fish this species have had two occasions to meet and discuss the matter of size. I am convinced that their recommendations, as well as their research plan, will be a great contribution towards the future of tuna research within the framework of our Commission.

As regards bluefin tuna in the west Atlantic, I believe that the member and non-member ICCAT countries who carry out bluefin fishing in this Convention area have taken the necessary measures for the application regulations on bluefin tuna in the Atlantic for 1989 as adopted at the Special Meeting of the Commission held in Madrid in 1988.

I don't have to remind you that the International Commission for the Conservation of Atlantic Tunas continues to carry out important and conscientious work in the area of management of tuna species, in adopting conservation measures aimed at maintaining the catches at an average equilibrium level for a rational exploitation of these highly migratory resources.

In the course of these last two years, very strict messures have been taken to restrict effort on bluefin tuna in the western Atlantic. The fishing of certain species below a minimum weight has been prohibited. A port inspection scheme to assure the implementation of the conservation measures has been adopted. Special attention has been given to the study of swordfish and an intensive research program on billfish is being carried out. Efficient collaboration has been maintained with the General Fisheries Commission of the Mediterranean for the evaluation of the large pelagic stocks which will allow ICCAT to obtain catch data on bluefin and swordfish in the Mediterranean. These are, in effect, some very concrete decisions which our Commission has taken, and if they are correctly applied in all the interested countries, I am convinced that ICCAT will have attained its objectives.

The excellent work of the scientific committee and the prudent guidance of the Secretariat are, nevertheless, affected by the serious financial difficulties due to budgetary cuts and to the accumulation of pending contributions. (These pending contributions at present amount to $644,334, out of a total budget of $750,000 for 1989).

But we are united here with a positivie aim. We have to find once and for all a solution to the financial crises of the Commission and to put an end to the restrictions which have been imposed on it.

At this point in my remarks, I would like to congratulate wholeheartedly our Secretariat, and in particular, Dr. Olegario Rodríguez Martín, for their dedication, which has without a doubt contirubted towards the survival of the Commission and to the continuance of our research work even through this extremely difficult period.

As regards the delegates of the diverse countries close to the Commission, it is our duty, within our respective governments, to oversee the preservation of the tuna resources at a sustainable level.

The Commission will meet its objectives if it can function in a satisfactory fashion. Our annual meetings provide us with the occasion to solve quickly any touchy problem which might hinder the smoothe running of our Commission.

This year's Agenda contains several subjects of importance, among which I would like to point out the following:

-- The review and evaluation of the Report of the Standing Committee on Research and Statistics prepared after the recent sessions of the Committee held fifteen days ago in Madrid.

-- As regards the Panels, we should pay very close attentin to the state of the stocks in view of formulating recommendations to the Commission for the management of the resources and for research programs.

-- Inasmuch as it concerns the Finance Committee, the following important matters should be solved:

   A new formula should be sought for the calculation of country contributions, in accordance with the proposal presented by the Côte d'Ivoire;

   A Biennial Budget should be approved for 1990 and 1991 which is both rational and sufficiently flexible to carry out the activities of the Commission in a normal way, without the restrictions it is subject to at prsent.

I would like to point out one other matter which should be in the minds of all the delegates at the time of approving the budgets. It is the matter of the country contributions, which is often somewhat confusing in the report of the budget. The contributions of some countries can decrease even if the budget increases, which is the case this year. It can, on the contrary, increase while the total budget remains unchanged. The contributions depend on the amount of catch and canning of each country.

It is with profound regret that I refer to Senegal, whose absence will always have severe repercussions.

I have left for last the matter of arrears in the contributions, or rather to the problems which these bring about. This is the fundamental problem affecting the finances of the Commission. I believe that we should find measures to put an end to this situation.

In summary, the matters to be discussed this week are numerous. So I ask all the participants, start right now with myself, to be realistic and concise in their interventions, and to do everything possible to facilitate the work of the rapporteur in order to have available as soon as possible a concise report which will meet with the approval of the all the people here present.

REPORT OF THE MEETINGS OF PANELS 1 - 4*

REPORT OF THE MEETING OF PANEL 1

1. OPENING

In the absence of Côte d'Ivoire, Chairman of Panel 1, and at the proposal of France, the meeting was chaired by the Commission Chairman, Mr. S. Makiadi J. Lopes.

2. ADOPTION OF AGENDA

The Agenda was adopted without changes (Appendix 1).

3. ELECTION OF RAPPORTEUR

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

4. REVIEW OF PANEL MEMBERSHIP

The Panel presently has 17 member countries: Angola, Brazil, Cape Verde, Côte d'Ivoire, Cuba, France, Gabon, Ghana, Japan, Korea, Morocco, Portugal, São Tomé and Principe, Spain, U.S.A., U.S.S.R., and Venezuela.

Six countries: Brazil, Cape Verde, Côte d'Ivoire, Gabon, Ghana and Morocco were not present at the meeting.

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

The SCRS Chairman, D. J. L. Cort (Spain), summarized the conclusions of the scientific committee regarding yellowfin and skipjack.

5.a) Yellowfin

Dr. Cort noted that the SCRS normally works under the hypothesis of two yellowfin stocks, one in the east and one in the west Atlantic. However,

*Current Panel Membership is shown in Table 1.

there is now some question about this traditional hypothesis, due to several tag recoveries of adult yellowfin which had crossed the Atlantic from the United States to the west African coasts. Fishing effort in the west Atlantic has declined since 1984 following the departure to the Pacific Ocean of a part of the U.S. and Venezuelan fleets. Because of this, recent catches showed a slight decrease. However there is a rapid development of an important coastal longline fishery of the United States which in 1988 took 33 percent of the west Atlantic yellowfin catches. There is still no evaluation by the SCRS on the state of the stock. Recent improvements in statistics in this area, however, will allow analyses to be carried out which will better determine the state of the stock.

In the east Atlantic, purse seine fishing effort has remained moderate since 1984, and the catch rates have been high since 1985. Fishing effort on this stock since 1984 is at a level slightly lower than that corresponding to the maximum sustainable yield. The analyses presented to the SCRS in 1988 showed that the very low catch rates of large yellowfin observed at the end of 1983 and at the beginning of 1984 were most probably due to an important environmental anomaly of the "El Niño" type, rather than to what the SCRS initially thought was a collapse of the adult stock. This explains how the catch rates have very rapidly recovered to high levels. All these elements were analyzed in detail in the Yellowfin Year Program which ended its work in June, 1989, in Madrid. Detailed results of the Program will be published by ICCAT in a special volume in early 1991.

5.b) Skipjack

Since 1986, the east Atlantic skipjack catch has shown since 1986 an increasing trend, despite the purse seine fishing effort which remains low. In 1988 a record catch of 123,000 MT was made in the east Atlantic. This increase in catches probably resulted more from changes in purse seine fishing strategy and an improvement in purse seine efficiency than to an increase in stock abundance.

In the west Atlantic, the 1988 catch was 25,000 MT, which was lower than the catch levels of the 1982-1986 period.

No analysis was presented to the SCRS on the state of the skipjack stock in the Atlantic. The scientific committee considered, however, that the conclusion that the stock was underexploited during the 1980-1982 period of the International Skipjack Year Program, when fishing effort was high, is still valid with the current conditions of reduced purse seine fishing effort. The potential increase in catches has not yet been determined.

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

The Panel Chairman reviewed the ICCAT regulation prohibiting the landing of yellowfin less than 3.2 kg. The SCRS Chairman noted that the potential gains from the regulation would be less with the present lower exploitation level.

Panel 1 recommended continuing the present regulation in case there should be an increase in purse seine fishing effort.

7. RESEARCH NEEDED TO BE CARRIED OUT

The Panel examined a number of recommendations made by the SCRS regarding statistics and research on yellowfin and skipjack. These recommendations, for the most part, come from the intensive research program carried out during the last three years on yellowfin and which was finalized in a meeting in June, 1989. Besides these general recommendations, the SCRS recommended holding an Ad Hoc Working Group meeting in September, 1990, to carry out a complete evaluation of the state of the yellowfin and skipjack resources in the west Atlantic. This group will have available numerous data collected recently on these two species and that the SCRS has not yet been able to analyze.

At the proposal of the United States and Venezuela, the Panel recommended that all this research be carried out.

8. DATE AND PLACE OF PANEL NEXT MEETING

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

9. ELECTION OF PANEL CHAIRMAN

France proposed that Côte d'Ivoire continue to chair Panel 1; this proposal was seconded by Spain and Côte d'Ivoire was unanimously elected.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The Report of Panel 1 was adopted.

12. ADJOURNMENT

The meeting was adjourned.

REPORT OF THE MEETING OF PANEL 2

1. OPENING

The meeting was called to order by the Chairman, Mr. D. Silvestre (France).

2. ADOPTION OF AGENDA

The Agenda was adopted without amendment (Appendix 1).

3. ELECTION OF RAPPORTEUR

Ms. K. L. Rodrigues (U.S.A.) was designated rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

Canada, France, Japan, Korea, Portugal, Spain, and the United States, which are members of the Panel, were represented. Morocco, which is also a member of the Panel, was not present. No new requests for membership were made.

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

Dr. J. L. Cort, SCRS Chairman, reviewed and summarized SCRS findings on bluefin tuna and North Atlantic albacore.

5.a) Bluefin

The SCRS based its analysis on the hypothesis of two separate stocks with limited intermixing. The hypothesis of two stocks, one in the west Atlantic and one in the east Atlantic and Mediterranean Sea, has been used for many years. The degree of intermixing has been estimated to be 3 to 4 percent per year. For management purposes, however, Atlantic bluefin tuna are considered to be composed of separate eastern and western stocks.

The trends of this year's assessment for the eastern Atlantic are similar to those of the 1988 assessment. The analysis indicates the spawning stock size (ages 5+) is approximately 60 percent of the 1970 value. Older fish, ages 10+, have declined by approximately 50 percent. The estimated stock size of ages 2 to 4 are above that of the early 1970's.

The results of the 1989 assessment for the western Atlantic stock also show trends similar to those of the 1988 assessment and earlier analyses. This year's analysis indicates that the spawning stock size (ages 10+) is approximately 25 percent of the 1970 level, while ages 6 to 9 are approximately 40 percent of the 1970 level. The stock size of young fish, ages 1 to 5 for the most recent year (1986) for which we have useful estimates available is approximately 24 percent of the 1970 level. The SCRS does not place a great deal of confidence in the abundance estimate of the younger ages in the last two years of the analysis.

5.b) Albacore - North

The general trend in catches of North Atlantic albacore has been downward for the period 1960-1988. This is explained in general by decreases in fishing effort of both trollers and longliners. In particular, the recent decrease in catch, from 1986 to 1988, is mainly attributed to the withdrawal of the Taiwanese longline fleet.

Progress was made at the Albacore Workshop held in September as regards the development of a catch-at-size table for the years 1975-1988. Additional research is needed to convert the catch-at-size table to a catch-at-age table which would then be analyzed by VPA. Also, some methodologies were proposed to develop abundance indices but these could not be produced during the time between the September Workshop and the SCRS meeting. Therefore, the SCRS was unable to determine the present status of the stock. When all these tasks are finished, possibly in 1990, the SCRS will be able to provide an indication of the status of the stock.

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

6.a) Bluefin

The SCRS recommended no changes to the management measures for the eastern stock. Although uncertainty exists, particularly in the stock size of ages 2 to 4 fish, the spawning stock shows a continuing downward trend. The SCRS stressed the lack of compliance with the minimum-size regulation which results in high catches of undersized fish.

The representative of the EEC supported the concern of the SCRS regarding the catch of small-sized fish in non-compliance with the ICCAT regulations on these fish and affects the future of the stock.

For the western Atlantic stock, the SCRS advises that, given the uncertainties associated with the estimates of stock size and the lack of significant improvement, catch monitoring levels should not be increased at this time. The management program, begun in 1982, appears to have stopped the downward trend in abundance of the youngest age groups. The SCRS noted, however, that the 1989 best estimate showed less improvement in the stock than the 1988 SCRS Report indicated. The abundance of medium-sized fish (ages 6 to 9) has been stabilized. Maintaining the recommended monitoring catch level of 2,660 MT will result in a continuing decline of the older age group (10+) for at least the near term.

The SCRS expressed further concern about the recent increase in the catch of ages 1 to 3 and fishing mortality on ages 6 to 9. If continued, these harvests will inhibit the long-term recovery.

The Delegate from the United States, referring to SCRS bluefin tuna Figures 44 and 46) which show trends in population size, expressed his serious concern for the declining trends of stock in the past several years. The Delegate reminded the Commission that the low monitoring levels implemented in the early 1980's were based on the advice of the SCRS to remain as close to zero catch as possible. Although the confidence levels are less than optimal, the situation depicted in Figure 44 can only be described as serious. The delegation from the United States is among those seriously concerned with the future of bluefin tuna. The status quo which has been maintained over the past few years was expected to produce improvements. Signs of significant improvement seem to have disappeared. Already the stock size is a fraction of what it once was.

The U. S. Delegates stated that the credibility of the Commission is at stake. Today, fishermen say the decisive actions taken earlier, although difficult, were right. The SCRS recommended that there be no increases. Reading between the lines, however, there is a plea for action. If the Commission cannot take timely action, there is no one else to do it.

The Delegate from Japan presented a statement (Appendix 2 to Annex 5) noting Canada's recent successful catches, mainly due to the increased abundance of medium-sized fish. The Delegate noted serious concern over the assessment parameters and methodology which changes year after year and believes recent catches of both small- and medium-sized fish confirm the improvement shown in the analysis. The Delegate expressed the belief that the lack of improvement in the older age group is a result of the large catches of small bluefin in the late 1970's and early 1980's. This is of concern because again, high catches of small bluefin are occurring. Japan believes the situation should continue to be closely monitored and current measures should continue for one more year.

The Delegate from Canada expressed concern about the slow rate of recovery of the Atlantic stock of bluefin tuna (Appendix 3 to Annex 5). The age 10+ group continues to decline with consequences for Canada's traditional fishery. The increased catch of the 1 to 3 and 6 to 9 age groups is of particular concern. Additional measures to preclude high catches of small bluefin should be considered by the countries involved in these fisheries. Canada supports continuation of the current management measures for 1990.

The Delegate from the U.S. pointed out that despite changes in assessment parameters and methodologies, there are no perceptible differences in the results. In regard to the comment from the Delegate of Canada, the United States is also very concerned about the increased catch of small fish and is in the process of developing domestic regulations to reduce these catches by half. Again, looking at the results of the analysis, in particular, Figure 10 of the 1989 SCRS Report, the United States sees no upturn in the trends. The United States believes the Commission has an obligation to those it serves and the responsibility to act on their behalf.

The Chairman of the SCRS stated that the Panel members' comments are all relevant and reflect the SCRS Report. There is evidence of new recruitment that does not appear in the analyses. It is a very complex problem. The assessment work has made a step forward. However, uncertainties in our understanding of all the environmental parameters make accurate assessment difficult. The SCRS Chairman did not feel as pessimistic as the Delegate from the United States. There are some signs of recovery.

The Delegate of the United States asked the SCRS Chairman whether the signs of recovery are in the eastern Atlantic stock or western Atlantic stock. The United States does not believe there are any significant improvements in the western Atlantic and asked that the Commission consider a proposal to reduce monitoring levels, beginning in 1991, if there are no improvements in the status of medium and large bluefin tuna. The SCRS Chairman responded that, in his personal view, the recovery of the west stock is suggested by the recent bluefin catches made by the Canadian fishery where no bluefin have been detected for several years. In addition, the mean age of the bluefin catch by the Canadian fishery has declined in the last four years.

The Delegate of Canada could not, at this time, accept a trigger date of 1991 and suggested instead that the United States, Japan and Canada meet during the interim prior to the next meeting of the Commission to review management measures and discuss the proposal made by the United States. The Delegate reiterated his concern over the catches of age 1 to 3 fish and encouraged each country to review measures to reduce mortality on these fish.

The Delegate of Japan agreed to the Canadian proposal to have an interim meeting to discuss these problems.

The Delegate of the United States agreed to the Canadian proposal to meet and discuss measures, including the idea of subtracting quota overages from the following year's quota.

While accepting the Canadian proposal, the Panel also confirmed that the present size limit of 6.4 kg and fishing mortality regulation should continue for the Atlantic bluefin stock. For the western Atlantic bluefin stock, the U.S. proposed that the regulatory measures adopted by the Commission for 1989 be extended until the Commission discusses the matter at its next Regular Meeting (1991). This proposal was accepted by the Panel and recommended to the Commission.

6.b) Albacore - North

The Delegate of Spain expressed her country's concern that the stock could not be evaluated even though a data base was established during the Workshop held in September, 1989.

There is a progressive increase in the number of boats which use new gears in this fishery, such as the pelagic trawl and drift nets. The total of six pelagic trawlers in 1987 rose to 54 in 1988 and the number of trollers doubled, from 10 to 20 vessels in the same period.

The basic problem arises from the interaction of the new gears with the traditional gears and even their possible incompatibility.

The Chairman of the Panel commented that perhaps Agenda Item 7, "Research", should come before Agenda Item 6 "Measures for the conservation of the stocks", as measures cannot be taken when the information is not available.

The Chairman of the SCRS stated that improvements to the data are needed. At the 1990 Albacore Workshop the data base will be updated and improved. Once this work is finalized, the SCRS will have the results. These Workishops are necessary for improvements in data, but they are not always able to achieve an evaluation.

The Delegate of France expressed the opinion that the stock of albacore in the northeast Atlantic is being moderately exploited at present. There has been, in fact, a considerable decline in fishing effort: the French troll fleet decreased from 200 vessels in 1970 to around a few dozen units at present, and the 50 to 100 Taiwanese longliners have all left the fishery. The total French catch of 2,500 MT in 1988 made by the new gears in the fleet remained very low compared to the previous catches. It can be concluded, even without detailed analyses of the SCRS, that the stock would be able to support higher catches, comparable, for example, to the high catch levels observed during the last decades.

France considers that the future of the albacore fisheries in the North Atlantic depends, in fact, on the future possibilities of implementing new efficient fishing gears, such as the pelagic trawls which French fisherman have successfully put into operation recently. These new gears might, however, like any major technical advancement, introduce a number of problems because of changes in sizes caught, of possible by-catch species of these new gears, as well as possible interactions with traditional gears. These problems should, therefore, be studied as soon as possible, simultaneously with a detailed analysis of the state of the stock, although there obviously is no cause for concern on the state of the stock.

The Delegate of Spain pointed out that this fishery had remained stable for a long time, exploited by traditional gears. She also noted that the efficiency of these gears and the better quality of product obtained could not be doubted.

The generalized use of the new fishing methods, by the current fleets as well as the appearance of other fleets, could possibly have an unstabilizing effect on the traditional fishing strategy, the consequences of which would be difficult to evaluate. To avoid this situation, it is necessary to formulate a recommendation to conserve the stock.

7. RESEARCH NEEDED TO BE CARRIED OUT

7.a) Bluefin

Concerning bluefin tuna, the Chairman of the SCRS expressed grave concern for the lack of basic catch and size information from the eastern Atlantic stock. He urged further efforts to collect these data, particularly in the Mediterranean. In addition, a study on the effects of the use of spotter aircraft and resulting abundance indices should be carried out.

In the western Atlantic, the size and/or species composition of catches from the Dominican Republic need to be identified. A solution should also be found for unreported catches. In total, nine research recommendations were made for Atlantic bluefin tuna. They are listed in Item 4.2 of the bluefin tuna section of the SCRS Report.

The Panel concurred with all these recommendations.

7.b) Albacore - North

Concerning northern albacore, the Chairman of the SCRS referred to Appendix 6 of the 1989 SCRS Report entitled "Proposed Plan for the Albacore Research Program." Several problems were identified and the SCRS recommended that an albcore workshop be held in 1990 and that the four-year program described in Appendix 6 be adopted.

The Chairman of the Panel noted the difficulty in attaining proper management and conservation without sufficient information. The schedule of research outlined in the Albacore Research Program falls within the spirit and objectives of the Commission.

The Delegate from France stated that the Albacore Research Program should be encouraged 100 percent and supported by the Commission because it will provide the answers to these problems. He added that the Program should be put into action.

The Delegate from Spain agreed with France. Additional knowledge on the resource is of major importance and will shed some very useful light on the lack of information we have today. Implementation of the Program should have priority.

The Delegate of the United States concurred with the Spanish delegation; the Commission should move forward with its responsibilities.

The representative of the European Community noted that the EEC had put into effect a program between Spain and France to study the interactions between the surface fisheries in the North Atlantic in accordance with a research recommendation (study of gear interaction) made by the SCRS at its 1988 meeting. The results of this program will be available in September, 1990, and will be presented to ICCAT.

The Chairman of the Panel thanked the EEC for its active involvement in finding solutions. The Panel recommended that the Commission adopt the Proposed Plan for the Albacore Research Program.

8. DATE AND PLACE OF NEXT PANEL MEETING

The next meeting of Panel 2 will be held at the same time and place as the next Commission Meeting.

9. ELECTION OF PANEL CHAIRMAN

The Delegate of Portugal proposed that France continue to chair Panel 2. The United States seconded this proposal and France was unanimously re-elected chairman.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The Report of Panel 2 was adopted.

12. ADJOURNMENT

The meeting was adjourned.

REPORT OF THE MEETING OF PANEL 3

1. OPENING

The meeting was opened by the Chairman, Mr. L. J. Weddig (U.S.A.).

2. ADOPTION OF AGENDA

The Agenda was adopted without changes (Appendix 1).

3. ELECTION OF RAPPORTEUR

The Chairman asked for nominations for rapporteur. The Delegation of South Africa volunteered to provide a rapporteur, and Mr. A. J. Penney was duly appointed.

4. REVIEW OF PANEL MEMBERSHIP

Japan, South Africa, Spain and U.S.A., members of this Panel, were present. Brazil, also a panel member, was absent.

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

Dr. J. L. Cort, Chairman of the SCRS, reviewed and summarized the conclusions of the SCRS concerning the status of the stock of southern bluefin tuna and albacore in the south Atlantic.

5.a) Southern bluefin tuna

The Chairman of the SCRS reported that the status of the stock had been re-evaluated on the basis of updated catch-at-age, effort and tagging data at the Eighth Tripartite Scientific Meeting of Australia, Japan and New Zealand, held in Japan in September, 1989. Compared with 1970, abundance indices for the longline fishery in 1987 were only 1/10 for 4- to 7-year-old fish and 1/2-1/3 for ages 8+.

5.b) Albacore - South

Dr. Cort reviewed the stock status determined from standardized CPUE of the Taiwanese longline fleet exploiting the adult stock in the south Atlantic. CPUE trends have fluctuated downwards from 1967 to 1988. The generalized production model was updated to incorporate these standardized CPUE data and results estimated an MSY in the range of 27,000 to 30,000 MT. The 1988 catch of 26,300 MT was slightly below this MSY value.

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

6.a) Southern bluefin tuna

The SCRS Chairman recalled that, since 1971, Japan had voluntarily restricted her longline fishery in areas where juvenile southern bluefin are abundant. Since the 1984 fishing season, Australia has maintained a national quota of 14,500 MT. In 1988, the Tripartite Administrative Meeting decided to reduce catch limits to 8,800 MT for Japan, 6,250 MT for Australia and 450 MT for New Zealand. In September, 1989, the scientific meeting could not reach an agreement on the future of the stock status under the continuation of these quotas.

6.b) Albacore - South

There are no regulations currently in effect for albacore.

7. RESEARCH NEEDED TO BE CARRIED OUT

7.a) Southern bluefin tuna

Dr. Cort reported that the SCRS made no recommendation for management of southern bluefin tuna in the Atlantic Ocean, since this stock is a part of the total population and is being monitored by another international body.

7.b) Albacore - South

The SCRS Chairman noted that a number of aspects of the Proposed Plan for the Albacore Research Program (Appendix 6 to the SCRS Report) also refer to albacore in the south Atlantic and asked whether the Panel felt that research on southern albacore should be included in this research program.

Since there were no comments from the Panel, the Chairman concluded that research on southern albacore would form part of the proposed special program. He thanked Dr. Cort for his presentations and complimented the SCRS Committee on the work done on these two species.

8. DATE AND PLACE OF NEXT PANEL MEETING

The Panel agreed to meet in conjunction with the next meeting of the Commission.

9. ELECTION OF PANEL CHAIRMAN

South Africa proposed that the United States continue to chair Panel 3. Spain seconded the proposal and the United States was unanimously re-elected.

10. OTHER MATTERS

In view of the unexpected re-scheduling of the meeting of Panel 3, South Africa requested permission to add a comment under this section. The Panel agreed and South Africa presented a statement expressing concern at the development of drift-net fisheries in the ICCAT area (Appendix 4 to Annex 5).

The Delegate from the United States commented on their current involvement in discussions on this matter and noted that two resolutions on drift-netting were being considered by the United Nations.

In reply, Japan presented a statement concerning their perspective on drift-net fishing (Appendix 5 to Annex 5), expressing the hope that ICCAT would evaluate drift-net fishing in the same scientific way as done with other fishing methods.

Korea supported the Japanese view that, as a result of selected mesh sizes, drift nets are highly selective in catching chosen target species. Non-target species which are bigger or smaller than the size of the mesh of the net can therefore escape. Speaking as an observer, France also supported the Japanese viewpoint.

The Delegate of Spain delegation made some general comments on the use of drift nets in tuna fishing. She indicated the necessity for studying in depth the possible impact of the introduction of these gears or of any other newe viewpoint.

The Delegate of Spain delegation made some general comments on the use of drift nets in tuna fishing. She indicated the necessity for studying in depth the possible impact of the introduction of these gears or of any other new gears on the traditional fisheries which could alter the exploitation schemes of these fisheries. The Spanish Delegate alluded to the Albacore Program that her country has supported with great interest; one part of this Program will study the interaction between gears. In reply to a query from the United States, the Delegate of Spain explained that this was not a specific proposal, but rather a general call for evaluation of interaction between fishing methods.

The Panel recommended that the SCRS consider, in its future deliberations, the effects of drift-net fisheries.

11. ADOPTION OF REPORT

The Report of Panel 3 was adopted.

12. ADJOURNMENT

The meeting was adjourned.

REPORT OF THE MEETING OF PANEL 4

1. OPENING

The meeting was opened by the Chairman, Mr. V. V. Ovchinnikov (U.S.S.R.).

2. ADOPTION OF AGENDA

The Agenda was adopted without changes (Appendix 1 to Annex 5).

3. ELECTION OF RAPPORTEUR

Mr. R. Steinbock (Canada) was appointed rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

All ten Panel members were present. France requested membership in this Panel and was welcomed. Cuba notified that it was withdrawing from Panel 4 at the end of the meeting.

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

Dr. J. L. Cort, SCRS Chairman, summarized the conclusions of the Committee regarding bigeye, small tunas, billfishes, and swordfish.

For each species or group of species, Dr. Cort summarized the conclusions of the Committee concerning the state of the stocks.

5.a) Bigeye

Bigeye is considered as a single stock, widely distributed in the Atlantic Ocean, and is fished primarily by longline. Current catches are lower than those of the MSY. An increase in yield would be possible by increasing the fishing mortality on larger fish.

Dr. Cort noted the Committee's recommendation that the current minimum size regulation of 3.2 kg in effect since 1980 be continued. Panel members made no comments concerning the SCRS Chairman's remarks.

5.b) Small tunas

Dr. Cort noted that small tunas were caught primarily in coastal, artisanal fisheries and that management of the stocks at the local level is easier than managing stocks of large, deep-water tunas.

5.c) Billfishes

Dr. Cort noted that the most recent analysis of the status of the eastern Atlantic stock of sailfish was presented to the SCRS in 1988. The Program of Enhanced Research for Billfish was initiated in 1987 to resolve data deficiencies for all billfishes in the Atlantic Ocean.

5.d) Swordfish

The SCRS Chairman addressed each of the three possible components of the North Atlantic swordfish stock individually. With respect to the North Atlantic stock, the results were similar to those obtained at the 1988 SCRS Swordfish Workshop, with a continual increase in age 1 and ages 2-4 fish throughout the time series studied, and a decreasing trend in ages 5+ fish. The assessments of swordfish, based on the North Atlantic, northeast and northwest stock hypotheses, used the virtual population analysis (VPA) methodology. The stock assessment for the three different views of North Atlantic swordfish produced more or less similar results. Dr. Cort noted, therefore, that the management recommendations generally apply to all North Atlantic areas.

The Committee noted that it is concerned about the general increasing trends in fishing mortality of overall ages, specifically older age fish. Present yield cannot be maintained over the long-term without either a decrease in fishing mortality or a continued increase in recruitment, which is unlikely. The SCRS Chairman noted that despite uncertainties in the analysis, it seemed that further increases in fishing effort will be detrimental. Therefore, the Committee recommended that action be taken to at least prevent the trend of increasing fishing mortality.

Item 6. REVIW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

6.a) Bigeye, b) Small tunas, c) Billfishes

There were no recommendations made for changes in the bigeye regulation and no recommendations were made for the management of the other species.

6.d) Swordfish

The U.S. Delegate expressed his deep concern about the status of the swordfish stock as reflected in the SCRS Report and urged management action by the Commission. He noted that there appeared to be no consideration by the SCRS of a minimum-size regulation and asked whether a minimum-size measure could help rebuild the swordfish stocks. Dr. Cort noted that advice on a minimum-size limit was not available but could be included in next year's SCRS report.

The Delegate from Spain expressed uncertainty regarding the Committee's stock assessment work for swordfish. She noted that the methodology and some of the parameters in the models cast doubt on the Committee's conclusions and added that in view of the uncertainties, major research efforts were necessary. (The text of the first Spanish statement on swordfish is attached as Appendix 6 to Annex 5).

The Delegate of France agreed with the comments made by Spain and noted that the uncertainty of the stock assessment model cast doubt on the true rates of fishing mortality.

The Delegate from Portugal noted that his country required more in-depth information before taking any position.

The Delegate of Japan noted that there were many problems with the stock assessment for swordfish and that more work was required. He noted the Committee's findings of a rapid and continuing increase in age 1 and ages 2-4 fish and the gradual decline in ages 5+. However, he advised that the Committee address the differences in growth rate by sex as this could alter the assessments. He noted that the member countries should seek to achieve catches at the MSY level as mandated by the Convention. (The text of the Japanese statement on swordfish is attached as Appendix 7 to Annex 5).

The Delegation from Korea associated itself with the Japanese position. (The text of the Korean statement on swordfish is attached as Appendix 8 to Annex 5.)

The Delegate of Canada expressed his country's concern about the Committee's findings on the serious state of the North Atlantic swordfish stocks. (The text of the first statement by Canada on swordfish is attached as Appendix 9 to Annex 5).

The Delegate of the U.S. noted that while uncertainty in stock assessment was admitted, the Committee's recommendation was that action be taken at least to prevent the trend of increasing fishing mortality. In view of the SCRS recommendations, he proposed action to limit increases in fishing mortality and joint studies to consider a reduction in current catches by 10-20 percent.

The Delegate from Canada noted that Canada's swordfish fishery is currently rebuilding within domestic management constraints. He advised that in view of the SCRS advice Canada was prepared to limit further its swordfish quota provided that joint action was taken in consultation with other member countries. He noted that it would be distressing to have to await further studies when the SCRS recommendation appeared irrefutable, using the analogy of letting the patient die before treating him. He urged that the countries involved in the fishery consult on possible joint management measures. The U.S. delegation seconded the Canadian proposal.

The Chairman adjourned the meeting for a short time to permit consultations among the delegations concerned.

After the Panel meeting was re-adjourned, The Delegate of the U.S. indicated that after consultations with the Spanish delegation, no progress or agreement on management measures could be reached. The U.S. Delegation stated its position on swordfish, which is attached as Appendix 10 to Annex 5.

The Canadian Delegation also stated its position on the North Atlantic swordfish stocks. (The text of the second statement by Canada on swordfish is attached as Appendix 11 to Annex 5.)

The Delegate of Spain expressed surprise at the message in the previous statements since there are other member countries involved in the North Atlantic swordfish fishery. It also expressed surprise at the urging of management measures in the absence of clear scientific advice. It was noted that Spain is also concerned with fisheries conservation and subscribes to rational management of fisheries resources based on scientific advice and also on socio-economic considerations. The Spanish Delegation reiterated its previous statement that it could not accept the SCRS recommendations in view of the doubts which exist on the methodology and parameters for the swordfish stock assessment. (The text of the second statement by Spain on swordfish is attached as Appendix 12 to Annex 5).

The Delegate of Japan expressed disappointment that the major fishing nations for swordfish, Spain and the U.S., could not reach an agreement. It hoped that the joint effort will continue. It strongly hoped that both countries will make their best efforts to avoid a head-on confrontation in this issue. As a small fishing nation on this stock, Japan is prepared to participate in the dialogue or cooperative effort.

At the final session of Panel 4, the Spanish delegation stated its position in response to the earlier U.S. statement. (The text of the third statement by Spain on swordfish is attached as Appendix 13 to Annex 5.)

No management measures were agreed upon.

7. RESEARCH NEEDED TO BE CARRIED OUT

7.a) Bigeye

The SCRS recommendations on statistics and research were endorsed.

7.b) Small tunas

The SCRS recommendations stressed the need to improve catch and effort data on small tunas and that estimates of discards be taken into account.

It was also recommended that studies related to the stock evaluation of small tunas be carried out.

7.c) Billfishes

In assessing the status of both blue and white marlins, the SCRS continued to be concerned about the uncertainty and lack of data on these species.

The SCRS Chairman summarized the recommendations for billfishes in terms of statistics and research. No management recommendations were made although the need to closely monitor the billfish fisheries was stressed, particularly for blue and white marlins.

The U.S. Delegation presented a statement on billfish (attached as Appendix 14 to Annex 5), and urged Panel members to participate in, and support, the Program of Enhanced Research for Billfish.

7.d) Swordfish

At the request of the Panel Chairman, Dr. Cort outlined the SCRS recommendations for North Atlantic swordfish on statistics and research.

8. DATE AND PLACE OF NEXT PANEL MEETING

The Panel agreed to meet in conjunction with the next meeting of the Commission.

9. ELECTION OF PANEL CHAIRMAN

At the proposal of the United States, which was seconded by all the other members of the Panel, the U.S.S.R. was re-elected Chairman of Panel 4.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The Report of Panel 4 was adopted.

12. ADJOURNMENT

The meeting was adjourned.

Table 1. Panel Membership

1 Tropical Tunas
Yellowfin tuna
Skipjack

2 Temperate tunas - North
Bluefin tuna (North)
Albacore (North)

3 Temperate Tunas - South
Southern bluefin tuna
Albacore (South)

4 Other Species
Bigeye, Atlantic bonito,
Billfishes, Other species

Country	PANEL 1	2	3	4	TOTAL
Angola	X	-	-	X	2
Benin	-	-	-	-	0
Brazil	X	-	X	-	2
Canada	-	X	-	X	2
Cape Verde	X	-	-	-	1
Côte d'Ivoire	X*	-	-	-	1
Cuba	X	-	-	-	1
Equatorial Guinea	-	-	-	-	0
France	X	X*	-	X	3
Gabon	X	-	-	-	1
Ghana	X	-	-	-	1
Japan	X	X	X	X	4
Korea	X	X	-	X	3
Morocco	X	X	-	-	2
Portugal	X	X	-	X	3
São Tome & Principe	X	-	-	-	1
South Africa	-	-	X	-	1
Spain	X	X	X	X	4
Uruguay	-	-	-	-	0
U.S.A.	X	X	X*	X	4
U.S.S.R.	X	-	-	X*	2
Venezuela	X	-	-	X	2
	17	8	5	10	40

*Panel Chairman.

Appendix 1 to Annex 6

Agenda for 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. Review of the Report of the Standing Committee on Research and Statistics (SCRS)
6. Review of Possible measures for the conservation of stocks:

Panel 1	Panel 2	Panel 3	Panel 4
a) Yellowfin	a) Bluefin (North)	a) Southern bluefin	a) Bigeye
b) Skipjack	b) Albacore (North)	b) Albacore (South)	b) Atlantic bonito
			c) Billfishes
			d) Other species

7. Research needed to be carried out
8. Date and place of next Panel meeting
9. Election of Panel Chairmen
10. Other matters
11. Adoption of Report
12. Adjournment

Appendix 2 to Annex 5

Statement by Japan on Bluefin Tuna

(Appended to Report of Panel 2)

1. Japan is pleased to note that Canada in 1989 for the second year has been able to obtain good bluefin catches. This we see is mainly due to the increased abundance of medium-sized fish and indicates the health of the bluefin tuna stock.

2. Japan would like to thank the SCRS for its hard work in providing their report on bluefin tuna. However, despite strenuous efforts by our scientists, the results of the bluefin VPA analysis change year after year. This problem may be caused by difficulties found with the parameters used and the assessment method. Therefore, we still find serious problems with the assessment.

3. However, we do note that the analysis continues to show an improvement in numbers of both medium-sized fish that make up part of the spawning stock and small fish. This improvement is confirmed by recent catches.

4. We note that there still seems to be no improvement in the numbers of large bluefin. In the late 1970's and early 1980's, there were very large catches of small bluefin and the result of this is still with us. This situation causes us concern because once again we are seeing very high catches of small bluefin.

5. Japan believes that we must continue to closely monitor the bluefin tuna stock conditions and continue with the current management measures for one more year.

Appendix 3 to Annex 5

Statement by Canada on Bluefin Tuna

(Appended to Report of Panel 2)

The Canadian delegation wishes to express its concern over the bluefin stocks in the northwest Atlantic. Canada has reviewed the scientific advice by SCRS to the Commission and is still concerned about the slow rate of recovery of these stocks.

The Canadian industry is of the view that the numbers of spawners (age 10+) are still declining, affecting our traditional fishery.

Canada is, therefore, also concerned about the recent increases in the catch of 1- to 3-year-old fish and the fishing mortality on ages 6-9 fish, which will continue to affect the recovery of the spawning biomass (age 10+).

In light of these concerns, and Canada's wish to improve the rate of recovery of the west Atlantic bluefin stock, Canada would support a continuation of the current management measures for 1990. However, we believe consideration of further measures to protect the 1- to 3-year-old fish should be examined by each of those countries involved in this fishery.

Appendix 4 to Annex 5

Statement by the Republic of South Africa on Drift Nets

(Appended to Report of Panel 3)

South Africa wishes to draw the attention of the Commission to the fact that its fisheries inspectors have observed foreign vessels with large drift nets aboard transshipping fish, including tunas, in the port of Cape Town. The distinguished delegates are no doubt aware of the potentially destructive nature of drift-net fishing on the high seas including the loss and waste of target species, the capture of non-target species and the associated mortality of marine mammals and birds. The loss of netting material poses a further threat to marine life and the environment. South Africa has accordingly banned drift netting in her waters. As tuna and tuna-like fishes are also captured by drift nets, South Africa considers it necessary to bring this matter to the attention of members and hopes that the Commission will address the problem in the near future, especially if this fishing technique persists or escalates.

Appendix 5 to Annex 5

Statement by Japan on Drift Nets

(Appended to Report of Panel 3)

1. The drift-net method of fishing has been used for centuries all over the world and is still being used in many areas for inshore, high seas, and pelagic fisheries.

2. Drift-net fishing is a popular method of fishing as it is fuel-efficient and can selectively target surface species that are widely dispersed. Drift nets can be used selectively by adjusting mesh size, net deployment, time, and area.

3. Recently some environmental groups have caused hysteria about drift nets that have led some people to misunderstand the use of this gear. Drift-net fishing is not harmful to the ocean's environment or resources when used properly. Drift nets can and should be managed as any other fishing gear, on a scientific basis.

4. It is well known that all fishing gears take species other than those targeted. This is no surprise. However, what is important are the amount of removals by all gears and the impact of those removals on individual populations.

5. ICCAT is charged with managing tuna and tuna-like species based on MSY by using the best scientific evidence. Japan would hope that in ICCAT the misinformation and hysteria that has been spread about drift nets will be recognized for what it is.

Appendix 6 to Annex 5

First Statement by Spain on Swordfish

(Appended to Report of Panel 4)

For a more appropriate interpretation of the state of this fishery, which could lead to rather catastrophic views, we are going to emphasize the uncertainty shown in the SCRS Report concerning some of the parameters used in its evaluation.

Stock structure

There seems to be no sound basis for any breakdown of the North Atlantic stock since larval distribution, size composition of the catches, standardized CPUE trends of various fleets, partial recruitment schemes, sex-ratio distribution by size class, etc., strongly suggest a single stock structure in the North Atlantic and we are going to make our comments in reference to this.

Thus we ask that at the subsequent SCRS meetings one, overall evaluation of the North Atlantic be carried out and another for the South Atlantic be made, rather than using other, less sound, stock hypotheses.

Growth

The growth curve used was obtained from tag/recapture data without considering differential growth rates by sex.

The sex-ratio data by size class indicate that differential growth by sexes probably exists (although other possibilities cannot be disregarded a priori); and if so, the age composition of the population could be very different, significantly affecting the results of the evaluation.

The uncertainties in the growth curve have forced the SCRS to assume an age 5+ class, which seems very unrealistic.

Standardized CPUE

The large differences which exist between the obtained indices and the catch trends were shown, especially for ages 3, 4, and 5+.

The SCRS Report (swordfish species section: State of the stock, North Atlantic, paragraph 9) refers to these discrepancies and indicates that "this may imply that the indices of abundance used in the tuning are not truly reflective of actual changes in stock size...." Since these indices have been used in the calibration of the analyses, they could produce results very different from what is really occurring in the stock.

Partial recruitment

Partial recruitment was assumed to be 1 for age 5 or older. However, the results obtained offered quite a different picture, variable according to the different ages. Thus, assuming a partial recruitment of 1 could have had significant repercussions on the results of the evaluation applied to these adult fish.

The section on research recommendations for swordfish in the SCRS Report refers to the need to study the sensitivity of the results in relation to the partial recruitment schemes.

Yield per recruit

The results obtained for the North Atlantic as a whole showed that the wide variations in fishing mortality resulted in slight changes in yield per recruit (SCRS Report, swordfish species section: State of the Stock, North Atlantic, paragraph 10). Even with fishing mortality levels higher than the current levels, yield per recruit will remain almost constant, at the level of F-max. This shows once again the lack of consistency of the final results obtained.

Conclusions

For the aforementioned reasons, it appears clear that although there has been considerable progress in our scientific knowledge of this species, we still lack consistent data to warrant concern on this stock which would lead to the adoption of specific (drastic) measures. Besides, we cannot say in all certainty that it is unlikely that recruitment continues to increase since this is what has been happening in the last few years.

In any case, the concern of Spain on this species and its future is leading it to make great effort for the most correct and rational management of the stock. Spain is willing to agree to scientific collaboration with the concerned countries.

Appendix 7 to Annex 5

Statement by Japan on Swordfish
(Appended to Report of Panel 4)

Japan is pleased to note that the mercury scare that occurred in the middle 1970's has been resolved and that more North Americans and Spaniards are enjoying eating swordfish. As a result of this change, the swordfish fishery in the Atlantic has become quite active.

Given the rapid increase in swordfish catches in the Atlantic, we must closely monitor the stock conditions to prevent overfishing while at the same time seek to achieve MSY as outlined in the ICCAT Convention for tunas and tuna-like species.

Japan would like to commend the SCRS for its hard work on the swordfish stock assessment. However, it is clear that there are many problems with the assessment and more work must be done. For example, the assessment shows a rapid and continuous increase in the number of small and medium-sized fish and at the same time a gradual decline in the number of age 5+ fish.

It is very difficult to understand this phenomenon of inconsistency. More work must be done and uncertainties in the assessment corrected. For example, the assessment does not address the very different growth rates by sex. This must be corrected and could possibly change the results of the assessment dramatically.

We strongly hope that this stock will be managed for user nations to allow utilization closest to MSY in accordance with the Convention.

Appendix 8 to Annex 5

Statement by Korea on Swordfish
(Appended to Report of Panel 4)

On behalf of the Korean delegation, I would like to comment on the swordfish issue.

Last year, the total Korean catch of swordfish in the Atlantic Ocean amounted to 123 MT taken by 32 longliners. The catch of this species represents a very small portion of the total Atlantic tuna catches of the Republic of Korea.

As you well know, swordfish is not a target species, but is taken as a by-catch species.

According to our National Fisheries Development Agency, Korea caught about 120 MT of swordfish in the south Atlantic Ocean and only 3 MT in the North Atlantic.

We share the position of Japan.

Appendix 9 to Annex 5

First Statement by Canada on Atlantic Swordfish

(Appended to Report of Panel 4)

Despite the uncertainty in the stock structure, as pointed out in the SCRS Report, the three different views of a northeast, northwest and a single North Atlantic stock structure all suggest the same serious state of the North Atlantic swordfish population. The numbers of fish caught since 1978 have increased three-fold. The numbers of 1- and 2-year-olds caught have increased eight-fold over the same time period.

In many cases when fisheries scientists conduct assessments on stocks, they do not have adequate data to reach conclusive recommendations. However, in these cases, based on their knowledge and expertise, scientists quite often couch their findings in terms that can best be described as "warnings". This is how Canada interprets the SCRS report on swordfish. Canada refers specifically here to the statement "despite uncertainties in the analysis, it seems that further increases in fishing effort will be detrimental." This SCRS statement refers to the entire Atlantic swordfish population.

This is a stock that has been fished for many years, but it is only in the last two years that any significant assessment has been carried out by this Commission. As a result of this assessment, ICCAT is now in a position to move towards some type of management measure to ensure that the swordfish stocks do not decline to such a level that we enter into a recruitment fishery with the subsequent risk of a collapse of the fishery.

Canada has been concerned about swordfish management and the decline in the average size of fish caught. Canada has for many years implemented domestic management measures which limit Canada's total catch and limit new entrants to the fishery. Canada has a long history in this fishery and therefore accepts and supports the SCRS recommendation that action should be taken--and taken now—to at least prevent the trend of increasing fishing mortality.

As indicated earlier by my colleague from the United States, more dialogue and consultations amongst member countries involved in this fishery are required on the possible management measures which could be implemented by ICCAT.

Statement by the United States on Swordfish
(Appended to Report of Panel 4)

For the past three years, the U.S. Delegation has expressed concern over the decline in the swordfish resource in the North Atlantic and has noted the need for expanded monitoring of the stock by ICCAT countries to ensure that effective management measures could be implemented to avoid over-fishing of the resource.

In recent years we have witnessed the decline in the number of large fish which form the adult spawning stock in the northwestern Atlantic, a decline in the average size of swordfish caught, and a decline in CPUE.

The catch of swordfish in the North Atlantic has increased significantly from previous years, and in 1988 it recorded its highest yield of 19,525 MT. Spanish and U.S. swordfish longline fisheries dominated the landings with 9,600 MT (48 percent) and 5,800 MT (29 percent), respectively, and other countries caught the remainder.

While some data may indicate some uncertainties, other indicators point to serious problems that need to be addressed immediately or more drastic measures will be needed in the future.

The 1989 SCRS Report indicates that the biomass of age 5+ fish in the northwestern Atlantic has declined steadily, with the 1988 estimate at only 30 percent of the 1978 level. The SCRS Report clearly warns us that the present yield in the North Atlantic cannot be maintained without a decrease in fishing mortality or continued increases in recruitment; and it is unlikely that recruitment will continue to increase. The Committee therefore recommended that "action should be taken to at least prevent the trend of increasing fishing mortality."

In addition, independent assessments in the U.S. have concluded: that the spawning biomass has declined to about 40 percent of the 1978 level; that fishing mortality has increased for all ages with the highest rates occurring for the spawning stock in recent years; and that the average size of swordfish taken in the northwestern Atlantic has decreased steadily to about 50 percent of the 1978 level. As a result, the U.S. Regional Fishery Management Councils acting together, have initiated domestic action in an effort to correct the threat to the future of the stock.

It is with this background that the U.S. has proposed limiting or reducing the catch of swordfish throughout the northern Atlantic. We believe that the catch of swordfish in the North Atlantic should be reduced by 20 percent or at least take the initial step of limiting mortality to recent levels to prevent the increase in fishing mortality that is likely to occur without any constraint.

The U.S. Delegation is greatly concerned and deeply disappointed at the lack of progress toward effectively managing the swordfish stock in the North Atlantic at this time.

The U.S. Delegation is especially disappointed and concerned over the lack of any movement by the Spanish Delegation to join in efforts to make some progress. The Spanish Delegation has rejected out-of-hand any possibility of at least limiting increases in current catch levels. Without effective action by Spain, as the largest harvester of swordfish, there can be no effective progress in conserving the swordfish stocks and bringing the current high fishing mortality of the spawning sized fish under control. Without moderate action this year, future action required will be more drastic with severe consequences to the fishermen of all nations engaged in this fishery.

Other countries with smaller catches of swordfish than Spain and the U.S. are hoping to expand their capacity to harvest swordfish in their local waters. This desire to expand will not be possible if Spain and the U.S. and other principle fishing nations do not join in controlling the current deteriorating condition.

Efforts by the U.S. or any other nation will be useless if action is not taken ultimately by Spain. The Spanish fleet has more than tripled its catch in the North Atlantic since 1979 and has expanded fishing activities into the northwestern Atlantic. Further expansion of these fishing activities in the North Atlantic will result in even greater pressures.

The U.S. Delegation recognizes that abrupt changes in management measures are difficult to achieve because of socio-economic considerations. But we must initiate some action immediately to avoid more difficult measures that will be required in the future. Even if we were to find some agreement today, it would take almost a full year or more to implement. Without action now, it will take two or more years to initiate needed measures.

The U.S. Delegation is puzzled by the lack of any sign of cooperation within ICCAT by the Spanish Delegation. We have expressed a desire to meet with Spanish officials in the interim period, prior to the next ICCAT meeting, and have yet to receive a positive indication in this regard.

The U.S. Delegation is deeply disappointed by the lack of any action by the Spanish Delegation, and we continue to hope for some sign of cooperative efforts toward achieving the needed measures now for the conservation of North Atlantic swordfish, before we arrive at the point when more drastic measures will be needed.

Appendix 11 to Annex 5

Second Statement by Canada on North Atlantic Swordfish

(Appended to Report of Panel 4)

The Canadian Delegation would again like to repeat its concerns over the increased fishing mortalities of North Atlantic swordfish by certain member countries of ICCAT.

In light of the SCRS scientific advice for this stock, these increasing fishing mortalities combined with serious declines in year classes of age 5+ swordfish and higher mortalities of 1- to 4-year-old fish suggests an alarming downward trend in the health of North Atlantic swordfish stocks.

As we indicated during earlier Panel 4 discussions, Canada would like to encourage those member countries involved in this fishery to at least make a determined effort towards further dialogue (bilaterally or multilaterally in ICCAT) to develop management measures to curb the growth in current fishing effort on this stock, particularly by those fishing nations, such as Spain, which have greatly increased their fishing effort and catch of North Atlantic swordfish in recent years.

Canada believes that management measures are now a necessary prerequisite for this stock to recover adequately. Management measures such as quota and fishing effort controls and minimum sizes should be considered sooner, not later, in order to improve recruitment levels.

The Canadian Delegation is concerned that certain ICCAT members such as the Spanish delegation do not appear to acknowledge there is a stock decline problem nor are they committed at this time to even agreeing upon establishing a dialogue to establish a long-term management strategy for the North Atlantic swordfish stocks.

In closing, the Canadian Delegation is disappointed with the conclusions accepted by Panel 4 for North Atlantic swordfish and we urge that concerned members re-assess their position with a view towards recommending management measures by the time of the next ICCAT meeting in 1990. In this regard, Canada would be prepared to engage in any constructive dialogue between concerned Panel 4 members of ICCAT during the intervening period.

Appendix 12 to Annex 5

Second Statement by Spain on Swordfish

(Appended to Report of Panel 4)

Spain has demonstrated in all fora where appropriate an active policy of conservation of the resources. Therefore, in this sense it considers itself as authorized as anyone to set an example.

Even though Spain has an important fishing fleet and has more than one million people are employed either directly or indirectly in fishing and aquaculture, Spain is making a great effort to adapt its structures to the rational management of the fishing resources it exploits, and which are practically all destined for human consumption. This effort to adapt even implies an increase in the unemployment rate in a country whose overall rate of unemployment is approximately 20 percent.

It is clear that the rational concept of fishery management could have various interpretations, all of them absolutely valid. In our country, if a choice has to be made between man and fish, man would come first. We would like to make it clear that we want man to continue to have fish to catch in a continuous manner and that's why we are as concerned as anyone about going ahead with rational management when the scientific data clearly advise us to do so and not with the numerous current uncertainties, as is the case of swordfish.

We believe that these are the criteria which all countries have followed since the new Law of the Sea, and that the Spanish position is in absolute agreement with that which is internationally accepted and, therefore, Spain does not have to feel any sense of guilt, which others are trying to create for us.

In accordance with our intervention at the first meeting of Panel 2, we would like to point out that there are too many uncertainties in the evaluations carried out by the SCRS on North Atlantic swordfish to be able to accept their results.

Also we consider that other parameters and equally valid methodologies could be used which could perhaps indicate a moderate level of exploitation.

Consequently, all of this leads us to consider that at this time there are no sufficiently justified reasons for accepting any type of recommendation which implies taking special measures.

Appendix 13 to Annex 5

Third Statement by Spain on Swordfish

(Appended to Report of Panel 4)

The Spanish Delegation wishes to express its protest for not having been permitted in the previous Panel session to reply at the proper time to the last intervention of the United States, in which Spain's trust in science was questioned, as well as its willingness to carry out discussions concerning measures to be taken to conserve the resources.

It is unfortunate to have to listen, in this forum, to statements such as those made previously by the United States, whose tone and content are not within the normal practices of this Commission.

In its first statement to Panel 4, our delegation presented a series of very clear and specific criticisms of the results of the scientific report, which were explicitly supported and expanded upon by various delegations and even recognized by the U.S. delegation. Therefore, we feel that the countries that have shown their trust in science are Spain and those other delegations which have expressed fundamental doubt about the scientific report presented on swordfish. The United States seems to understand that if scientific data, whose very authors recognize as containing many uncertainties, are not accepted, then we do not believe in science. We cannot accept that these fallacies be expressed publicly so as to impose the exclusive, political-economic desires of one country on other countries. It is a matter of imposing unilateral points of view in multilateral fora, posing, however, as an apparent victim.

As regards the presumed negation by Spain to participate in dialogues, this delegation believes that it is very difficult to carry out discussions when the only objective of one party is that the other party accedes to its desires.

The Spanish delegation understands the concept of dialogue as a process in which both parts are willing, as the case arises, to accept some type of concession in their positions, especially when there is no scientific evidence nor moral reason to impose any measures.

Even in this obvious case and out of respect for the ICCAT forum, our country is willing, once again, to demonstrate its capacity for dialogue, despite the aggressive interventions made in the previous session, and indicates its willingness to deal with these subjects of concern before the next meeting of the Commission.

Appendix 14 to Annex 5

Statement by the United States on Billfish

(Appended to Report of Panel 4)

The United States commends the SCRS on the steps that have been taken to implement the ICCAT Enhanced Research Program for Billfish. The progress as detailed in this year's SCRS overview report is most encouraging. The United States supports the continued activities of the ICCAT Program and urges the adoption of the proposed 1990 Enhanced Research Program Budget and the work to be done under it. The cost of the Enhanced Billfish Program should continue to be funded through voluntary contributions.

REPORT OF THE MEETING OF THE INFRACTIONS COMMITTEE

1. OPENING OF THE MEETING

The meeting was opened by the Committee Chairman, Mr. B. García Moreno (Cuba).

2. ADOPTION OF AGENDA

The Agenda, circulated prior to the meeting, was adopted without modification. It is attached as Appendix 1.

3. ELECTION OF RAPPORTEUR

Following the custom established in the last few years, the Chairman asked the Spanish delegation to designate one of its members to serve as rapporteur. Mr. E. de Salas accepted this responsibility.

4. REVIEW OF THE IMPLEMENTATION OF REGULATIONS RECOMMENDED BY THE COMMISSION REGARDING YELLOWFIN, BIGEYE, AND BLUEFIN TUNAS

The Chairman presented Document COM/89/20 which contains the text of the ICCAT regulations currently in effect, and shows the status of application of their application in the different member countries. (See tables attached as Appendix 2 to Annex 6.)

The Executive Secretary made special note of Portugal's position since that country had presented an objection to the regulation on fishing mortality for bluefin tuna, and he asked Portugal to clarify, if necessary, its current position with respect to this regulation.

The Delegate of Portugal took note of this comment and will provide the pertinent information later.

5. COLLABORATION OF NON-MEMBER COUNTRIES TOWARDS THE OBJECTIVES OF THE COMMISSION

The Chairman recalled that this item had been recommended last year as a way to extend the ICCAT recommendations and that the Secretariat had been given the task of contacting non-member countries. He asked the Executive Secretary to report on the steps taken.

The Executive Secretary presented Document COM/89/22, and recalled first of all that this matter had arisen because of the fishing activities in the Convention area, in particular in the Mediterranean, involving non-member country vessels fishing for bluefin tuna. This made it essential to try to seek the collaboration of the non-member countries to assure the correct application of the ICCAT recommendations. Following the instructions of the Commission made at its 1988 meeting, the Secretariat wrote to non-member countries, requesting their collaboration, and later contacted the flag countries of the observed vessels to explain the situation in more detail. Eleven countries have responded so far to this request for information and collaboration.

In general, it was agreed that these contacts were very positive, and the Chairman asked the Committee's advice as to whether this work should be continued.

The Delegate from Mexico explained the situation in his country, indicating Mexico's interest in the conservation of tuna stocks in the Atlantic as well as in the Pacific. He emphasized that his country has already established the necessary collaboration in the Pacific by signing the Convention of the Eastern Pacific Tuna Organization. As regards the Atlantic, since 1983 his country has participated in the Commission Meetings, and this year in the SCRS Meeting as well. He noted that his country regularly sends to ICCAT all the information requested.

The Delegate of Spain referred to last year's meeting when the situation in the Mediterranean was reported, and reminded the Committee that one country had presented a detailed report that said that five of these vessels were based in Spanish ports. Spain carried out an exhaustive investigation of this matter in the past, and found out that the five vessels in question had not entered any Spanish port for more than three years at least, and that they do not belong to Spanish companies. The Spanish Delegation considered the contacts outlined by the Secretariat were very positive, since the conflicts last year have not reoccurred. It felt that this work should be continued, and expressed its hope that fishing effort in the Mediterranean would not increase.

The U.S. Delegate supported the Spanish declaration concerning the work of the Secretariat and its positive results.

The Delegate of Japan thanked the ICCAT Secretariat for its efforts on the Japanese proposal to investigate activities of non-member country vessels. It hoped the Secretariat will continue to make further efforts on this issue.

6. PORT INSPECTION

The Chairman asked the Executive Secretary to present Document COM/89/-21, which gives background information on port inspection and contains the forms used for inspections as well as a list of inspectors and correspondents named by each country.

The Executive Secretary noted that the scheme, signed in 1978 and in effect since 1983, has been officially accepted by nine of the member countries, although others have indicated their intention to collaborate by naming inspectors. In view of the growing importance of ICCAT regulations, the member countries were reminded of the importance of this matter.

The Delegate of South Africa expressed surprise at the fact that only nine countries had ratified the scheme. He felt that our the Commission's work was comprised of three elements: research, management, and inspection. The Commission needs to rely on all three elements to effectively achieve its objectives.

The Chairman agreed with South Africa's intervention and reiterated the importance of more countries participating in the ICCAT port inspection scheme.

The Delegate of São Tomé & Principe, in response to the comments by South Africa and the Executive Secretary, noted that his government had responded favorably by naming inspectors, and he felt that this action implied legal and official acceptance of the scheme.

The Executive Secretary took due note of São Tomé & Principe's words and asked that his country inform the Secretariat, in order to have a written record, to the effect that the naming of inspectors also meant official acceptance of the scheme.

The Delegate from Venezuela stated that his country had not taken any action up to now due to the lack of sufficient information on the state of the stocks of their fishing area. In the short term, Venezuela plans to adopt regulations on yellowfin and bigeye. He also expressed his country's interest in participating in the port inspection scheme.

The Chairman noted these comments and thanked Venezuela for their interest.

The Chairman then requested information needed for updating the lists of inspectors and correspondents named in the different countries.

The Delegate of Portugal indicated that there had been some changes words, in their inspectors, and that they would immediately send the new information to the Secretariat.

The United States reported that a new correspondent had been named, and that this information would be sent immediately to the Secretariat.

7. FUTURE WORK OF THE COMMITTEE AND PLANS FOR IMPROVEMENT

The Chairman emphasized the need for an annual meeting and for continuing contacts with non-member countries.

The catching of very small fish in the Mediterranean is a cause of concern. The Chairman suggested that ICCAT collaborate with other organizations, specifically with the General Fisheries Commission of the Mediterranean (GFCM) to improve our knowledge and ensure fulfillment of the ICCAT regulations in order to conserve the resources. This would facilitate the task of making the non-member countries aware of the problem.

The Delegate of Spain felt this last suggestion was very positive and supported it fully.

The Executive Secretary recalled that a joint GFCM/ICCAT meeting is planned for 1990 to discuss many issues concerning the Mediterranean, and in particular, bluefin tuna. He suggested that the matter of collaboration be included in the agenda of this joint meeting.

The Chairman of the SCRS stated that all matters concerning the Mediterranean should be handled treated with extreme caution, taking into account the unreported catches, particularly of fish below the size limit recommended by the Commission, as estimating these catches has often been difficult for the SCRS.

The Chairman of the Infractions Committee confirmed that this matter would be dealt with prudently by the joint meeting.

8. DATE AND PLACE OF THE NEXT COMMITTEE MEETING

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

9. ELECTION OF THE CHAIRMAN OF THE COMMITTEE

The Delegate of Spain expressed her satisfaction of the work done by the Chairman of the Committee and proposed that Cuba continue to chair the Infractions Committee.

This proposal was seconded by São Tomé & Principe, U.S.S.R., South Africa, Angola, Japan, U.S.A, Portugal, Korea and France, and Cuba was unanimously re-elected chairman of the Infractions Committee.

10. OTHER MATTERS

No other matters were discussed.

11. ADOPTION OF REPORT

The Report was approved with slight modifications.

12. ADJOURNMENT

The meeting of the Infractions Committee was adjourned.

Table 1 - Status of adoption of regulatory measures on size limits by the member countries for YELLOWFIN, BIGEYE and BLUEFIN TUNAS (as of 31-XII-89)

Species	YELLOWFIN	BIGEYE		BLUEFIN
Commission recommendation	3.2 kg limit	3.2 kg limit	3.2 kg limit	6.4 kg limit
Area of application	Entire Atlantic	Entire Atlantic	Entire Atlantic	Entire Atlantic
Date of entry into effect	July 1, 1973	September 7,1980	July 17, 1985	August 10, 1975
Date of expiration	Indefinite period	December 31,1984	Indefinite period	Indefinite period
ANGOLA	June 17, 1979			No fishing
BENIN				
BRAZIL	Feb. 23, 1973	March 1981		
CANADA	Sept. 4, 1973	No fishing		Feb. 17, 1973
CAPE VERDE	Sept. 5, 1987		Sept. 5, 1987	
COTE D'IVOIRE	March 2, 1970	March 2, 1970		
CUBA	July 1, 1973	Sept. 7, 1980		No fishing
EQUATORIAL GUINEA	..............No fishing..............			
FRANCE	June 29, 1973	March 3, 1981		Aug. 8, 1975
GABON	No fishing or landing	Being considered		No fishing or landing
GHANA	June 19, 1976			
JAPAN	June 14, 1973	Sept. 7, 1980	Sept. 7, 1980	April 16, 1975
KOREA	Jan. 21, 1973	Sept. 15, 1980		Dec. 17, 1975
MOROCCO	No fishing			
PORTUGAL	Nov. 26, 1973	July 17, 1981	Aug. 10, 1984	Nov. 27, 1976
SAO TOME & PRINCIPE				
SOUTH AFRICA	May 1973	Dec. 5, 1980	Dec. 5, 1980	June 27, 1975
SPAIN	May 29, 1974		Aug. 14, 1987	March 3, 1975
URUGUAY				
USA	Nov. 5, 1975	March 30, 1981	April 9, 1986	Aug. 13, 1975
USSR	Sept. 28, 1978	Sept. 28, 1978		Sept. 28, 1978
VENEZUELA	Nov. 19, 1981	Nov. 19, 1981	Nov. 19, 1981	Nov. 19, 1981

NOTE: For more details on national regulations, please request information from the country's administration.

Table 2 - Status of adoption of regulatory measures on BLUEFIN TUNA fishing mortality by the member countries (as of 31-XII-89)

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

* In process.
** Objections presented and ratified on November 16, 1978, March 19, 1980, and July 21, 1982.

NOTE: For more details on national regulations, please request information from the country's administration.

Table 3 - Status of adoption of regulatory measures on west Atlantic BLUEFIN TUNA catches by the member countries (as of 31-XII-89)*

Catch prohibited, except for monitoring purposes	1,160 MT	2,660 MT	2,660 MT	2,660 MT	2,660 MT
Size limit at 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 1987**
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					
CUBA	Developing fishery not subject to limitation				
EQUATORIAL GUINEA					
FRANCE					
GABON	No fishing or landings				
GHANA					
JAPAN	March 3, 1982	March 7, 1983	March 7, 1983	March 7, 1983	March 7, 1983
KOREA					
MOROCCO					
PORTUGAL	No fishing				
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
USSR			Feb. 15, 1984	Feb. 15, 1984	
VENEZUELA					

* 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 decided at the 1989 meeting that it would be in force until the end of 1991.

NOTE: For more details on national regulations, please request information from the country's administration.

Agenda of the Infractions Committee

1. Opening of the meeting
2. Adoption of Agenda
3. Election of Rapporteur
4. Review of the implementation of regulations recommended by the Commission regarding yellowfin, bigeye, and bluefin tunas
5. Collaboration of non-member countries towards the objectives of the Commission
6. Port Inspection
7. Future work of the Committee and plans for improvement
8. Date and place of the next Committee meeting
9. Election of the Chairman of the Committee
10. Other matters
11. Adoption of Report
12. Adjournment

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

1. OPENING OF THE MEETING

1.1 The 1989 Meeting of the Standing Committee on Finance and Administration (STACFAD) was opened by the Committee Chairman, Mrs. P. García Doñoro. She cited the work to be done by the financial committee during this session. She added that the group should bear in mind the financial difficulties of earlier years. She commended the efficient work carried out by the Executive Secretary and his staff in spite of these financial problems.

2. ADOPTION OF AGENDA

2.1 The Tentative Agenda was reviewed and it was confirmed that "Ratification of the Protocol to the Convention" would be discussed by the Commission Plenary. The Agenda, thus modified, was adopted and is attached as Appendix 1.

3. ELECTION OF RAPPORTEUR

3.1 The Chairman nominated Mr. J. Pereira (Portugal) to serve as rapporteur.

4. COMMISSION AND PANEL MEMBERSHIP

4.1 The Chairman referred the Committee to the Administrative Report (COM/89/8). She also informed the Committee that countries could request changes to membership to Panels at this time.

4.2 The Delegate from Cuba asked to withdraw from Panel 4, due to the decline of the activities of the Cuban longline fleet.

4.3 The Delegate from France asked to join Panel 4.

4.4 The Executive Secretary presented Document COM/89/7, which gives information on the current composition of the Panels, Panel Chairmen, the terms of reference of the Panels, and species to be discussed by each Panel.

4.5 The Executive Secretary gave some background information on the withdrawal of Senegal from the Commission. He noted that FAO, as depository of the ICCAT Convention, had advised the Secretariat, via telex, not to include Senegal in the calculations of country contributions, that Senegal later confirmed its withdrawal by formal notification, and that the withdrawal was effective as of December 31, 1988. The Committee noted that the withdrawal of Senegal also affected Panel membership.

5. COORDINATION OF RESEARCH

5.1 The Chairman referred again to the Administrative Report (COM/89/8) which was presented by the Executive Secretary. He noted that specific information on the Secretariat's coordination was contained in COM-SCRS/89/11 (Secretariat Report on Statistics and Coordination of Research).

5.2 The Assistant Executive Secretary informed the Committee that one of the essential jobs of the Secretariat was to collect basic tuna data tics and enter them into the computer for use by the scientists. He cited the three intersessional meetings held in 1989: The Final Meeting of the Yellowfin Year Program, the Albacore Data Preparatory Meeting, and the Albacore Workshop. The Secretariat prepared the data bases for all these meetings. Data bases were also prepared for the Bluefin and Swordfish Species Groups of the SCRS.

5.3 It was noted that data processing increased considerably in 1989, and that statistics generally improved. The Assistant Executive Secretary emphasized the importance of timeliness in the submission of data by the national offices. He informed the Committee that, in accordance with a 1988 recommendation by the SCRS, he attended a meeting of the General Fisheries Commission of the Mediterranean (GFCM) in order to improve Mediterranean statistics. Contacts made at that meeting resulted in an improvement in these statistics. The GFCM proposed a joint meeting with ICCAT to conduct stock evaluation on large pelagic fish.

5.4 The Assistant Executive Secretary presented other highlights from Document COM/89/11, including port sampling, the purchase of an additional hard disk for the Commission's Micro-VAX system, which has considerably enhanced the Secretariat's computer capacity, the preparation of the Revised Field Manual, and the scientific publications of the Commission.

5.5 The Delegate from Spain commended the Secretariat's work in the coordination of research. However, she pointed out that her country is deeply concerned about the delay in the revision of the Field Manual. She noted that at the 1988 Meeting, the Committee was informed that the revised Field Manual would be available in early 1989, but that it still was not available. She added that good statistics depend on adequate training of technicians, so it is essential that this Manual be completed as soon as possible in the three official languages of the Commission.

5.6 The Assistant Executive Secretary clarified that the first draft of the Field Manual was completed (in English only) and distributed to the scientists for their comments and suggestions. One of the main reasons for the delay in the final publication of this Manual was due to the lack of agreement on some methods to measure fish, which had to be decided at this years's SCRS Meeting.

5.7 The SCRS Chairman referred the Committee to Appendix 5 of the 1989 SCRS Report, which deals with this matter. The SCRS decided that the final deadline for the receipt of additional comments/suggestions on the previously circulated draft Field Manual was the end of 1989. The SCRS also expects that the final version of the Field Manual will be published before the next meeting.

5.8 The STACFAD Chairman noted that the Field Manual is an important tool for technicians, lab personnel, etc. She urged that the Executive Secretary expedite the publication of the Manual.

6. RELATIONS WITH OTHER ORGANIZATIONS

6.1 The Executive Secretary referred the Committee to the pertinent sections in the Administrative Report (COM/89/8) and the Secretariat Report on Statistics and Coordination of Research (COM/89/11) dealing with this matter.

7. COMMISSION PUBLICATIONS

7.1 The Committee was referred to Section 12 of the Administrative Report (COM/89/8) which gives a list of the Commission publications issued in 1989.

8. MEETINGS DURING THE YEAR

8.1 The Committee was again referred to the pertinent sections of COM/89/8 and COM/89/11 dealing with the meetings at which ICCAT was represented.

9. OTHER ADMINISTRATIVE MATTERS

9.1 There were no other administrative matters discussed.

10. AUDITOR'S REPORT - 1988

10.1 The Executive Secretary informed the Committee that the Auditor's Report for Fiscal Year 1988 had been distributed to all the member countries in May, 1989, and that an extract would be included in the next Biennial Report.

11. FINANCIAL STATUS OF THE SECOND HALF OF THE BIENNIAL BUDGET - 1989

11.1 The financial Committee reviewed the 1989 Financial Report (COM/89/9) which gives detailed information on the financial status of the Commission for the first three quarters of 1989 and estimates to the end of the Fiscal Year.

11.2 The Executive Secretary reviewed the financial statements attached to this report. In particular, he cited the $100,000 paid by Ghana in 1989 towards its outstanding debt. He also announced that the 1989 contribution from Korea had just been deposited in the Commission's account. Therefore, the current outstanding debt owed to the Commission amounts to $611,724.85.

11.3 Dr. Rodríguez Martín informed the Committee that at the time of the meeting a total of $525,699 had been received in contributions towards the 1989 budget of $750,000. He also noted that the Value Added Tax (VAT) paid towards certain goods and services had been reimbursed by the Spanish Government. Special mention was made of a voluntary contribution totaling $31,048.18 received from the Association of the Fish Canning Industry of Azores. The Executive Secretary expressed gratitude and hoped that other countries would follow this example.

11.4 The Delegate of the United States congratulated the Portuguese delegation for their extra budgetary contribution and asked that a letter be sent by the Commission Chairman to the President of the Fish Canning Industry of Azores expressing the gratitude of the entire Commission.

11.5 The Delegate from Portugal, on behalf of the President of the Association of the Fish Canning Industry of Azores, thanked the U.S. Delegate for his kind words. He also noted that the Azorian Canning Industry intends to make an annual extrabudgetary contribution to ICCAT. He added that the example set by the Association of the Fish Canning Industry of Azores should be followed by other countries, since such a procedure would help alleviate the Commission's financial difficulties.

11.6 The Committee Chairman noted that other countries have also given voluntary contributions in the recent past, such as Japan ($10,000), Korea ($1,500), Spain ($4,166), and Taiwan ($10,000). She expressed her gratitude to these countries and proposed that a letter of thanks be sent to all these countries/industries for their contributions. This initiative was supported by the delegations.

11.7 The Delegate of Spain, while endorsing what was expressed by other delegations, noted that several countries have taken a very positive stance towards the Commission's work. She also expressed the Commission's gratitude to the authorities of Madeira for their generosity in hosting this meeting.

11.8 In referring to the "Other income" section of Statement 6 of the Financial Report, the Delegate of Spain inquired what income had been received from observers attending the 1989 meetings. She also inquired as to observer countries and organizations which attended the recent SCRS meeting.

11.9 The Executive Secretary referred the Committee to Appendix 2 to the 1989 SCRS Report (List of Participants). He informed the Group that the following non-member countries and organizations attended that meeting: Dominican Republic, Mexico, Senegal, FAO, EEC, GFCM, IATTC, ICSEAF, NEAFC and National Taiwan University.

11.10 As regards the payment of observer fees, the Executive Secretary informed the Committee that the Dominican Republic intended to submit payment of the $1,000 fee soon. The Delegate of Mexico assured the Committee that the observer fee would also be paid very soon. The scientist who attended the SCRS could not provide information about payment of an observer fee from his country. The Executive Secretary also pointed out that since a voluntary contribution of $10,000 had been received late last year from Taiwan, he had not sought to collect an observer fee from Taiwan at the 1989 SCRS meeting, even though the observer from Taiwan had informed him that if ICCAT sent an invoice to the National Taiwan University, payment of the $1,000 would be remitted.

11.11 The observer from the European Economic Community informed the Committee that an ad hoc procedure had been put into effect which would allow the EEC to make a voluntary contribution to ICCAT.

11.12 The Delegate of Spain thanked the Executive Secretary for the information provided and added that the decision to charge an observer fee was not an arbitrary one, but one that had been studied in detail and approved by the Commission as a means to alleviate ICCAT's financial problems. She noted that this matter could be discussed again at this meeting when we discuss financial matters in more detail.

12. PENDING CONTRIBUTIONS OF THE MEMBER COUNTRIES, AND THEIR REPERCUSSION ON THE FINANCES OF THE COMMISSION

12.1 The Executive Secretary summarized Document COM/89/18 dealing with considerations on the financial situation of the Commission.

12.2 The Delegate of Canada proposed, and France supported, the possibility of presenting the budget in Pesetas.

12.3 Spain called the attention of the Committee to Article X of the Convention which establishes that the contributions should be made in United States dollars and that amending the Convention is a long process.

12.4 The Executive Secretary pointed out that the Commission's main problem is not due totally to the dollar exchange rate, but to the increasing outstanding debt.

12.5 Spain noted the extreme efforts made by the member countries to make payment. She pointed out that the majority of the overdue payments refer to 1989.

12.6 The Delegate from Sao Tomé & Principe suggested that a letter be sent to those countries which have contributions pending payment so that they might make an effort to remit payment and urge all member countries to pay their contributions in the first quarter of each year.

12.7 The Delegate from Côte d'Ivoire reiterated that the Commission's financial problem was due to the method used to calculate the member country contributions. He also felt that some member countries in arrears might react positively once they see the progress we are making in devising a new formula to calculate the country contributions.

12.8 France also demonstrated interest in finding a viable solution to the problem of past-due contributions.

12.9 The Delegate from Côte d'Ivoire clarified that even if a new calculation scheme is adopted, the past outstanding debt will not be recalculated according to this scheme.

12.10 The Committee Chairman summarized the discussions of this Agenda Item up to this point and reiterated the need to make payment of contributions as early in the year as possible.

13. REVIEW OF THE WORKING CAPITAL FUND

13.1 The Executive Secretary referred the Committee to the Financial Report (COM/89/9) and specifically to Statement 6, which deals with the Working Capital Fund. He noted that this Fund is essential, especially to meet expenditures in the early part of the year before the country contributions arrive. He noted that the cash balance in the fund as of November 16 was $187,450.

13.2 In response to an inquiry from Canada concerning the "appropriate level" in the Working Capital Fund, the Executive Secretary clarified that the Commission had decided at one of its early meetings that the minimum essential level be established at 15% of the total budget. Later, the Commission decided to take into account the fact that this Fund should also be used to cover the unpaid contributions.

14. FINANCIAL STATUS OF THE YELLOWFIN YEAR PROGRAM

14.1 The Executive Secretary referred to the Financial Report (COM/89/9), to the section on the Yellowfin Year Program. He noted that 1989 YYP expenses amounted to $2,694.75 and that the balance of YYP funds was $17,153.14.

14.2 The SCRS Chairman informed the Committee that activities should be carried out until the publication of the YYP results, i.e., 1991.

14.3 As regards the expenditures to be covered by this balance, Dr. A. Fonteneau, YYP Coordinator, informed the Committee that there are some major payments to be made, such as hard part analysis. He noted that the Program publication will have about 250 pages, including the report, scientific documents, etc., and that was even the possibility that additional funds may be necessary.

15. TRUST FUND FOR THE PROGRAM OF ENHANCED RESEARCH FOR BILLFISH

15.1 The Delegate of Spain also referred to COM/89/9, specifically to the section on the Billfish Program. She noted that at the 1988 meeting there was a commitment made for a voluntary contribution of $25,000 each year for a five-year period. However, since only $12,000 were made available in 1989, the Delegate of Spain inquired whether more funding was forthcoming.

15.2 The representative from the Billfish Foundation informed the Committee that at a recent meeting of the Foundation's Board of Directors it was confirmed that they would comply with their commitment of donating $25,000 per year for billfish research. He added that the balance of the 1989 donation would be received by the Commission before the end of this year.

15.3 The Executive Secretary noted that the Billfish Program budget for 1989 was $44,100 for east and west Atlantic activities and that up to the time of the meeting $30,319 had been made available. He also noted that expenditures up to now amounted to $26,266 and that there was a balance of $4,052.

15.4 The representative from the Billfish Foundation clarified that their contribution towards the Billfish Program pertained to the fourteen member states of the Foundation and asked that the Commission documents be corrected to this effect.

15.5 The U.S. Delegate assured the Committee that its full financial commitment towards the Billfish Program would be met.

15.6 The Delegate of Spain pointed out her satisfaction that the document reflected her country's support.

15.7 The Executive Secretary noted that the Billfish Program funds cover mainly field activities by the Coordinators and do not contribute towards Secretariat overhead.

15.8 The Delegate of Spain inquired as to the repercussion this Program has had on the Secretariat's activities.

15.9 The Executive Secretary responded that it was difficult to separate clearly the time and effort spent on each species of the Commission's mandate.

15.10 Referring to the inquiry made by Spain, the Delegate from the United States stressed that we cannot quantify the value of each study carried out on ICCAT species and evaluate it according to its budgetary allocation.

15.11 Spain noted that it is important that the Commission conduct in-depth studies of the species which come under the ICCAT Convention.

16. ADOPTION OF THE BUDGET FOR THE BIENNIAL PERIOD 1990-1991

16.1 The Executive Secretary summarized the document prepared on the Estimated Regular Budget, 1990-1991 (COM/89/10) and referred specifically to the table showing the catch and canning figures. He noted that according to Article X of the Convention, the catch and canning figures to be used for the calculation of member country contributions should be based on the latest information available. He added that to calculate the tentative contributions which were circulated with the 1990-1991 estimated budget, the catch/canning figures for 1987 were used. The total budget proposed by the Executive Secretary for 1990 amounted to $900,000.

16.2 The Delegate of Spain referred to the 1990 budget and expressed her support for the total budget of $900,000 proposed by the Executive Secretary. However, Spain recognized that this represents a substantial increase over the 1989 budget and noted that inflation should be taken into account. Spain agreed to a 10% increase in the salary chapters over the 1989 budget allotment.

16.3 The Delegate of Spain noted that priority should be given to the Albacore Research Program Plan proposed by the 1989 SCRS, since albacore represent 14% of total Atlantic tuna catches. She proposed that $50,000 be allotted from the 1990 budget to the Albacore Program in order to initiate research. Therefore, the other budget chapters should be adjusted accordingly.

16.4 The Chairman of the SCRS observed that the scientific committee formulated various recommendations which are included in the SCRS Report and he referred, in particular, to those which have some economic repercussion in the budget presented by the Executive Secretary (see Addendum 2 to the Sub-Committee on Statistics -- Statistical Priorities). He also mentioned other items, such as the book on Atlantic tropical tunas published by FAO and which should be translated into Spanish.

16.5 The Delegate of France expressed some reservations on the proposed $900,000 budget for 1990, since it shows a considerable increase over the 1989 budget. However, he recognized that such an increase is necessary in light of the Commission's difficulties to carry out its work. He also noted that further consultation with his government was needed. France expressed support for the Albacore Research Program.

16.6 The Delegate of Portugal recognized the importance of the Albacore Research Program and supported Spain's proposal to allot $50,000 from the 1990 budget to initiate this research.

16.7 The Delegate from Côte d'Ivoire supported the proposed $900,000 budget for 1990 and the Albacore Research Program.

16.8 The Delegate from Angola reiterated the importance of research on albacore and supported the proposed Albacore Research Program. He also supported the 1990 budget of $900,000.

16.9 The Delegate of the U.S. expressed her country's support of the Commission's work and the 1990 budget as proposed. She added, however, that her government needs more time to study the 1991 budget.

16.10 The STACFAD Chairman clarified that the Committee was only considering the 1990 budget at this time.

16.11 The Delegate from Japan recognized the severe austerity measures and salary cuts which the Secretariat has experienced over the last few years and noted that the time has come to resume normal activities. He would support the $900,000 proposed budget provided that the Executive Secretary assures the Committee that he can still manage after allotting $50,000 from this budget towards the Albacore Research Program. He pointed out that one of the major albacore fishing countries is Taiwan and he suggested that we solicit a voluntary contribution from Taiwan for albacore research. He also asked the Secretariat to study the advantages of changing the budget currency to Pesetas and inform the Commission at next year's meeting.

16.12 The Delegate of Sao Tomé & Principe affirmed that, despite a 100% increase over his country's 1989 contribution, he is in favor of the $900,000 budget and supports the $50,000 allotment from that budget for the Albacore Research Program.

16.13 The Delegates of Canada, Korea, South Africa, Cuba and the United States supported the rational budget presented by the Executive Secretary, i.e., $900,000, as well as the allocation of $50,000 from the regular budget for the Albacore Research Program.

16.14. The U.S., in referring to the matter of changing the budget currency, pointed out that such a change would require a renegotiation of the ICCAT Convention.

16.15 The Committee analyzed the revised budget of $900,000 which includes an allotment of $50,000 for the Albacore Research Program and a re-distribution of funds among the other budget chapters.

16.16 The Executive Secretary pointed out that the calculations on salaries were made using a hypothetical exchange rate of 120 Pesetas to the U.S. Dollar. Therefore, if the dollar falls below 120, the increase in salaries will be fictitious.

16.17 The Delegate of Portugal clarified that his country supported the Albacore Research Program as well as the $900,000 budget.

16.18 The SCRS Chairman explained that the Albacore Research Program involves a high budget, but since this research proposal was presented by the SCRS without prior notice, the $50,000 would serve to initiate the Program's activities. He referred the Committee to Appendix 6 of the 1989 SCRS Report which gives all the details. Funding for 1990 could include observers on-board surface gears, compilation of biological data and analysis of these data.

16.19 The Delegate from Spain noted that the Albacore Research Plan is a four-year program and asked the Commission to solicit extra-budgetary contributions towards this work.

16.20 The Delegate of Côte d'Ivoire asked that when specific research programs are planned that the Committee give clear indications of the length of the program as well as the total costs involved.

16.21 The Chairman pointed out that the salaries chapters (1 and 8-A) were the most affected by the re-distribution of the budget.

16.22 The Delegate of France reiterated his reservations on the $900,000 budget, but in the spirit of cooperation, France supported this budget provided that the $50,000 allotment for the Albacore Research Program is included.

16.23 The Chairman thanked the Committee for approving the budget for Fiscal Year 1990.

16.24 The Executive Secretary clarified that the Committee approves a biennial budget, with the understanding that the budget for the second half of the biennial period (1991) will be revised at next year's meeting.

16.25 The Delegate of Spain thanked all the delegations for sharing in her support of the $900,000 budget corresponding to Fiscal Year 1990. Spain believes that this decision will give new momentum and strength to the Commission, to the Secretariat staff as well as to the consequences of the objectives established in the Convention. She especially appreciated the support of the developing countries and recognized that this budget represented for them an additional burden which was more difficult to bear than for other countries. She hoped that this spirit of cooperation and collaboration which has made it possible to resume the research activities of the Commission would continue so that among all the countries we may resolve some of the problems which still afflict the Commission.

16.26 The Chairman noted that the 1990-1991 biennial budget was approved but that the budget pertaining to Fiscal Year 1991 would be studied at the 1990 meeting. The revised 1990 budget and tentative 1991 budget is attached herewith as Appendix 2.

17. MEMBER COUNTRY CONTRIBUTIONS TO THE 1990-1991 BUDGET

17.1 The Committee studied and approved the tables showing the revised member country contributions for 1990-1991. The calculations reflect the recent changes in Panel membership and the updated catch and canning information using 1987 as the base year. The tables of country contributions for 1990-1991 are attached as Appendix 3 to this Report.

17.2 The Executive Secretary explained that the 1991 country contributions were only orientative and that they will also be revised according to the the total 1991 budget, if revised.

17.3 The Delegate of Venezuela expressed some reservation concerning the 1990 budget approved and noted that the increased contribution would be a burden for his country.

18. PROGRESS REPORT OF THE WORKING GROUP ON THE CALCULATION OF COUNTRY CONTRIBUTIONS

18.1 The Group's report was presented and summarized by its Chairman, Mr. L. Weddig (U.S.A.). He pointed out that the Group used various calculation approaches and that the Secretariat presented simulations using these approaches. He indicated that the Group had decided to consider the report a study document which would be taken home and presented to the respective governments. Mr. Weddig informed STACFAD that the Group had agreed to meet in 1990 to discuss this matter further.

18.2 The Spanish Delegation congratulated Mr. Weddig for his effective chairmanship of the Working Group which made it possible to make considerable progress as regards the proposal presented by Côte d'Ivoire. The Spanish Delegation hoped that the Group could rely on Mr. Weddig's excellent collaboration next year. The Delegate of Spain also expressed her country's appreciation to the Secretariat for its support and for the work carried out for the Working Group.

18.3 The STACFAD Chairman and the Committee expressed their appreciation to Mr. Weddig and the Working Group for their efficient work and for the progress made in the study of alternative schemes to calculate member country contributions. The Committee adopted the report of the Working Group, which is attached herewith as Appendix 4.

19. RECOMMENDATIONS FOR RESEARCH AND STATISTICS

19.1 The SCRS Chairman referred the Committee to Addendum 2 to the Sub-Committee on Statistics of the 1989 SCRS Report, which identifies the statistical priorities and their financial repercussions. These priorities include the purchase of electronic equipment, communications equipment, travel for statistical purposes, etc.

19.2 The Committee approved the recommendations contained in the Sub-Committee Report.

20. DATE AND PLACE OF THE NEXT MEETING OF THE COUNCIL OR SPECIAL MEETING OF THE COMMISSION

20.1 The Chairman proposed holding a special meeting in 1990, taking into account the important decisions to be made for 1991, such as a revision of the budget.

20.2 The STACFAD Chairman also proposed holding the 1990 meeting in Madrid, since it is the most economical and she suggested November 12 to November 16, 1990 (i.e., a five-day period) as the dates for the meeting.

20.3 The Committee approved these suggestions made by the Chairman and recommended them to the Commission.

21. ITEMS TO BE CONSIDERED BY THE COUNCIL AT ITS NEXT MEETING

21.1 Since a meeting of the Council will not be held in 1990, this item was not discussed.

22. DATE AND PLACE OF THE NEXT REGULAR MEETING OF THE COMMISSION

22.1 The date and place of the next regular meeting of the Commission will be decided at the 1990 meeting.

23. ELECTION OF THE CHAIRMAN OF THE COMMITTEE

23.1 The Delegate of Portugal proposed that Mrs. P. Doñoro continue as Chairman of the Committee. The Delegate of Cuba seconded the Portuguese proposal and commended her efficient chairmanship. The Delegates of France, the U.S., Japan, Côte d'Ivoire, South Africa, Sao Tomé & Principe, Angola and Korea also endorsed Mrs. Doñoro's re-election and congratulated her for her work as STACFAD Chairman. Mrs. P. García Doñoro was unanimously re-elected Chairman of STACFAD for the 1990-1991 biennial period.

23.2 Mrs. Doñoro thanked the delegates for their support and commended that her close relationship with the Commission delegates helped to made her job easier. She expressed her appreciation for the spirit of collaboration demonstrated by the Committee this year, without which the work of the Committee could not have been achieved.

23.3 The STACFAD Chairman also thanked the rapporteur, the Executive Secretary, the Assistant Executive Secretary and the entire Secretariat staff and the interpreters for their efficient work during the meeting.

24. OTHER MATTERS

24.1 No other matters were discussed.

25. ADOPTION OF REPORT

25.1 The Report was adopted.

26. ADJOURNMENT

26.1 The 1989 Meeting of the Standing Committee on Finance and Administration (STACFAD) was adjourned.

Appendix 1 to Annex 7

Agenda of the Standing Committee on Finance and Administration (STACFAD)

1. Opening of the meeting
2. Adoption of Agenda
3. Election of Rapporteur
4. Commission and Panel membership
5. Coordination of research
6. Relations with other organizations
7. Commission publications
8. Meetings during the year
9. Other administrative matters
10. Auditor's Report - 1988
11. Financial status of the 2nd half of the biennial budget - 1989
12. Pending contributions of the member countries, and their repercussion on the finances of the Commission
13. Review of the Working Capital Fund
14. Financial status of the Yellowfin Year Program
15. Trust Fund for the Program of Enhanced Research for Billfish
16. Adoption of the budget for the biennial period 1990-1991
17. Member country contributions to the 1990-1991 budget
18. Progress report of the Working Group on the calculation of country contributions
19. Recommendations for research and statistics
20. Date and place of the next meeting of the Council or special meeting of the Commission
21. Items to be considered by the Council at its next meeting
22. Date and place of the next regular meeting of the Commission
23. Election of the Chairman of the Committee
24. Other matters
25. Adoption of Report
26. Adjournment

Regular Budget, 1990-1991 (US $)

CHAPTER	1990 BUDGET $900,000	1991 BUDGET * $990,000	
1. Salaries	440,000	489,000	
2. Travel	6,000	20,000	**
3. Annual Commission Meeting	37,000	44,000	
4. Publications	23,000	25,000	
5. Office Equipment	5,000	6,500	
6. Operating Expenses	75,000	89,000	
7. Miscellaneous	5,000	7,500	
Sub-Total	591,000	681,000	
8. Coordination of Research			
a) Salaries	126,000	145,000	
b) Travel for improvement of statistics..	8,000	10,000	
c) Port sampling	18,000	20,000	
d) Biostatistical work	10,000	12,000	
e) Electronic equipment	16,000	25,000	
f) Data processing	35,000	39,000	
g) Scientific meetings (including SCRS)..	42,000	51,000	
h) Albcore Research Program	50,000		
i) Miscellaneous	4,000	7,000	
j) Billfish Reserch Program	0	0	
Sub-Total	309,000	309,000	
TOTAL BUDGET	$900,000	$990,000	

Table of member country contributions to the Regular Commission Budget - 1990 (US$)

TOTAL BUDGET= $ 900,000

COUNTRY	A #	B %	C (MT)	D (MT)	E (MT)	F %	G $	H $	I $	J $	K $
Angola	2	4.84	1819	1637	3456	0.68	1,000	2,000	13,516	3,798	20,314
Benin	0	1.61	97	0	97	0.02	1,000	0	4,505	107	5,612
Brazil	2	4.84	16240	2499	18739	3.69	1,000	2,000	13,516	20,592	37,109
Canada	2	4.84	1279	398	1677	0.33	1,000	2,000	13,516	1,843	18,359
Cape Verde	1	3.23	5133	228	5361	1.05	1,000	1,000	9,011	5,891	16,902
Cuba	1	3.23	7650	1837	9487	1.87	1,000	1,000	9,011	10,425	21,436
Equatorial Guinea	0	1.61	400	0	400	0.08	1,000	0	4,505	440	5,945
France	3	6.45	42000	29100	71100	13.99	1,000	3,000	18,022	78,133	100,154
Gabon	1	3.23	0	0	0	0.00	1,000	1,000	9,011	0	11,011
Ghana	1	3.23	33465	0	33465	6.58	1,000	1,000	9,011	36,775	47,786
Cote d'Ivoire	1	3.23	0	0	0	0.00	1,000	1,000	9,011	0	11,011
Japan	4	8.06	34473	0	34473	6.78	1,000	4,000	22,527	37,883	65,410
Korea	3	6.45	7625	0	7625	1.50	1,000	3,000	18,022	8,379	30,401
Morocco	2	4.84	4993	247	5240	1.03	1,000	2,000	13,516	5,758	22,274
Portugal	3	6.45	14623	4282	18905	3.72	1,000	3,000	18,022	20,775	42,796
S.Tome & Principe	1	3.23	385	0	385	0.08	1,000	1,000	9,011	423	11,434
South Africa	1	3.23	5545	361	5906	1.16	1,000	1,000	9,011	6,490	17,501
Spain	4	8.06	155793	33500	189293	37.23	1,000	4,000	22,527	208,016	235,543
U.S.A.	4	8.06	23865	36586	60451	11.89	1,000	4,000	22,527	66,430	93,957
U.S.S.R.	2	4.84	7840	998	8838	1.74	1,000	2,000	13,516	9,712	26,228
Uruguay	0	1.61	1194	7	1201	0.24	1,000	0	4,505	1,320	6,825
Venezuela	2	4.84	24820	7463	32283	6.35	1,000	2,000	13,516	35,476	51,992
TOTAL	40	100	389239	119143	508382	100.00	22,000	40,000	279,333	558,667	900,000

A: Panel membership.
B: Percentage of payments for annual membership and panel membership (G+H).
C: Catch (live weight) - 1987.
D: Canned production (net product weight) - 1987.
E: Total (C+D).
F: Percentage distribution of E.
G: Payment of $1,000 annual membership fee.
H: Payment of $1,000 for each pannel membership.
I: 1/3 of (Total contribution less G+H) distributed percentage-wise according to column B.
J: 2/3 of (Total contribution less G+H) distributed percentage-wise according to column F.
K: Total (G+H+I+J)

Table of member country contributions to the Regular Commission Budget - 1991 (US$)

TOTAL BUDGET= $ 990,000

COUNTRY	A #	B %	C (MT)	D (MT)	E (MT)	F %	G $	H $	I $	J $	K $
Angola	2	4.84	1819	1637	3456	0.68	1,000	2,000	14,968	4,206	22,173
Benin	0	1.61	97	0	97	0.02	1,000	0	4,989	118	6,107
Brazil	2	4.84	16240	2499	18739	3.69	1,000	2,000	14,968	22,804	40,772
Canada	2	4.84	1279	398	1677	0.33	1,000	2,000	14,968	2,041	20,009
Cape Verde	1	3.23	5133	228	5361	1.05	1,000	1,000	9,978	6,524	18,502
Cuba	1	3.23	7650	1837	9487	1.87	1,000	1,000	9,978	11,545	23,524
Equatorial Guinea	0	1.61	400	0	400	0.08	1,000	0	4,989	487	6,476
France	3	6.45	42000	29100	71100	13.99	1,000	3,000	19,957	86,524	110,481
Gabon	1	3.23	0	0	0	0.00	1,000	1,000	9,978	0	11,978
Ghana	1	3.23	33465	0	33465	6.58	1,000	1,000	9,978	40,725	52,703
Cote d'Ivoire	1	3.23	0	0	0	0.00	1,000	1,000	9,978	0	11,978
Japan	4	8.06	34473	0	34473	6.78	1,000	4,000	24,946	41,951	71,898
Korea	3	6.45	7625	0	7625	1.50	1,000	3,000	19,957	9,279	33,236
Morocco	2	4.84	4993	247	5240	1.03	1,000	2,000	14,968	6,377	24,344
Portugal	3	6.45	14623	4282	18905	3.72	1,000	3,000	19,957	23,006	46,963
S.Tome & Principe	1	3.23	385	0	385	0.08	1,000	1,000	9,978	469	12,447
South Africa	1	3.23	5545	361	5906	1.16	1,000	1,000	9,978	7,187	19,166
Spain	4	8.06	155793	33500	189293	37.23	1,000	4,000	24,946	230,357	260,303
U.S.A.	4	8.06	23865	36586	60451	11.89	1,000	4,000	24,946	73,565	103,511
U.S.S.R.	2	4.84	7840	998	8838	1.74	1,000	2,000	14,968	10,755	28,723
Uruguay	0	1.61	1194	7	1201	0.24	1,000	0	4,989	1,462	7,451
Venezuela	2	4.84	24820	7463	32283	6.35	1,000	2,000	14,968	39,286	57,254
TOTAL	40	100	389239	119143	508382	100.00	22,000	40,000	309,333	618,667	990,000

A: Panel membership.
B: Percentage of payments for annual membership and panel membership (G+H).
C: Catch (live weight) - 1987.
D: Canned production (net product weight) - 1987.
E: Total (C+D).
F: Percentage distribution of E.
G: Payment of $1,000 annual membership fee.
H: Payment of $1,000 for each pannel membership.
I: 1/3 of (Total contribution less G+H) distributed percentage-wise according to column B.
J: 2/3 of (Total contribution less G+H) distributed percentage-wise according to column F.
K: Total (G+H+I+J)

Appendix 4 to Annex 7

Report of the Working Group to Study Alternative Schemes to Calculate the Member Country Contributions to the Commission Budget

The Working Group to Study Alternative Schemes to Calculate the Member Country Contributions to the Commission Budget met at the Hotel Savoy in Funchal, Madeira, on November 15 and 16, 1989. The Commission Chairman, Mr. S. Makiadi J. Lopes (Angola) opened the meeting and introduced the subject. He also solicited the nomination of a Chairman. The Delegate of Spain proposed Mr. L. Weddig (U.S.A.), who presided over the entire session.

The following member countries participated in the meeting of the Working Group: Canada, Côte d'Ivoire, Cuba, France, Japan, Korea, Portugal, Sao Tomé & Principe, South Africa, Spain, Venezuela, the United States and the U.S.S.R. The European Economic Community (EEC) attended as an observer.

The Working Group reviewed Document COM/89/19, which was prepared by the Secretariat and presented by the Executive Secretary. The Group studied this document which summarizes the information received from other international fisheries organizations concerning their contribution calculation scheme.

The Group noted that some fisheries organizations are comprised only of countries with similar economic development, while others, like ICCAT, are comprised of countries with various levels of economic development. It was also noted that the base for the contribution calculations of organizations in the latter category varied considerably, and that there are some which distinguish between countries with different levels of economic development and that they apply different criteria to calculate their contributions (e.g., Forum Fisheries Agency and the Indo-Pacific Tuna Development and Management Program).

Some clarifications were made on the current ICCAT calculation system, in the event the EEC officially joins the Commission. It was confirmed that the EEC will have only vote, while those ICCAT member countries which are also members of the European Community will withdraw from the Commission. Hence, since there will be one membership fee and one contribution paid by the EEC, that part of the budget which applies to Commission and Panel membership will be reduced. On the other hand, the EEC's contribution will be based on the total catch and canning of tuna and tuna-like fish from the ICCAT Convention area by all EEC member states. Therefore, there could be some increase in the contribution of the EEC member states calculated on the basis of catch and canning. The Working Group asked the Secretariat to study the possible impacts which the adherence of the EEC may have on the distribution of the country contributions and to submit the results of this study at the next Commission meeting.

The Delegate of Spain proposed that as the calculations are defined by Article X of the Convention, any new methods should be based on the same

Article and the discussion should start from this Article. This view was supported by various countries, including Korea, France and Portugal. The Delegate of Korea presented a statement to this effect, which is attached at Addendum 1 to this report.

The original proposal by Côte d'Ivoire, as included in Document COM/-89/19, was introduced and reviewed. The Delegate from Côte d'Ivoire, supplementing the original proposal, commented that any system to solve the problem of the Commission's financial difficulties, by applying a new system of calculation of the country contributions that may reduce the payment of the developing countries, would be subject to discussion.

Several countries, including France, Spain, Angola, and Sao Tomé & Principe, expressed their agreement with the philosophy of differentiating the criteria for contributions according to the degree of economic development of the countries.

There was a general consensus that the Working Group should try to find a suitable method of calculation which would result in a reduction of the contributions of the developing countries, and would yet be fair to all the countries of the Commission. At the same time it was made clear among the participants that the change in the procedure of the calculation would involve an amendment of the Convention.

While recognizing that amending the Convention would take a long time, and since considerable time has already passed since the proposal was first set forth by Côte d'Ivoire, the Working Group felt that rapid progress in coming up with a new scheme is required, although it would still be a mid-to long-term solution for the Commission's financial problems. The Delegate of Côte d'Ivoire proposed setting up an Ad Hoc Drafting Group comprised of Angola, Côte d'Ivoire, Cuba, France, Japan, Korea, Portugal, Spain, the U.S., the U.S.S.R, and Venezuela, while membership is still open to any Commission members to participate. This idea was supported by the majority.

In accordance with a suggestion by the Chairman, the Working Group decided to start model calculations, applying various alternative calculation procedures.

The Delegate of Spain suggested that one approach would be to categorize the member countries into three groups, according to the economic development of each country. She suggested that the United Nations criteria be applied for categorizing countries. She also suggested raising the Commission membership fee to $2,000, while maintaining the fee for Panel membership at $1,000. Then the total budget, less these membership fees (fixed fees) should be divided into three categories at a fixed percentage for each group. Those amounts set for each category should then be proportioned by the catch and canning percentage among each group.

Considerable discussion ensued on how to categorize the countries, but the U.N. categories were accepted as the most logical and objective choice, since they are based on exhaustive economic studies. The following three groups were identified:

Group A: Canada, France, Japan, Portugal, South Africa, Spain, U.S.A., and the U.S.S.R. (8 countries)

Group B: Angola, Brazil, Côte d'Ivoire, Cuba, Gabon, Ghana, Korea, Morocco, Uruguay, and Venezuela (10 countries)

Group C: Benin, Cape Verde, Equatorial Guinea, and Sao Tomé & Principe (4 countries)

However, the Working Group agreed that these U.N. categories should be verified and updated.

Increasing the Commission membership fee to $3,000 was also discussed, but the Group agreed that it might be too much of a burden on the developing countries. Other elements which may be included in a calculation scheme were discussed, such as, gross national product, national debt, tuna prices by species, tuna imports, fresh fish consumption, per capita income, etc.

France emphasized that no matter what factors are used in a calculation scheme, it was important to maintain the ICCAT feature as a fishery organization and factors such as tuna prices should not be taken into account.

The percentages to be applied to the total budget (less fixed fees) were also discussed. The Chairman suggested making simulation analyses using various percentage values. Based on the distribution of proportions in the present system, the Delegate of Côte d'Ivoire proposed that 85% of the budget be borne by Group A countries, 14% by Group B countries, and 1% by Group C countries.

The Working Group agreed to calculate hypothetical contributions applying the procedure proposed by Spain using different total budget levels, 1987 catch and canning values, and the current Panel structure. Also, while applying the proportions proposed by Côte d'Ivoire (85%-14%-1%), the Delegate of Spain also asked that other percentage proportions be tried as well for purposes of comparison. The Secretariat agreed to do these calculations for the Working Group.

The Secretariat presented several tables using total budgets of $900,000 and $825,000 and applying different proportions for Groups A and B, while always maintaining the proportion for Group C countries at 1%. The Working Group noted that the amount of the total budget would only slightly alter the proportion of the country contributions. The result of the calculations with a total budget of $900,000 and percentage proportions assigned as 85%-14%-1% is attached as Alternative 1. The table showing the country contributions as currently calculated is also attached (labeled as "Present Calculation Scheme")

France and Sao Tomé & Principe noted that this alternative scheme reduced some of the members' contributions in Group A by a considerable amount (e.g. Canada and South Africa), while some countries in Group C still have to pay a sizable contribution, which they could not accept.

It was clarified that, according to the present scheme, one-third of the total budget (less fixed fees) is distributed by the proportion of Panel and Commission membership, whereas in the above alternative scheme

(Alternative 1) this provision is not applied. Therefore, the share of countries with minor catches decreases a great deal.

Various delegations noted that there were significant incoherencies in the modifications of the contributions of some member countries within Group A as well as with respect to the contributions of other member countries classified in the other Groups.

The Delegate of Spain further asked if the Secretariat could calculate the contributions in a similar way as her original proposal, but including the provision of one-third of the budget being based on the proportion of Commission membership/Panel fees, as outlined in Article X of the Convention. The Secretariat responded that this could be done in two ways: (1) by dividing the total budget into each country category according to the percentage (e.g., 85%-14%-1%) and calculating the contributions according to Article X within each category; or (2) by applying different factors to the contributions obtained by the current calculation scheme, according to the assigned country categories.

The Delegates of France and Portugal proposed extrapolating or reducing the contributions calculated according to the current scheme (table labeled as "Present Contribution Scheme"), by applying a factor to each country group so that the sub-total for each country corresponded to the 85%-14%-1% of the total budget.

The Working Group decided to use a $900,000 budget and apply the above two methods.

The Secretariat presented Alternative 2 and Alternative 3, both which divided the total budget of $900,000 among Groups A, B and C at a proportion of 85%, 14% and 1%, respectively. In Alternative 2, the contributions are calculated within each Group in exactly the same way as outlined in Article X of the Convention. In Alternative 3, the contributions calculated according to the current system for all countries are prorated by applying a factor which is common within each specific Group but which differs between Groups, so that the sum of the contributions in each Group corresponds to 85%, 14% and 1% of the total budget.

There was a general consensus that the calculations which included the provision of one-third of the budget to be distributed according to Commission and Panel membership would be more realistic (i.e., Alternatives 2 and 3), particularly in the sense that it reduces the contribution of developing countries and redistributes more evenly the contributions among the developed countries. The Delegates of France, Cuba, Sao Tomé & Principe, Angola, Spain and Côte d'Ivoire expressed their preference of the scheme applied in Alternative 2 over that applied in Alternative 3. The Delegate of Portugal, however, preferred Alternative 3. The Delegate of the United States noted that his country could accept either Alternative 2 or 3.

However, there was unanimous agreement that the delegates were not authorized to adopt officially any alternative calculation scheme at the time of this meeting. Since any alternative scheme increases the financial burden of countries in Group A, the respective governments have to be consulted. Therefore, these alternatives will be taken back to member country governments for further analysis and study. Any other plans similar to these could also be studied. The Working Group was asked to maintain contact in the interim period through the Secretariat. Then, at the 1990 meeting, the Group should meet once more to decide which contribution scheme would be best suited to the Commission.

The Chairman observed that the attached tables are hypothetical, and asked the member countries to pay particular attention to the proportion of each country's contribution rather than the dollar of the contribution. Also, he observed that the proportional contribution of each member will be affected by its catches, canning, the number of Panels in which it participates, the adherence of new members to the Commission or the withdrawal of others. He also noted that the percentages allocated to each category should be flexible, as there could be drastic changes in the results due to any of the above factors in the future.

The Delegate of Côte d'Ivoire, noting that Senegal has withdrawn from the Commission, proposed that this report and its attached tables be sent to Senegal so as to inform this country of the developments taking place and that such a scheme is under consideration for the future.

The U.S. Delegate agreed with the above proposal and further suggested that a hypothetical table be prepared by the Secretariat, that includes Senegal in the calculations, which could be sent to that country along with this report. This could possibly lead Senegal to consider rejoining the Commission. This proposal was accepted by the Working Group.

The Delegate of Spain suggested expanding this proposal further to include, not only Senegal, but other developing countries which have expressed an interest in joining the Commission.

The Working Group was very satisfied with the progress made at this session which is in accordance with the mandate given to the Group by the Commission in 1988. The Group thanked the Chairman for his efficient chairing of the meeting. The Secretariat was commended for promptly providing the Group with the tables of calculations using different scenarios for their study. The Working Group agreed to forward its report to STACFAD and to meet at the same time and place as the 1990 Special Commission Meeting, after consideration of these materials in the interim.

PRESENT CONTRIBUTION SCHEME
TOTAL BUDGET: US$ 900,000
% DISTRIBUTION: CURRENT

				TOTAL BUDGET= $		900,000						
COUNTRY	A #	B %	C (MT)	D (MT)	E (MT)	F %	G $	H $	I $	J $	K $	PERCENT TOTAL
Canada	2	4.84	1,279	398	1,677	0.33	1,000	2,000	13,516	1,843	18,359	2.04
Espana	4	8.06	155,793	33,500	189,293	37.23	1,000	4,000	22,527	208,016	235,543	26.17
France	3	6.45	42,000	29,100	71,100	13.99	1,000	3,000	18,022	78,132	100,154	11.13
Japan	4	8.06	34,473	0	34,473	6.78	1,000	4,000	22,527	37,883	65,410	7.27
Portugal	3	6.45	14,623	4,282	18,905	3.72	1,000	3,000	18,022	20,775	42,796	4.76
South Africa	1	3.23	5,545	361	5,906	1.16	1,000	1,000	9,011	6,490	17,501	1.94
U.S.A.	4	8.06	23,865	36,586	60,451	11.89	1,000	4,000	22,527	66,430	93,957	10.44
U.S.S.R.	2	4.84	7,840	998	8,838	1.74	1,000	2,000	13,516	9,712	26,228	2.91
GROUP A SUB-TOTAL	23	50.00	285,418	105,225	390,643	76.84	8,000	23,000	139,667	429,281	599,948	66.66
Angola	2	4.84	1,819	1,637	3,456	0.68	1,000	2,000	13,516	3,798	20,314	2.26
Brasil	2	4.84	16,240	2,499	18,739	3.69	1,000	2,000	13,516	20,592	37,109	4.12
Cote d'Ivoire	1	3.23	0	0	0	0.00	1,000	1,000	9,011	0	11,011	1.22
Cuba	1	3.23	7,650	1,837	9,487	1.87	1,000	1,000	9,011	10,425	21,436	2.38
Gabon	1	3.23	0	0	0	0.00	1,000	1,000	9,011	0	11,011	1.22
Ghana	1	3.23	33,465	0	33,465	6.58	1,000	1,000	9,011	36,775	47,786	5.31
Korea	3	6.45	7,625	0	7,625	1.50	1,000	3,000	18,022	8,379	30,401	3.38
Maroc	2	4.84	4,993	247	5,240	1.03	1,000	2,000	13,516	5,758	22,274	2.47
Uruguay	0	1.61	1,194	7	1,201	0.24	1,000	0	4,505	1,320	6,825	0.76
Venezuela	2	4.84	24,820	7,464	32,284	6.35	1,000	2,000	13,516	35,477	51,993	5.78
GROUP B SUB-TOTAL	15	40.32	97,806	13,691	111,497	21.93	10,000	15,000	112,634	122,525	260,159	28.91
Benin	0	1.61	97	0	97	0.02	1,000	0	4,505	107	5,612	0.62
Cap Vert	1	3.23	5,133	228	5,361	1.05	1,000	1,000	9,011	5,891	16,902	1.88
Guinea Ecuatorial	0	1.61	400	0	400	0.08	1,000	0	4,505	440	5,945	0.66
S.Tome et Principe	1	3.23	385	0	385	0.08	1,000	1,000	9,011	423	11,434	1.27
GROUP C SUB-TOTAL	2	9.68	6,015	228	6,243	1.23	4,000	2,000	27,032	6,860	39,893	4.43
TOTAL	40	100	389,239	119,144	508,383	100	22,000	40,000	279,333	558,667	900,000	100.00

A: Panel membership.
B: Percentage of payments for annual membership and panel membership (G+H).
C: Catch (live weight) - 1987
D: Canned production (net product weight) - 1987
E: Total (C+D).
F: Percentage distribution of E.
G: Payment of $1,000 annual membership fee.
H: Payment of $1,000 for each panel membership.
I: 1/3 of (Total contribution less G+H) distributed percentage-wise according to column B.
J: 2/3 of (Total contribution less G+H) distributed percentage-wise according to column F.
K: Total (G+H+I+J)

ALTERNATIVE 1
TOTAL BUDGET (LESS FIXED BASIC FEES) DIVIDED PERCENTAGE-WISE BY GROUP
(85% FOR GROUP A, 14% FOR GROUP B, AND 1% FOR GROUP C) AND THEN CATCH & CANNING PROPORTION APPLIED

TOTAL BUDGET= $ 900,000

COUNTRY	# PANELS	PANEL FEE	MEM+PANEL FEES	CATCH (MT)	CANNING (MT)	C+C (MT)	C+C %	GROUP PERCENT	TOTAL CONTRIB	PERCENT TOTAL
Canada	2	2,000	4,000	1,279	398	1,677	0.43		6,978	0.78
Espana	4	4,000	6,000	155,793	33,500	189,293	48.46		342,096	38.01
France	3	3,000	5,000	42,000	29,100	71,100	18.20		131,240	14.58
Japan	4	4,000	6,000	34,473	0	34,473	8.82		67,208	7.47
Portugal	3	3,000	5,000	14,623	4,282	18,905	4.84		38,566	4.29
South Africa	1	1,000	3,000	5,545	361	5,906	1.51		13,486	1.50
U.S.A.	4	4,000	6,000	23,865	36,586	60,451	15.47		113,333	12.59
U.S.S.R.	2	2,000	4,000	7,840	998	8,838	2.26		19,692	2.19
GROUP A SUB-TOTAL	23	23,000	39,000	285,418	105,225	390,643	100.00	85.00	732,600	81.40
Angola	2	2,000	4,000	1,819	1,637	3,456	3.10		7,541	0.84
Brasil	2	2,000	4,000	16,240	2,499	18,739	16.81		23,199	2.58
Cote d'Ivoire	1	1,000	3,000	0	0	0	0.00		3,000	0.33
Cuba	1	1,000	3,000	7,650	1,837	9,487	8.51		12,720	1.41
Gabon	1	1,000	3,000	0	0	0	0.00		3,000	0.33
Ghana	1	1,000	3,000	33,465	0	33,465	30.01		37,286	4.14
Korea	3	3,000	5,000	7,625	0	7,625	6.84		12,812	1.42
Maroc	2	2,000	4,000	4,993	247	5,240	4.70		9,369	1.04
Uruguay	0	0	2,000	1,194	7	1,201	1.08		3,230	0.36
Venezuela	2	2,000	4,000	24,828	7,464	32,292	28.96		37,084	4.12
GROUP B SUB-TOTAL	15	15,000	35,000	97,814	13,691	111,505	100.00	14.00	149,240	16.58
Benin	0	0	2,000	97	0	97	1.55		2,127	0.24
Cap Vert	1	1,000	3,000	5,133	228	5,361	85.87		10,007	1.11
Guinea Ecuatorial	0	0	2,000	400	0	400	6.41		2,523	0.28
S.Tome et Principe	1	1,000	3,000	385	0	385	6.17		3,503	0.39
GROUP C SUB-TOTAL	2	2,000	10,000	6,015	228	6,243	100.00	1.00	18,160	2.02
TOTAL	40	40,000	84,000	389,247	119,144	508,391		100.00	900,000	100.00

This table has been slightly modified since the 1989 Commission Meeting to reflect changes in Panel Membership for France and Cuba, as well as corrections to catch figures received from Venezuela.

ALTERNATIVE 2
TOTAL BUDGET DIVIDEDBY 85%, 14% AND 1% FOR GROUP A, B AND C AND ARTICLE X OF THE CONVENTION (CURRENT SCHEME) APPLIED WITHIN EACH GROUP

TOTAL BUDGET= $ 900,000

COUNTRY	PANEL NO.	MEM + PANEL %	CATCH (MT)	CANNING (MT)	CATCH+ CANNING (MT)	CATCH+ CANNING %	MEMBER FEE	PANEL FEE	1/3(A) TOT DIST'D BY MEM+PANEL	2/3(A) TOT DIST'D BY CATCH+CAN	TOTAL CONTRIB $	TOTAL %
Canada	2	10.00	1,279	398	1,677	0.43	1,000	2,000	24,500	2,104	29,604	3.29
Espana	4	16.67	155,793	33,500	189,293	48.46	1,000	4,000	40,833	237,438	283,272	31.47
France	2	10.00	42,000	29,100	71,100	18.20	1,000	2,000	24,500	89,184	116,684	12.96
Japan	4	16.67	34,473	0	34,473	8.82	1,000	4,000	40,833	43,241	89,074	9.90
Portugal	3	13.33	14,623	4,282	18,905	4.84	1,000	3,000	32,667	23,713	60,380	6.71
South Africa	1	6.67	5,545	361	5,906	1.51	1,000	1,000	16,333	7,408	25,741	2.86
U.S.A.	4	16.67	23,865	36,586	60,451	15.47	1,000	4,000	40,833	75,826	121,660	13.52
U.S.S.R.	2	10.00	7,840	998	8,838	2.26	1,000	2,000	24,500	11,086	38,586	4.29
GROUP A SUB-TOTAL	22	100.00	285,418	105,225	390,643	100.00	8,000	22,000	245,000	490,000	765,000	85.00
Angola	2	11.54	1,819	1,637	3,456	2.84	1,000	2,000	3,846	1,896	8,742	0.97
Brasil	2	11.54	16,240	2,499	18,739	15.42	1,000	2,000	3,846	10,282	17,128	1.90
Cote d'Ivoire	1	7.69	0	0	0	0.00	1,000	1,000	2,564	0	4,564	0.51
Cuba	2	11.54	7,650	1,837	9,487	7.81	1,000	2,000	3,846	5,205	12,051	1.34
Gabon	1	7.69	0	0	0	0.00	1,000	1,000	2,564	0	4,564	0.51
Ghana	1	7.69	33,465	0	33,465	27.54	1,000	1,000	2,564	18,361	22,925	2.55
Korea	3	15.38	7,625	0	7,625	6.28	1,000	3,000	5,128	4,184	13,312	1.48
Maroc	2	11.54	4,993	247	5,240	4.31	1,000	2,000	3,846	2,875	9,721	1.08
Uruguay	0	3.85	1,194	7	1,201	0.99	1,000	0	1,282	659	2,941	0.33
Venezuela	2	11.54	34,828	7,464	42,292	34.81	1,000	2,000	3,846	23,205	30,051	3.34
GROUP B SUB-TOTAL	16	100.00	107,814	13,691	121,505	100.00	10,000	16,000	33,333	66,667	126,000	14.00
Benin	0	16.67	97	0	97	1.55	1,000	0	167	31	1,198	0.13
Cap Vert	1	33.33	5,133	228	5,361	85.87	1,000	1,000	333	1,717	4,051	0.45
Guinea Ecuatorial	0	16.67	400	0	400	6.41	1,000	0	167	128	1,295	0.14
S.Tome et Principe	1	33.33	385	0	385	6.17	1,000	1,000	333	123	2,457	0.27
GROUP C SUB-TOTAL	2	100.00	6,015	228	6,243	100.00	4,000	2,000	1,000	2,000	9,000	1.00
TOTAL	40		399,247	119,144	518,391		22,000	40,000	279,333	558,667	900,000	100.00

This table has been slightly modified since the 1989 Commission Meeting to reflect changes in Panel Membership for France and Cuba, as well as corrections to catch figures received from Venezuela.

ALTERNATIVE 3
CURRENT CONTRIBUTION SCHEME, BUT PRORATED ACCORDING TO 85%, 14% AND 1% FOR GROUP A, B, AND C, RESPECTIVELY
(RAISING FACTORS: 1.28 FOR GROUP A; 0.48 FOR GROUP B; AND 0.23 FOR GROUP C)

TOTAL BUDGET= $ 900,000

COUNTRY	PANEL #	MEMBER+ PANEL %	CATCH (MT)	CANNING (MT)	CATCH+CAN (MT)	CAT+CAN %	MEMBER FEE	PANEL FEE	1/3 DIST'D BY MEM+PANEL	2/3 DIST'D BY CATCH+CAN	TOTAL NORMAL CONTRI.	TOTAL CONTR. (NORM.CONTRI. X FACTORS)	TOTAL CONTRI. %
Canada	2	4.84	1,279	398	1,677	0.33	1,000	2,000	13,516	1,843	18,359	23,410	2.60
Espana	4	8.06	155,793	33,500	189,293	37.23	1,000	4,000	22,527	208,016	235,543	300,343	33.37
France	3	6.45	42,000	29,100	71,100	13.99	1,000	3,000	18,022	78,132	100,154	127,707	14.19
Japan	4	8.06	34,473	0	34,473	6.78	1,000	4,000	22,527	37,883	65,410	83,404	9.27
Portugal	3	6.45	14,623	4,282	18,905	3.72	1,000	3,000	18,022	20,775	42,796	54,570	6.06
South Africa	1	3.23	5,545	361	5,906	1.16	1,000	1,000	9,011	6,490	17,501	22,316	2.48
U.S.A.	4	8.06	23,865	36,586	60,451	11.89	1,000	4,000	22,527	66,430	93,957	119,806	13.31
U.S.S.R.	2	4.84	7,840	998	8,838	1.74	1,000	2,000	13,516	9,712	26,228	33,444	3.72
GROUP A SUB-TOTAL	23	50.00	285,418	105,225	390,643	76.84	8,000	23,000	139,667	429,281	599,948	765,000	85.00
Angola	2	4.84	1,819	1,637	3,456	0.68	1,000	2,000	13,516	3,798	20,314	9,838	1.09
Brasil	2	4.84	16,240	2,499	18,739	3.69	1,000	2,000	13,516	20,592	37,109	17,972	2.00
Cote d'Ivoire	1	3.23	0	0	0	0.00	1,000	1,000	9,011	0	11,011	5,333	0.59
Cuba	1	3.23	7,650	1,837	9,487	1.87	1,000	1,000	9,011	10,425	21,436	10,382	1.15
Gabon	1	3.23	0	0	0	0.00	1,000	1,000	9,011	0	11,011	5,333	0.59
Ghana	1	3.23	33,465	0	33,465	6.58	1,000	1,000	9,011	36,775	47,786	23,144	2.57
Korea	3	6.45	7,625	0	7,625	1.50	1,000	3,000	18,022	8,379	30,401	14,724	1.64
Maroc	2	4.84	4,993	247	5,240	1.03	1,000	2,000	13,516	5,758	22,274	10,788	1.20
Uruguay	0	1.61	1,194	7	1,201	0.24	1,000	0	4,505	1,320	6,825	3,306	0.37
Venezuela	2	4.84	24,820	7,464	32,284	6.35	1,000	2,000	13,516	35,477	51,993	25,181	2.80
GROUP B SUB-TOTAL	15	40.32	97,806	13,691	111,497	21.93	10,000	15,000	112,634	122,525	260,159	126,000	14.00
Benin	0	1.61	97	0	97	0.02	1,000	0	4,505	107	5,612	1,266	0.14
Cap Vert	1	3.23	5,133	228	5,361	1.05	1,000	1,000	9,011	5,891	16,902	3,813	0.42
Guinea Ecuatorial	0	1.61	400	0	400	0.08	1,000	0	4,505	440	5,945	1,341	0.15
S.Tome et Principe	1	3.23	385	0	385	0.08	1,000	1,000	9,011	423	11,434	2,580	0.29
GROUP C SUB-TOTAL	2	9.68	6,015	228	6,243	1.23	4,000	2,000	27,032	6,860	39,893	9,000	1.00
TOTAL	40	100.00	389,239	119,144	508,383	100.00	22,000	40,000	279,333	558,667	900,000	900,000	100.00

This table has been slightly modified since the Commission Meeting to reflect changes in Panel Membership for France and Cuba, as well as corrections to catch figures received from Venezuela.

Addendum 1 to Appendix 4 to Annex 7

Statement by Korea on the New Formula for the Calculation of Contributions

First of all my delegation wishes to express its appreciation to the Secretariat for Document COM/89/19 which served as a good reference in studying the matter we are going to discuss in this Working Group.

According to this document, it is very clear that most of the international fisheries organizations have adopted the system of calculation of contributions based on the amount of catches of each member country, either in part or in total.

My delegation holds the position expressed in previous meetings that it is fair and rational to calculate the contributions of each member country according to the fishing activities as outlined in the Convention, in that ICCAT is a fisheries organization and tuna are highly migratory species.

The distinction between industrialized and developing countries as presented by Ivory Coast is not acceptable to my delegation because, as Spain pointed out, it would not help to redistribute justly the contributions, taking into account the differences existing between the countries that would be classified in one group or another.

In consideration of the different economic situations some member countries are experiencing, my delegation is willing to participate in exploring other alternatives without any commitment at this meeting.

However, my delegation wishes to emphasize that in any solution to the financial problem facing ICCAT, whether it leads to an amendment or not, much more importance should be given to the fishing activities of each member country than other factors, even though certain special consideration could be given for some limited number of countries which have economic difficulties.

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

Madrid, November 1-10, 1989

TABLE OF CONTENTS

1. OPENING OF THE MEETING

Because of the vacancy in the SCRS Chairmanship, the meeting of the Standing Committee on Research and Statistics was opened by Mr. S. Makiadi J. Lopes, the Chairman of the Commission. Mr. Makiadi welcomed all the SCRS participants and commended the work which has been carried out by scientists during the species groups and throughout the year on the various aspects of tuna research.

2. ELECTION OF CHAIRMAN

Mr. Makiadi asked the opinion of the national scientists as to whether the elected Chairman would only preside over the 1989 SCRS session, with the understanding that another election would be held at the end of the SCRS meeting, or whether the person elected would also serve for the 1990-1991 biennial period. France proposed electing a Chairman at this session to preside over the 1989 session and who would then serve as Chairman for the 1990-1991 biennial period. This proposal was accepted.

Nominations were made by secret ballot and Messrs. A. Fonteneau (France), R. Conser (U.S.A.) and J. L. Cort (Spain) were nominated. However, Dr. Fonteneau declined nomination since he had already served two terms as SCRS Chairman and he believed that an opportunity should be given to a younger scientist.

Dr. José Luis Cort (Spain) was elected SCRS Chairman by acclamation. Dr. Cort assumed the chair and thanked all the delegates present for their support and confidence in him.

3. ADOPTION OF AGENDA AND ARRANGEMENTS FOR THE MEETING

The Agenda, circulated prior to the meeting, was reviewed and adopted without any changes and is attached herewith as Appendix 1. The scientists nominated to serve as rapporteurs are as follows:

For Agenda Item 10:

Tropical Tunas	A. Fonteneau (General), P. Pallarées (YFT), J. Pereira (BET), J. Arriz (SKJ)
ALB - Albacore	F. X. Bard
BFT - Bluefin	D. Clay (assisted by J. L. Cort and B. Liorzou)
BIL - Billfish	E. Prince
SWO - Swordfish	S. Kume
SBF - Southern bluefin	S. Kume
SMT - Small tunas	W. Nelson
All other items (except 10)	P. M. Miyake

4. 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.

5. ADMISSION OF OBSERVERS

The observers from the non-member countries and international organizations listed in the List of Participants (Appendix 2) were introduced and admitted.

6. ADMISSION OF SCIENTIFIC PAPERS

The Committee reviewed the papers submitted to the Committee. It was recognized that all the scientific papers were presented before the deadline dates established and were accompanied by the required number of copies. Hence, all the documents were admitted to the 1989 SCRS. The List of SCRS Documents is attached as Appendix 3.

7. REVIEW OF NATIONAL FISHERIES AND RESEARCH PROGRAMS

7.1 ANGOLA - No report was submitted.

7.2 BENIN - No report was submitted.

7.3 BRAZIL -No report was submitted.

7.4 CANADA

The Canadian nominal catch of Atlantic bluefin tuna in 1988 was 2,788 fish weighing 392 MT. This represents the greatest number of bluefin landed by Canadian fishermen in more than twenty years. This substantial increase is primarily the result of catches of medium-sized fish off southwest Nova Scotia (between Browns Bank and the northeast peak of Georges Bank - averaging 173 kg) and the Virgin Rocks area (central Grand Banks of Newfoundland - averaging 327 kg).

Of the bluefin landed, 1490 were caught by offshore longline vessels under charter to two Canadian companies. This was the second year of this experimental charter agreement. Fishing effort in this fishery was directed towards tuna species which do not have catch limits (i.e., bigeye, albacore and yellowfin) due to the 35 MT by-catch limit (per vessel) for bluefin tuna. The bluefin landed in this fishery were considerably smaller (average weight 69.7 kg) than those landed by the traditional inshore fisheries.

The Canadian nominal catch of swordfish in 1988 was 705 MT, taken mainly by the traditional longline fishery with minor catches by the harpoon fishery (18 MT) and the offshore longline fishery (16 MT). The swordfish landed in the fishery off Nova Scotia (average 37.8 kg dressed weight) were smaller than those landed in the fishery off the Grand Banks of Newfoundland (57.2 kg dressed).

During the period 1985 to 1988, the mean catch of bluefin per vessel day in the traditional fisheries of the Gulf of St. Lawrence appears to have stabilized at near the present low level. In 1988, two different areas had successful bluefin fisheries. These very successful fisheries have encouraged the implementation of a new management plan for 1989. This new management plan effectively places area quotas on the Canadian fishery in an attempt to harvest bluefin in each geographically separate fishery.

The provisional Canadian bluefin landings for 1989 are 573 MT. Included in this are 17 MT of bluefin confiscated by enforcement personnel, legal action pending.

This represents the largest catch (weight) of bluefin by Canada since 1977 when 668 MT were caught and the first time that landings were limited by the ICCAT conservation measures setting up a monitoring level. This increase is largely due to the substantial catch (158 MT) of medium-sized bluefin from southwestern Nova Scotia and eastern Newfoundland.

The provisional nominal landings of swordfish are more than 435 MT, the fishery is still in progress.

7.5 CAPE VERDE

In 1988, 1,257 small boats, 57 baitboats without freezers and 1 freezer-equipped baitboat fished for tuna.

The total catch of tunas was 4,290 MT, of which 1,840 MT were taken by the baitboats. The 1988 catch was lower as compared to 1987.

Size sampling and collection of catch and effort statistics continued as in the past.

7.6 COTE D'IVOIRE

Côte d'Ivoire no longer has a tuna fleet. The foreign fleets (French, Spanish, Japanese, and Norwegian purse seiners and Ghanaian baitboats) are developing an important fishery in the east Atlantic which lands or transships around 100,000 MT/year at the fishing port of Abidjan. This consequently entails a significant change for the CRO as regards the collection, coding and acquisition of logbooks from all these tuna vessels as well as the taking size measurements of tunas (more than 60,000 individuals) and billfish from the artisanal fishery.

In 1988, there were several transatlantic tag recoveries on yellowfin tuna. There were two other tags which had remained at sea for a long period (four and five years).

The CRO of Abidjan actively participated in the ICCAT Yellowfin Year Program and the Program of Enhanced Research for Billfish.

7.7 CUBA - No report was submitted.

7.8 EQUATORIAL GUINEA - No report was submitted.

7.9 FRANCE

In 1988, the total catch of tunas by the French fleet amounted to 50,700 MT, of which 41,700 MT were of tropical tunas taken by French baitboats and purse seiners off west Africa; the rest was comprised of temperate tunas taken in the Mediterranean and in the northeast Atlantic.

Fishing effort for the tropical fleet remained stable, but its total catch increased slightly. A major part of the purse seiners continue to operate, however, in the Indian Ocean.

In the northeast Atlantic, the development of new fishing methods, (gillnet and paired pelagic trawls) was confirmed, although catches by these methods were only slightly higher in 1988 (750 MT for gillnets, 1,700 MT for pelagic trawls) with a still low nominal effort (20 gillnet boats, 27 paired trawls and only 11 traditional trollers).

Research on tropical tunas is carried out in collaboration with Senegal, Côte d'Ivoire and Venezuela, thanks to the ORSTOM scientists working in the research centers of these countries. There was particular emphasis on yellowfin data as the Yellowfin Year Program reaches its final phase.

A one-year research program, co-financed by the EEC and carried out jointly by IFREMER and the IEO, began in June, 1989, to study the interaction of different surface gears in the Bay of Biscay.

7.10 GABON - No report was submitted.

7.11 GHANA - No report was submitted.

7.12 JAPAN

In 1988, the total Japanese catch of Atlantic tuna and billfish amounted to 37,500 MT, which was taken by two gear types: longline and purse seine. The longline catch of 31,700 MT, or 85% of the total, consisted mainly of bigeye tuna (20,000 MT), followed by yellowfin tuna (3,000 MT) and then by bluefin tuna, southern bluefin tuna and swordfish. Two purse seiners in the Gulf of Guinea harvested 5,800 MT of tropical tunas (yellowfin and skipjack). These catches were comparable to those of the previous two years.

Japanese fishermen have been under national measures relating to the ICCAT regulations. As regards the bluefin tuna regulations, governmental patrol boats have been dispatched every year to the Atlantic, especially to the Mediterranean Sea during May-July, to monitor the longline fleet. Also, the number of longline vessels in the northwest Atlantic was limited to comply with the bluefin catch limit.

The collection and compilation of Atlantic tuna fishery data and biological sampling has been carried out by the Far Seas Fisheries Research Laboratory. The same laboratory has also been conducting scientific research on the biology and population dynamics of tunas. Current research activities are centered on stock assessment studies on bluefin and bigeye tunas and swordfish, and the results have been reported to the SCRS. Research efforts in 1989 were also focused on the interim Albacore Workshop and the Final Meting of the Yellowfin Year Program.

7.13 KOREA

The 1988 total catch of tuna and tuna-like fishes amounted to 7,801 MT, taken by 29 longliners, which was similar (about 2.3 percent increase) to the 1987 catch. Bigeye tuna remained the major species in 1988 and comprised 63 percent (4,919 MT) of the total catch. Yellowfin and albacore catches amounted to 1,368 MT and 197 MT, respectively. There have been no changes in fishing strategy and grounds for the Korean tuna longliners in recent years.

The National Fisheries Research and Development Agency (NFRDA) has been in charge of collecting and processing the tuna fishing data. Catch and effort data as well as size data on tuna and related species for 1988 were submitted to ICCAT.

7.14 MOROCCO

In 1988, the total tuna catch by the Moroccan coastal fleet was about 4,117 MT of which 75 percent was landed in Atlantic ports and 25 percent in Mediterranean ports. The two traps in operation to the north of Morocco caught 139 MT of tunas.

The tuna fleet is generally comprised of small longliners using gillnets. The purse seiners also fish for tunas in addition to other pelagic species, such as sardines, anchovies, mackerels.

The "Institut Scientifique des Pêches Maritimes" (ISPM) is in charge of collecting statistics on tunas and tuna-like species at the different landing points.

7.15 PORTUGAL - See National Report of Portugal.

7.16 SAO TOME & PRINCIPE - No report was submitted.

7.17 SOUTH AFRICA - No report was submitted.

7.18 SPAIN

Spanish catches of tunas and tuna-like species amounted to 157,291 MT in 1988, and remained at the average level of the last four years. The change in fishing strategy of the tropical purse seine fleet caused a decrease of 30 percent in yellowfin catches and an increase of the same magnitude in the catches of skipjack. Likewise, catches of swordfish rose due to the fact that during 1988 the fleet expanded towards the south Atlantic. The catches of other species showed no noticeable changes.

Research activities were carried out mainly within the Yellowfin Year Program and the joint IFREMER-IEO program financed by the EEC, on the albacore fishery in the Cantabrian Sea, and in particular, on the problems of interaction of the surface fleets. Tagging programs also continued and 1,650 fish (bluefin, albacore and skipjack) were tagged in 1988 and 3,128 fish were tagged in 1989.

7.19 URUGUAY - No report was submitted.

7.20 U.S.A.

Total reported U.S. landings of tuna and tuna-like fishes in 1988 were 29,500 MT. This represents an increase of 4,000 MT over 1987. This is primarily attributed to an increase of 2,452 MT in yellowfin landings which amounted to 9,447 MT, and to a 1,000 MT increase in swordfish landings, which totaled 5,891 MT. The U.S. longline fishery for yellowfin in the Gulf of Mexico continued to expand in 1988, accounting for 76 percent (7,213 MT) of the total yellowfin landings.

Bluefin landings decreased slightly by 61 MT to 1,290 MT. Skipjack landings decreased by 614 MT to 36 MT, while bigeye landings decreased by 306 MT to 702 MT.

Major research activities on large pelagics in 1988 and 1989 included monitoring of landings and size of swordfish, progress in relating broad-scale swordfish distribution to environmental factors, conduct of the 1989 NMFS swordfish assessment, continuation of port and tournament sampling for billfishes and other pelagics, coordinating increased efforts related to the ICCAT Enhanced Research Program for Billfish, development of indices of abundance for ICCAT SCRS bluefin assessments and bluefin larvae surveys. The cooperative tagging program tagged and released 5,470 billfish and 549 tunas in 1988.

7.21 U.S.S.R.

In 1988, the total U.S.S.R. catch of tunas and related species amounted to 22,869 MT. The species composition was as follows: 3,207 MT of yellowfin tuna, 1,822 MT of skipjack tuna, 1,077 MT of bigeye tuna, 1,707 MT of Atlantic black skipjack, 5,638 MT of frigate tuna, 357 MT of bullet tuna, 32 MT of marlins, 4 MT of sailfish, 8,882 MT of Atlantic bonito and 143 MT of king mackerel.

In the eastern tropical Atlantic, 2,158 MT of tunas were caught by longline (mainly yellowfin and bigeye); 5,187 MT were caught by purse seine (yellowfin tuna, skipjack, bullet tuna, Atlantic black skipjack and frigate tuna); and 15,524 MT of tunas were taken by trawl (bonito, frigate tuna, Atlantic black skipjack and king mackerel).

Scientific research centered on the study of yellowfin tuna and skipjack biology and distribution. The MSY of bigeye tuna was estimated and new data on the biology and distribution of small tunas (targeted by trawl) were obtained. Two scientific cruises were carried out. Four scientists worked on-board commercial vessels as observers.

7.22 **VENEZUELA** - No report was submitted.

7.23 **SENEGAL** (Observer)

In 1988, the tuna fleet based at Dakar was comprised of 15 French, 2 Spanish, 2 Cape Verdian and 3 Senegalese baitboats and 3 Senegalese purse seiners. The total landings in Dakar of this fleet reached 11,578 MT. These landings are higher than those observed for 1987 (+5.5 percent, or 603 MT). The number of boats increased from 22 to 1987 to 25 in 1988.

The foreign fleet not based in Dakar, mainly comprised of 10 French and 19 Spanish purse seiners, landed and transshipped 29,732 MT, which was an increase of 10,573 MT.

Landings and transshipments of all the fleets combined in Dakar reached 41,303 MT in 1988, which was 37 percent more than in 1987.

The total catch of small tunas amounted to 446 MT in 1988, which is comparable to the 1987 catch.

The overall catch of sailfish taken by the artisanal and by the sport fisheries remained stable in 1988 with a total of about 500 MT and 50 MT, respectively (these figures are still provisional).

The collection of tuna statistics and sampling at the port of Dakar in 1988 was carried out normally. Research carried out in 1988 by the CRODT centered on:

-- The finalization of the Yellowfin Year Program
-- The study on the relationship of environmental factors and tuna behavior
-- The study of small tunas and sailfish stocks off Senegal
-- The study of the sailfish sport fishery at Dakar

This work was the subject of several papers presented to the SCRS.

7.24 TAIWAN (Observer)

In 1988, there were no significant changes in the Taiwanese longline fishery in the Atlantic as regards the number or type of vessels or the amount of catches from 1987 activities.

The 1988 total catch was estimated at about 28,595 MT, of which about 4,600 MT were from the North Atlantic and about 24,000 MT were from the south Atlantic. Of these, albacore is still the dominant species with 23,218 MT (81.2 percent of the total production in weight). In particular, albacore comprised about 98 percent of the North Atlantic catch. Other species caught were yellowfin tuna (4.84 percent), bigeye tuna (4.55 per cent) and others (9.41 percent) (see SCRS/89/106).

The Institute of Oceanography of the National Taiwan University is still in charge of scientific reserach and the processing of catch statistics. Currently, studies on effort standardization, construction of catch-at-age from catch-at-length data and assessment of the albacore stock are being carried out for the Albacore Workshop.

8. REPORT OF THE ALBACORE WORKSHOP

The Report of the Albacore Longline Data Preparatory Meeting (Taipei, Taiwan, July 1989) (SCRS/89/15, contained in Collective Volume, XXXI) and the Report of the Albacore Workshop (Madrid, Spain, September 1989) (SCRS/-89/16, also in Collective Volume, XXXI) were presented by the Convener of both meetings, Dr. R. Conser.

The Longline Data Preparatory Meeting had a two-fold purpose: (1) to review the entire longline data base for accuracy; and (2) to examine the discrepancies found in the size frequencies between the Taiwanese at-sea sampling program and the ICCAT port sampling program. While there were no discrepancies found in the basic data, some clarification was required on the procedures used to summarize Taiwanese data for submission to ICCAT. Once this clarification was made, the data base was found to be quite adequate and sufficient.

At the 1989 Albacore Workshop, the entire data base was reviewed critically for creating the catch-at-size data base. The time series selected for the data base was 1975 to the present. As the data are adequate for the North Atlantic only and the length-weight relationship is only available for the North, the catch-at-size data base was established for North Atlantic only. Also, the catch-per-unit-of-effort data series was reviewed.

The Workshop also studied the tagging data, and the use of various biological parameters (including length-weight relationship, growth, natural mortality ranges) was discussed and agreed upon. Considerable discussion was held on fishery interactions at various levels.

As regards the status of stocks, the north-south two-stock hypothesis was reconfirmed. However, the question of movement of fish between the South Atlantic and the Indian Ocean requires further investigation. The methods to develop age-specific abundance indices and standardization of the indices were also discussed.

Research recommendations were made for the short- and long-term.

The SCRS Chairman noted that considerable progress had been made by these two meetings and thanked all the scientists for their hard work. He also thanked the National Taiwan University for hosting the Longline Data Preparatory meeting. He noted that stock assessments have to be made as requested by the Commission.

The observer from the European Economic Community (EEC) explained the joint research program to study the fishery interaction of albacore, which is currently in process for the North Atlantic by France and Spain, with partial funding by the EEC.

The Reports of both meetings, with some minor corrections to tables, were adopted by the SCRS.

9. REPORT OF THE FINAL MEETING OF THE YELLOWFIN YEAR PROGRAM

The Report of the Final Meeting of the Yellowfin Year Program (COM-SCRS/89/12) was accepted by the Committee and referred to Agenda Item 11 dealing with the Yellowfin Year Program.

10. REVIEW OF CONDITIONS OF STOCKS:

YFT - Y E L L O W F I N   T U N A

YFT-1. DESCRIPTION OF THE FISHERIES

Yellowfin tuna fishing is carried out in the entire Atlantic, between 45°N and 40°S in tropical waters. The major part of the catches (+80 percent) are taken by surface gears (purse seine, baitboat, hand-line); the remainder are taken by longline.

The baitboat fisheries are mainly directed at juveniles which are found in shallow waters in mixed schools with skipjack in the west Atlantic and with skipjack and juvenile bigeye in the east Atlantic.

The purse seine fleets fish close to the coast on the same juvenile concentrations which are taken by baitboat, whereas in the east Atlantic since 1975 they extended their fishing area towards offshore areas near the Equator where they fish large yellowfin.

The intertropical area constitutes the traditional longline fishing area. This fishery has lost importance since the 1970's and now only takes about 5 percent of the total yellowfin catch. On the other hand, a new U.S. surface longline fishery using live bait is developing in the Gulf of Mexico since 1986 and presently its catches represent 30 percent of the total west Atlantic catch. Figuress 1, 2, and 3 shows the location of the principal fisheries and the size distributions of their catches in recent years.

YFT-1.a Catches

Table 1 and Figures 4 and 5 show the development of the catches by gear for the east and west Atlantic, from 1959 to 1988.

For the total Atlantic, a continuous increase in catches can be noted up to 1983 when catches reached 160,400 MT, followed by a decline in 1984 and a later recovery in the following years.

As regards the east Atlantic, a marked increasing trend in the catches is observed since the early 1970's, reaching 134,800 MT in 1981. This high catch rate was maintained until the important decline in 1984. The catch made a rapid recuperation in 1985 and the recovered level was maintained in 1986 and 1987. In 1988, there was a decline of 15 percent due to the decrease in catches of the Spanish purse seine fleet. Because of the high skipjack catches of this fleet in 1988 (48,800 MT vs. 34,400 MT in 1987) the decline in yellowfin catches can perhaps be attributed to the change in the target species of this fleet in 1988.

The recent changes in the catches in the east Atlantic are closely related to the fluctuation in the purse seine catches. Baitboat catches have remained stable at about 15,000 MT.

Longline catches have shown a continuous decline since 1972, and represented about 20 percent of the total catch vs. 5 percent in recent years.

The total catch of the west Atlantic has been maintained. The slow declining trend of the purse seine catches is compensated by the increase in the longline catches, in particular those of the U.S. longline fleet which, in 1988, landed 33 percent of the total catch in this area of the Atlantic.

YFT-1.b Fishing effort

In the east Atlantic, fishing effort is exerted mainly by the purse and baitboat fleets. Table 2 and Figures 6 and 7 show the development of nominal effort, expressed in fishing vessel carrying capacity, and nominal standardized effort, exerted by these fleets. The increase in the purse seine fleets up to 1983 was reflected in an increasing trend in effort in early years. The rapid shifting of the FIS fleet to the Indian Ocean in 1987 and the less drastic, but continuous, movement of the Spanish fleet to the Indian Ocean caused a significant decline in nominal effort.

In comparing these values of nominal effort with the searching time for schools, the vessel carrying capacity seems to be a good indicator of effective effort. However, the data provided by the observers during the Yellowfin Year Program, compared with data from the fishing logbooks, show increases in the fishing efficiency of the purse seiners in recent years. Therefore, the values of effective effort used up to now, which are not corrected, could be underestimated. Figure 8 shows this concept and its possible effects.

As concerns the west Atlantic, nominal effort (measured in vessel carrying capacity) is maintained for the Venezuelan purse seine fleet.

Effort data for 1986 and 1987 are available for the U.S. longline fleet. Although this series is short, the values do not seem to correspond to the development of the catches during these years. One probable explanation might be that part of the catches are from the longline fleet directed at swordfish which catches yellowfin as by-catch and therefore the existing values of effort could be under-estimated.

Other data available are the effort values, in fishing days, of the Venezuelan purse seine, baitboat and longline fleets, although the data series is too short (1985-87) to be able to make conclusions on its development.

YFT-2. STATE OF THE STOCKS

The two hypotheses on yellowfin stock structure which have have been considered each year (the existence of one stock in the Atlantic or two stocks, one in the east and the other in the west Atlantic, separated at about 30°W) were discussed again, in light of the recoveries of five large yellowfin in the east Atlantic which had been tagged off the east coast of North America. These tagged fish showed rapid transatlantic movement and they were all recaptured by surface gear seems. These transatlantic recoveries confirmed the traditional hypothesis based on longline CPUE, of the existence of mixing between large yellowfin of the east and west Atlantic, although the mixing rate has not yet been determined. Perhaps this mixing is distinct between surface yellowfin taken by purse seine and deep yellowfin taken by longline.

This possibility, which for the moment is difficult to include in our analysis, should be taken into account in applying analytical methods of evaluation since it would certainly modify the age structure of catches of large yellowfin.

As regards young yellowfin, recoveries have always taken place on the same side of the ocean where the fish were tagged. This would indicate a sedentary nature of juveniles in the east as well as in the west Atlantic.

For the east Atlantic, the homogeneity of the size classes seems to indicate one stock unit. On the contrary, for the west Atlantic the heterogeneity of the size distributions of the different fisheries, the geographic remoteness of the fishing areas (Gulf of Mexico, Venezuela and Brazil) and the lack of the tag recoveries between fisheries, seem to indicate the existence of three components of the stock.

In spite of the evidence from transatlantic recoveries which is contrary to the hypothesis of two independent and isolated stocks on both sides of the Atlantic, analyses were only presented on the state of the east Atlantic stock.

YFT-2.a East Atlantic stock

Document SCRS/89/48 shows overall effective CPUE (Figure 9) and effective CPUE for large yellowfin tunas (Figure 10) for the FIS and Spanish purse seine fleets for the period 1980-1988. In both, a decline in catch rates for 1983-84 and an important recuperation, to levels higher than in years prior to 1983, can be seen starting in 1985 and which has been maintained until 1988. This trend in catch rate is more obvious for individuals over 30 kg.

Document SCRS/89/49 gives a production model (Figure 11) based on these indices of abundance. The model fitted to the data of recent years (1980-88) shows a rapid recuperation of the stock in 1985 and that the stock size has been maintained since then at the equilibrium curve estimated by the model, with yield close to MSY (117,000-129,000 MT) and effort below F_{opt} (62,000 to 63,000 fishing days).

The fishing mortality vectors obtained from cohort analysis (Figure 12) show a period of high exploitation during the 1980-83 period, with fishing mortality rates of purse seiners close to .4 on the older age-classes, an important decline in fishing mortality (F=.12) exerted on the adult stock in 1984, and a period of moderate exploitation with F values estimated at about .23. The fishing mortality values exerted on juveniles (1-2 years) were maintained in 1984 at the average value of the previous period (F=.29), then declined slightly (F=.27) for the recent period.

The spawning biomass, which had declined since 1975 to an average of 160,000 MT during the period of high exploitation, has recovered to the level of the 1960's at about 190,000 MT.

The low mortality exerted on the adult stock in 1984, the rapid recovery of the stock which is observed from the production model in 1985, and the data provided within the Yellowfin Year Program on the oceanographic anomaly "El Niño" which occurred in 1984 in the Gulf of Guinea area, seem to indicate that there were changes in catchability of large yellowfin tunas to the purse seine resulting in a decline of the CPUE values. Consequently, that year is not representative of the stock abundance. In the same way, the non-availability of large yellowfin to the purse seine caused a change in the strategy of the fleet which has left the traditional yellowfin areas to target skipjack concentrations. These facts explain the decline in yellowfin catches in 1984.

On the other hand, the stable longline CPUE during the period in question shows that the changes in catchability were exclusive to the purse seiners.

Consequently, from the results of the evaluations, we can conclude that at present the stock is in a state of moderate exploitation, although the high exploitation of juveniles is being maintained. The potential benefit that can be derived from increasing the size at first capture while maintaining the current level of effort would be considerably less than that derived during the state of over-exploitation in 1980-83 (Figure 13).

YFT-2.b West Atlantic stock

In recent years data have been collected by national and well as international organizations (IATTC) on the principal fleets which operate in this part of the Atlantic. Therefore, at present, there is sufficient basic information available to analyze the state of the stock. However, these data still has not been processed, so for the moment they cannot be used to evaluate the state of the stock.

YFT-2.c Single Atlantic stock

For the same reasons as mentioned above, no analyses have been carried out based on the single stock hypothesis.

YFT-3. EFFECTS OF CURRENT REGULATIONS

In 1973, ICCAT adopted the 3.2 kg minimum size regulation for yellowfin tuna, allowing only for a maximum of 15 percent per trip in number of fish of yellowfin weighing less than 3.2 kg. This would result in an increase in the yield per recruit.

Apparently this measure has not reduced fishing mortality of young yellowfin tuna.

YFT-4. RECOMMENDATIONS

YFT-4.a Statistics

The multi-species sampling system for the east Atlantic put into effect in Venezuelan ports since 1987 has enabled us to verify the reliability of the species composition declared in the fishing logbooks. There were biases detected in the species compositions of young yellowfin and skipjack tunas reported by the vessel captains for the east Atlantic as well as for the west Atlantic. However, the low sampling coverage rate does not allow us to establish a correction method similar to that developed for the east Atlantic by the Working Group on Juvenile Tropical Tunas. Stratified sampling, by gear, is recommended, as well as an increase in the current sampling coverage in order to be able to develop a general correction method of the species composition of the surface catches.

In the same way, it is recommended that logbook data corresponding to 1988 for the Venezuelan fleets be made available to ICCAT, such as those which were provided for earlier years.

YFT-4.b Research

The data compiled during the Yellowfin Year Program, from observers on board as well as from the fisheries, have shown significant changes in the fishing strategy of the purse seine fleets in recent years. In the majority of the cases, the effects of these changes on the abundance indices which are obtained from the fishery are difficult to measure. Given the importance of these indices in the analyses of the state of the stocks, the major part of the recommendations which are included in this report are directed in this sense. It is recommended that:

i) Work on estimating effective effort of yellowfin that takes into account the probable increases in individual fishing efficiency of the purse seine vessels in recent years.

ii) Investigate the CPUE values to use as indices of abundance for the east as well as the west Atlantic. For the east Atlantic the surface thermocline seems to define two units for the adult stock, clearly differentiated. Therefore, the Group recommends that work be carried out to prepare an integrated purse seine-longline index for recent years.

iii) It has been shown that the changes in environmental conditions, especially those which affect the depth of the thermocline, can have an effect on the catchability of yellowfin to purse seine. Therefore, it is recommended that the environmental parameters be monitored which could be necessary in interpreting abnormal changes in the CPUE values such as was the case of the 1984 anomaly in the equatorial area.

iv) The Group recommends that a detailed study be carried out, based on the data from the fishing logbooks, on the species composition and size distributions of the schools associated with aggregating devices.

v) In the same way, it is recommended that stock evaluations be carried out using the so-called integrated calibration methods.

vi) The lack of processed data from the west Atlantic fisheries has made it impossible to carry out yellowfin stock analyses for the west Atlantic. The Group recommended that a meeting be held for the west Atlantic, whose objectives would be: (a) to analyze the existing data and develop a good data base; (b) to define the indices and parameters necessary to carry out an evaluation; and (c) to evaluate the stock.

vii) The cohabitation of the longline fleets targeting yellowfin and swordfish in the same fishing areas is very frequent in the west Altantic. The taking of yellowfin as by-catch by vessels which usually fish swordfish could result in underestimates of the available effort values. Therefore, it is recommended that longline effort data for the west Atlantic be reviewed in order to detect and correct any possible bias. A possible method to estimate the total effort would be from CPUE of vessels which clearly target yellowfin and calculating yellowfin effort by dividing the total catch by this CPUE.

YFT-4.c Management

The recent changes in the fisheries resulted in a continued decline in nominal and effective effort for the east Atlantic. Consequently, the potential benefit of applying the current regulatory measures has changed with respect to previous states of overfishing. In this situation, the potential advantages of new management measures would not justify a modification of existing measures.

BET - B I G E Y E T U N A

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 only known nursery, which is located in the Gulf of Guinea.

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 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.

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 medium or adult bigeye tuna (average weight of 30 kg). The Dakar-based baitboats, which fish off Senegal and Mauritania, exploit medium-sized bigeye (average weight of 18 kg).

In the eastern tropical Atlantic, the purse seine and baitboat fleets take small bigeye tuna (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.

Changes in annual catches of bigeye, by country and gear, during the 1958-87 period, as well as the preliminary estimates for 1988 are shown in Table 3 and Figure 14.

Changes in annual catches, areas of operations and size ranges characteristic of each gear during the period 1975-1988 are shown in BET-Figure 2.

Catches increased up to 1974 (63,600 MT), then showed a decreasing trend until 1979 (45,100 MT). In the following years, the catch gradually increased and is still at a high level, reaching a maximum of 74,300 MT in 1985. The total catch decreased since 1986, reaching in 1988 the lowest level registered for the recent period, 44,100 MT. This decrease of 30,000 MT compared to the 1985 catch is mainly due to a decline in the longline catch, but a decrease has also been observed in the surface gears.

The fluctuations in catches between years basically reflect the longline operations, as their catches make up more than 60 percent of the total since the beginning of the fishery. As regards surface gears, baitboat catches have increased in recent years reaching a peak in 1985 (17,600 MT) and then decreased continuously to 1988, when the catch of 8,300 MT was the lowest for the last 20 years. This reflects a decrease in the Portuguese and Canary Island baitboat catches.

A sharp decrease in longline catches observed since 1986 reflects the departure of part of the Japanese and Korean fleets from the Atlantic in 1986 and 1987, the number of boats was stable in 1988. The decrease is most likely related to the variations in local hydrological conditions, rather than to a drop in stock abundance. Purse seine catches also declined in the recent period, reflecting the decrease in purse seine effort which occurred since 1984.

BET-2. STATE OF THE STOCKS

The Committee analyzed the state of the bigeye stock, based on the hypothesis of a single stock in the entire Atlantic. The single stock hypothesis seems the most likely, according to the fisheries data, the geographic distribution of the species and the results of tagging, since the known spawning areas are located in the tropical area between 15°N and 15°S, and 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. The CPUE indices from surface fisheries are not used for the bigeye stock. Since these 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.

A detailed analysis of (adult) bigeye abundance for the 1973-75 period showed that the strong CPUE observed for longliners in 1974 was definitely related to a temporary increase in the catchability of the adult stock, most likely provoked by an anomaly in oceanographic conditions, and not by a sharp increase in the abundance of the species. This bias in the CPUE caused by the environmental anomaly had led us to think that the 1974 effective effort had decreased 10 percent compared to 1973, while the effective effort had in fact increased around 50 percent. The exact level of effective effort exerted in 1974 does not in any way change the conclusions of the production model. The problem of the CPUE of this year is of particular interest, however, but it is exemplary of the effects of catchability possibly being temporarily increased by the environment (Figure 16).

The CPUE of the seasonal fisheries of the northeastern Atlantic islands only reflects the local abundance of a fraction of the stock, and is subject to variations caused by local hydrological conditions. Although the FIS baitboat fishery is seasonal, its CPUE seems to be less influenced by environmental changes and could provide a measure of abundance of medium-sized bigeye. The CPUE of the tropical purse seiners, if interpreted as an abundance index for small bigeye, indicates a certain stability in recruitment for the entire exploitation period (Figure 17).

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.

The average longline CPUE for the 1983-87 period is 28 percent lower than that of the CPUE calculated for the initial phase (virgin stock) of the fishery (1961-65) which is a reliable index for a low exploitation rate (Figure 18).

The changes in total annual biomass of adult bigeye, calculated by cohort analysis, shows a regular decline since the beginning of the fishery, a decrease which follows the CPUE trend of the longline fishery (cf. Figure 18), which in the recent period remained at a relatively stable level (Figure 19).

The age-specific mean fishing mortality rates, estimated by cohort analysis for 1980-1988, indicate that in recent years fishing mortality on young age classes (ages 1 and 2) has been high, due to the tropical surface gears. As regards adults, age-classes 4 and older, mortality is also at a high level because of longline activities (Figure 20). The fishing mortality observed for 1988 is slightly lower in general than that observed in previous years (Figure 21).

An updated production model analysis for the 1961-87 period, including the adjusted 1974 CPUE, indicates MSY values from 66,300 MT (m = 2) to 73,500 MT (m = 1), according to the value of m used (Figure 22). This analysis suggests that the current catches are lower than those of the MSY.

The production model analysis also indicates that fishing effort on bigeye tuna is at a level lower than the optimal fishing effort (f-opt) estimated by the model. This was always the case in previous analyses.

The yield-per-recruit analysis for bigeye tuna indicates that, with the present exploitation scheme, yield can be increased significantly by increasing fishing mortality. However, a change in the age at first capture would have no effect on the yield per recruit, unless it is accompanied by an increase in fishing mortality (Figure 23).

The multi-gear, yield-per-recruit analysis suggests that, with the current exploitation scheme, significant gains could be expected if the increase in fishing mortality on large bigeye is accompanied by a simultaneous decrease in the mortality on small bigeye (Figure 24).

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 fleet (purse seine and baitboat) continues 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 returns to the levels of the recent period of high exploitation, the current regulation would still be useful in improving the yield per recruit of the stock, as well as its spawning potential.

BET-4. RECOMMENDATIONS

The Committee recommends:

BET-4.a Statistics

i) That ongoing multi-species sampling of the surface catch in the eastern tropical Atlantic be continued to resolve the species composition problem in the reported catch which mixes small bigeye, yellowfin and skipjack tunas.

ii) The change in landing ports by the Tema fleet can eventually pose problems in the collection of statistics for this fleet; thus species and size sampling of catches transshipped to Puerto Rico should be continued. Sampling on eastern and western Atlantic catches at Puerto Rico 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.

iii) That all countries which fish bigeye tuna with longline send ICCAT the proportion of deep longlines in operation by five-degrees per month strata.

BET-4.b Research

i) That 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) That research on changes in gear efficiency between traditional and deep longline operations be continued in order to calculate the effective effort on bigeye tuna.

iii) That 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) That 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. According to the available evaluations, the potential gains of a change in age at first capture are, in the present situation, unforeseeable. However, the Committee recommends maintaining the regulations currently in effect, taking into account a possible increase in effort.

SKJ - S K I P J A C K T U N A

SKJ-1. DESCRIPTION OF FISHERIES

Skipjack 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, although some minor by-catch of skipjack is taken by longline. In the east Atlantic, the most important catches are taken by purse seiners, mainly those of the Spanish and FIS fleets, followed by those taken by baitboats from Ghana, Portugal, Spain, FIS and Cape Verde. In the west Atlantic, the major skipjack fishery is baitboat, comprised mainly of Brazilian, Venezuelan and Cuban vessels. The purse seine fishery, with lesser catches which, in recent years, are taken mainly by the Venezuelan fleet.

SKJ-1.a Catches

Catch, by gear, in the east and west Atlantic are shows in Table 4 and Figure 25-A, B and C.

Total east Atlantic catches show an increasing trend which started in 1986. In 1988, the highest catches in the history of the fishery were recorded for this Atlantic area, due to the increase in catches by the purse seine fleet, which caught 71,900 MT in 1988 (a level similar to that reached in 1974 and 1982), and due to the record catches of the baitboat fleet which caught 50,200 MT, even though fishing did not take place in 1988 in the Angola area.

As regards the west Atlantic, the total skipjack catch in 1988 amounted to 25,100 MT, which is at least 25 percent more than the 1987 level, although it is less than the catch in the 1982-86 period.

There was an increase in baitboat catches, mainly by Brazilian vessels, whereas purse seiners decreased their landings because a part of the Venezuelan purse seine fleet has moved, since 1985, to the Pacific Ocean. The reasons for the low Brazilian catches in 1987 is unknown. Catches corresponding to 1988 reached a level which is similar to those of other years.

SKJ-1.b Fishing effort

There are no estimates available on effective effort exerted on skipjack. Therefore, as in other years, vessel carrying capacity was considered as a measure of nominal effort. Table 2 and Figure 4 show total carrying capacity and by fleets for the East Atlantic from 1972 to 1988. Purse seine carrying capacity has maintained its declining trend, due to the fact that the Spanish fleet has continued to transfer its effort to the Indian Ocean. Baitboat effort has maintained stable in recent years, although at a much lower level than that of 15 years ago.

Due to the lack of available data from the west Atlantic, estimates of nominal effort could not be carried out.

SKJ-2. STATE OF THE STOCKS

Up to now, the studies carried out on skipjack stock structure in the Atlantic have not provided definitive information to divide the resource into smaller units. There could be two management units, in the east and west Atlantic, and there could be some minor mixing, judging by the absence of transatlantic recoveries of tagged fish.

SKJ-2.a East Atlantic stock

The last detailed skipjack stock evaluation for the east Atlantic was made 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, just as the Group, and later the SCRS, had assumed.

Observing the changes in the total nominal effort, it is noted that at th time of the evaluation, the fishery supported the highest effort levels in the historical series, with a mean carrying capacity of 71,100 MT in the 1978-1983 period. Since then, nominal effort decreased continuously until 1988, with an average of 50,260 MT for the 1984-1988 period. This important reduction in nominal effort (29 percent) in the last few years compared to the period in which the evaluation was made, presumably has been accompanied by a reduction in effective effort.

Therefore, although new stock evaluations have not been made, it seems reasonable to think that if the analyses carried out in 1984 were repeated at the present time, they would provide similar results as to the state of underexploitation of the stock.

Figures 26 and 27 show the changes in the fishery; the two periods of effort can be clearly noted as well as their relation to the catches.

As regards parameters, such as CPUE, the Committee did not advise interpreting their evaluation as indicative of skipjack stock abundance. The clear increasing trend of the two CPUE's of the purse seine fleets (Figure 28) should not be interpreted as an index of the change in the abundance of the stock. Instead it should be related to changes in fishing strategy of the fleets due to the low availability of yellowfin in 1983-84 and/or to the increase in the availability of skipjack to purse seine which could have occurred as a result of the decrease in competition among vessels, because of the reduction in the number of units of the fleet.

In short, the high values of catch and CPUE should be attributed to changes in catchability and therefore in skipjack effective effort, which could have increased, independent of the changes in nominal effort. Under this hypothesis of higher catchability of the skipjack stock, the current effective effort could be the highest in the history of the fishery.

SKJ-2.b West Atlantic stock

The data on the state of the west Atlantic skipjack stock have not been sufficiently analyzed.

SKJ-2.c Single Atlantic stock

There are no analyses regarding this hypothesis.

SKJ-3. EFFECTS OF CURRENT REGULATIONS

There are no regulations for skipjack tuna. The current regulations for yellowfin and bigeye have no effect on skipjack.

SKJ-4. RECOMMENDATIONS

The Committee recommends:

SKJ-4.a Statistics

i) Continuing to improve the collection of catch and effort statistics for the purse seine and baitboat fleets which operate in the west Atlantic.

ii) Increasing the coverage on multi-species sampling of Venezuelan landings and stratifying it by fishing gear.

iii) Preparing synoptic maps showing the location of the principal skipjack fisheries and the size distributions of the catches, as has been done for yellowfin and bigeye.

iv) Having the Secretariat review and improve the present carrying capacity tables for purse seiners and baitboats in the west Atlantic.

v) Once the reorganization of the research institutes has been completed in Brazil, sampling should continue at the same good level as has been done up to the present.

SKJ-4.b Research

i) Updating the estimates of effort directed at skipjack according to the scheme developed during the Skipjack Year Program. These calculations should be made using the current species compositions (which were not available during the Skipjack Year Program).

ii) Carrying out complementary research on maturity, fecundity and spawning of the west Atlantic skipjack stock.

iii) Continuing the study of time-area interactions between fleets which exploit skipjack concentrations, since the data obtained during the Yellowfin Year Program suggest a change in the individual power of the purse seiners that could be explained, in part, by the decrease in the number of boats in the last few years. Consequently, it is necessary that studies be carried out on the possible increases in fishing efficiency on skipjack.

iv) Continuing research on the effect of environmental factors on abundance, recruitment and availability of skipjack.

v) All the available statistical data on skipjack in the West Atlantic should be revised during the working group on yellowfin stock analysis in the West Atlantic.

vi) Carrying out new skipjack stock evaluations, particularly from an analytical standpoint.

SKJ-4.c Management

There are no apparent reasons for advising management measures for Atlantic skipjack.

ALB - A L B A C O R E

ALB-1. DESCRIPTION OF FISHERIES

Albacore is caught in the entire Atlantic Ocean. The gears which traditionally exploit this species are:

--in temperate latitudes, the troll which takes young fish and the baitboat which catches mostly medium-sized albacore.

--in tropical latitudes, the longline which catches mainly adult albacore.

The trollers and baitboats are mainly Spanish and French which fish during the summer in the northeast Atlantic, principally in the Bay of Biscay. Some Spanish baitboats also operate in winter in the Canary Islands.

The longliners are Taiwanese and they exploit the entire tropical area, specifically looking for large albacore.

Some South African baitboats fish in the southeast Atlantic but details are lacking on their fishing.

The French fleet has been equipped with two new gears in recent years, the gillnet and the paired pelagic trawl. These vessels use trolls during the day and either gillnet or pelagic trawl at night (paired trawls). The sizes of albacore taken by the gillnets are similar to those taken by the troll and the sizes of albacore taken by the pelagic trawls are comparable to those caught by the baitboats. The most recent information (end of the 1989 season) indicates that the pelagic trawls can take adult albacore (90 to 120 cm) in large quantities, as do the baitboats.

It is generally agreed that the stock structure of Atlantic albacore is composed of a north stock and a south stock, separated at 5°N latitude.

There could also be a separate stock in the Mediterranean. The Albacore Workshop held in September, 1989, examined this hypothesis and confirmed that the stock analyses should be conducted using the hypothesis of three stocks.

ALB-1.a Catches

Table 5 provides the historical catch series by stock and gear from 1959 to 1988.

Figure 30 shows the historical catch series for the North Atlantic stock. In 1988, total North Atlantic catches were 30,500 MT, which is 5,800 MT less than in 1987 and 12,100 MT less than in 1986. This recent decrease is mainly due to the sharp decrease in longline catches since 1986; the Taiwanese fleet was withdrawn due to difficulties in supplying their vessels.

The North Atlantic surface fisheries took 28,300 MT in 1988. These were mostly from the Spanish troll fisheries (9,500 MT compared to 10,000 MT in 1987) and Spanish baitboats (15,800 MT compared to 18,200 MT in 1987).

The new French gears have had minor catches up to the present: 750 MT in 1988 for the gillnets, 1,700 MT in 1988 for the pelegic trawls (Table 6).

In general, the total North Atlantic albacore catches have shown a decreasing trend for the 1960-1988 period (Figure 30).

Figure 31 shows the historical catch series for the south Atlantic stock. In 1988, the south Atlantic catches increased slightly (26,300 MT compared to 23,600 MT in 1987), by 2,700 MT. The longline catches increased from 15,800 to 21,100 MT, while the South African surface fishery decreased from 6,100 to 4,100 MT. This is a recently developed surface fishery. However, because of the lack of fine statistics, it is not yet known if these catches come in part from the albacore stock in the Indian Ocean.

In general, the south Atlantic albacore catches showed relatively strong fluctuations between 10,000 and 30,000 MT per year during the last three decades. The decrease in catches in 1983-1984 could be explained up to a certain point by a decrease in longline fishing effort.

ALB-1.b Fishing effort

For the North Atlantic, the changes in nominal fishing effort of the surface gears are shown in Figure 32. A continuous and significant decrease in nominal fishing effort for trollers is noted for 1957 to 1980, followed by stabilization at a low level.

The nominal fishing effort of baitboats presented a slightly decreasing trend for the 1970-1980 period and then was stable. The nominal effort of the new French gears increased sharply in 1988. The nominal effort of the troll/gillnet vessels went from 1,000 days fishing in 1987 to 1,200 days fishing in 1988. The nominal effort of the trollers/pelagic trawlers went from zero to 754 fishing days in 1988.

The nominal fishing effort in 1988 was 20,240 fishing days for trollers, and 12,000 fishing days for baitboats.

Longline effort in the North Atlantic (Figure 33) dropped sharply, after having reached a maximum in 1986. This is due to logistical difficulties of the Taiwanese longliners which consequently withdrew from the North Atlantic.

In the south Atlantic the general trend in longline effort by Taiwan remained rather stable (Figure 33).

ALB-1.c Catch rates

In the North Atlantic the catch rates of the surface fisheries, recalculated according to the data revised by the Albacore Workshop in September, are different from the 1988 figures (Figure 34). The differences are minimal for the trollers, but are significant for the baitboats. The reason for such important differences is not clear.

The catch rate trend of the trollers is relatively stable in the two cases. The catch rate trend of the baitboats is increasing either since 1978 (old version) or since 1974 (new version). It is possible that the increase is due either to the improvement in statistics or to the introduction of sonar by the Spanish baitboat fleet.

The new gears introduced by France obtained important catch rates, particularly the trollers/pelagic trawlers (Table 6).

The North Atlantic longline nominal catch rates, stable from 1973 to 1983, showed a decreasing trend from 1984 (Figure 35). In a similar way, the south Atlantic longline nominal catch rates were stable from 1973 to 1983, then decreased (Figure 35).

ALB-2. STATE OF THE STOCKS

ALB-2.b North stock

The total North Atlantic catch decreased in 1988 by 16 percent with respect to the previous year. A decreasing trend in catches has taken place since the end of the 1970's due to a lower effort and catches of the trollers as well as a drastic decrease in the catches and effort of the longline fishery, which has occurred since 1986. Catches of the baitboat fleet show no trend since the mid-1970's.

The decrease in fishing effort of the trollers and longliners is sufficient to explain the decrease observed in total catches of the North Atlantic albacore stock.

There are no recent, good abundance indices available. In fact, the September Workshop recommended standardizing CPUE in order to develop abundance indices for the surface fisheries as well as for the longline fisheries. Some methods were also proposed, but this was not done because of the short time between the Workshop and the SCRS meeting.

Keeping in mind the possible biases in the nominal CPUE indices, the SCRS considered that the nominal CPUE of surface gears (troll and baitboats) may represent abundance of small and medium albacore, respectively. The changes in the nominal CPUE are shown in Figure 34.

The nominal CPUE of the longline may represent adult albacore abundance. The changes in this nominal CPUE are shown in Figure 35.

In addition, the September Workshop developed a table of total catch at size for recent years (1975-1988). Moreover, it reached an agreement on the growth curve that should be used. However, some research is still necessary before going from the catch at size table to a catch-at-age table which would be analyzed by VPA calibrated by standardized abundance, as mentioned above. When all this is finished, the SCRS thinks that appropriate results will be available to provide reliable advice on the state of the North Atlantic albacore stock. Hopefully all this will be possible in 1990.

In light of the divergent results obtained by the analyses made in previous years, and also taking into account the absence of a current complete analysis on the state of the north stock, the SCRS feels that it is not possible to determine precisely the present state of the north stock.

ALB-2.b South stock

The only abundance index for this stock is the standardized CPUE of Taiwanese longline fishery operating in the south Atlantic on the adult stock; still no applicable abundance indices have been proposed for the juvenile stock.

Longline CPUE trends have generally fluctuated downward from 1967 to 1988; but the overall longline catch tended to fluctuate steadily around 20,000 MT throughout the time series except in 1983 and in 1984 when low catches were observed. Since 1979, the catch of juvenile albacore noted in the surface fishery has increaseed to over 6,000 MT in 1987, and a slight decline to 4,100 MT occurred in 1988.

The generalized production model was updated using standardized catch and effort data of the Taiwanese longline fishery from 1967 to 1987. The MSY obtained by the model was estimated at the range of 27,000-31,000 MT, corresponding to an optimal effective effort of 10^7 effective hooks (Figure 36). Catches in 1987 (23,600 MT) and in 1988 (26,300 MT) were slightly below the MSY values of the model, and effective efforts estimated in 1987 (1.03×10^7 effective hooks) and in 1988 (9.9×10^6 effective hooks) were equally likely equivalent to the optimal effort corresponding to the MSY. However, in order to ensure whether or not the south stock is in a strongly exploited condition, further research using VPA and the yield-per-recruit analysis has to be carried out, and careful monitoring should be continued.

ALB-3. EFFECTS OF CURRENT REGULATIONS

There are no regulations currently in effect for albacore.

ALB-4. RECOMMENDATIONS

ALB-4.a Statistics and ALB-4.b Research

The SCRS noted that the September Workshop identified a whole series of problems on statistics and research and made various recommendations for short-term and long-term research. The SCRS endorsed all these recommendations. In particular, this Workshop proposed, in order to resolve these problems, on the one hand, holding a workshop in 1990, and on the other, carrying out a special three-year research program. The proposed research plan describing in detail these problems and the possible solution is attached in Appendix 6. The SCRS approved this plan and recommended that it be carried out.

Meanwhile it seems essential to hold a workshop in 1990 to provide the SCRS with preliminary precise advice on the state of exploitation of the North Atlantic albacore stock, using all the data currently available.

ALB-4.c Management

No management measures were proposed.

BFT - B L U E F I N   T U N A

BFT-1. DESCRIPTION OF FISHERIES

There are fisheries for bluefin tuna in the east and west Atlantic Ocean and in the Mediterranean Sea. Many different gears are used and the size of fish caught varies depending on the gear and location.

Table 7 and Figure 38 show the Atlantic bluefin landings in weight separated into west Atlantic, east Atlantic and Mediterranean Sea. The provisional 1988 catches are: 3,000 MT in the west Atlantic, 6,500 MT in the east Atlantic, and 14,500 MT in the Mediterranean Sea. (All these values assume the same landings as in 1987 for non-reported catch: 7 percent for west Atlantic, less than 1 percent for east Atlantic and 9 percent for Mediterranean.)

BFT-1.a East Atlantic

During 1988 the Spanish baitboat and trap catches have increased compared to 1987; these increases were 30 percent and 160 percent, respectively. French and Spanish baitboats comprised 40 percent of the landings and Spanish traps comprised 37 percent. Of the remaining 20 percent, Moroccan surface fisheries, Japanese longline and French unclassified gear comprise the major portion.

BFT-1.b Mediterranean

The data collection for the Mediterranean fisheries was much improved this year--both in terms of delivery of current year (1988) data and in correcting and providing historic data. Catches by French, Italian, and Yugoslavian purse seiners comprised 65 percent of the landings. Algerian, Italian, and Spanish unclassified gear comprised another 18 percent of the landings. Of the reported data, the only large change from last year included an increase in the Yugoslavian purse seine catch from 641 to 1,512 MT, and an increase in the French purse seine catch by 33 percent to 5,750 MT. This increase may have been partially due to transshipment at sea from Spanish purse seiners.

BFT-1.c West Atlantic

West Atlantic catches of bluefin tuna were restricted by catch limits of 1,160 MT in 1982 and 2,660 MT between 1983-1989; the catch limit of 2,660 MT represents about 40 percent of the largest catch between 1973 and 1981. The catch of the calendar year 1988 was 2,994 MT, this is the highest since 1981. Landings by longliners and purse seiners remained stable, landings by rod and reel declined about 20 percent and of other unclassified gear increased about 43 percent from 1987 values.

Longline catches comprise 46 percent of the west Atlantic harvest. Canada's landings exhibited the only large change of the reported data, increasing from 73 to 394 MT.

BFT-2. STATE OF THE STOCK

The Committee conducted its investigations using a two-stock working hypothesis with limited intermixing (west Atlantic and east Atlantic/-Mediterranean) (Figure 37). This hypothesis has been used for many years, while it is known there is limited mixing. The mixing between the eastern and western bluefin was estimated from tag recoveries and hardpart microanalysis to be 3 to 4% (SCRS/85/36), however, for management purposes SCRS considers Atlantic bluefin to be composed of an eastern and a western stock. The growth and natural mortality rate parameters for each stock were the same as those used by the 1988 SCRS. Details of assessment parameters used and the derivation of catch tables are presented in Appendix 8. Many of the more technical terms used in this text are explained in Appendix 9. The documents reviewed by the working group are listed in Addendum 1 to Appendix 8.

BFT-2.a East Atlantic and Mediterranean

Ten indices of abundance were available for examination by the working group (Table 8). Two of these, the Japanese longline indices for the east Atlantic and for the Mediterranean were generated by the working group during the meeting. The other indices had data for 1987 and 1988 added and in some cases had improvements in the analysis incorporated into the series. It was noted that the two age-1 indices, the Spanish baitboat and French purse seine, were similar in trends and may be good indices of abundance or even recruitment, however, the working group chose not to use these indices as little confidence can be placed in the numbers of age-1 fish in the catch at age. These two variable indices do indicate an upward trend over the last five years. The two French purse seine indices were separated at 1982 into two individual indices due to the introduction of spotter aircraft. The three small fish series with data for 1988 are highly variable over the last three to four years (Figure 39).

The 1988 SCRS Report noted the poor quality of the data in the catch at age. In 1989, despite the improvement in data collection, great concern must still be expressed on the composition of the catch at age of the younger ages 0 and 1 and some concern on ages 2 and 3 in the Mediterranean. Catch at age (Table 9), including 1987 and 1988, was available for analysis. Due to severe reservations on the composition of 0's and 1's in the table, it was agreed that the 0 group would be dropped from all discussions and the 1-year-olds would be further investigated. This year it was noted that fish less than 1 year old contributed 90 percent of the catch by numbers (Table 10).

It is significant to note that in most years the annual assessment is provided with one additional year of catch at age data, in 1989 the SCRS was provided with two additional years data (1987 and 1988). The catch at age for the eastern stock has lagged one year behind the west due to the difficulty in obtaining data for the eastern stock, particularly the Mediterranean. This year with improved data collection the Secretariat was able to provide both 1987 and 1988 catch at age for the eastern stock. This will greatly improve the SCRS's ability to provide more timely advice to the Commission.

Separable virtual population analysis (SVPA) was used to estimate partial recruitment (PR). The input for this calculation was catch at age from 1982 to 1988 for ages 1 to 18, a reference age of 1, an $M = 0.18$, an $F = 0.5$ and the selectivity on the oldest age (18) set at 2.0 of the selectivity of the reference age (Table 11 and Figure 40). The partial recruitment from this analysis was then standardized to the mean of ages 12 to 14. This was done as the working group considered it likely that all fish over age 13 would be subjected to approximately equal fishing mortality. The PR on the youngest age groups is very important in the assessment. The age-specific abundance indices for ages 2 and 3 only carried most of the weight in the calibration of the VPA. These ages are the ones for which some difficulty exists in the catch-at-age table (especially for the Mediterranean).

Six indices were used for calibration of the VPA. The indices representing large fish were the Japanese longline fisheries of the east Atlantic (ages 5+), the Japanese longline fisheries of the Mediterranean (ages 7+) and the Spanish trap fishery (ages 7+). The three indices representing small fish were the French purse seine CPUEs for age 2 and for age 3 and the Spanish baitboat CPUE for age 2.

As was done in the 1988 SCRS assessment, the six indices were weighted. The inverse of their contribution to the variance of the estimate of stock size was used as the weight; thus, the better the agreement between the index and the estimated stock size the greater the importance of that index in the calibration process.

The results of this year's assessment show similar trends to the 1988 SCRS assessment. The estimated terminal F (Table 18) applied to our catch-at-age table (Table 9) indicates the 1988 spawning stock size (ages 5+) is about 60 percent of the 1970 value while ages 10+ (the old fish) have declined by about 50 percent; recent estimates of stock size of ages 2 to 4 are above that of the early period of the catch table (Table 17 and Figure 41).

The working group noted that the estimates of population for age 2 in 1988 are based on those F values input by the working group. The abundance indices representing small fish covers ages 2 and 3; thus little confidence can be placed on estimates of recruitment (age 2) in the last two years of the analysis (Table 17).

BFT-2.b West Atlantic

Ten abundance indices were examined this year (Table 12). Three indices for large fish and two for medium fish indicate an essentially flat pattern in apparent abundance in the last four to five years while the five single-age indices indicate some variability with no trend in abundance (Figure 42).

Catch at age including 1988 (Table 13) was available for analysis. The catch composition (Table 14) was used to determine the relative importance of the various age groups.

The Committee selected the partial recruitment pattern using SVPA. The final PR was similar in shape to that used by the SCRS in previous years (i.e., dome-shaped) (Table 15, Figure 43). It should be noted that the PR for young ages has varied from year to year. The input for this calculation was catch-at-age data from 1983 to 1988 for ages 1 to 15, reference age of 6 with an $F = 0.2$, $M = 0.1$, and the selectivity of the oldest age (15) set at 0.75 of the selectivity of the reference age.

Five of the ten indices were used for calibration of the VPA. The five age-specific indices of the Japanese longline fishery within the U.S. EEZ were not used. It was considered that the data were also represented in the two longer time series of age aggregated indices of the same fisheries, which encompasses a larger geographic area. The indices representing large fish were the Gulf of Mexico larval bluefin index (ages 10+), the Gulf of St. Lawrence tended line index (ages 16+) and the U.S.A. Atlantic coast rod and reel and hand-line index (ages 10+). The two indices representing small and medium fish were the longline CPUE indices of the west Atlantic Ocean for ages 3 to 5 and ages 6 to 8.

As was done in the 1988 SCRS assessment, the five indices were weighted. The inverse of their contribution to the variance of the estimate of stock size was used as the weight; thus, the better the agreement between the index and the estimated stock size the greater the importance of that index in the calibration process.

The results of this year's assessment were similar to that of the 1988 SCRS assessment and earlier analyses (Figure 46). The estimated terminal F (Table 20) applied to our catch-at-age table (Table 13) indicates the 1988 spawning stock size (ages 10+) is about 25 percent of the 1970 value; ages 6 to 9 approximately 40 percent; ages 1 to 5 for 1986 (last year with useful estimates of young fish) approximately 24 percent of the 1970 value (Table 19, Figure 44).

The working group noted that the estimates of population for ages 1 and 2 in 1988 are based on those F values estimated by the working group. The best estimates of recruitment in recent years (1983-1986) appear to be above that of earlier years (1979-1982) although all these years are substantially below that of the early years of the studied population at age (1970-1974). However, the Committee was concerned that the abundance index representing small fish covers ages 3 to 5, thus little confidence can be placed on estimates of the abundance of younger ages in the last two years of the analysis (Table 19). The Committee does not have enough confidence in these estimates to state whether the real abundance in 1986 of ages 1 to 5 is above or below that of 1982.

BFT-3. EFFECTS OF CURRENT REGULATIONS

The ICCAT recommendation to limit fishing mortality on bluefin for the entire Atlantic Ocean and the Mediterranean Sea went into effect in August, 1975. If this is interpreted as limiting catches, the effectiveness of the recommendation can be investigated by examining catches since that time. Estimated catches for the entire Atlantic and Mediterranean declined from 26,100 MT in 1975 to 18,400 MT in 1979, averaged about 25,500 MT in 1982-1985 and decreased to about 20,000 MT between 1986 and 1987. They increased in 1988 to 24,000 MT.

Catches in the eastern Atlantic declined from 10,000 MT in 1975 to 5,200 MT in 1976, increased to 7,000 MT in 1977, declined regularly to 3,300 MT in 1981 and increased again in the following three years to approximately 7,000 MT. From 1985 to 1987, the catch has averaged 4,500 MT and in 1988 it increased to 6,400 MT.

In the Mediterranean, catches were variable from 1975 to 1988 with landings ranging from 11,000 to 17,000 MT except for 1978 to 1981 when they averaged 8,700 MT and 1985 when the catch reached a high of 19,300 MT.

In the western Atlantic, catches averaged approximately 6,100 MT from 1976 to 1981 and generally have been below or slightly above the catch limits set for scientific monitoring since that date; during calendar year 1988 the catch is estimated to be about 3,000 MT.

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). Some of the variability seen in Table 16 may be due to sampling deficiencies as well as changes in the fisheries. After the regulation went into effect, the percentage of individuals less than 6.4 kg was low in the western Atlantic from 1976 to 1981 (1.7 to 7.6 percent), but it increased to 22.4 and 17.7 percent in 1982 and 1983 (Table 16). The percentage declined to low levels (2 to 5 percent) between 1984 to 1987 and increased to 10 percent in 1988. In contrast, the percentage of undersized fish is still high in the eastern Atlantic and Mediterranean Sea with a 1976-1988 average of about 50 percent and 30 percent, respectively, and 1988 values of 73 percent and 58 percent, respectively.

Research data from 1985 (see SCRS, 1987) indicate the estimate of undersized fish in the Mediterranean would be a minimum. These minimum estimates of undersized fish indicate that countries fishing in the eastern Atlantic and Mediterranean have been targeting small fish.

An additional regulation limited catches in the western Atlantic in 1982 to 1,160 MT and 2,660 MT each year during 1983 to 1989, and prohibited fishing directed at the spawning stock in the Gulf of Mexico. As a result catches declined (Figure 38).

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 (by weight) after 1983. The percentage (in weight) of bluefin less than 120 cm SFL steadily decreased from 1975-1983, and since 1979 less than 15 percent of the total west Atlantic catch has been below 120 cm (Table 16). The percentage was 11 percent in 1988.

BFT-4. RECOMMENDATIONS

BFT-4.1 Statistical data and analysis

This is the first year for which the SCRS has attempted work with two concurrent analytical assessment groups, one for bluefin tuna and one for swordfish. This has created two problems, one dealing with the computation of statistics and one with the analytical capability of the SCRS. More national scientists are required to help in the assessment work in order to achieve adequate analysis. Although all data were provided for the work of the SCRS, it is important to note that with the ever increasing expectations it will be difficult for the Secretariat to provide essential data in a timely manner under present conditions.

Even with better data than presently available, more scientists with intimate knowledge of the bluefin fisheries of the eastern stock will be required. If the countries involved in this fishery are not willing to contribute personnel to the analytical process then the SCRS may not be able to provide advice on the eastern stock. The analytical assessment process has been evolving over the past ten years and has become highly quantitative. The computer software must constantly change to reflect this evolution. In recent years, scientists working on west Atlantic bluefin have provided the software used for analysis. It is vital that more scientists working on eastern bluefin participate in the assessment process by becoming familiar with this software and/or bringing their own software to the meeting. The SCRS must develop the capability of conducting independent analysis for each stock. The Committee, therefore, recommends that for the eastern and western bluefin stocks, common meetings be held to review new raw data and assessment methodology, separate meetings be held to develop stock independent parameters and conduct analyses and common meetings again be held to discuss stock status and assessment results.

The Committee is concerned over the degree of the error caused by possible introduced by substitutions in the catch-at-age table. It recommends that the Secretariat develop a system to identify the proportion of the catch at age that is generated using substituted data for both "Task I" catches and "Task II" size data.

BFT-4.1.a East Atlantic and Mediterranean

The Committee has repeatedly expressed grave concern that basic information on catch and size composition is not available. This year, the upcoming meeting of the General Fisheries Commission of the Mediterranean (GFCM) has provided incentive for many countries to start submitting data. The Secretariat is commended and encouraged to continue this process. Without such information the Committee may not be able to provide timely, accurate advice to the Commission, especially for the youngest ages that account for the majority of the catch. The Committee urges that data collection efforts be continued and increased, especially for the Mediterranean.

BFT-4.1.b West Atlantic

Concern was expressed that little is known on the size composition or exact species composition of the reported bluefin catch from the Dominican Republic. This could represent a significant portion of the nominal catch. The Secretariat should endeavor to determine if the catch is bluefin and if it is, to acquire the necessary data to determine the size composition of the bluefin catch.

Concern was expressed over unrecorded catches of Canada in 1988. The Committee recommends an investigation be carried out to identify a solution to the problem.

BFT-4.2 Research

Natural Mortality (Recommendation #1)

Members of the working group felt that two stocks within a single species with limited intermixing were unlikely to have a natural mortality differing by a factor of two (0.10 and 0.18). Work should be planned to analyze available data to provide better estimates of M.

Catch at Length (Recommendation #2)

A problem exists in converting various sample measures to length. Countries which are unable to sample whole fish should attempt to obtain factors to convert landed lengths to fork lengths or to more accurately convert weight to length.

Catch at Age (Recommendation #3)

The process used for converting numbers at length to numbers at age for both stocks are based on growth equations calculated over ten years ago. The growth equation of the eastern stock was derived from unvalidated hard part age determination. The growth equation from the west was derived from tagging data collected prior to 1978. Since that time a significant number of additional recoveries have occurred, including some at liberty over seven years. New analyses are necessary incorporating these data and if possible to identify changes in growth over time (if any). Every effort should be made to validate hard part age determination for both stocks.

Assessment Methodology (Recommendation #4)

The working group recommends continued examination of assessment methodology and the effects of changes in this methodology; including weighting procedures, partial recruitment patterns, sensitivity to the variability found in the indices, and conversion of catch at size to catch at age. In particular, we recommend examination of the effects on VPA calibration of disaggregated indices which exhibit correlated residuals and the effects of the differing time spans of an index.

Abundance Indices (Recommendation #5)

To permit evaluation of the quality of abundance indices the data, as a general rule, should be presented at the lowest level of aggregation. Work should continue to develop additional age-specific indices.

Bluefin Meetings (Recommendation #6)

The SCRS notes that two significant meetings on bluefin tuna are scheduled for 1990. The first is a joint GFCM/ICCAT meeting on the Mediterranean stock of large pelagics, including Atlantic bluefin tuna. This meeting will obviously involve the ICCAT Secretariat and scientists involved in bluefin research in the eastern stock of bluefin tuna. The second meeting is the world meeting on bluefin tuna being hosted by IATTC to be held at La Jolla, California (U.S.A.), beginning on May 25, 1990. The SCRS recommends that ICCAT send a representative to this latter meeting to both contribute information regarding the valuable data bases held in Madrid and to report back to the member countries regarding the main conclusions of this meeting.

Assessment Models (Recommendation #7)

Recognizing that the stock structure has not been definitively defined, it is accepted that a limited intermixing does occur. Research should started that will allow such intermixing in these two management stocks to be considered in the respective assessments in the future.

4.2.a East Atlantic and Mediterranean

Abundance Indices (Recommendations #8, #9)

An investigation should be carried out to study the effect of the use of spotter aircraft on vessel efficiency in the French purse seine fisheries and the resulting abundance indices.

It was suggested that the Japanese longline index developed by the bluefin working group for the Mediterranean may have been affected by changes in the hydrographic situation during the period of the fishery. French scientists identified a source of sea surface temperature data for the period. A cooperative study is encouraged between Japanese and French scientists to incorporate this data into a disaggregated CPUE series.

4.2.b West Atlantic

No research recommendations were formulated specifically for the western Atlantic stock.

BFT-4.3 Management

4.3.a Eastern Atlantic and Mediterranean

This year's analysis indicates trends similar to the 1988 SCRS assessment of bluefin in the east Atlantic and Mediterranean. Due to the uncertainty surrounding the previous assessment of the eastern stock, the Committee advised "no change in the existing management measures." There still exists a great deal of uncertainty, however, it can be said that the population of older fish (age 10+) is lower now than it was in 1970 (Figure 41). The spawning stock (age 5+) is also indicating a continuing downward trend in the population (Figure 41); its contribution to the catch is shown in Figure 45. The stock size of ages 2 to 4 is highly variable and must have very wide confidence intervals associated with it. This uncertainty for the youngest ages not only comes from the analytical technique and the variance in the abundance indices but also the high degree of uncertainty of the sampling of catches in the Mediterranean Sea. For this reason little confidence can be placed in the apparent upward trend of abundance of age 2 to 4 bluefin.

The Committee advises no change in the current regulations. At the same time the SCRS wishes to stress the high catch of small fish (Table 16) as a consequence of the small fish regulation not being complied with.

4.3.b West Atlantic

In 1984, it was advised that the monitoring catch levels were "likely to stop the decline of the stock as well as allow stock increases in the long-term (30 years). The SCRS further noted in 1984 that following confirmation that the stock was responding to the present management regime, it would be possible to increase gradually the allowable catch in proportion to the recovery rather than to hold the catch constant for the recovery period (30 years).

This year's analysis is generally compatible with recent assessments (Figure 46). It continues to indicate that increases in allowable catch are not advisable at this time. The downward trend in the abundance of the youngest age groups in the 1970's appears to have stopped with the inception of the management program in 1982. However, the most likely estimate showed less improvement in the abundance of young ages since 1982 than did the 1988 SCRS assessment.

The abundance of medium-sized fish (6-9 ages), which will form a major part of the adult group in the next four years, has remained relatively constant. Therefore, the 2,660 MT of the recommended catch for monitoring will cause the decline of the age 10+ group to continue for at least the near term, given the various assumptions of the analyses.

Because of the lack of significant improvement in stock abundance and uncertainties associated with the estimates, levels of monitoring should not be increased at this time. The Committee is concerned about the recent increases in the catch in numbers of ages 1- to 3-year-old fish and fishing mortality on ages 6-9 fish, the harvesting of which affects the recovery of the spawning biomass (10+). Such harvests, if continued, would slow or inhibit the long-term recovery.

BIL - B I L L F I S H E S

BIL-1. DESCRIPTION OF FISHERIES

Billfishes 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), 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 all marlins and sailfish also exist in Côte d'Ivoire, Barbados, Brazil, Aruba, Curaçao, and numerous other Caribbean island countries.

In addition, the recent development and expansion of longline fisheries in the Gulf of Mexico for tuna, Caribbean Sea for swordfish, and off Africa for swordfish have been reported by various nations (mainly Spain and the U.S. for east and west Atlantic, respectively). 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 billfisheries (mainly for the U.S. and Spanish longline fleet) 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 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 deficiencies for all billfishes in the Atlantic Ocean.

BIL-2.1 Blue marlin

Total Atlantic landings of blue marlin (Table 27, Figure 47-A) 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 1986, landings declined to a somewhat lower level, fluctuating between 1,300 and 2,600 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 the general trends in catches have followed the intensity of these fisheries.

Japanese CPUE indices, 1962-80, were presented at the 1982 SCRS meeting. Catch-per-unit-effort increased slightly during 1977-80, but only to a level well below the 1965-75 average. Production model results based on these indices (SCRS, 1982), indicated that some over-exploitation may have occurred during the early to mid-1970's. Analysis of Japanese CPUE data was presented to the SCRS in 1988 but was limited to the years 1977-1986 because the fishing gear, fleet deployment pattern and target species was significantly different in earlier years. Catch-per-unit-effort has stabilized since 1977. The same series of the CPUE (1977-1986) by North and South Atlantic indicated higher values in the North Atlantic (Figure 48-A).

An analysis of the Venezuelan recreational fishery was presented to the SCRS in 1988. Standardized CPUE from 1961-1987 declined from an historic high in 1962 to its lowest level by 1978. After 1978, CPUE increased somewhat but to a level below previous highs. This pattern is similar to that discussed above for the Japanese longline fishery. Cuban longline CPUE for blue marlin increased three-fold from 1970-1984 due to improved fishing methods (SCRS, 1987). Standardized CPUE (1972-1986) from the U.S. recreational fishery for 1972-1978 was at or below the 15-year average (except for 1974), and from 1979-1986 was at or above this average. An analysis of nominal CPUE from the Jamaican recreational blue marlin fishery presented to the SCRS in 1989 showed an increase from 1976 to an historic high in 1986, and fluctuations below this level in 1987-89.

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 is encouraged by the apparent slight increase and stabilization in standardized recreational CPUEs over the past decade (U.S. and Venezuela). However, the recent expansion of longline fisheries, as well as 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 information regarding the status of the blue marlin stocks.

BIL-2.2 White marlin

Landings from the total Atlantic (Table 28, Figure 47-B) increased rapidly from 1960 to almost 5,000 MT by 1965. Landings generally declined since then, fluctuating between 900 and 1,600 MT thereafter.

It was noted that Japanese CPUE indices of the total Atlantic had declined rapidly through 1980, since the initial peak in the mid-1960's (SCRS, 1982). The Japanese longline CPUE indices from 1977-86 indicated relatively stable CPUE levels for the total Atlantic during the period but because of changes in fishing practices, the levels of these values cannot be compared to earlier series. The same series of the CPUE (1977-1986) in the North Atlantic has been stable, but that in the South Atlantic indicated a sharp decrease and then levels off (Figure 48-B). Standardized CPUE from the U.S. recreational fishery previously reviewed by the 1987 SCRS had indicated a continuous decline since 1980. Standardized recreational CPUE from the fisheries located in Venezuelan has declined since 1971, reaching its lowest level by 1987.

Although the Committee remains unsure of the exact status of white marlin, the declining recreational CPUEs (U.S. and Venezuela), as well as the decline of Japanese longline CPUE in the south Atlantic in recent years 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 information regarding the status of white marlin stock(s).

BIL-2.3 Sailfish/spearfish

Landings for the total Atlantic (Table 29, Figure 47-C) 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 through 1977. Landings increased to about 3,300 MT by 1979, fluctuated around 2,200 MT between 1980-82, and increased again to about 3,800 MT in 1986-1988. 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. Conversely, the national report of Ghana presented to the 1989 SCRS indicates potential over-estimation of landings from this major artisanal fishery. These landing statistics should therefore be considered provisional until problems are clarified.

BIL-2.3.a West Atlantic

Catch-per-unit-effort data from the Venezuelan recreational fisheries which indicate a decline, with fluctuation since 1969, and relative stability, but at low levels of CPUE since the late 1970's. There were no new analyses presented on the status of the stock this year. Therefore, the Committee had no basis for changing its previous conclusion (SCRS, 1987) that western Atlantic sailfish appear to be only 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.

BIL-2.3.b East Atlantic

Standardized Japanese CPUE indices (SCRS/88/50) indicated a declining trend from the late 1960's to the mid-1970's, followed by a gradual decline through 1986 which may be revised if changes in gear deployment are considered (Figure 49). Standardized recreational CPUE from Senegal was stable from 1970-1980, then declined gradually through 1986 (Figure 49). This decrease may be overestimating the real decrease of abundance in this area because of the increased competition with the artisanal fishery operating in the same area. Preliminary production model results established for the coastal eastern Atlantic on a revised data base (Figure 50) suggested that the stock is not yet fully exploited. Results of a cohort analysis were not conclusive because of uncertainties with recruitment trends. The quality of the data needs to be improved before more definitive stock evaluations can be made.

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) established domestic regulations involving Atlantic billfishes in 1988. In addition, Mexico prohibits commercial longliners within 50 miles of her coast. These regulations have not been in effect long enough to influence landing statistics.

BIL-4. RECOMMENDATIONS

BIL-4.a Statistics

The Committee recommends:

i) That accurate estimates of total landings (Task I data) be made, by species, for Atlantic blue marlin, white marlin, and sailfish. In addition, billfish landings records from non-member countries who do not 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, in particular, 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 obtained and summarized in an ICCAT document.

v) That sailfish/marlin discards for historical longline and more recently developed fisheries be evaluated.

BIL-4.b Research

The 1990 Program Plan for the Program of Enhanced Research for Billfish (Appendix 4) describes recommended research. General recommendations of the Committee are:

i) That age and growth studies of marlins and sailfish be continued. Active sampling of juvenile marlin and sailfish should be initiated.

ii) That commercial and recreational fisheries data for billfishes be collected and analyzed to develop standardized abundance indices 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 is intended for 1990 due to the availability of tagging kits and appropriate posters. All ICCAT member and reporting nations are encouraged to actively participate in the program.

BIL-4.c Management

No management recommendations are made at this time, except to stress the need to monitor the billfish fisheries closely (particularly for blue and white marlin).

SWO - S W O R D F I S H

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 tropical waters of the Atlantic and in the Mediterranean Sea. In the North Atlantic, swordfish fisheries with a long history have been operating on both sides of the Atlantic. Since the mid 1980's, U.S. and Spanish swordfish longline fisheries have started to extend their operations offshore, and now fishing grounds of both fisheries are overlapping each other in the central North Atlantic. In tropical waters, swordfish have been caught by the tuna longline fishery as a by-product from west to east almost continuously and by directed fisheries. In the South Atlantic, longline fisheries have been taking swordfish which reflect local concentrations of the species in the areas such as off Brazil and the Gulf of Guinea. In the Mediterranean Sea, swordfish are abundant and have a long history of exploitation by various countries.

The catch of swordfish in the North Atlantic indicates a continuous increasing trend since the mercury content control was eased in 1978 (Table 31 and Figure 51). In 1988 it recorded its historically highest yield, with 19,525 MT. A major portion of the catch was taken by longline gear deployed at night. Spanish and U.S. swordfish longline fisheries dominated landings, with 9,600 MT (48 percent) and 5,800 MT (29 percent), respectively. These landings combined with Japanese (1,090 MT) and Canadian (690 MT) catches, account for almost 90 percent of the total North Atlantic catch. In the South Atlantic, the annual swordfish catch, which has been made by the longline fishery, showed a gradual increase until 1985, reaching 8,800 MT, and then decreased to 4,600 MT in 1987. In 1988, the catch almost doubled to 9,900 MT, as a result of a sharp increase in the catch by the Spanish swordfish longline fishery (4,400 MT). The catch of 2,900 MT by Japanese longline followed the Spanish catch. The Mediterranean swordfish catch exceeded 10,000 MT in 1984, mainly being ascribable to the Italian catch and has continued to increase since then. In 1988, the catch was estimated to be 17,500 MT (preliminary figure). In the Mediterranean, the recent longline catch accounted for about one third of the total catch, and various types of gears are used by the many coastal countries catching swordfish.

SWO-2. STATE OF THE STOCK

The catch-at-size data base of the Atlantic was updated to 1988, utilizing a substitution scheme for the catch data without size samples. The shortage of available size samples prevented the creation of catch-at-size data for the Mediterranean. Then, the catch-at-age data was generated from the revised catch-at-size data using the growth equation employed at the 1988 SCRS Swordfish Workshop. It should be noted that a generalized growth equation was used, instead of separate functions for each sex. Catch-at-age tables which were used for virtual population analyses (VPA) are given in Tables 32-A, 32-B and 32-C.

In 1988, the SCRS examined the North Atlantic swordfish as a single unit based on the conclusion that "although the available data do not permit a clear choice between one- or two-stock hypotheses, it is reasonable to consider all North Atlantic swordfish as a single group, as the 1987 Workshop recommended." Information developed during this assessment showed similar trends between eastern and western Atlantic CPUE's by age. An assessment of the overall North Atlantic stock was identified as the top priority. However, a two-stock hypothesis could not be rejected, although such a hypothesis would involve mixing of the two components in at least a portion of the central North Atlantic area. It should also be pointed out that exchange between the eastern Atlantic and the Mediterranean occurs, at least seasonally.

Because of conflicting information on the integrety of Atlantic swordfish stock structure, it was decided that analyses should also be conducted on eastern and western components as a second priority to an assessment of the overall North Atlantic stock (Table 32-D). Due to the way in which ICCAT data are summarized, it was convenient to identify an arbitrary east-west boundary only at 30°W longitude or 60°W longitude. The recapture of tagged fish moving between ICCAT areas 1-3 and 4-A (60°W longitude) led to the selection of 30°W longitude as a boundary (separation between ICCAT areas 4-A and 4-B) (Figure 52).

It was agreed that a full stock assessment for the south Atlantic would be conducted if time was available after the completion of the assessment for the north Atlantic. The south Atlantic assessment was placed at a lower priority because there are substantial deficiencies in the catch-at-age data set available for analysis. An assessment of Mediterranean swordfish was not possible because historical landings and size samples were not yet available.

The assessment of swordfish based on the North Atlantic and northeast and northwest stock hypotheses were carried out using virtual population analysis (VPA) methodology. For the analyses the ADAPT program, adopted jointly by the swordfish and bluefin tuna species groups was configured to closely resemble the program CAL, which was used in the 1988 ICCAT Swordfish Workshop. The use of the ADAPT program allowed substantial improvements in the assessment. In particular, it provided some indication of the reliability of estimated population sizes in the most recent years. (See Appendix 10).

NORTH ATLANTIC

The Committee examined the standardized CPUE series available. Eleven age-specific CPUE's were identified for the use of tuning VPA's with a natural mortality (m) of 0.2. Each of the U.S. and Spanish swordfish longline fisheries provided CPUE series for age 1, 2, 3, 4 and age groups 5+, respectively, and were used in the assessment. The CPUE from Japanese longline data was for age groups 5+. The partial recruitment (PR) used last year was incorporated in the VPA (ADAPT) runs. The PR pattern was .117 for age 1, .338 for age 2, .602 for age 3, .902 for age 4, and 1.00 for ages 5 and older.

The Committee reviewed last year's concern on the divergent trends between the catch-at-age estimates and the indices of abundance. Standardized catch per unit effort age-specific indices for the U.S., Spain and Japan were compared with catch at age for each of the index age groups (Figure 53).

The trends of indices for the U.S. age 1 generally supported the increase in the catch of age-1 fish for the 1982-1988 time series compared. The Spanish age-1 index followed the catch curve extremely well. Both indices were relatively flat for age-2, while the catch at age increased substantially. Age-3 indices bore little relationship to the catch-at-age trend. Age-4 indices showed a downward trend, while catch increased throughout the time series. Age 5+ indices tended downward for the U.S. and Spanish fisheries, while catch remained stable. The Japanese age 5+ index paralleled the age 5+ catch at age. In general, indices tracked the catch at age better for younger ages than for the older ages (3, 4, 5+).

It was noted, as was pointed out last year, that these patterns in catch and catch rates trends would be explained by: (1) a marked increase in effort; (2) a decline in catchability, perhaps due to competition among vessels as fleet sizes have grown; (3) error in standardized indices; and (4) error in the catch.

The VPA estimates for stock size (in number), fishing mortality and biomass indicate that:

a) Stock size - Estimates of the number of age-1 (recruit) swordfish on the first of January increased gradually each year through 1986, to about twice the 1978 level. Estimates increased greatly in 1987 and 1988 to approximately three times the 1978 level (Table 33-A, Figure 54-A). Age-2-4 fish (juvenile) increased in estimated number along the same trend as the age-1 fish, with a sharp increase in the last two years. The number of age 5+ fish (adult) declined continuously during the time period with the 1989 estimate only 54% of the initial estimated number in 1978.

b) Fishing mortality rate (F) - The rate of fishing mortality increased generally throughout the time period for age-1 fish from 0.02 to 0.09 (Table 33-B, Figure 54-B). F's on ages 2-4 fluctuated somewhat, but tended upward from an initial (1978) F of 0.23 to 0.45 in 1987. Age 5+ F's also increased substantially during the 1978-1988 time period, increasing from 0.39 to 0.63.

c) Biomass - The same trends were evident as were seen in the trends for numbers, with gradual and continuous increases in the biomass of the age-1 and age 2-4 groups, along with a substantial decline (41%) in the biomass of the age 5+ fish from 1978-1988 (Table 33-C, Figure 54-C).

For the total North Atlantic assessment, the results were similar to those obtained at the 1988 SCRS Swordfish Workshop, with a continual increase in age 1 and ages 2-4 fish throughout the time series, and a decreasing trend in ages 5+. The validity of the steep increase of young fish through time was questioned, although considered to be biologically possible. This may imply that the indices of abundance used in the tuning are not truly reflective of actual changes in stock size, that changes in catchability may have occurred, or that results may be biased by applying the present VPA assumptions to a species which exhibits different size by sex.

Yield-per-recruit analyses showed that the current fully recruited fishing mortality was greater than the maximum yield per recruit F_{max} and considerably greater than $F_{0.1}$. Wide changes in the range of F result in smaller changes in yield per recruit. A comparison of Tables YR-1 and YR-2 in the Appendix shows the potential gains in yield per recruit if small fish (i.e., ages 1 and 2) are not caught.

NORTHWEST ATLANTIC

Separate standardized CPUE's were developed from the Spanish fishery for east (ICCAT area 4-B) and west (ICCAT area 4-A) stock hypotheses (Table 34). These east and west Atlantic Spanish CPUE indices generally followed the same trend. The U.S. indices developed for the entire North Atlantic were used for the western analysis, because all of the U.S. catch comes from that area. Both the U.S. and Spanish indices were age-specific for ages 1, 2, 3, 4 and 5 and older. No CPUE indices were available from the Japanese longline fishery for the western area.

The same methodology was used to develop estimates of the partial recruitment (PR) for the northwest Atlantic analysis as was used for the total North Atlantic. The western PR pattern was 0.140 for age 1, 0.392 for age 2, 0.673 for age 3, 0.928 for age 4 and 1.0 for ages 5 and older.

The CPUE indices are compared with catch at age in Figure 55. The standardized U.S. age-1 CPUE showed a general upward trend similar to catch-at-age, but did not increase as rapidly as did the catch. The Spanish index developed for Area 4-A did not track catch during the earlier years of the index, but paralleled the catch from 1985-1988. Both U.S. and Spanish indices followed the same general trend as the age-2 catch, but with considerable variance. Age-3 indices did not reflect the upward trend in catch at age. The Spanish age-4 index showed some relationship to the catch-at-age, while the U.S. age-4 index did not fit. The U.S. age 5+ index showed a declining trend while the catch-at-age was declining. The Spanish age 5+ index showed similar trends to the catch at age, but with considerable variance.

The VPA estimates for stock size (in number), fishing mortality and biomass indicate that:

a) Stock size - An increasing trend was evident for age-1 fish, although not as severe as from the total North Atlantic assessment. The total increase was approximately two-fold, although there was a slight decline in the most recent year (Table 35-A, Figure 56-A). Age 2-4 fish increased in estimated number throughout the 1978-1989 time series by approximately 33 percent. The number of age 5+ fish estimated declined steadily from 1979 to 1986, and has declined sharply since 1986. There was an overall decline in the estimated number of age 5+ fish, since 1979 of 76 percent.

b) Fishing mortality rate (F) - The rate of fishing mortality increased gradually on age-1 fish from 1978 to 1988, with a 1988 estimate of 0.14 (Table 35-B, Figure 56-B). F on ages 2-4 was generally level at about 0.25 until 1985. F's increase substantially through 1988 to a level of 0.55. F's on the age 5+ group fluctuated around 0.4 until 1985 and then increased sharply to over 0.7 in 1986. the terminal 1988 estimate was 0.99. This sharp increase coincides with the increased catch of U.S. and Spanish fleets in the north-central Atlantic (ICCAT area 4-A).

c) Biomass - Biomass at age 1 followed the same upward trend as did estimated number at age. Age 2-4 biomass fluctuated, but remained relatively stable through the time period (Table 35-C, Figure 56-C). The increase in number appeared to be offset by the increase in F on the 2-4 age group. The biomass of age 5+ fish declined steadily, with the 1988 estimate being only 30 percent of the 1978 level.

Results from the northwest Atlantic assessment indicate a trend of increasing recruitment, stable stock biomass in the 2-4 age group, and substantial declines in number and biomass of age 5 and older fish to about one-third of the 1978 level. Fishing mortality rates appear to have increased sharply in recent years, although the same general concerns about the validity of the assessment expressed for the total north Atlantic apply to the northwest Atlantic.

In the hypothetical case where the real recruitment would not be increasing as presently estimated, the fishing mortality, as well as the biomass by age, could be quite different, to an indefined degree. This limitation applies to all the current analyses being carried out on the various swordfish stock hypotheses.

Yield-per-recruit analyses showed that the current fully recruited fishing mortality was greater than the maximum yield per recruit F and considerably greater than $F_{(0.1)}$. A comparison of Tables YR-3 and YR-4 in Appendix 10 shows the potential gains in yield per recruit if small fish (i.e., ages 1 and 2) are not caught.

NORTHEAST ATLANTIC

Age-specific standardized Spanish indices of abundance were developed for ICCAT area 4-B for ages 1, 2, 3, 4 and 5+ The standardized Japanese longline index for age 5+ developed for the southeastern portion of area 4-B was also used for the northeast Atlantic analysis.

The same methodology used in the previous two analyses was applied to the northeastern analysis for development of the PR. The northeastern PR pattern was 0.10 for age 1, 0.316 for age 2, 0.576 for age 3, 0.884 for age 4, with full recruitment at age 5.

The various abundance indices are compared with catch at age in Figure 57. The standardized Spanish age-specific age-1 and age-2 CPUE indices followed the increase in catch-at-age of those two age-groups extremely well. The age-3 index also provided a reasonable parallel fit to the catch-at-age 3 as did the age-4 index to the age-4 catch. The age 5+ index followed the general direction of area 4-B catch-at-age of 5+ year-old fish. The Japanese longline index for age 5+ fish did not reflect the trend in catch at age of older fish.

The VPA estimates for stock size (in number), fishing mortality, and biomass indicated that:

a) Stock size - The estimated number of age 1 fish for the northeast Atlantic increased steadily through 1985, followed by a rapid increase to 1987. Estimates of overall abundance increased by over two-fold during the 1978-1988 time period (Table 36-A, Figure 58-A). Number of ages 2-4 fish estimated for the northeast Atlantic increased by over three times from 1978-1989. Age 5+ estimates were generally stable from 1978-1988, declining only slightly in 1989.

b) Fishing mortality (F) - F for age-1 fish increased steadily throughout the time series, but never exceeded 0.1 (Table 36-B, Figure 58-B). Age 2-4 fish generally increased, but at a less rapid rate than for the northwest Atlantic. Age 5+ F's increased substantially in the northeastern Atlantic through 1983 to 0.66, and then declined through 1986 as part of the Spanish fleet moved into ICCAT area 4-A. Increasing F's occurred in 1987 and 1988 as the Spanish catch increased substantially in area 4-B.

c) Biomass - Biomass for ages 1 and 2-4 fish showed gradual increases throughout the time series, paralleling the increases in numbers at age (Table 36-C, Figure 58-C) The biomass of age 5+ fish declined somewhat with high F's and fewer fish in the older age groups, with the 1988 estimate at 64% of the 1978 age 5+ biomass.

Although the results of the northeast Atlantic analysis showed the same general trends as the Northwest Atlantic, there were some differences. The rate of increase in numbers of age-1 fish was greater in the northeast Atlantic as was the rate of increase of age 2-4 fish. The rate of decline in the number of age 5+ fish in the northeast analysis was much less than its northwest counterpart. Despite uncertainties in the analysis, the Committee felt that general conclusions about trends in stock size and biomass and in fishing mortality could be drawn for the northeast Atlantic swordfish.

Yield-per-recruit analyses showed that the current fully recruited fishing mortality was greater than the maximum yield per recruit F and considerably greater than $F_{(0.1)}$. A comparison of Tables YR-5 and YR-6 in Appendix 10 shows the potential gains in yield per recruit if small fish (i.e., ages 1 and 2) are not caught.

Similarity of Assessment Results

The results described above for the three different views of north Atlantic swordfish are similar. This somewhat alleviates the concern of having made an arbitrary decision (based largely on logistic considerations) on stock separation for north Atlantic swordfish.

SOUTH ATLANTIC

The Committee was unable to carry out an analytical assessment of the South Atlantic stock, due to time constraints. However, based on the very large increase in catch in tropical waters of the South Atlantic in 1988, the Committee felt that it was important to conduct an assessment as soon as adequate catch-at-size data are available. The United States offered to work with Spain to facilitate an assessment of the South Atlantic as soon as it practical.

SWO-3. EFFECTS OF CURRENT REGULATIONS

There are no ICCAT regulations in effect for this species.

SWO-4. RECOMMENDATIONS

SWO-4.a Statistics

i) All countries should report swordfish catch and effort statistics by five-degree squares or smaller areas by month.

ii) All countries catching swordfish (directed or by-catch) should carry out an adequate level of size sampling and, when possible, sample for sex, preferably by month and five-degree square.

iii) All countries which have major swordfish fisheries should submit, by August of each year, the previous year's catch-at-size data.

iv) An improvement was made in the ICCAT data base for the Mediterranean Sea, due to the recent submission of some data from Turkey, Greece, Italy, etc. The ICCAT collaboration with the General Fisheries Commission of the Mediterranean (GFCM) to improve Mediterranean statistics should be continued.

v) Some of the U.S. swordfish boats reflagged their nationality in 1988, and reportedly the reflagging is increasing. Because the fishery data from these boats have been essential for stock analysis, it is recommended that the Secretariat should be encouraged to obtain these data.

SWO-4.b Research

i) The Joint GFCM/ICCAT Stock Assessment proposed for 1990 is considered to be the best opportunity to advance the stock analyses on Mediterranean swordfish. It is recommended that ICCAT scientists participate in the meeting as much as possible and the Secretariat assist the group with an improved data base.

ii) An analysis on tag recapture data which incorporates information on the distribution of fishing effort on the basis of small geographical strata, should be carried out to obtain further information on stock structure, especially on mixing of east and west fish.

iii) Emphasis should be placed on developing validated growth models. It was also recommended that development of a growth equation by sex should be pursued.

iv) Research should be conducted on maturity at age.

v) Sensitivity analyses

a) Research is needed on VPA and analytical assessment techniques or models that will allow evaluation of mixing rates for stocks exploited by wide ranging fisheries.

b) It must be determined whether bias is introduced in estimates of fishing mortality, population size and spawning stock biomass by conducting Virtual Population Analyses which do not account for sexually dimorphic growth. The magnitude of bias, if any, must be evaluated.

c) The sensitivity of VPA techniques to different natural mortality rates by age and changes in age-specific catchability through time should be evaluated.

d) The sensitivity of the VPA results to dome-shaped partial recruitment curve, such as the one estimated during the SCRS meeting.

vi) All techniques to identify stock(s) and quantify mixing rates should be explored, including age-, growth-, maturity-, and genetic-based methodologies. Detailed size composition and effort records should be investigation for patterns in distributions which might provide information on mixing rates.

vii) Scientific tagging should be intensified to refine the growth model and to help resolve the question of stock structure including the Mediterranean and eastern Atlantic. Tagging by commercial fishermen should be encouraged.

SWO-4.c Management

This year's stock assessments were carried out for the total North Atlantic, the northwest Atlantic and the northeast Atlantic. It was noted that all VPA analyses showed more or less similar results and were similar to those obtained at the 1988 Swordfish Workshop. Thus, the following comments and management recommendations apply generally to all north Atlantic areas. Consistent increasing trends in stock sizes of recruits (age-1) and juveniles (ages 2-4) and a decreasing trend in stock size of adults (age 5+: possible spawning potential) may come from uncertainty in the catch at size, growth, and CPUE indices, although biologically possible. However, general increasing trends of fishing mortality in overall ages, specifically those of older ages with higher rates, are of concern to the Committee. Present yield cannot be maintained over the long-term without either a decrease in fishing mortality or continued increases in recruitment. It is unlikely that recruitment will continue to increase.

Despite uncertainties in the analysis, it seems that further increases in fishing effort will be detrimental.

Therefore, the Committee recommends that action should be taken to at least prevent the trend of increasing fishing mortality. Appendix 10 gives projections of stock size and yield under differing fishing strategies.

SBF - S O U T H E R N   B L U E F I N

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 middle latitudes in the eastern Indian Ocean. The habitat of young fish is located in coastal waters of southern Australia, and as they 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 recorded its peak catch of 77,500 metric tons (MT) in 1961 and the Australian surface catch of young fish peaked at 21,500 MT in 1982. In recent years, New Zealand has participated in harvesting this species by handline gear in its coastal waters, although the catch amount has been very small. In 1988, catches by these three countries were 10,800, 10,600 and 100 MT for Japan, Australia 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 and 6,200 MT during the last decade (Table 37), reflecting the shifts of the Japanese longline fishery between two oceans.

SBF-2. STATE OF THE STOCKS

At the Eighth Tripartite Scientific Meeting of Australia, Japan and New Zealand held in Shimizu, Japan, in September 1989, the status of the stock was re-evaluated on the basis of the updated catch at age, fishing effort and tagging data. Abundance indices of 1987 based on CPUE of southern bluefin tuna targeted operations of the longline fishery were about 1/10 for age 4-7 fish and 1/2-1/3 for parental stock (age 8 and older) of the levels of the early 1970's. On the other hand, all VPA runs showed estimated ratio of parental biomass between 1960 and 1988 ranged between 8% and 25%. They were also consistent with predictions at previous meetings that a further decline to at least 1989-90 was unavoidable. While the parental biomass in 1960 was recognized to be below initial parental biomass, the precise relationship between 1960 and initial level was unknown.

SBF-3. EFFECTS OF CURRENT REGULATIONS

Since 1971, as a first stock management action, Japanese longline fishermen have adopted a voluntary measure of restricting southern bluefin 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 off western Australia. Japan and New Zealand introduced national quotas of 23,150 and 1,000 MT, respectively, for the 1985 fishing season. Recently, Australia and Japan reduced their catch limits to 11,500 MT and 19,500 MT, respectively.

In 1988, in accordance with the recommendation made at the scientific meeting, the Tripartite Administrative Meeting decided to reduce their catch limits to 8,800 MT for Japan, 6,250 MT for Australia, and 450 MT for New Zealand. In September 1989, the scientific meeting could not reach an agreement on the future stock state under the continuation of these catch quotas. As of now, the administrative meeting has been reviewing the possibile revision of the present catch quotas taking into account the discussion made at the scientific meeting and the socio-economic factors in the three countries.

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; they are Atlantic bonito, Atlantic black skipjack, frigate tuna, and spotted Spanish mackerel (including serra Spanish mackerel) (Figure 59). 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 120,000 MT in 1983. 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 the U.S.S.R., and frigate tuna by Spain and Ghana. Increases in recent years are also reported for Spanish and king mackerels from surface gears from Mexico and the United States. Since 1984, the catches have been relatively stable at around 90,000-100,000 MT, reaching approximately 104,000 MT in 1987 (Table 38). The 1988 catch data are incomplete, as statistics have not yet been received from many countries.

It should also be noted that there has been an improvement in statistical coverage, due to an increase in the number of countries which report their catches as well as to an improvement in the catch coverage and species identification of the reported catch.

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 under-exploited. Annual stock evaluations of spotted Spanish and king mackerels are carried out for coastal areas of the eastern United States. The results of these assessments show an overfished condition, with rebuilding occurring under management quotas.

SMT-3. EFFECTS OF CURRENT REGULATIONS

A "U.S. Fishery Management Plan for Coastal Migratory Pelagic Resources (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). It provides a total allowable catch (TAC) for spotted Spanish and king mackerels, divided by area and between the commercial and recreational fisheries. The TACs and allocations are adjusted annually, based on the most recent assessment. These regulations appear to be effective in rebuilding the stocks to provide yields at full exploitation levels.

SMT-4. RECOMMENDATIONS

SMT-4.a Statistics

Catch and effort statistics of small tunas are very incomplete for most of the coastal countries. Therefore, the Committee recommends:

i) That special efforts be made to improve the catch data of small tunas by the different fisheries (artisanal, industrial, sport), as well as the corresponding effort, as far as possible.

ii) That discards off the African coasts, unreported marketing of purse seine catches, and the size of individuals of the species involved be estimated.

iii) That efforts be made by member countries to report catch statistics by species and gear.

SMT-4.b Research

Biological studies have not been greatly advanced, and there is a general lack of information on the status of stocks of the small tunas. Therefore, the Committee recommends:

That studies related to the stock evaluation of small tunas be carried out as far as possible, and that the results be communicated 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 has no recommendation 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. PLANS FOR FINALIZING THE YELLOWFIN YEAR PROGRAM

Dr. A. Fonteneau, General Coordinator of the Yellowfin Year Program, introduced this item, and suggested that a rapporteur be chosen for this Agenda item. Ms. P. Pallarés was designated for this task.

The General Coordinator then presented the Report of the Final Meeting of the Yellowfin Year Program (SCRS/89/12), of which he was chairman. This report answered the questions posed by the Committee on the status of the yellowfin stock during the critical period, 1983 and 1984. It was reported that the decrease in the CPUE value of yellowfin in the east Atlantic during those years did not indicate a serious reduction in the adult stock biomass, but rather was due to the low catchability of large yellowfin by purse seiners. This decrease in availability of yellowfin could be related to the oceanographic anomaly, of the "El Niño" type, which was detected in the Gulf of Guinea at the end of 1983 and beginning of 1984. The YYP Meeting Report was accepted without discussion.

Ms. Pallarés then presented new data and analyses made available since the final meeting of the Program; these analyses had been carried out in compliance with the recommendations made at the YYP meeting (SCRS/89/12) and their results will be included in the final report.

The procedure to follow for the publication of the documents pertaining to the Yellowfin Year Program was then discussed. The dates which had been proposed by the YYP group were approved, i.e., the final version of the report to be submitted by the 1990 SCRS meeting, and the publication of the final documents in early 1991. All the documents presented to the Committee were accepted.

At the proposal of the Assistant Executive Secretary, and in order to facilitate the preparation of the publication, it was recommended that the work be presented on a diskette or similar form, if feasible. The documents are acceptable in WORDSTAR, WORDPERFECT, WPS-PLUS/DOS or ASCII files.

Regarding the Final Report of the Program, it was agreed that an editing committee be formed by three scientists named by the SCRS Chairman, who will carry out their work by mail and who should meet before the summer for the final editing of the YYP documents that will be published by ICCAT. This committee will designate the reviewers who will review each document before its final presentation.

Finally, the General Coordinator invited the observer from the IATTC to comment on the results presented, based on his experience with Pacific yellowfin. It was considered interesting to analyze jointly the similarities and differences in the parameters of the Atlantic and eastern Pacific stocks of yellowfin tuna.

12. REVIEW OF ENVIRONMENTAL CONDITIONS IN RELATION TO FISHERIES

The Committee held a half-day session on environmental conditions in relation to fisheries. The report of this session was presented by the Coordinator, Dr. A. Fonteneau (France). He emphasized the areas where studies have to be developed and referred to the recommendations in the report. The report was adopted and is attached as Appendix 7.

The Committee noted that at the half-day session, it was decided that a Sub-Committee on Environment be established at the 1990 SCRS Meeting. In the meantime, however, it was recommended that a Working Group be created to define the terms of reference, nature and function of such a sub-committee. The SCRS Chairman nominated Mr. J. Pereira (Portugal), as Chairman of the Environment Working Group and asked him to carry out his work through correspondence. The Committee asked this Working Group also to organize some activities concerning the environment for the 1990 session (e.g., seminar on a specific subject relating to environment) as a temporary solution until the formal sub-committee is established.

13. REVIEW OF THE PROGRESS MADE BY THE ENHANCED BILLFISH RESEARCH PROGRAM

A small group was formed, and Dr. B. Brown was nominated convener, to evaluate the progress made by the Enhanced Research Program for Billfish and to develop the plan for 1990. Dr. B. Brown later presented the report of this small group to the SCRS.

The progress and all the activities carried out by the Billfish Program in 1989, as well as the achievements made in sampling, collection of statistics, species identification kits, observer program on fishing boats, preparing tagging kits and publicity posters, and the financial aspects of the Program are reported in COM-SCRS/89/13 (Addendum 1 to Appendix 4).

The group prepared a detailed Program Plan for 1990 including the funding requirement for each activity.

The Committee reviewed the small group's report and after introducing some modifications, it was adopted together with the 1990 Program Plan (which includes the budget for 1990) (Appendix 4). The Committee recommended approval of the plan to the Commission, with the understanding that all funding will be covered by private donations.

14. 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. R. Conser (U.S.A.). The Committee adopted the Report together with its recommendations. While doing so, the Committee noted that the study of available options for the computer communication system and options for the data base software system requires very special knowledge on the subject. It recommended that the Secretariat solicit assistance of experts in this area in its evaluation of various systems. The Report of the Sub-Committee is attached as Appendix 5.

15. REVIEW OF EDITORIAL AND PUBLICATION POLICY

This subject was discussed under Agenda Item 11 (since it dealt with the publication procedure to be followed for the Yellowfin Year Program final report) and by the Sub-Committee on Statistics. The Committee endorsed all the previous decisions made.

The Committee confirmed that the report of the Albacore Workshop and the Data Preparatory Meeting would be included in the "Collective Volume of Scientific Papers" series.

16. REVIEW OF FUTURE SCRS RESEARCH PROGRAMS AND CONSIDERATION OF SCRS MEETING PROCEDURES

a) Organization of the next SCRS meeting

The Committee discussed the organization of the next SCRS meeting. France expressed its concern about delays in receiving the report of the species groups. As some drafts were not available until very late into the Plenary Sessions, they could not be fully reviewed by the SCRS. He noted that report drafts should be submitted to the Secretariat at the latest by the first day of the SCRS Plenary Session, and that reports submitted after that time should not be accepted.

Spain referred to the recommendations section of the bluefin tuna report and questioned the feasibility of the simultaneous meetings of various species groups. Spain suggested that a working group be established to study the overall organization of the SCRS. The U.S. delegate noted that one of the reasons for major delays this year was that the catch-at-size tables could not be created in time, since the statistics were not provided to the Secretariat on time. The U.S. supported the establishment of a working group to explore other possibilities for organizing the meeting.

The delegate from Côte d'Ivoire concurred with setting up a working group. He also emphasized that drafts should not be accepted after the first day of the SCRS Plenary Session.

Canada, while agreeing with the idea of the deadline, noted the length of time needed for analysis and proposed that if such a cut-off time is established, an earlier starting date for the species group meetings would be advisable.

The U.S. also agreed with the proposal of setting a deadline, but asked that there be some flexibility, for example, that the deadline could possibly be extended by a decision of the Committee if there was adequate justification, such as a special data problem.

The Committee concluded that the drafts should be submitted by the opening of the SCRS Plenary Session. This deadline could, however, be altered by a decision of the Committee, depending on the situation. The deadline for the receipt of data is at least two weeks before the species group meetings. It was also emphasized that no corrections to the data would be accepted after the first day of the species groups meetings.

The SCRS Chairman established a working group to study alternative organizational procedures of the SCRS meeting with Ms. P. Pallarés (Spain) serving as Chairman. The Group was asked to draw up a plan, through correspondence, to be submitted at the next Committee meeting.

The Committee recommended that in 1990 the SCRS Plenary Session meet during five working days, the species groups meet during the three working days prior to the Plenaries, except for bluefin tuna and swordfish, which would meet during the five working days prior to the start of the 1990 Plenary Sessions.

Intersessional Meetings

The Committee identified the following intersessional meetings to be held in 1990, which are either organized by ICCAT or require direct ICCAT involvement.

ALBACORE WORKSHOP

The Committee recognized that it is essential to hold the proposed Workshop in order to answer the questions posed by the Commissioners on stock assessment. The Committee decided to hold the Workshop in late September, 1990, at the ICCAT Headquarters. Dr. F. X. Bard was nominated to convene this Workshop.

WEST ATLANTIC TROPICAL TUNA STOCK ASSESSMENT

The Committee noted that the best time to hold this meeting would be in September, 1990, and at a site in one of the west Atlantic countries. Since the meeting was proposed by the yellowfin group, and again by the skipjack group, the assessment could be on both species.

The Committee decided to hold this meeting in early September, 1990. Most of the data base work has been completed. Dr. B. Brown was nominated Convener for this meeting.

GFCM/ICCAT JOINT WORKING GROUP FOR ASSESSMENT OF LARGE PELAGIC SPECIES

It was reported that this meeting is being prepared by FAO for sometime after mid-May and probably at Bari, Italy. Since the World Bluefin Meeting is now scheduled in late May, ICCAT expressed its preference of holding the meeting in early or mid-June, 1990. The Secretariat is asked to keep concerned scientists informed of any further developments on this matter.

WORLD BLUEFIN MEETING (hosted by IATTC)

The meeting will be held starting on May 25, 1990, at La Jolla, California (U.S.A.). As already noted in other sections of this report, many ICCAT scientists will participate in this meeting.

b) Future albacore research program

The Committee reviewed and concurred with the Albacore Research Program which was developed by the albacore species group. It noted that progress on the stock analyses has not been as up to date as wished, despite the data which have been accumulated over the years and noted that new albacore fisheries are developing. Therefore, the Committee wishes to draw special attention of the Commission to the Albacore Research Program Plan (Appendix 6) developed by the Committee and asks the Commission to consider this as a first-priority research item.

The Plan requires funding by the Commission and the Committee hopes that the special funds for the Program would be approved by the Commission and that the Program could begin in 1990.

c) Future plan for monitoring environmental factors

The Committee noted that this matter was discussed fully under the Agenda Item 12.

d) Plan for GFCM/ICCAT joint meeting on Mediterranean stock assessment

As this subject has been discussed in other species sections as well as by the Sub-Committee on Statistics, the Committee only confirmed its previous decision to support participation in the meeting.

e) Other matters

No other matters were discussed.

17. COOPERATION WITH OTHER ORGANIZATIONS

Cooperation with other organizations was discussed under various Agenda Items. The relationship with FAO is considered to be very close and the mutual collaboration has been satisfactory. In particular, ICCAT's collaboration with GFCM, as well as with the CWP, should be noted.

Close collaboration was maintained with the Inter-American Tropical Tuna Commission (IATTC), particularly in preparing for the World Bluefin Tuna Meeting to be hosted by IATTC, as mentioned in the bluefin tuna species section.

In April, 1989, FAO asked ICCAT if the Secretariat could translate into Spanish the "Symposium on Tropical Tunas in the East Atlantic" recently published by FAO (document 292, 250 pages of text). The ICCAT Executive Secretary deferred his response in order to obtain a specific recommendation from the SCRS. France, Spain, Côte d'Ivoire and the U.S.A. supported the need for such a translation as the publication in question is useful for scientists as well as for industry personnel.

The Executive Secretary stated that the Secretariat would try to start translation; however, it is difficult to guarantee that this work will be achieved by the next meeting of the SCRS, due to the heavy work load at the Secretariat.

The Committee felt that the matter is urgent as the fishermen are very interested in the publication and hoped that the Secretariat could prepare the translation and publication as soon as possible.

18. RECOMMENDATIONS

The Committee wishes to draw the attention of the Commission to various recommendations made by the SCRS in the previous sections. Those concerning statistics, research and management of tuna species are found in Section 4 of each of the respective species reports of Agenda Item 10 of the SCRS Report and in the Report of the Sub-Committee on Statistics.

Various new programs and special research activities are proposed and emphasized in Agenda Items 16 and 17.

19. OTHER MATTERS

No other matters were discussed.

20. ADOPTION OF REPORT

The report was adopted.

21. ADJOURNMENT

The meeting was adjourned.

Table 1. Atlantic yellowfin catch (1,000 MT) - as of October 29, 1989

	1959	1960	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
TOTAL	57.8	68.9	59.1	58.1	64.9	69.3	68.1	58.8	60.2	83.0	92.7	73.4	73.2	93.5	94.7	106.8	124.6	123.1	128.7	130.5	124.8	125.5	151.2	159.8	160.4	111.7	149.9	132.2	130.8	119.7
E ATL.	38.6	52.0	51.0	28.3	42.3	47.3	54.4	43.3	52.6	73.7	80.4	59.2	57.5	78.2	79.8	92.2	108.1	109.3	115.3	115.7	111.7	112.4	134.8	134.3	123.4	75.3	112.6	105.2	106.9	94.2
-SURF.	5.9	11.4	10.0	10.8	19.1	28.4	26.8	30.7	35.5	51.9	59.9	43.1	42.8	60.1	59.3	72.8	92.7	96.6	99.7	104.5	105.0	99.9	126.9	124.4	117.3	66.6	105.0	101.2	102.2	88.7
BB	5.8	11.2	9.8	10.6	17.8	21.1	18.5	15.1	16.8	22.1	15.6	9.6	10.6	13.1	14.7	19.7	9.6	12.8	10.9	9.0	13.7	7.6	9.8	13.2	11.5	13.7	16.1	15.1	16.5	16.7
ANGOLA	1.3	2.3	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
CAP VERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	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	0.9
FIS	4.5	8.9	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
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	++	0.1	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	8.8
JAPAN	0.0	0.0	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
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	0.7	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
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	0.4	0.1	1.1	0.8	1.0	0.9	0.4	0.2	++	0.1	0.3	0.1	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	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	3.8	0.3	0.1	++	0.3	0.7	0.3	++	++	0.1
ESPANA	0.0	0.0	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	2.2
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	0.0	0.0	0.0	++	++	0.0	0.0	++	0.0	0.0	++	++	0.2	++	++	++	0.1
PS	0.0	0.0	0.0	0.0	1.3	7.2	8.3	15.7	18.7	29.7	44.3	33.4	32.2	46.9	44.5	53.1	83.0	83.6	88.3	94.6	89.9	91.8	111.7	107.9	101.9	50.5	87.4	83.8	82.8	70.0
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	0.0	0.0	0.6	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0
FIS	0.0	0.0	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
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	0.1	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
JAPAN	0.0	0.0	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
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	0.3	1.0	1.6	2.2	3.4	3.0	3.2	4.8	4.5	2.3	0.6	2.3	2.3	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	0.1	0.2	0.1	0.2	0.9	1.3	0.3	0.0	++	0.0	0.0
ESPANA	0.0	0.0	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	59.5	60.2	44.3
USA	0.0	0.0	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
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	0.1	++	0.1	0.9	1.2	1.8	3.4	1.4	0.7	2.2
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	2.4	5.4	0.8	0.0	0.0	3.6	3.0
OTHERS	0.0	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	1.8	1.5	1.0	0.9
SURF UNC	0.1	0.1	0.2	0.3	0.1	++	++	++	++	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	1.9
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	4.6	2.7	3.4	2.0	1.2	2.0	1.8	1.8
OTHERS	0.1	0.1	0.2	0.3	0.1	++	++	++	++	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	1.1	0.2
-LL	32.8	40.6	40.9	17.4	23.2	18.9	27.6	12.5	17.1	21.9	20.4	16.1	14.7	18.1	20.4	19.4	15.4	12.8	15.6	11.3	6.8	12.5	7.9	9.9	6.1	8.7	7.6	4.0	4.6	5.5
CHI.TAIW	0.0	0.0	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	0.3
CUBA	0.0	0.0	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
JAPAN	32.8	40.6	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	1.5
KOREA	0.0	0.0	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
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	0.1	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
USSR	0.0	0.0	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
OTHERS	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 1. Continued...

	1959	1960	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
W ATL.	19.1	16.9	8.1	29.6	72.2	21.6	13.6	15.5	7.6	9.3	12.3	14.2	15.7	15.3	14.9	14.5	16.5	13.8	13.4	14.8	13.1	13.0	16.4	25.5	37.0	36.4	37.3	27.0	24.0	25.5
-SURF	0.0	0.0	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	5.6	4.8	15.1	29.4	27.0	25.7	14.4	14.2	12.0
BB	0.0	0.0	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	3.0	3.6	3.7	4.3	2.3	3.6	3.6
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	0.1	0.4	0.9	1.0	1.8	1.3	2.2	0.7	1.3	1.6
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	++	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
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	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VENEZUEL	0.0	0.0	0.0	0.0	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	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	0.0	++	0.2	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0
PS	0.0	0.0	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	0.6	1.1	3.7	1.0	5.1	2.8	12.1	25.7	23.2	21.0	10.7	8.4	6.9
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	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
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	0.5	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
USA	0.0	0.0	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
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	6.9
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	1.0	0.0	0.3	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0
SURF UNC	0.0	0.0	0.0	0.0	0.0	0.0	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	0.5	1.4	2.2	1.6
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	++	0.1	0.2	1.3	2.0	1.5
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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	++	0.4	++	0.2	0.1	++	++	++	++	0.3	++	0.1	0.1
-LL	17.3	14.9	6.1	26.0	18.8	19.2	11.4	13.0	4.9	7.7	10.4	13.9	15.4	11.6	12.4	12.6	14.2	12.6	11.4	9.5	9.0	6.6	11.4	9.9	7.2	9.0	11.0	11.7	9.4	13.2
BRASIL	5.9	4.7	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	0.2	0.4	0.7
CHI.TAIW	0.0	0.0	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	1.3
CUBA	0.0	0.0	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
JAPAN	11.3	10.2	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	1.5
KOREA	0.0	0.0	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
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	++	0.1	0.6	1.1	0.6	0.7	++	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	0.0	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
USA	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	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.1	0.1	1.7	3.4	4.4	8.3
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.5	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
OTHERS	0.0	++	++	++	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	0.2	0.4	0.4	0.4	0.3	0.1	0.2
-UNCL	1.8	2.0	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	0.5	0.4	0.5	0.5	0.9	0.5	0.3
VENEZUEL	1.8	2.0	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
OTHERS	0.0	0.0	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	0.5	0.4	0.5	0.5	0.9	0.5	0.3
UNCL. REGION	0.0	0.0	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
-LL	0.0	0.0	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
OTHERS	0.0	0.0	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

For each region-gear group, countries with < 950 MT annual catch during the entire period covered are included.

++ Catches less than 50 MT but more than 0.5 MT.

* Provisional data.

1/ It was considered that the fishery has remained stable with respect to the previous year.

2/ Estimates from landings at the port of Abidjan.

3/ Applied the same species composition as the Spanish fleet.

4/ Data obtained from the national report, applying the same East/West proportion as the previous year.

5/ Data obtained from the national report, considering an equal East/West division.

Table 2. Carrying capacity (1000 MT) of yellowfin and skipjack surface fisheries in the east Alantic.

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988*
-BB																	
FIS	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
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
SPAIN (CAN.)	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
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
CAPE VERDE									0.2	0.2	1.0	1.0	1.0	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
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
-PS																	
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
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
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		
JAPAN	1.9	1.9	0.6	0.2							0.4	0.4	0.4	0.8	0.8	0.8	0.8
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
OTHERS**	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
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
TOTAL PS+BB	36.5	32.2	42.3	54.1	46.0	53.5	68.4	62.0	67.6	69.6	77.1	81.8	60.7	51.8	49.3	45.6	43.9

* Preliminary data
** Ghana (1982-87), Mexico (1983), Congo (1980-81), Gran Cayman (1982-83), Portugal (1979-81), Venezuela (1983).

Table 3. Atlantic bigeye catch (1,000 MT) - as of October 29, 1989

	1959	1960	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
TOTAL	7.7	9.1	17.0	23.1	26.0	23.5	39.2	25.0	24.7	23.0	35.7	41.3	55.0	46.4	56.4	63.6	60.7	44.6	54.1	51.7	45.1	62.7	67.1	72.9	58.4	68.8	74.3	58.7	47.1	44.1
-SURF	6.3	6.1	5.8	7.1	10.9	5.7	9.8	5.3	11.5	4.2	12.7	13.9	15.9	13.9	18.5	24.5	19.9	17.2	25.0	23.4	17.9	21.4	25.7	21.2	25.1	27.3	25.6	25.1	18.3	15.1
BB	6.3	6.1	5.8	7.1	10.9	5.7	9.8	5.3	11.4	3.8	9.7	10.5	11.8	9.3	13.6	17.9	14.6	9.9	12.8	14.6	9.5	12.1	9.7	6.9	9.8	11.1	17.6	15.0	12.3	8.2
FIS	0.0	0.0	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
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	0.1	0.1	0.2	0.1	0.2	0.3	0.5	0.4	0.3	1.1	1.4	1.2	1.3	0.7
JAPAN	0.0	0.0	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
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	0.2	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
PORTUGAL	6.3	6.1	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
ESPANA	0.0	0.0	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
OTHERS	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	0.2	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	0.3
PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	0.4	2.9	3.4	4.1	4.7	4.9	6.6	5.3	6.9	11.5	8.6	8.0	8.7	15.2	14.0	15.2	16.0	7.9	9.8	5.5	6.7
FIS	0.0	0.0	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
JAPAN	0.0	0.0	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
ESPANA	0.0	0.0	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	7.9	3.7	4.5
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	0.1	++	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	++
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	0.3	1.1	0.2	0.0	0.0	0.1	++
OTHERS	0.0	0.0	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
SURF UNC	0.0	0.0	0.0	0.0	0.0	0.0	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	0.2
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	0.0	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	0.2
-LL	1.5	3.0	11.2	16.0	15.1	17.8	29.4	19.6	13.2	18.8	23.0	27.4	39.1	32.5	37.9	39.1	40.8	27.4	29.1	28.3	27.2	41.4	41.4	51.7	33.3	41.5	48.5	33.5	28.7	28.9
CHI.TAIW	0.0	0.0	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	1.0
CUBA	0.0	0.0	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
JAPAN	1.5	2.9	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	20.0
KOREA	0.0	0.0	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
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	0.1	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
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	1.5	1.5	1.4	0.0	0.0	0.0	++	0.3	0.1	++	++	++	0.0	0.0
USSR	0.0	0.0	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
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.1	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	0.8	1.8	1.7
-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	0.0	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
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	0.0	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

++ Catches < 0.5 MT.
*1982 - 4 boats = 2 Ecuador + 1 Venezuela + 1 Mexico.
1983 - 5 boats = 2 Ecuador + 1 Cayman Islands + 2 Mexico.
1984 - 3 boats = 1 Cayman Islands + 2 Mexico
1987 - 2 boats = 1 Maroc + 1 Venezuela.
1988 - 2 boats = 1 Maroc + 1 Venezuela.

Table 4. Atlantic skipjack catch (1,000 MT) - as of October 29, 1989

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
TOTAL	2.3	4.4	5.9	11.3	20.0	18.8	24.1	22.8	24.4	48.4	29.3	50.2	78.7	78.2	78.9
E. ATLANTIC	0.4	1.1	2.6	9.3	16.0	13.3	22.6	21.0	21.6	45.7	27.4	47.6	76.2	74.3	75.1
-PS	0.0	0.0	0.0	0.0	0.4	0.9	3.3	6.1	7.9	24.2	14.3	29.8	48.8	48.7	49.8
CANADA	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.6	0.9	0.1	0.6	1.2	++	1.2
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
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
FIS	0.0	0.0	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
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	0.2
JAPAN	0.0	0.0	0.0	0.0	0.0	++	1.8	1.4	2.2	6.3	0.7	3.5	6.2	3.4	1.5
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
ESPANA	0.0	0.0	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
USA	0.0	0.0	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
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
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
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	0.2	0.1	0.0
-BB	0.4	1.1	2.6	9.3	15.7	11.9	19.2	14.9	13.6	21.5	13.0	17.7	27.2	25.3	25.1
ANGOLA	0.1	0.5	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
CAP VERT	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	1.5	1.4
FIS	0.0	0.0	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
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
JAPAN	0.0	0.0	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
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	0.9
MAROC	0.0	0.0	0.0	0.0	0.0	0.0	3.2	1.5	0.9	0.9	0.1	1.1	0.1	++	0.1
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	0.7	0.2
PORTUGAL	0.3	0.6	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
ESPANA	0.0	0.0	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
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
-SURF UNCL	0.0	0.0	++	++	++	0.5	0.1	0.0	++	++	0.1	0.1	0.2	0.3	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
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
OTHERS	0.0	0.0	++	++	++	0.5	0.1	0.0	++	++	0.1	0.1	0.2	0.3	0.2
W. ATLANTIC	1.8	3.3	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
-PS	0.0	0.0	0.0	0.5	3.0	4.4	0.1	++	++	0.1	0.1	0.0	0.0	1.3	0.4
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	0.1	0.0
USA	0.0	0.0	0.0	0.5	3.0	4.0	0.1	++	++	0.1	0.1	0.0	0.0	0.1	0.0
VENEZUEL	0.0	0.0	0.0	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	++	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.4
-BB	1.8	3.3	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
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
CUBA	1.8	3.3	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
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	0.4
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
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
VENEZUEL	0.0	0.0	0.0	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
-SURF UNCL	0.0	0.0	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
BRASIL	0.0	0.0	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

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
TOTAL	117.8	57.1	68.8	108.9	106.2	88.3	108.8	129.0	153.0	133.0	126.6	118.0	116.5	115.0	148.1
E. ATLANTIC	113.2	51.9	64.9	105.5	98.9	81.7	96.0	106.0	119.9	100.7	91.0	77.7	89.9	94.8	122.7
-PS	74.2	35.4	32.5	55.9	56.7	35.6	54.0	64.6	72.3	63.6	61.7	47.7	58.3	55.3	71.9
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
CAYMAN I	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
CONGO	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.2	0.0	0.0	0.0	++	++	++	0.0
FIS	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
GHANA	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
JAPAN	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
MAROC	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	0.0	0.0
ESPANA	30.6	16.9	15.6	21.5	24.5	17.4	24.2	31.3	34.7	27.6	44.6	29.4	39.7	34.4	48.8
USA	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
USSR	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
NEI	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	3.4	0.9	0.0	0.0	1.7	3.0
OTHERS	0.1	0.3	0.2	0.1	0.5	0.2	0.4	0.3	1.0	0.3	0.4	1.2	1.1	0.7	0.9
-BB	38.9	16.4	28.7	42.5	41.4	44.6	38.1	38.9	44.5	34.9	28.0	29.8	30.0	38.4	50.1
ANGOLA	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	++
CAP VERT	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	2.1
FIS	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
GHANA	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	27.4
JAPAN	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
KOREA	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
MAROC	++	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
PANAMA	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
PORTUGAL	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
ESPANA	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
OTHERS	0.1	++	0.0	0.0	0.0	0.0	++	0.1	++	++	++	++	0.1	0.1	0.2
-SURF UNCL	0.1	0.1	3.7	7.1	0.8	1.5	3.9	2.5	3.1	2.2	1.3	0.2	1.6	1.0	0.6
GHANA	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	0.0
USSR	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
OTHERS	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	0.6
W. ATLANTIC	3.9	4.5	3.7	3.2	6.6	6.2	12.7	22.7	32.2	31.3	34.8	39.9	26.2	20.1	25.1
-PS	0.1	0.4	0.7	0.6	3.5	1.5	3.1	4.7	9.7	11.1	18.0	11.2	6.8	6.1	2.1
ESPANA	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
USA	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
VENEZUEL	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	2.1
OTHERS	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
-BB	3.0	2.8	2.8	2.4	2.8	4.4	9.4	18.0	22.4	20.1	16.8	28.5	18.8	13.7	22.9
BRASIL	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
CUBA	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
JAPAN	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
PANAMA	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
ESPANA	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
VENEZUEL	++	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	4.0
OTHERS	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
-SURF UNCL	0.8	1.3	0.2	0.2	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.2	0.7	0.3	0.2
BRASIL	0.5	1.1	0.1	0.2	0.3	0.2	0.3	0.0	0.0	0.0	++	++	++	0.1	0.1

Table 4. Continued....

	1959	1960	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
ALL ATLANTIC																														
-LL+TRAW	0.0	++	++	0.0	0.0	++	++	++	++	++	++	++	0.1	0.1	0.1	0.2	0.2	++	0.1	0.1	++	++	0.1	++	0.6	0.1	0.1	++	++	0.1
OTHERS	0.0	++	++	0.0	0.0	++	++	++	++	++	++	++	0.1	0.1	0.1	0.2	0.2	++	0.1	0.1	++	++	0.1	++	0.6	0.1	0.1	++	++	0.1
-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	0.2	0.1	0.4	0.5	0.5	0.2	0.1	0.6	0.4	0.1	0.2	0.9	0.4	0.7	0.2	0.3	0.1	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	0.2	0.2	0.1	0.4	0.5	0.5	0.2	0.1	0.6	0.4	0.1	0.2	0.9	0.4	0.7	0.2	0.3	0.1	0.3

++ Catches < 50 MT and >= 1 MT.
1/ Applying the same species composition of the Spanish fleet.
2/ Provisional. Estimated from Abidjan landings.
3/ Provisional. Same as previous year.
4/ Corrected.
5/ Added Dakar landings.

Table 5. Atlantic albacore catch (1,000 MT) - as of October 30, 1989.

	1959	1960	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
TOTAL	54.6	63.0	53.3	77.2	77.5	90.4	90.7	75.0	75.0	71.9	76.5	70.3	83.1	83.4	75.7	72.5	50.8	77.2	75.1	72.2	73.4	61.3	59.2	74.0	67.9	57.6	74.0	75.0	64.4	60.3
N. ATL.	49.9	52.5	42.5	58.3	60.1	64.4	60.4	47.2	58.6	45.7	47.3	46.2	57.6	49.5	47.0	52.3	32.8	57.3	52.9	48.5	50.1	38.2	34.1	42.0	50.9	39.5	40.4	42.6	36.3	30.5
-SURF	49.3	51.2	42.0	52.4	45.4	48.5	45.7	39.5	49.0	37.9	32.5	30.1	39.7	34.7	28.8	37.6	20.0	34.3	32.0	34.3	37.9	28.8	24.3	28.8	34.3	19.9	23.3	26.2	30.8	28.3
BB	18.5	18.1	21.1	21.5	20.7	20.4	20.1	16.8	18.3	13.9	14.6	14.4	15.7	8.2	10.1	16.7	10.6	20.4	15.6	11.7	15.8	16.2	13.4	15.9	21.1	8.3	12.6	15.2	18.8	15.9
FRANCE	10.7	9.4	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	++	0.1	0.1	0.1	0.0
PORTUGAL	0.6	0.6	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
ESPANA	7.3	8.1	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	8.9	18.7	14.9	11.3	15.4	15.7	12.6	15.3	19.0	7.4	11.8	14.6	18.2	15.8
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	0.1	0.2	0.1	0.1	++	0.0	0.0
TROL	30.8	33.1	20.9	30.9	24.6	28.1	25.5	22.8	30.7	24.0	17.9	15.7	24.0	26.5	18.7	21.0	9.5	13.9	16.5	22.6	22.1	12.6	10.8	12.8	12.8	11.0	10.7	10.8	11.5	9.8
FRANCE	8.2	10.2	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
ESPANA	22.6	22.9	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	9.5
SURF 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	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.1	++	0.1	0.1	0.4	0.6	0.1	0.2	0.6	2.5
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	0.0	0.0	0.3	2.4
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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	++	0.1	++	++	0.1	++	0.2	0.2	0.1
-LL	0.6	1.3	0.5	5.8	14.7	15.9	14.7	7.7	9.5	7.7	14.8	16.1	17.9	14.7	18.1	14.6	12.7	23.0	20.9	14.2	12.2	9.4	9.8	13.2	16.6	19.5	17.1	16.4	5.5	2.2
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	14.8	3.9	2.1
CUBA	0.0	0.0	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	0.1	0.1	0.1	0.1	0.0	++	++	0.1	++	0.1	++	++	++	++
JAPAN	0.6	1.1	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	0.0
KOREA	0.0	0.0	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	++	++
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	0.2	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	1.0	0.0
VENEZUEL	0.0	0.2	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	++	0.3	0.4	0.3	0.1	++	++
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	++	++	++	++	0.1	0.1
-UNCL+TRAW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
S. ATL.	4.7	10.5	10.8	19.0	17.4	26.0	29.8	27.3	15.9	25.7	28.5	23.7	25.0	33.3	28.2	19.7	17.5	19.3	21.6	23.1	22.5	22.5	23.6	29.1	14.4	13.2	28.4	28.1	23.6	26.3
-SURF	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	0.4	0.3	0.7	1.9	3.3	3.8	2.5	3.2	5.6	4.9	6.1	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	++	0.1	++	0.1	0.1	++	0.1	0.1	0.3	0.1	++	++	++
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	0.0	++	0.1	++	0.2	0.5	0.9	0.9	0.4	++	++	++	0.1	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	0.0	0.0	0.1	0.1	0.1	0.2	++	0.1	0.1	0.4	1.2	1.4	2.5	1.7	2.6	5.3	4.7	5.1	3.9
ESPANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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	++	0.2	++	0.2	++	++	0.0	0.0	++	++
-LL	4.7	10.5	10.4	17.2	17.4	26.0	29.8	27.3	15.9	25.7	28.5	23.7	25.0	33.2	28.1	19.6	17.4	19.2	21.2	22.8	21.8	20.6	20.3	25.3	11.8	9.8	22.7	22.8	17.0	21.9
ARGENTIN	1.7	1.8	1.5	0.7	1.5	1.5	1.1	0.8	0.7	1.2	0.4	0.5	0.3	0.1	++	++	0.1	++	0.1	++	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	0.0	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	++	0.3	0.4
CHI.TAIW	0.0	0.0	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	21.1	15.8	21.1
JAPAN	3.0	8.7	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	0.0
KOREA	0.0	0.0	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
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	0.2	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	0.0	0.0
S.AFRICA	0.0	0.0	0.0	0.0	0.7	0.6	++	0.1	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	++	0.3	0.4	0.1	0.5	0.2	++	0.1	0.0	0.1
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	0.0	++	0.2	0.4	0.5	1.5	0.3	0.2	0.1
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	++	0.1	++	0.0	0.0	0.1	0.0	0.0	++	0.1	0.2	++	0.0	++	0.1	++	++	0.1	++	++	++	++

Table 5. Continued...

	1959	1960	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
-UNCL+TRAW	0.0	0.0	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	++	0.1	0.2	0.2	0.4	0.5	0.3
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	0.0	++	0.1	0.2	0.2	0.4	0.5	0.3
S.AFRICA	0.0	0.0	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
MEDI	0.0	0.0	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	0.6	0.6	0.6	0.8	0.5	1.5	3.0	2.6	5.0	5.2	4.3	4.5	3.5
-SURF	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	0.9	0.6	0.5	1.7	1.2	0.1	0.2	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	0.0	0.0	0.1	0.3	++	0.1	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	0.0	0.0	0.2	0.4	0.1	0.1	0.1
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	0.0	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
OTHERS	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	0.0
-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	0.0	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
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	++	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.4	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	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	++	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	0.0	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	2.4	2.1	3.1	3.6	4.0	4.2	3.3
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	1.7	1.4	1.6	1.0	1.0	1.0	0.0
ITALY	0.0	0.0	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
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	0.2	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

++ Catches less than 50 MT but more than 1 MT

Table 6. Nominal effort, catch and catch rates for the French fleet in 1987 and 1988. The "pure troll" are the vessels which continue to use the traditional method of fishing.

	Nominal effort (Fishing days)		Catch		Catch rates (kg/day)	
	1987	1988	1987	1988	1987	1988
"Pure troll"	917	770	429	359	473	466
Gillnet + Troll	1000	1200	1035	753	1028	627
Trawl + Troll	0	754	0	1700	--	2245
Baitboat					1741	1885

Table 7. Atlantic bluefin catch (MT) - as of October 29, 1989

	1959	1960	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
TOTAL	25493	24701	27984	33823	29318	35213	31002	22706	251207	15738	17385	16019	17493	14492	14632	23651	26167	28197	25473	20449	18456	18907	19142	23212	23672	27237	26839	21607	19656	
24354																														
W. ATL.	1570	1032	1620	5799	13838	18679	14171	8090	5940	3176	3012	5466	6591	3948	3971	5510	5078	5913	6710	5824	6364	5922	5912	1546	2709	2499	2759	1917	2602	2994
-PS	781	277	903	3768	5770	5158	3331	1006	2082	687	1118	4280	3769	2011	1656	960	2320	1582	1502	1230	1381	758	910	232	384	401	377	360	367	383
CANADA	0	0	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
NORWAY	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
USA	781	277	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
-RR	30	29	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
CANADA	14	5	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
USA	16	24	60	340	1072	502	968	3615	287	439	838	436	961	696	280	2504	122	248	328	267	285	276	244	308	405	400	465	326	538	432
-LL	283	340	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	764	1138	1372
ARGENTIN	0	0	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
BRASIL	0	0	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	++
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	32	33	104
CHI.TAIW	0	0	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	8
CUBA	0	0	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
JAPAN	200	339	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	1100
KOREA	0	0	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
NORWAY	0	0	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
PANAMA	0	0	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
URUGUAY	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	9	10	6	4	2
USA	83	1	0	26	96	99	79	39	20	9	2	0	++	0	1	1	0	0	0	0	0	10	83	30	114	127	132	139	139	158
-OTH+UNC	476	386	243	300	348	510	309	273	389	205	293	323	383	514	669	691	908	675	826	902	793	657	600	657	1021	862	678	465	558	800
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	6	0	2	++
CANADA	79	32	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
DOMIN.R.	0	0	0	0	0	0	0	0	++	++	++	++	++	++	100	117	46	30	16	61	109	121	141	115	168	207	81	109	199	199
MEXICO	0	0	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
POLAND	0	0	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
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	**	**	**	**	**	**	**	**	**	**	0	0	0	0	0	0	0	++	3
USA	397	354	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
E. ATL.	18469	18854	20750	23230	9020	10239	10834	9290	10523	4629	5683	5764	4675	4732	4685	6067	9976	5212	6977	5800	4767	4064	3331	6669	8010	7386	4754	4292	4199	6372
-BB	3052	1198	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
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	10	1	0	0	0	0
FRANCE	2031	553	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
JAPAN	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
PORTUGAL	0	0	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
ESPANA	1021	645	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
-PS	2500	6222	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
MAROC	0	2286	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
NORWAY	2500	3936	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
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	74	3	0	123	0	0
S.AFRICA	0	0	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
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	41	0	12	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	5	0	0	0	0	0	0

Table 7. Continued...

	1959	1960	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
-TRAP	11061	10430	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
MAROC	5378	3714	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
PORTUG	883	1016	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
ESPANA	4800	5700	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
-LL	56	481	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	800
CHI.TAIW	0	0	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
JAPAN	56	481	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	800
KOREA	0	0	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
NORWAY	0	0	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
PANAMA	0	0	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	0
ESPANA	0	0	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
-UBC	1800	523	536	414	177	61	30	2	15	8	1	18	105	106	15	1	2	11	303	456	1025	45	78	43	134	215	137	119	105	466
DENMARK	800	47	192	202	4	61	30	2	15	8	1	++	1	++	2	1	++	3	1	3	1	0	4	++	++	0	0	1	0	0
FRANCE	0	0	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
GER.F.	1000	434	331	212	++	++	++	++	0	++	++	14	1	6	2	0	0	0	0	1	1	0	2	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	0	0	++	5	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	84	44	0	0	0	202
NETHERLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++	0
NORWAY	0	0	0	0	0	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	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
PORTUGAL	0	0	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	17
ESPANA	0	0	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	0
SWEDEN	++	42	13	++	++	0	++	++	++	++	0	4	3	0	0	0	2	8	2	2	++	++	1	++	1	++	0	0	0	++
MEDIT.	5454	4815	5614	4794	6460	6295	5997	5326	8744	7933	8690	4789	6227	5812	5976	12074	11113	17072	11786	8825	7325	8921	9899	14997	12953	17352	19326	15398	12855	14988
-PS	388	225	472	419	1533	1261	435	1876	2919	3341	3629	2393	3904	4084	4324	8119	8065	13970	9552	7278	5990	7394	7430	11023	9370	9856	13218	10552	8430	10401
FRANCE	0	0	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
ITALY	164	116	349	332	1256	990	301	630	1088	691	1828	1203	1336	2783	2700	6000	6270	9607	5431	4663	3705	5120	4704	5442	4552	5382	4522	4789	2579	2229
MAROC	0	0	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
ESPANA	0	0	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
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	2230	1524	910	910
YUGOSL	224	109	123	87	277	271	134	246	331	150	301	90	326	200	224	317	155	562	932	1049	756	573	374	486	1218	825	1010	757	641	1512
-TRAP	3382	2890	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	681
ALGERIE	++	++	++	**	++	++	++	150	150	150	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ITALY	1823	1229	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
LIBYA	1100	1100	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
MAROC	0	0	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
ESPANA	374	561	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	201
TUNISIE	85	0	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
-LL	0	0	0	C	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	449
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	29	41	62	1	65	63
JAPAN	0	0	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	250
PANAMA	0	0	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
ESPANA	0	0	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	136

Table 7. Continued...

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
-UNCL.	1684	1700	2099	1514	2068	1653	1290	700	2188	910	893	838	822	469	566
ALGERIE	0	0	0	0	0	0	0	0	0	0	0	100	100	1	++
FRANCE	384	400	599	214	668	953	390	0	0	0	0	0	0	0	0
GREECE	700	900	1100	1000	1200	600	700	500	600	500	500	0	0	0	0
ITALY	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
LIBYA	0	0	0	0	0	0	0	0	0	0	0	500	600	300	400
MALTA	100	100	100	100	100	100	100	100	100	100	++	++	++	++	++
MAROC	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
TURKEY	500	300	300	200	100	0	100	100	1488	310	393	138	22	68	66

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
-UNCL.	688	868	1166	822	1063	810	697	1604	2024	2243	5322	4367	3762	3015	3457
ALGERIE	33	66	49	40	20	150	190	220	250	252	254	260	566	420	677
FRANCE	0	0	0	0	31	51	0	50	60	60	30	30	30	30	30
GREECE	0	0	0	0	0	0	0	516	500	500	500	500	125	100	100
ITALY	100	100	112	134	110	120	0	104	61	0	1370	2260	2433	1548	1503
LIBYA	500	634	799	336	677	424	59	16	180	300	300	300	300	300	300
MALTA	21	37	25	47	26	23	24	32	40	31	21	21	41	36	25
MAROC	0	0	0	0	0	0	0	0	0	1	4	12	18	0	44
ESPANA	0	14	0	88	72	15	33	101	108	542	1974	984	249	581	778
TURKEY	34	17	181	177	127	27	391	565	825	557	869	0	0	0	0

++ Catch < 0.5 MT.
** Catch unknown.

Table 8. Abundance indices used in the calibration of east Atlantic and Mediterranean Sea bluefin tuna stock size estimation. (Age 1 indices were not considered—see text of report, Section 2a)

GEAR COUNTRY	LL JAPAN	LL JAPAN	TRAP SPAIN	PSM FRANCE					BB SPAIN	
AREA	EAST ATLANTIC	MEDITER- RANEAN	GIBRALTAR ATLANTIC	MEDITERRANEAN					BAY OF BISCAY ATLANTIC	
AGE RANGE	5+	7+	7+	1	2	2	3	3	1	2
1970	—	—	—	0.7	—	—	—	—	—	18.0
1971	—	—	11.0	8.1	—	—	—	—	—	13.7
1972	—	—	3.5	1.1	—	—	—	—	—	13.3
1973	—	—	18.2	14.9	—	—	—	—	—	25.6
1974	7.94	—	—	54.0	—	—	—	—	0.8	29.2
1975	8.22	—	15.5	48.9	—	—	—	—	12.3	42.2
1976	12.79	—	13.7	33.7	—	—	—	—	2.9	37.6
1977	19.14	810.3	10.1	16.6	—	—	—	—	18.3	43.9
1978	10.18	62.5	16.2	121.2	63.3	—	86.1	—	63.4	24.8
1979	18.42	177.4	16.8	15.9	86.1	—	137.3	—	7.6	7.8
1980	7.15	174.3	33.7	353.1	20.0	—	49.2	—	110.5	17.0
1981	8.19	90.8	33.0	32.1	135.8	—	14.1	—	104.4	25.5
1982	13.99	795.3	71.3	392.4	—	122.7	—	96.2	6.6	23.6
1983	10.46	375.0	41.3	255.5	—	87.7	—	54.7	227.4	33.2
1984	9.24	206.6	43.4	33.8	—	256.6	—	16.0	5.8	105.0
1985	4.90	261.3	37.8	27.5	—	150.9	—	173.5	8.1	51.1
1986	6.99	158.5	11.5	182.6	—	96.7	—	075.0	190.3	36.5
1987	11.18	218.8	14.2	163.1	—	228.5	—	080.4	67.2	82.0
1988	—	—	41.1	362.7	—	75.0	—	139.4	203.7	35.3
Stock measure	numbers	numbers	numbers	numbers	numbers	numbers	numbers	numbers	numbers	numbers
Time of year for stock size	middle	start	start	middle	middle	middle	middle	middle	middle	middle

TABLE 9. Catch (numbers of bluefin tuna) in the east Atlantic and Mediterranean

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	130694	10423	115725	138102	181757	685791	93610	214061	147854	74075
2:	76341	88641	148570	66881	130102	289266	188083	287032	195233	40217
3:	26357	52434	73295	83399	56415	34088	279697	43050	149979	101630
4:	16746	15130	15235	6434	63235	19638	40803	66156	28978	48658
5:	9570	12223	7466	3184	7470	6727	20323	2254	4905	6944
6:	8927	4146	8017	3600	5119	4732	5376	5396	1775	2647
7:	4619	4563	4308	6822	3042	3323	3371	4214	2652	2592
8:	3715	12279	2455	10255	5379	3442	1999	2476	1768	3764
9:	6403	3174	3249	6560	10663	5758	3965	2705	1320	3954
10:	8583	1905	1162	1598	4600	5743	3059	3580	3485	3501
11:	5082	1432	1306	1828	4701	7257	4079	3827	2018	2321
12:	3594	1553	1928	1862	6115	10354	5326	4501	3012	2129
13:	2558	3065	2959	2677	7133	10250	7951	5131	3598	3637
14:	2417	4304	3573	3231	6859	8198	6740	6240	5935	3246
15:	1285	3358	2676	2549	4242	5120	4870	4992	3563	2206
16:	457	1525	1103	1477	2522	3523	3154	3299	1577	2406
17:	99	652	446	670	1311	1911	1757	1949	836	1454
18:	21	256	150	196	588	742	1163	1242	823	837
19:	2	18	12	41	75	206	274	409	503	164
20+:	1	1	6	11	57	253	423	572	625	130
1+:	307471	221082	393641	341377	501385	106322	676023	663086	560439	306512
2+:	176777	210659	277916	203275	319628	420531	582413	449025	412585	232437
3+:	100436	122018	129346	136394	189526	131265	394330	161993	217352	192220
4+:	74079	69584	56051	52995	133111	97177	114633	118943	67373	90590

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	110511	148702	686474	689247	258877	482147	656445	264724	908742
2:	152516	319670	195261	156855	548907	288798	273187	437236	169138
3:	99926	94453	188618	114841	44474	276421	149951	102015	216552
4:	27918	12747	23223	28790	32652	34224	74727	27759	22428
5:	8620	12429	5230	10547	22789	16070	8449	9538	7809
6:	5399	7120	3693	3666	10277	8477	5992	7681	7528
7:	3186	4235	6299	9440	6314	4260	3194	5011	7035
8:	2217	4897	8647	5937	7268	3411	2181	3600	5578
9:	2541	3852	5714	5778	11673	3703	2573	3908	6958
10:	3885	3731	6204	14061	12003	6914	3611	5396	5898
11:	3997	4628	7277	5917	9776	7245	5446	4735	5887
12:	3984	3777	8275	6318	9977	7674	6845	4738	5711
13:	3911	2202	10381	6232	5454	5317	4869	3800	5820
14:	3347	1502	3009	4306	3410	2717	2502	2295	3615
15:	2699	1081	1410	1062	1801	1576	1208	1481	2036
16:	1537	693	1086	445	1105	784	495	401	696
17:	566	429	881	242	701	378	229	119	288
18:	192	330	424	115	262	144	109	29	97
19:	48	116	160	81	139	77	67	7	17
20+:	8	85	97	6	112	85	57	7	27
1+:	437008	626679	162363	63886	987971	150422	202137	884480	381860
2+:	326497	477977	475889	374639	729094	668275	545692	619756	473118
3+:	173981	158307	280628	217784	180187	379477	272505	182520	303980
4+:	74055	63854	92010	102943	135713	103056	122554	80505	87428

Table 10. Catch (in number) composition of the east Atlantic and Mediterranean bluefin (It should be noted that this is the composition of age 1+, and that the unknown, but large numbers of 0 age fish are not included.)

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE:										
1:	0.4251	0.0471	0.2940	0.4045	0.3625	0.6199	0.1385	0.3228	0.2638	0.2417
2:	0.2483	0.4009	0.3774	0.1959	0.2595	0.2615	0.2782	0.4329	0.3484	0.1312
3:	0.0857	0.2372	0.1862	0.2443	0.1125	0.0308	0.4137	0.0649	0.2676	0.3316
4:	0.0545	0.0684	0.0387	0.0188	0.1261	0.0178	0.0604	0.0998	0.0517	0.1587
5:	0.0311	0.0553	0.0190	0.0093	0.0149	0.0061	0.0301	0.0034	0.0088	0.0227
6:	0.0290	0.0188	0.0204	0.0105	0.0102	0.0043	0.0080	0.0081	0.0032	0.0086
7:	0.0150	0.0206	0.0109	0.0200	0.0061	0.0030	0.0050	0.0064	0.0047	0.0085
8:	0.0121	0.0555	0.0062	0.0300	0.0107	0.0031	0.0030	0.0037	0.0032	0.0123
9:	0.0208	0.0144	0.0083	0.0192	0.0213	0.0052	0.0059	0.0041	0.0024	0.0129
10:	0.0279	0.0086	0.0030	0.0047	0.0092	0.0052	0.0045	0.0054	0.0062	0.0114
11:	0.0165	0.0065	0.0033	0.0054	0.0094	0.0066	0.0060	0.0058	0.0036	0.0076
12:	0.0117	0.0070	0.0049	0.0055	0.0122	0.0094	0.0079	0.0068	0.0054	0.0069
13:	0.0083	0.0139	0.0075	0.0078	0.0142	0.0093	0.0118	0.0077	0.0064	0.0119
14:	0.0079	0.0195	0.0091	0.0095	0.0137	0.0074	0.0100	0.0094	0.0106	0.0106
15:	0.0042	0.0152	0.0068	0.0075	0.0085	0.0046	0.0072	0.0075	0.0064	0.0072
16:	0.0015	0.0069	0.0028	0.0043	0.0050	0.0032	0.0047	0.0050	0.0028	0.0078
17:	0.0003	0.0029	0.0011	0.0020	0.0026	0.0017	0.0026	0.0029	0.0015	0.0047
18:	0.0001	0.0012	0.0004	0.0006	0.0012	0.0007	0.0017	0.0019	0.0015	0.0027
19:	0.0000	0.0001	0.0000	0.0001	0.0001	0.0002	0.0004	0.0006	0.0009	0.0005
20+:	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0006	0.0009	0.0011	0.0004
2+:	0.5749	0.9529	0.7060	0.5955	0.6375	0.3801	0.8615	0.6772	0.7362	0.7583
3+:	0.3267	0.5519	0.3286	0.3995	0.3780	0.1186	0.5833	0.2443	0.3878	0.6271
4+:	0.2409	0.3147	0.1424	0.1552	0.2655	0.0878	0.1696	0.1794	0.1202	0.2956
5+:	0.1865	0.2463	0.1037	0.1364	0.1394	0.0701	0.1092	0.0796	0.0685	0.1368
6+:	0.1553	0.1910	0.0847	0.1271	0.1245	0.0640	0.0791	0.0762	0.0598	0.1141

YEAR:	80	81	82	83	84	85	86	87	88
AGE:									
1:	0.2529	0.2373	0.5906	0.6479	0.2620	0.4191	0.5461	0.2993	0.6576
2:	0.3490	0.5101	0.1680	0.1474	0.5556	0.2510	0.2273	0.4943	0.1224
3:	0.2287	0.1507	0.1623	0.1079	0.0450	0.2403	0.1247	0.1153	0.1567
4:	0.0639	0.0203	0.0200	0.0271	0.0330	0.0297	0.0622	0.0314	0.0162
5:	0.0197	0.0198	0.0045	0.0099	0.0231	0.0140	0.0070	0.0108	0.0057
6:	0.0124	0.0114	0.0032	0.0034	0.0104	0.0074	0.0050	0.0087	0.0054
7:	0.0073	0.0068	0.0054	0.0089	0.0064	0.0037	0.0027	0.0057	0.0051
8:	0.0051	0.0078	0.0074	0.0056	0.0074	0.0030	0.0018	0.0041	0.0040
9:	0.0058	0.0061	0.0049	0.0054	0.0118	0.0032	0.0021	0.0044	0.0050
10:	0.0089	0.0060	0.0053	0.0132	0.0121	0.0060	0.0030	0.0061	0.0043
11:	0.0091	0.0074	0.0063	0.0056	0.0099	0.0063	0.0045	0.0054	0.0043
12:	0.0091	0.0060	0.0071	0.0059	0.0101	0.0067	0.0057	0.0054	0.0041
13:	0.0089	0.0035	0.0089	0.0059	0.0055	0.0046	0.0041	0.0043	0.0042
14:	0.0077	0.0024	0.0026	0.0040	0.0035	0.0024	0.0021	0.0026	0.0026
15:	0.0062	0.0017	0.0012	0.0010	0.0018	0.0014	0.0010	0.0017	0.0015
16:	0.0035	0.0011	0.0009	0.0004	0.0011	0.0007	0.0004	0.0005	0.0005
17:	0.0013	0.0007	0.0008	0.0002	0.0007	0.0003	0.0002	0.0001	0.0002
18:	0.0004	0.0005	0.0004	0.0001	0.0003	0.0001	0.0001	0.0000	0.0001
19:	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000
20+:	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000
2+:	0.7471	0.7627	0.4094	0.3521	0.7380	0.5809	0.4539	0.7007	0.3424
3+:	0.3981	0.2526	0.2414	0.2047	0.1824	0.3299	0.2267	0.2064	0.2200
4+:	0.1695	0.1019	0.0792	0.0968	0.1374	0.0896	0.1019	0.0910	0.0633
5+:	0.1056	0.0816	0.0592	0.0697	0.1043	0.0598	0.0398	0.0596	0.0470
6+:	0.0858	0.0617	0.0547	0.0598	0.0812	0.0459	0.0328	0.0489	0.0414

Table 11. SVPA output for analysis of bluefin tuna in the east Atlantic and Mediterranean

Separable VPA using
POPE/SHEPARD (1982) log catch ratio method
VERSION 2.1 ... 04/NOV/88
last revision 26/OCT/89
RUN DATE: 28 /10/89 14:42

INPUT DATA USED FOR ANALYSIS:-
FIRST YEAR 82 LAST YEAR 88 TOTAL YEARS 7
FIRST AGE 1 LAST AGE 18 TOTAL AGES 18

CATCH DATA USED IN THE SEPARABLE ANALYSIS

YEAR	82	83	84	85	86	87	88
AGE							
1	686474.	689247.	258877.	482147.	656445.	264724.	908742.
2	195261.	156855.	548907.	288798.	273187.	437236.	169138.
3	188618.	114841.	44474.	276421.	149951.	102015.	216552.
4	23223.	28790.	32652.	34224.	74727.	27759.	22428.
5	5230.	10547.	22789.	16070.	8449.	9538.	7809.
6	3693.	3666.	10277.	8477.	5992.	7681.	7528.
7	6299.	9440.	6314.	4260.	3194.	5011.	7035.
8	8647.	5937.	7268.	3411.	2181.	3600.	5578.
9	5714.	5778.	11673.	3703.	2573.	3908.	6958.
10	6204.	14061.	12003.	6914.	3611.	5396.	5898.
11	7277.	5917.	9776.	7245.	5446.	4735.	5887.
12	8275.	6318.	9977.	7674.	6845.	4738.	5711.
13	10381.	6232.	5454.	5317.	4869.	3800.	5820.
14	3009.	4306.	3410.	2717.	2502.	2295.	3615.
15	1410.	1062.	1801.	1576.	1208.	1481.	2036.
16	1086.	445.	1105.	784.	495.	401.	696.
17	881.	242.	701.	378.	229.	119.	288.
18	424.	115.	262.	144.	109.	29.	97.

NATURAL MORTALITY = .180
TERMINAL F= .500
TERMINAL S= 2.000
REFERENCE AGE (FOR UNIT SELECTION) IS 1

APPROX.COEFF. VARIATION OF CATCH DATA = 34.4%
APPROX. TWICE S.E. (2 ln (1 + cv/100) = .59

YEAR	82	83	84	85	86	87	88
F(I)	.424	.368	.552	.515	.422	.377	.500

AGE	1	2	3	4	5	6	7
S(J)	1.000	1.129	.936	.396	.179	.143	.160

AGE	8	9	10	11	12	13	14
S(J)	.160	.223	.437	.557	.918	1.259	1.429

AGE	15	16	17	18
S(J)	1.651	1.816	2.175	2.000

YEAR	82	83	84	85	86	87	88
MEAN F	.390	.338	.508	.474	.389	.347	.460

Table 12. Abundance indices considered for calibration of west Atlantic bluefin tuna stock size estimation.

GEAR	Larval bluefin	Tended line	Longline	Longline	Longline					Rod & reel
COUNTRY	U.S.A.	CANADA	JAPAN	JAPAN	U.S.OBSERVER					U.S.A.
AREA	Gulf of Mexico	NW Atlantic	NW Atlantic	NW Atlantic	U.S. EEZ					U.S. Coast
AGE RANGE	10+	16+	3-5	6-8	3	4	5	6	7	10+
1970	—	—	—	—	—	—	—	—	—	—
1971	—	—	—	—	—	—	—	—	—	—
1972	—	—	—	—	—	—	—	—	—	—
1973	—	—	—	—	—	—	—	—	—	—
1974	—	—	—	—	—	—	—	—	—	—
1975	—	—	—	—	—	—	—	—	—	—
1976	—	—	0.78	0.08	—	—	—	—	—	—
1977	6.11	—	2.68	0.60	—	—	—	—	—	—
1978	10.80	—	1.68	0.19	—	—	—	—	—	—
1979	—	—	0.37	0.63	—	—	—	—	—	—
1980	—	—	0.87	0.68	—	—	—	—	—	—
1981	5.98	0.21	0.93	0.59	—	—	—	—	—	—
1982	4.10	0.19	0.43	0.35	—	—	—	—	—	—
1983	3.93	0.13	0.11	0.10	—	—	—	—	—	37.81
1984	1.22	0.09	0.51	0.38	1.78	2.45	1.04	0.29	0.28	26.79
1985	—	0.05	0.89	0.66	7.44	2.77	0.81	0.58	0.53	25.34
1986	2.29	0.05	0.19	0.26	2.58	1.77	0.45	0.17	0.33	26.15
1987	0.92	0.04	0.87	0.51	3.65	4.13	1.40	0.48	0.45	—
1988	2.71	0.06	0.67	0.61	2.67	2.21	0.98	0.49	0.45	23.25
Stock measure	Biomass	Numbers	Numbers	Numbers	Numbers	Numbers	Numbers	Numbers	Numbers	Numbers
Time of year for stock size	start	middle	start	start	start	start	start	start	start	middle

Table 13. Catch (in number) of bluefin tuna in the west Atlantic

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	71408	64903	45772	5460	55914	44489	5427	1343	5725	3007
2:	124014	151510	97975	73811	19080	146899	19629	22494	10197	10539
3:	101254	38021	33329	28705	22228	4164	70609	7394	17839	14245
4:	15635	45126	2711	5486	4224	14311	3368	21695	5557	7844
5:	8772	1468	3407	4482	4489	2167	2886	15250	7758	11596
6:	1802	819	2163	2395	1983	815	1653	3008	7527	1541
7:	607	1375	91	622	592	370	252	3016	2522	2832
8:	109	1370	432	562	900	235	142	889	445	2322
9:	90	1291	416	1317	476	390	644	353	459	766
10:	257	928	344	1085	788	698	691	568	320	425
11:	431	877	175	349	901	1327	473	890	194	389
12:	433	771	388	487	521	950	753	950	362	448
13:	590	1007	727	682	681	841	1318	803	417	665
14:	737	1062	961	744	1891	1392	2074	1002	648	1125
15:	606	909	963	545	1614	1487	2623	1604	1140	1563
16:	433	987	758	618	1548	1582	2277	1946	1224	1698
17:	324	513	574	500	1528	910	1436	1859	1628	1499
18:	180	336	468	486	2530	978	1170	1860	1966	1595
19:	160	223	333	311	774	531	787	1014	1305	934
20+:	267	193	386	314	1738	985	1689	2423	3495	3087
1+:	328109	313689	192373	128961	124400	225521	119901	90361	70728	68120
2+:	256701	248786	146601	123501	68486	181032	114474	89018	65003	65113
3+:	132687	97276	48626	49690	49406	34133	94845	66524	54806	54574
4+:	31433	59255	15297	20985	27178	29969	24236	59130	36967	40329

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	3539	6269	3702	4114	917	563	583	1511	4846
2:	18464	10209	3651	2583	7164	5689	5548	13018	3532
3:	7850	15481	1536	3040	2001	11854	7018	7506	10941
4:	6895	4858	477	889	1684	2460	2833	4884	3719
5:	4778	5188	235	669	2021	3883	1876	3997	3178
6:	1534	3634	404	739	1600	3855	1326	4445	3771
7:	1993	2570	511	620	746	1769	1333	1155	3446
8:	4098	2044	417	994	455	670	975	1432	1644
9:	4267	2095	302	966	506	419	515	965	1244
10:	1291	2603	487	851	629	434	580	929	1049
11:	839	1728	754	707	768	455	471	505	1079
12:	636	1296	702	649	689	499	393	511	621
13:	567	935	671	806	867	706	574	472	604
14:	688	749	320	922	703	851	595	464	506
15:	1099	671	178	663	917	959	835	591	642
16:	1712	985	119	391	531	898	678	625	563
17:	1515	800	176	408	281	585	420	419	618
18:	1662	686	149	562	266	351	351	333	338
19:	1505	715	175	391	219	213	198	226	348
20+:	3210	4446	1024	1525	883	656	498	477	757
1+:	68142	67962	15990	22489	23847	37769	27600	44465	48446
2+:	64603	61693	12288	18375	22930	37206	27017	42954	43600
3+:	46139	51484	8637	15792	15766	31517	21469	29936	35068
4+:	38289	36003	7101	12752	13765	19663	14451	22430	24127

Table 14. Catch (in number) composition of west Atlantic bluefin tuna

YEAR :	70	71	72	73	74	75	76	77	78	79
AGE:										
1:	0.2176	0.2069	0.2379	0.0423	0.4495	0.1973	0.0453	0.0149	0.0809	0.0441
2:	0.3780	0.4830	0.5093	0.5724	0.1534	0.6514	0.1637	0.2489	0.1442	0.1547
3:	0.3086	0.1212	0.1733	0.2226	0.1787	0.0185	0.5889	0.0818	0.2522	0.2091
4:	0.0477	0.1439	0.0141	0.0425	0.0340	0.0635	0.0281	0.2401	0.0786	0.1151
5:	0.0267	0.0047	0.0177	0.0348	0.0361	0.0096	0.0241	0.1688	0.1097	0.1702
6:	0.0055	0.0026	0.0112	0.0186	0.0159	0.0036	0.0138	0.0333	0.1064	0.0226
7:	0.0018	0.0044	0.0005	0.0048	0.0048	0.0016	0.0021	0.0334	0.0357	0.0416
8:	0.0003	0.0044	0.0022	0.0044	0.0072	0.0010	0.0012	0.0098	0.0063	0.0341
9:	0.0003	0.0041	0.0022	0.0102	0.0038	0.0017	0.0054	0.0039	0.0065	0.0112
10:	0.0008	0.0030	0.0018	0.0084	0.0063	0.0031	0.0058	0.0063	0.0045	0.0062
11:	0.0013	0.0028	0.0009	0.0027	0.0072	0.0059	0.0039	0.0098	0.0027	0.0057
12:	0.0013	0.0025	0.0020	0.0038	0.0042	0.0042	0.0063	0.0105	0.0051	0.0066
13:	0.0018	0.0032	0.0038	0.0053	0.0055	0.0037	0.0110	0.0089	0.0059	0.0098
14:	0.0022	0.0034	0.0050	0.0058	0.0152	0.0062	0.0173	0.0111	0.0092	0.0165
15:	0.0018	0.0029	0.0050	0.0042	0.0130	0.0066	0.0219	0.0178	0.0161	0.0229
16:	0.0013	0.0031	0.0039	0.0048	0.0124	0.0070	0.0190	0.0215	0.0173	0.0249
17:	0.0010	0.0016	0.0030	0.0039	0.0123	0.0040	0.0120	0.0206	0.0230	0.0220
18:	0.0005	0.0011	0.0024	0.0038	0.0203	0.0043	0.0098	0.0206	0.0278	0.0234
19:	0.0005	0.0007	0.0017	0.0024	0.0062	0.0024	0.0066	0.0112	0.0185	0.0137
20+	0.0008	0.0006	0.0020	0.0024	0.0140	0.0044	0.0141	0.0268	0.0494	0.0453
2+:	0.7824	0.7931	0.7621	0.9577	0.5505	0.8027	0.9547	0.9851	0.9191	0.9559
3+:	0.4044	0.3101	0.2528	0.3853	0.3972	0.1514	0.7910	0.7362	0.7749	0.8011
4+:	0.0958	0.1889	0.0795	0.1627	0.2185	0.1329	0.2021	0.6544	0.5227	0.5920
5+:	0.0481	0.0450	0.0654	0.1202	0.1845	0.0694	0.1740	0.4143	0.4441	0.4769
6+:	0.0214	0.0404	0.0477	0.0854	0.1484	0.0598	0.1500	0.2455	0.3344	0.3067

YEAR :	80	81	82	83	84	85	86	87	88
AGE:									
1:	0.0519	0.0922	0.2315	0.1829	0.0385	0.0149	0.0211	0.0340	0.1000
2:	0.2710	0.1502	0.2283	0.1149	0.3004	0.1506	0.2010	0.2928	0.1761
3:	0.1152	0.2278	0.0961	0.1352	0.0839	0.3139	0.2543	0.1688	0.2258
4:	0.1012	0.0715	0.0298	0.0395	0.0706	0.0651	0.1026	0.1098	0.0768
5:	0.0701	0.0763	0.0147	0.0297	0.0847	0.1028	0.0680	0.0899	0.0656
6:	0.0225	0.0535	0.0253	0.0329	0.0671	0.1021	0.0480	0.1000	0.0778
7:	0.0292	0.0378	0.0320	0.0276	0.0313	0.0468	0.0483	0.0260	0.0711
8:	0.0601	0.0301	0.0261	0.0442	0.0191	0.0177	0.0353	0.0322	0.0340
9:	0.0626	0.0308	0.0189	0.0430	0.0212	0.0111	0.0187	0.0217	0.0257
10:	0.0189	0.0383	0.0305	0.0378	0.0264	0.0115	0.0210	0.0209	0.0217
11:	0.0123	0.0254	0.0472	0.0314	0.0322	0.0120	0.0171	0.0114	0.0223
12:	0.0093	0.0191	0.0439	0.0289	0.0289	0.0132	0.0142	0.0115	0.0128
13:	0.0083	0.0138	0.0420	0.0358	0.0364	0.0187	0.0208	0.0106	0.0124
14:	0.0101	0.0110	0.0200	0.0410	0.0295	0.0225	0.0216	0.0104	0.0104
15:	0.0161	0.0099	0.0111	0.0295	0.0385	0.0254	0.0303	0.0133	0.0133
16:	0.0251	0.0145	0.0074	0.0174	0.0223	0.0238	0.0246	0.0141	0.0116
17:	0.0222	0.0118	0.0110	0.0181	0.0118	0.0155	0.0152	0.0094	0.0128
18:	0.0244	0.0101	0.0093	0.0250	0.0112	0.0093	0.0127	0.0075	0.0070
19:	0.0221	0.0105	0.0109	0.0174	0.0092	0.0056	0.0072	0.0051	0.0072
20+	0.0471	0.0654	0.0640	0.0678	0.0370	0.0174	0.0180	0.0107	0.0156
2+:	0.9481	0.9078	0.7685	0.8171	0.9615	0.9851	0.9789	0.9660	0.9000
3+:	0.6771	0.7575	0.5402	0.7022	0.6611	0.8345	0.7779	0.6732	0.7239
4+:	0.5619	0.5298	0.4441	0.5670	0.5772	0.5206	0.5236	0.5044	0.4980
5+:	0.4607	0.4583	0.4143	0.5275	0.5066	0.4555	0.4209	0.3946	0.4213
6+:	0.3906	0.3819	0.3996	0.4978	0.4219	0.3527	0.3530	0.3047	0.3556

Table 15. SVPA output for analysis of bluefin in the west Atlantic

Separable VPA using
POPE/SHEPARD (1982) log catch ratio method
VERSION 2.1 ... 04/NOV/88
last revision 26/OCT/89
RUN DATE: 28 /10/89 6:19

INPUT DATA USED FOR ANALYSIS:-
FIRST YEAR 83: LAST YEAR 88: TOTAL YEARS 6
FIRST AGE 1: LAST AGE 15: TOTAL AGES 15

CATCH DATA USED IN THE SEPARABLE ANALYSIS

YEAR	83	84	85	86	87	88
AGE						
1	4114.	917.	563.	583.	1511.	4846.
2	2583.	7164.	5689.	5548.	13018.	8532.
3	3040.	2001.	11854.	7018.	7506.	10941.
4	889.	1684.	2460.	2833.	4884.	3719.
5	669.	2021.	3883.	1876.	3997.	3179.
6	739.	1600.	3855.	1326.	4445.	3771.
7	620.	746.	1769.	1333.	1155.	3445.
8	994.	455.	670.	975.	1432.	1645.
9	966.	506.	419.	515.	965.	1244.
10	851.	629.	434.	580.	929.	1049.
11	707.	768.	455.	471.	505.	1080.
12	649.	689.	499.	393.	511.	620.
13	806.	867.	706.	574.	472.	603.
14	922.	703.	851.	595.	464.	506.
15	663.	917.	959.	835.	591.	642.

NATURAL MORTALITY = .100
TERMINAL F= .200
TERMINAL S= .750

REFERENCE AGE (FOR UNIT SELECTION) IS 6 .

APPROX.COEFF. VARIATION OF CATCH DATA = 31.5%
APPROX. TWICE S.E. (2 ln (1 + cv/100) = .55

YEAR	83	84	85	86	87	88
F(I)	.087	.091	.120	.110	.165	.200

AGE	1	2	3	4	5	6	7	8
S(J)	.124	.826	.974	.564	.744	1.000	.802	.736

AGE	9	10	11	12	13	14	15
S(J)	.593	.653	.619	.586	.699	.649	.750

YEAR	83	84	85	86	87	88
MEAN F	.060	.062	.083	.076	.113	.138

Table 16. Minimum estimates of percent composition of small fish less than 6.4 kg for both stocks of Atlantic bluefin tuna and of small fish less than 120 cm for the west Atlantic stock

Year	East Atlantic	Mediterranean	East Atlantic & Mediterranean	West Atlantic	
	< 6.4 kg as % by numbers			<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	7.6	11.4
1979	48.7	25.6	35.0	4.0	9.1
1980	57.0	20.7	33.2	4.6	8.8
1981	63.1	11.8	26.1	7.0	9.5
1982	67.3	28.9	37.1	22.4	6.3
1983	75.3	59.0	65.0	17.8	4.1
1984	16.7	22.8	21.0	4.1	5.9
1985	20.8	58.7	53.3	1.6	11.7
1986	74.6	58.9	63.5	2.9	9.5
1987	28.4	26.8	27.2	5.2	13.1
1988	73.4	58.3	63.6	10.0	11.2

Table 17. Population (in thousand fish) of bluefin tuna for the east Atlantic and Mediterranean

YEAR :	70	71	72	73	74	75	76	77	78	79
AGE 2:	354	469	635	453	516	1122	638	891	628	409
3:	201	227	311	395	317	313	674	362	484	347
4:	195	144	142	193	254	214	230	310	264	268
5:	182	148	107	104	156	155	161	155	199	194
6:	157	143	112	82	84	123	123	116	128	162
7:	155	123	116	86	65	66	99	98	92	105
8:	115	126	99	93	66	52	52	79	78	74
9:	90	93	94	80	68	50	40	42	64	64
10:	72	69	75	75	61	47	37	30	32	52
11:	54	52	56	61	61	47	34	28	22	24
12:	37	40	42	46	49	47	32	25	20	16
13:	23	27	32	34	37	36	30	22	17	14
14:	13	17	20	24	26	24	21	18	14	11
15:	5	9	10	14	17	15	13	11	9	6
16:	2	3	4	6	9	11	8	6	5	4
17:	1	1	1	2	4	5	6	4	2	3
18:	0	0	1	1	1	2	3	3	1	1
19:	0	0	0	0	0	1	1	1	1	0
20+	0	0	0	0	0	1	1	2	2	0
2+:	1656	1692	1856	1750	1793	2330	2202	2203	2061	1755
3+:	1302	1223	1221	1298	1277	1208	1564	1313	1433	1346
4+:	1100	996	910	902	960	895	890	951	950	998

YEAR :	80	81	82	83	84	85	86	87	88
AGE 2:	541	975	701	559	1335	725	626	1235	430
3:	305	313	525	409	325	619	344	276	635
4:	198	164	176	268	237	231	267	152	138
5:	180	140	126	126	197	168	162	155	102
6:	155	142	106	100	96	144	126	127	121
7:	133	125	112	85	80	70	113	100	99
8:	85	108	101	88	62	61	55	91	79
9:	58	69	86	76	68	45	48	44	73
10:	50	47	54	66	58	46	35	38	33
11:	40	38	35	40	43	38	32	26	27
12:	18	30	27	23	28	27	25	22	17
13:	12	11	22	15	13	14	15	15	14
14:	8	6	7	9	7	6	7	8	9
15:	6	4	4	3	3	3	3	4	5
16:	3	3	2	2	2	1	1	1	2
17:	2	1	2	1	1	1	0	0	1
18:	1	1	1	0	0	0	0	0	0
19:	0	0	0	0	0	0	0	0	0
20+	0	0	0	0	0	0	0	0	0
2+:	1795	2179	2087	1871	2558	2201	1859	2294	1785
3+:	1254	1203	1386	1312	1222	1476	1233	1059	1355
4+:	949	890	861	903	897	857	889	783	719

Table 18. Fishing mortality of bluefin tuna for the east Atlantic and Mediterranean

YEAR :	70	71	72	73	74	75	76	77	78	79
AGE 2:	0.267	0.230	0.294	0.176	0.320	0.329	0.386	0.431	0.412	0.113
3:	0.154	0.290	0.296	0.261	0.215	0.126	0.597	0.139	0.411	0.382
4:	0.098	0.122	0.125	0.037	0.315	0.106	0.214	0.264	0.128	0.220
5:	0.059	0.095	0.079	0.034	0.054	0.049	0.148	0.016	0.027	0.040
6:	0.064	0.032	0.081	0.049	0.069	0.043	0.049	0.052	0.015	0.018
7:	0.033	0.041	0.041	0.090	0.052	0.057	0.038	0.048	0.032	0.027
8:	0.036	0.113	0.028	0.128	0.093	0.075	0.043	0.035	0.025	0.057
9:	0.081	0.038	0.039	0.094	0.186	0.134	0.114	0.074	0.023	0.070
10:	0.140	0.030	0.017	0.023	0.086	0.142	0.095	0.140	0.125	0.076
11:	0.109	0.030	0.026	0.033	0.087	0.185	0.139	0.162	0.107	0.113
12:	0.113	0.043	0.051	0.045	0.145	0.274	0.197	0.219	0.182	0.153
13:	0.131	0.130	0.106	0.091	0.239	0.374	0.341	0.289	0.266	0.339
14:	0.229	0.330	0.215	0.157	0.345	0.463	0.440	0.480	0.620	0.398
15:	0.323	0.556	0.344	0.229	0.311	0.458	0.542	0.672	0.546	0.483
16:	0.271	0.772	0.348	0.317	0.363	0.448	0.557	0.868	0.451	0.878
17:	0.221	0.750	0.526	0.360	0.503	0.505	0.413	0.798	0.547	0.981
18:	0.218	1.401	0.370	0.454	0.604	0.583	0.650	0.564	0.957	1.944
19:	0.188	0.287	0.192	0.159	0.306	0.429	0.432	0.488	0.459	0.487
20+:	0.188	0.287	0.192	0.159	0.306	0.429	0.432	0.488	0.459	0.487
MEAN	0.156	0.279	0.178	0.156	0.233	0.287	0.289	0.316	0.296	0.363
MEANPOP*	0.157	0.109	0.191	0.163	0.183	0.404	0.266	0.266	0.267	0.151

YEAR :	80	81	82	83	84	85	86	87	88
AGE 2:	0.366	0.440	0.360	0.364	0.589	0.565	0.639	0.485	0.556
3:	0.439	0.397	0.494	0.365	0.162	0.661	0.638	0.512	0.462
4:	0.167	0.088	0.155	0.125	0.163	0.176	0.363	0.222	0.195
5:	0.054	0.102	0.046	0.096	0.135	0.110	0.059	0.070	0.088
6:	0.039	0.056	0.039	0.041	0.125	0.066	0.053	0.068	0.070
7:	0.027	0.038	0.063	0.129	0.090	0.068	0.031	0.056	0.081
8:	0.029	0.051	0.099	0.077	0.136	0.063	0.044	0.044	0.081
9:	0.049	0.063	0.076	0.087	0.207	0.093	0.060	0.102	0.110
10:	0.089	0.092	0.133	0.262	0.254	0.178	0.121	0.169	0.215
11:	0.114	0.143	0.253	0.177	0.287	0.234	0.203	0.225	0.274
12:	0.280	0.147	0.398	0.354	0.492	0.374	0.354	0.266	0.452
13:	0.450	0.241	0.727	0.579	0.576	0.520	0.422	0.332	0.592
14:	0.584	0.303	0.587	0.755	0.718	0.625	0.486	0.352	0.592
15:	0.664	0.368	0.506	0.413	0.831	0.868	0.620	0.585	0.592
16:	0.726	0.344	0.760	0.287	0.998	1.117	0.736	0.419	0.592
17:	0.507	0.443	0.965	0.364	0.972	1.202	1.264	0.378	0.592
18:	0.309	0.617	1.062	0.296	0.834	0.522	1.604	0.493	0.592
19:	0.543	0.304	0.683	0.572	0.686	0.616	0.481	0.372	0.592
20+:	0.543	0.304	0.683	0.572	0.686	0.616	0.481	0.372	0.592
MEAN	0.291	0.232	0.429	0.301	0.449	0.452	0.451	0.294	0.380
MEANPOP	0.178	0.253	0.480	0.327	0.359	0.466	0.404	0.385	0.437

* Mean F weighted by population numbers.

Table 19. Population (in thousand of fish) of bluefin tuna in the west Atlantic

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	348	273	250	119	395	132	98	68	60	71
2:	212	247	185	183	102	304	77	84	60	49
3:	185	75	80	75	96	75	137	51	54	44
4:	41	72	32	41	41	66	63	57	39	32
5:	34	23	23	27	32	33	46	54	31	30
6:	34	23	19	17	20	25	28	39	35	21
7:	36	29	20	15	13	16	22	24	32	24
8:	34	32	25	18	13	12	14	19	19	27
9:	38	30	27	22	16	11	10	13	17	16
10:	33	34	26	24	19	14	10	9	11	15
11:	34	29	30	23	21	16	12	8	7	10
12:	23	30	26	27	21	18	14	10	6	6
13:	18	21	27	23	24	18	15	12	8	5
14:	16	16	18	23	20	21	16	13	10	7
15:	11	14	13	15	20	16	18	12	11	8
16:	10	10	12	11	13	17	13	14	10	8
17:	7	9	8	10	10	10	14	10	11	8
18:	4	6	7	7	9	7	9	11	7	8
19:	3	3	5	6	6	5	6	7	8	5
20+:	6	3	6	6	12	10	12	16	22	16
1+:	1129	979	841	694	903	827	633	529	458	411
2+:	781	706	590	575	508	695	534	461	398	340
3+:	569	459	405	392	405	391	457	378	338	291
4+:	383	384	324	317	310	316	321	326	283	247

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	51	44	53	62	47	49	68	44	131
2:	61	43	34	44	52	42	43	61	39
3:	35	38	29	27	37	40	32	34	43
4:	27	24	20	25	22	32	25	23	24
5:	22	18	17	17	22	18	27	20	16
6:	16	15	11	15	15	18	13	22	14
7:	17	13	10	10	13	12	12	10	16
8:	19	14	10	9	8	11	9	10	8
9:	22	13	10	8	7	7	9	7	8
10:	14	16	10	9	7	6	6	8	6
11:	13	11	12	9	7	5	5	5	6
12:	8	11	9	10	7	6	4	4	4
13:	5	7	9	7	8	6	5	4	3
14:	4	4	5	7	6	7	5	4	3
15:	5	3	3	5	6	5	5	4	3
16:	6	4	2	3	4	4	3	4	3
17:	6	4	3	2	2	3	3	2	3
18:	5	4	3	2	1	2	2	2	2
19:	6	3	3	2	1	1	1	1	2
20+:	12	21	18	9	6	3	3	3	4
1+:	356	311	270	282	279	275	281	273	336
2+:	305	266	218	220	232	226	214	228	205
3+:	243	224	183	176	180	185	170	167	167
4+:	209	186	154	149	142	145	138	133	124

Table 20. Fishing mortality of bluefin tuna for the west Atlantic

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	0.243	0.287	0.213	0.049	0.161	0.437	0.060	0.021	0.105	0.046
2:	0.938	1.021	0.802	0.548	0.217	0.701	0.311	0.331	0.197	0.254
3:	0.844	0.750	0.568	0.509	0.279	0.060	0.776	0.165	0.420	0.409
4:	0.505	1.054	0.093	0.150	0.115	0.260	0.057	0.509	0.161	0.293
5:	0.311	0.071	0.171	0.195	0.159	0.071	0.069	0.349	0.305	0.515
6:	0.057	0.038	0.127	0.156	0.112	0.035	0.064	0.085	0.259	0.082
7:	0.018	0.051	0.005	0.044	0.047	0.025	0.012	0.144	0.086	0.131
8:	0.003	0.047	0.018	0.034	0.075	0.022	0.011	0.049	0.026	0.096
9:	0.002	0.046	0.016	0.064	0.032	0.038	0.068	0.030	0.029	0.051
10:	0.008	0.029	0.014	0.048	0.045	0.055	0.079	0.071	0.031	0.031
11:	0.013	0.032	0.006	0.016	0.046	0.089	0.043	0.124	0.028	0.043
12:	0.020	0.027	0.016	0.019	0.027	0.057	0.060	0.103	0.061	0.076
13:	0.034	0.053	0.029	0.032	0.030	0.049	0.094	0.076	0.054	0.137
14:	0.048	0.072	0.059	0.034	0.104	0.071	0.147	0.086	0.073	0.181
15:	0.057	0.070	0.078	0.039	0.086	0.100	0.167	0.146	0.120	0.224
16:	0.046	0.111	0.069	0.059	0.133	0.103	0.196	0.161	0.142	0.236
17:	0.052	0.064	0.079	0.053	0.183	0.097	0.115	0.217	0.177	0.232
18:	0.053	0.063	0.069	0.080	0.365	0.153	0.156	0.192	0.332	0.234
19:	0.052	0.078	0.074	0.054	0.158	0.108	0.159	0.176	0.179	0.232
20+:	0.052	0.078	0.074	0.054	0.158	0.108	0.159	0.176	0.179	0.232
MEAN	0.174	0.209	0.132	0.115	0.125	0.133	0.139	0.160	0.147	0.184
MEANP*	0.427	0.490	0.316	0.243	0.158	0.378	0.259	0.210	0.183	0.200

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	0.076	0.161	0.077	0.072	0.021	0.012	0.009	0.037	0.040
2:	0.379	0.288	0.119	0.063	0.156	0.155	0.144	0.253	0.264
3:	0.272	0.557	0.057	0.124	0.058	0.368	0.259	0.263	0.312
4:	0.315	0.241	0.026	0.038	0.084	0.084	0.125	0.258	0.180
5:	0.261	0.369	0.015	0.041	0.103	0.253	0.077	0.233	0.238
6:	0.104	0.288	0.039	0.053	0.118	0.261	0.115	0.235	0.320
7:	0.129	0.226	0.053	0.070	0.062	0.167	0.121	0.125	0.257
8:	0.253	0.170	0.047	0.125	0.061	0.066	0.117	0.166	0.236
9:	0.229	0.178	0.031	0.130	0.078	0.066	0.060	0.146	0.190
10:	0.102	0.190	0.051	0.103	0.106	0.080	0.110	0.131	0.209
11:	0.071	0.172	0.069	0.088	0.114	0.093	0.105	0.119	0.198
12:	0.083	0.134	0.088	0.071	0.105	0.091	0.098	0.143	0.188
13:	0.117	0.151	0.086	0.124	0.115	0.134	0.129	0.147	0.224
14:	0.184	0.199	0.063	0.146	0.136	0.142	0.143	0.131	0.208
15:	0.241	0.246	0.060	0.162	0.190	0.248	0.180	0.185	0.240
16:	0.362	0.314	0.056	0.162	0.170	0.256	0.249	0.178	0.240
17:	0.304	0.255	0.076	0.247	0.150	0.255	0.164	0.215	0.240
18:	0.384	0.196	0.062	0.325	0.225	0.253	0.214	0.170	0.240
19:	0.322	0.252	0.063	0.204	0.181	0.253	0.198	0.186	0.240
20+:	0.322	0.252	0.063	0.204	0.181	0.253	0.198	0.186	0.240
MEAN	0.220	0.241	0.060	0.124	0.118	0.170	0.138	0.175	0.224
MEANP*	0.227	0.269	0.065	0.085	0.094	0.161	0.111	0.191	0.169

* Mean F weighted by population numbers.

Table 21. Weight at age (kg) of bluefin from the east Atlantic and Mediterranean

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	4.5	4.6	4.5	4.0	4.1	4.2	4.5	4.2	5.2	4.6
2:	10.3	10.1	10.6	10.2	11.0	10.8	11.9	11.2	9.5	10.7
3:	21.2	19.3	20.4	18.7	21.2	21.9	18.8	21.1	20.1	19.2
4:	35.2	34.9	35.4	33.6	35.6	36.9	35.4	33.2	32.8	33.4
5:	53.0	53.5	55.9	54.4	55.1	51.1	52.7	55.9	53.6	50.3
6:	72.8	70.8	71.8	72.2	73.4	72.6	75.8	74.1	71.6	70.7
7:	101.2	102.1	94.7	99.7	97.7	95.0	95.6	95.3	95.7	93.1
8:	120.6	133.6	117.8	126.8	126.1	123.2	123.9	117.9	124.3	116.0
9:	148.7	150.5	150.6	146.8	157.0	152.3	156.4	144.9	148.7	140.9
10:	179.3	177.1	176.9	176.4	179.2	178.0	179.3	175.4	180.7	173.5
11:	207.9	205.8	207.3	207.5	207.8	203.6	206.4	201.9	207.9	203.3
12:	230.9	232.8	235.4	236.6	237.3	234.0	235.1	233.5	232.2	234.2
13:	254.5	263.6	263.9	265.9	267.3	263.4	259.4	263.5	259.8	268.6
14:	283.0	294.0	292.9	295.2	296.1	290.9	293.9	293.9	290.7	294.6
15:	307.8	321.6	320.4	322.3	323.7	317.9	324.5	324.0	322.3	325.1
16:	335.0	347.7	348.9	345.2	348.2	341.9	354.4	349.1	347.0	354.6
17:	361.0	381.2	379.5	379.8	371.3	360.4	382.1	381.0	381.4	376.5
18:	390.8	414.5	414.9	406.9	393.5	382.6	410.7	412.2	418.3	412.8
19:	412.6	442.6	440.0	422.2	414.8	408.9	437.8	435.4	427.2	419.9
20+	412.0	442.0	538.6	491.1	490.2	468.2	513.2	507.0	488.7	447.9
MEANCAT*	54.8	53.2	51.1	51.0	40.1	33.6	35.8	34.9	38.7	40.4

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	4.7	4.7	5.8	5.1	5.7	5.6	5.0	5.2	4.8
2:	11.0	11.0	12.6	13.1	12.4	11.5	12.1	10.6	11.7
3:	18.6	18.0	20.7	18.9	23.7	22.5	19.0	18.8	19.7
4:	32.6	31.4	34.2	31.5	34.8	36.4	33.3	34.9	37.1
5:	52.7	52.6	51.0	53.6	51.1	52.6	54.1	51.3	53.6
6:	72.2	72.0	73.0	71.3	75.3	72.7	70.8	71.2	75.0
7:	93.9	94.9	95.1	101.1	96.8	96.0	95.7	95.1	96.7
8:	118.7	117.8	115.7	118.8	121.1	123.0	121.5	122.1	122.3
9:	146.1	147.2	147.0	148.1	147.1	152.2	149.3	150.6	154.2
10:	177.7	178.3	177.9	175.3	175.6	180.2	179.4	178.2	180.9
11:	205.4	208.5	205.4	203.3	208.0	209.2	209.9	210.1	207.8
12:	235.1	234.5	231.2	233.3	240.9	239.3	238.7	238.4	236.4
13:	268.8	264.6	257.2	263.9	271.4	269.3	269.8	267.5	264.0
14:	298.5	296.2	294.6	297.4	302.5	298.4	301.5	295.8	293.8
15:	331.6	324.6	332.8	328.6	331.8	329.6	329.6	327.1	323.4
16:	360.3	353.8	366.4	342.4	362.3	360.7	358.2	349.8	352.8
17:	385.8	375.6	391.9	374.1	395.9	391.0	383.4	379.6	384.8
18:	405.0	406.6	426.1	385.5	423.9	412.4	410.0	392.9	407.0
19:	429.6	438.2	454.1	420.0	455.7	443.7	441.3	415.8	442.6
20+:	431.9	471.9	491.7	412.6	483.1	503.7	464.1	459.8	476.4
MEANCAT*	34.2	34.0	33.2	27.1	31.7	32.0	26.2	32.3	24.5

* Mean weight (kg) of bluefin weighted by catch numbers.

Table 22. Weight at age (kg) of bluefin tuna in the West Atlantic

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	3.4	3.6	4.4	3.8	3.6	3.9	4.0	4.6	5.2	5.5
2:	9.6	8.4	9.8	8.9	9.9	8.7	10.2	10.4	11.0	11.4
3:	17.8	21.1	19.2	20.4	16.6	20.4	18.7	20.0	21.1	21.2
4:	34.5	31.8	34.8	33.2	32.0	31.1	29.5	31.5	29.0	33.5
5:	45.3	43.1	49.1	44.0	44.4	41.4	40.5	41.3	44.7	43.3
6:	64.1	67.7	60.8	68.2	62.4	63.7	59.0	58.6	61.3	62.5
7:	83.3	85.4	88.7	83.1	86.9	82.4	86.1	76.9	78.2	80.5
8:	110.1	105.0	112.3	112.9	101.2	108.5	111.1	96.6	101.2	102.8
9:	121.4	122.5	126.7	131.5	130.2	132.7	143.5	125.8	130.8	126.1
10:	152.4	144.9	147.2	149.2	144.9	150.1	158.9	149.6	160.3	155.1
11:	174.0	171.2	172.2	172.1	169.6	166.5	173.9	171.2	182.9	180.4
12:	198.3	198.7	200.8	205.6	190.5	190.7	193.1	192.7	199.3	200.9
13:	222.8	223.6	227.3	227.7	215.7	210.8	214.4	214.8	217.7	217.7
14:	247.3	248.2	246.6	249.0	246.1	236.4	229.8	236.8	235.8	236.2
15:	263.9	272.1	269.1	274.6	260.3	259.8	251.4	254.2	257.2	256.3
16:	288.5	287.1	290.7	298.2	288.7	281.5	277.4	274.1	275.2	278.5
17:	312.7	314.0	318.6	318.3	306.1	306.6	296.5	296.6	293.7	297.3
18:	330.8	334.5	340.7	338.6	321.0	322.7	320.3	315.3	313.1	317.1
19:	348.2	351.5	355.2	359.2	340.2	348.3	344.9	339.0	339.6	340.4
20+	398.3	394.7	391.0	392.9	370.2	383.7	387.0	385.8	396.0	395.4
MEANCAT*	68.5	78.0	90.1	106.3	83.3	86.7	104.1	112.5	118.2	115.1

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	5.3	5.6	4.2	3.9	4.8	3.7	4.2	4.2	3.9
2:	13.0	11.3	11.1	10.2	10.9	10.0	9.5	9.5	11.1
3:	22.4	21.6	21.6	19.8	22.3	17.3	19.0	20.7	19.4
4:	32.3	32.4	33.4	34.3	36.4	30.7	36.9	33.1	33.4
5:	45.5	45.4	55.5	53.6	53.0	44.9	49.2	47.0	47.3
6:	67.1	64.2	68.1	69.4	77.2	64.0	70.9	65.7	66.6
7:	86.3	84.0	88.3	92.2	95.1	82.6	91.9	86.9	86.6
8:	109.4	104.5	111.9	113.0	114.7	104.5	117.2	111.6	112.7
9:	128.6	126.6	136.7	138.3	137.5	127.1	137.9	136.7	138.0
10:	156.9	150.5	156.4	158.6	157.8	151.5	157.1	157.9	163.7
11:	185.3	174.9	181.2	184.7	181.9	174.7	176.6	180.3	185.3
12:	212.7	200.7	201.9	205.9	203.5	199.2	201.7	201.1	211.6
13:	235.9	222.3	227.2	229.6	228.4	220.8	226.9	228.6	231.2
14:	251.8	238.0	248.0	253.1	247.1	238.6	248.4	255.1	252.7
15:	264.4	257.0	269.5	272.6	276.9	261.6	272.6	276.8	275.2
16:	287.4	279.0	299.0	295.1	300.3	285.0	295.9	300.3	301.3
17:	304.2	296.9	320.6	323.1	320.9	302.7	319.1	322.4	314.7
18:	323.7	321.0	341.2	347.4	341.8	323.7	347.5	342.8	340.6
19:	343.5	335.5	354.6	368.1	361.8	347.2	361.4	367.0	355.1
20+	396.8	417.1	429.4	424.8	442.1	420.0	427.6	423.1	426.1
MEANCAT*	117.7	114.2	108.6	94.0	85.7	71.7	66.4	62.5	44.9

* Mean weight (kg) of bluefin weighted by catch numbers.

Table 23. Catch biomass (MT) of bluefin tuna in the east Atlantic and Mediterranean

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE :										
1:	588	48	521	552	745	2880	421	899	769	341
2:	786	895	1575	682	1431	3124	2238	3215	1855	430
3:	559	1012	1495	1560	1196	747	5258	908	3015	1951
4:	589	528	539	216	2251	725	1444	2196	950	1625
5:	507	654	417	173	412	344	1071	126	263	349
6:	650	294	576	260	376	344	408	400	127	187
7:	467	466	408	680	297	316	322	402	254	241
8:	448	1640	289	1300	678	424	248	292	220	437
9:	952	478	489	963	1674	877	620	392	196	557
10:	1539	337	206	282	824	1022	548	628	630	607
11:	1057	295	271	379	977	1478	842	773	420	472
12:	830	362	454	441	1451	2423	1252	1051	699	499
13:	651	808	781	712	1907	2700	2062	1352	935	977
14:	684	1265	1047	954	2031	2385	1981	1834	1725	956
15:	396	1080	857	822	1373	1628	1580	1617	1148	717
16:	153	530	385	510	878	1205	1118	1152	547	853
17:	36	249	169	254	487	689	671	743	319	547
18:	8	106	62	80	231	284	478	512	344	346
19:	1	8	5	17	31	84	120	178	215	69
20+	0	0	3	5	28	118	217	290	305	58
1+:	10902	11055	10549	10843	19279	23794	22901	18959	14936	12220
2+:	10313	11007	10029	10290	18534	20914	22480	18060	14167	11880
3+:	9527	10112	8454	9608	17102	17790	20241	14845	12313	11449
4+:	8968	9100	6959	8048	15906	17043	14983	13937	9298	9498

YEAR:	80	81	82	83	84	85	86	87	88
AGE :									
1:	519	699	3982	3515	1476	2700	3282	1377	4362
2:	1678	3516	2460	2055	6806	3321	3306	4635	1979
3:	1859	1700	3904	2170	1054	6219	2849	1918	4266
4:	910	400	794	907	1136	1246	2488	969	832
5:	454	654	267	565	1165	845	457	489	419
6:	390	513	270	261	774	616	424	547	565
7:	299	402	599	954	611	409	306	477	680
8:	263	577	1000	705	880	420	265	440	682
9:	371	567	840	856	1717	564	384	589	1073
10:	690	665	1104	2465	2108	1246	648	962	1067
11:	821	965	1495	1203	2033	1516	1143	995	1223
12:	937	886	1913	1474	2403	1836	1634	1130	1350
13:	1051	583	2670	1645	1480	1432	1314	1017	1536
14:	999	445	886	1281	1032	811	754	679	1062
15:	895	351	469	349	598	519	398	484	658
16:	554	245	398	152	400	283	177	140	246
17:	218	161	345	91	278	148	88	45	111
18:	78	134	181	44	111	59	45	11	39
19:	21	51	73	34	63	34	30	3	8
20+	3	40	48	2	54	43	26	3	13
1+:	13011	13554	23698	20729	26179	24267	20018	16907	22171
2+:	12491	12855	19716	17214	24704	21567	16736	15531	17809
3+:	10814	9338	17256	15159	17897	18246	13430	10896	15830
4+:	8955	7638	13351	12989	16843	12026	10581	8978	11564

Table 24. Catch biomass (MT) of bluefin tuna of the west Atlantic

YR :	70	71	72	73	74	75	76	77	78	79
AGE:										
1:	243	234	201	21	201	174	22	6	30	17
2:	1191	1273	960	657	189	1278	200	234	112	120
3:	1802	802	640	586	369	85	1320	148	376	302
4:	539	1435	94	182	135	445	99	683	161	263
5:	397	63	167	197	199	90	117	630	347	502
6:	116	55	132	163	124	52	98	176	461	96
7:	51	117	8	52	51	30	22	232	197	228
8:	12	144	49	63	91	25	16	86	45	239
9:	11	158	53	173	62	52	92	44	60	97
10:	39	134	51	162	114	105	110	85	51	66
11:	75	150	30	60	153	221	82	152	35	70
12:	86	153	78	100	99	181	145	183	72	90
13:	131	225	165	155	147	177	283	172	91	145
14:	182	264	237	185	465	329	477	237	153	266
15:	160	247	259	150	420	386	659	408	293	401
16:	125	283	220	184	447	445	632	533	337	473
17:	101	161	183	159	468	279	426	551	478	446
18:	60	112	159	165	812	316	375	586	616	506
19:	56	78	118	112	263	185	271	344	443	318
20+	106	76	151	123	643	378	654	935	1384	1221
1+:	5483	6167	3956	3650	5454	5233	6099	6427	5743	5863
2+:	5240	5933	3754	3629	5253	5060	6078	6421	5714	5847
3+:	4050	4661	2794	2972	5064	3782	5877	6187	5601	5726
4+:	2247	3858	2154	2386	4695	3697	4557	6039	5225	5425

YR :	80	81	82	83	84	85	86	87	88
AGE:									
1:	19	35	16	16	4	2	2	6	19
2:	240	115	41	26	78	57	53	124	95
3:	176	334	33	60	45	205	133	155	212
4:	223	157	16	30	61	76	105	162	124
5:	217	236	13	36	107	174	92	188	150
6:	103	233	28	51	124	247	94	292	251
7:	172	216	45	57	71	146	123	100	298
8:	448	214	47	112	52	70	114	160	185
9:	549	265	41	134	70	53	71	132	172
10:	203	392	76	135	99	66	91	147	172
11:	155	302	137	131	140	79	83	91	200
12:	135	260	142	134	140	99	79	103	131
13:	134	208	152	185	198	156	130	108	139
14:	173	178	79	233	174	203	148	118	128
15:	291	172	48	181	254	251	228	164	177
16:	492	275	36	115	159	256	201	188	170
17:	461	238	56	132	90	177	134	135	195
18:	538	220	51	195	91	114	122	114	115
19:	517	240	62	144	79	74	72	83	124
20+	1274	1854	440	648	390	276	213	202	323
1+:	6519	6145	1558	2756	2427	2781	2287	2771	3380
2+:	6500	6110	1542	2740	2422	2778	2285	2765	3361
3+:	6260	5995	1502	2713	2344	2722	2232	2641	3266
4+:	6085	5660	1468	2653	2300	2517	2099	2486	3054

Table 25. Catch (biomass) composition of the east Atlantic and Mediterranean bluefin. (It should be noted that in this composition, age 1+ and the unknown, but large, numbers of 0-age fish are not included.)

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE 2+:	0.95	1.00	0.95	0.95	0.96	0.88	0.98	0.95	0.95	0.97
3+:	0.87	0.91	0.80	0.89	0.89	0.75	0.88	0.78	0.82	0.94
4+:	0.82	0.82	0.66	0.74	0.82	0.71	0.65	0.73	0.61	0.78
5+:	0.77	0.78	0.61	0.72	0.71	0.68	0.59	0.61	0.55	0.64
6+:	0.72	0.72	0.57	0.71	0.69	0.67	0.54	0.61	0.53	0.61

YEAR:	80	81	82	83	84	85	86	87	88
AGE 2+:	0.96	0.95	0.83	0.83	0.94	0.89	0.84	0.92	0.80
3+:	0.83	0.69	0.73	0.73	0.68	0.75	0.67	0.64	0.71
4+:	0.69	0.56	0.56	0.63	0.64	0.49	0.53	0.53	0.52
5+:	0.62	0.53	0.53	0.58	0.60	0.44	0.40	0.47	0.48
6+:	0.58	0.48	0.52	0.56	0.55	0.41	0.38	0.44	0.46

Table 26. Population (numbers) composition of west Atlantic bluefin

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE										
2+ :	0.690	0.720	0.700	0.827	0.557	0.838	0.842	0.868	0.862	0.820
3+ :	0.500	0.467	0.478	0.560	0.442	0.466	0.719	0.705	0.725	0.695
4+ :	0.335	0.390	0.382	0.450	0.335	0.374	0.498	0.606	0.601	0.584
5+ :	0.299	0.317	0.343	0.391	0.288	0.293	0.397	0.495	0.512	0.503
6+ :	0.269	0.293	0.316	0.351	0.253	0.253	0.323	0.390	0.440	0.426

YEAR:	80	81	82	83	84	85	86	87	88
AGE									
2+ :	0.851	0.848	0.791	0.773	0.827	0.821	0.755	0.836	0.608
3+ :	0.673	0.699	0.656	0.612	0.636	0.668	0.599	0.610	0.491
4+ :	0.570	0.568	0.542	0.513	0.500	0.522	0.484	0.483	0.362
5+ :	0.491	0.484	0.463	0.421	0.419	0.405	0.394	0.398	0.290
6+ :	0.427	0.422	0.395	0.359	0.338	0.339	0.296	0.323	0.243

Catch (biomass) composition of west Atlantic bluefin

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE										
2+ :	0.955	0.962	0.947	0.994	0.958	0.964	0.996	0.999	0.993	0.996
3+ :	0.733	0.753	0.695	0.808	0.919	0.701	0.959	0.956	0.967	0.971
4+ :	0.398	0.621	0.527	0.642	0.842	0.684	0.717	0.929	0.881	0.906
5+ :	0.298	0.385	0.502	0.590	0.814	0.592	0.699	0.805	0.844	0.849
6+ :	0.224	0.375	0.458	0.534	0.773	0.573	0.677	0.690	0.765	0.741

YEAR:	80	81	82	83	84	85	86	87	88
AGE									
2+ :	0.996	0.992	0.986	0.992	0.998	0.999	0.999	0.998	0.994
3+ :	0.951	0.965	0.950	0.980	0.960	0.977	0.973	0.949	0.963
4+ :	0.917	0.887	0.920	0.951	0.938	0.895	0.909	0.889	0.893
5+ :	0.875	0.850	0.906	0.937	0.908	0.864	0.859	0.826	0.853
6+ :	0.833	0.795	0.894	0.920	0.855	0.795	0.814	0.753	0.804

Population (biomass) composition of west Atlantic bluefin

YEAR:	70	71	72	73	74	75	76	77	78	79
AGE										
2+ :	0.979	0.983	0.980	0.991	0.972	0.989	0.991	0.992	0.991	0.988
3+ :	0.943	0.946	0.946	0.961	0.951	0.932	0.974	0.970	0.973	0.970
4+ :	0.885	0.917	0.918	0.931	0.919	0.900	0.916	0.945	0.941	0.940
5+ :	0.861	0.876	0.898	0.906	0.893	0.856	0.874	0.900	0.909	0.906
6+ :	0.833	0.859	0.877	0.883	0.865	0.827	0.832	0.844	0.870	0.864

YEAR:	80	81	82	83	84	85	86	87	88
AGE:									
2+ :	0.990	0.989	0.989	0.988	0.988	0.990	0.983	0.989	0.968
3+ :	0.962	0.968	0.970	0.965	0.959	0.966A/FF4		0.954	0.941
4+ :	0.935	0.932	0.939	0.939	0.916	0.927	0.9241	0.911	0.890
5+ :	0.904	0.897	0.907	0.896	0.874	0.871	0.870	0.865	0.840
6+ :	0.868	0.862	0.860	0.850	0.813	0.825	0.793	0.808	0.793

Table 27. Atlantic blue marlin catch (MT) - as of October 30, 1989

	1959	1960	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
TOTAL	841	2815	4077	7302	9034	8007	6153	3852	2234	2428	3085	2858	3197	2373	3180	3015	3180	2311	2167	1494	1379	1609	1892	2732	1775	2412	2832	1787	1600	1788
N. ATL.	231	684	647	3446	5138	4806	3680	2033	1167	1338	1595	1839	2111	1313	1615	1914	2074	1363	1252	970	876	1058	1243	1611	1134	1258	1347	972	618	536
-LL	231	581	531	3331	5010	4645	3517	1884	970	1170	1388	1635	1932	1122	1406	1497	1683	978	876	553	480	639	780	1154	763	886	1121	672	353	279
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	1	0
CHI.TAIW	0	0	0	9	27	8	2	34	131	337	348	369	158	300	155	183	105	169	64	81	51	160	98	100	106	74	81	87	26	59
CUBA	0	0	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
JAPAN	231	581	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	60
KOREA	0	0	0	0	0	1	4	46	66	93	214	368	221	215	457	385	304	174	307	185	67	45	70	18	25	137	147	25	10	20
PANAMA	0	0	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
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	3	4	1	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	20	61	92	32
USSR	0	0	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
VENEZUEL	0	0	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
-RR	**	103	116	115	128	161	163	149	197	168	207	204	179	191	209	234	241	265	295	295	295	295	295	295	187	187	154	198	168	175
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	7	11	7	2
USA	**	103	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
-UNCL	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	82
BARBADOS	0	0	0	0	0	0	0	0	0	0	0	**	**	**	**	183	150	120	81	72	51	73	117	99	126	126	10	14	13	11
GRENADA	0	0	0	0	0	0	0	0	0	0	0	**	**	**	**	**	**	**	**	**	**	1	1	12	6	8	11	36	33	21
NLD.ANT.	0	0	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
PORTUGAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	1	1	1	++
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	++	1	++	++
S. ATL.	610	2131	3430	3856	3896	3201	2473	1819	1067	1090	1490	1019	1086	1060	1565	1101	1106	948	915	524	503	551	436	840	496	1054	1385	715	882	1152
-LL	610	2131	3430	3856	3896	3201	2473	1819	1067	1090	1489	1018	1086	1060	1565	1101	1106	937	863	522	488	544	410	812	493	943	1274	605	772	1039
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
CHI.TAIW	0	0	0	11	21	5	2	35	160	385	1016	560	604	628	537	369	422	240	107	177	139	129	104	150	39	50	98	71	103	235
CUBA	0	0	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
JAPAN	610	2131	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	300
KOREA	0	0	0	0	0	1	3	47	79	93	98	120	258	251	532	449	354	392	356	140	78	92	56	33	67	221	248	42	115	233
PANAMA	0	0	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
S.AFRICA	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
USSR	0	0	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
-UNCL	0	0	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	110	113
BENIN	0	0	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
BRASIL	0	0	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	++	1
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	100	100	100	100	100
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	6	0
-PS	0	0	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
FIS	0	0	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
ESPANA	0	0	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

++ Catch < 0.5 MT.
** Catch unknown.
***Dead discards from the U.S. longline fishery were 108 MT for 1988.

Table 28. Atlantic white marlin catch (MT) - as of October 30, 1989

	1959	1960	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
TOTAL	112	313	823	2059	2612	3731	4903	3501	1416	2036	2232	2085	2246	2331	1779	1747	1572	1812	977	937	1012	955	1130	1091	1672	1100	1550	1406	987	971
N. ATL.	16	85	101	376	912	1690	2124	1787	578	681	1190	1036	1535	1198	990	1211	1084	1047	499	426	479	505	778	652	1377	704	891	857	515	335
-LL	16	25	41	302	848	1620	2048	1711	497	594	1114	932	1440	1099	886	1103	977	938	390	317	370	396	669	543	1236	559	749	826	423	263
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	1	0
CHI.TAIW	0	0	0	1	4	3	2	32	47	58	132	97	178	244	120	248	84	142	44	79	62	105	174	130	203	52	115	275	93	176
CUBA	0	0	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
JAPAN	16	25	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	20
KOREA	0	0	0	0	0	1	1	51	44	52	204	340	219	213	106	90	71	64	71	33	16	12	48	12	28	18	120	19	2	4
PANAMA	0	0	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
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	9	14	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	20	39	11	103	89	12
USSR	0	0	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
VENEZUEL	0	0	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
-RR	**	60	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
USA	**	60	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
-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	2	1	**	1	++
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	2	1	**	1	++
S. ATL.	96	228	722	1683	1700	2041	2779	1714	838	1355	1042	1049	711	1133	789	536	488	765	478	511	533	450	352	439	295	396	659	549	472	636
-LL	96	228	722	1683	1700	2041	2779	1714	838	1355	1042	1049	711	1133	789	536	488	740	475	509	529	447	352	439	295	396	655	545	472	636
ARGENTIN	0	0	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
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
CHI.TAIW	0	0	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	138	232	439
CUBA	0	0	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
JAPAN	96	228	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	50
KOREA	0	0	0	0	0	2	7	58	125	157	177	230	341	332	165	139	109	220	111	5	24	25	37	60	13	39	184	25	20	41
PANAMA	0	0	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
URUGUAY	0	0	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
USSR	0	0	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
-UNCL	0	0	0	0	0	0	0	0	0	0	++	++	0	0	0	0	0	25	3	2	4	3	++	++	++	++	4	4	0	0
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	4	4	0	0
BRASIL	0	0	0	0	0	0	0	0	0	0	++	++	0	0	0	0	0	25	3	2	4	3	++	++	++	++	++	++	0	0

++ Catch < 0.5 MT.
** Catch unknown.
*** Dead discards from the U.S. longline were 29 MT for 1988.

Table 29. Atlantic sailfish catch (MT) - as of October 30, 1989

	1959	1960	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
TOTAL	28	326	683	898	996	1479	2916	2409	1890	2585	2090	2766	2820	2451	1633	1344	1204	1526	1922	2643	3285	2469	2071	1911	3618	3490	3546	3803	3865	3706
E. ATL.	0	0	0	0	0	0	3	5	90	89	95	98	126	161	160	124	165	193	816	1723	2350	1519	1047	784	2788	2429	2539	2751	2886	2818
-LL	0	0	0	0	0	0	3	5	14	13	14	11	14	39	14	9	7	1	13	5	**	0	37	171	200	128	89	69	56	28
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	3	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	0	0	9	9	0	0	0
CUBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	158	200	115	19	55	50	22
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	54	3	1	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	10	0	4	7	9	0	0
USSR	0	0	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
-BB	0	0	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	52	52
SENEGAL	0	0	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	52	52
-TROL	0	0	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	385	385
SENEGAL	0	0	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	385	385
-UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	22	25	638	1574	2246	1191	485	96	2163	2180	2191	2201	2393	2353
BENIN	0	0	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	28	28
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	40	40	40	40	0
GHANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	22	11	638	1574	2246	1191	449	16	2161	2067	2100	2136	2325	2325
KOREA	0	0	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
SENEGAL	0	0	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	0
W. ATL.	**	111	322	296	234	255	327	301	337	343	330	697	651	457	391	445	436	549	697	689	642	625	566	766	646	887	885	953	936	858
-LL	**	**	196	154	77	82	139	107	136	136	116	449	396	196	123	159	144	178	191	203	159	148	116	305	192	372	414	434	521	639
BRASIL	**	**	159	91	46	46	46	46	25	57	27	21	70	105	37	82	88	124	137	139	68	93	46	68	49	87	36	109	127	301
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	0	0	42	39	49	19	134
CUBA	0	0	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
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	135	69	52	104
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	3	78	3
VENEZUEL	0	0	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
-RR	**	111	126	142	157	173	188	194	201	207	214	220	227	233	240	248	254	261	308	308	308	308	308	308	308	345	221	230	231	35
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	37	26	35	36	27
USA	**	111	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
-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	184
ARUBA	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	10	10	20	20	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	0	0	62	119	90	84	87	55	53	8	4	0	20	0	0
DOMIN.R.	0	0	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	40
GRENADA	0	0	0	0	0	0	0	0	0	**	**	**	**	**	**	**	**	**	31	37	40	31	36	27	37	66	164	211	104	114
NLD.ANT.	0	0	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	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
UNCL. REG.	28	215	361	602	762	1224	2586	2103	1463	2153	1665	1971	2043	1833	1082	775	603	784	409	231	293	325	458	361	184	174	122	99	43	30
-LL	28	215	361	602	762	1224	2586	2103	1463	2153	1665	1971	2043	1833	1082	775	603	784	409	231	293	325	458	361	184	174	122	99	43	30
CHI.TAIW	0	0	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
CUBA	0	0	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
JAPAN	28	215	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	30
KOREA	0	0	0	0	0	3	11	149	231	275	543	779	767	745	165	139	109	151	111	32	24	23	65	48	7	77	0	0	0	0
PANAMA	0	0	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

++Catch < 0.5 MT.

Table 30. Atlantic unclassified billfishes catch (MT) - as of October 30, 1989

AREA	COUNTRY	GEAR	1959	1960	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
ETRO	GABON	UNCL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**	116	++	++	++	++	++	**	**
ETRO	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	0	0	129	78	68	94	0
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	0	0	11	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	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	0	0	5	++
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	0	0	1	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	0	0	36	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	0	0	5	0	0	29
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	0	0	23	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	0	0	22	0	0	10
WTRO	GUADELOU	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	MARTINIQ	SURF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++	++	++	++	++	++	++	++	0	0	0
TOTAL			0	0	0	0	++	++	++	++	++	0	0	**	**	**	**	**	**	**	**	**	**	**	116	++	++	129	176	68	99	39

++ Catch < 0.5 MT.
** Catch unknown.

Table 31. Atlantic swordfish catch (MT) - as of October 29, 1989

	1959	1960	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
TOTAL	6603	4387	5591	6399	11900	13669	12954	12960	13792	14672	16897	17657	11746	12598	13247	13365	15344	13489	13929	19814	19842	23975	20667	24557	25709	33193	36211	38101	40181	45414
N. ATL.	6232	3828	4381	5342	10189	11258	8652	9338	9084	9137	9138	9425	5198	4727	6001	6301	8776	6587	6352	11797	11859	13527	11126	12832	14423	12741	14154	18010	19642	19525
-LL	1428	1042	2060	3202	9192	10833	7759	8492	8656	8950	8938	9127	5140	4430	5446	5078	7015	5125	5401	11085	11099	12800	10507	12600	13897	12575	14019	17812	19459	19190
CANADA	0	0	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
CHI.TAIW	0	0	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
CUBA	300	300	300	400	125	134	171	175	336	224	97	134	160	75	248	572	280	283	398	281	128	278	227	254	410	206	162	636	910	832
JAPAN	28	20	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	1090
KOREA	0	0	0	0	0	1	2	27	46	24	22	40	159	155	374	152	172	335	541	634	303	284	136	198	53	257	59	16	7	4
MAROC	0	0	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
NORWAY	0	0	0	0	0	0	++	300	300	200	600	400	200	**	**	**	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	**	**	7	171	24	25	91	22	76	26	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	7	15	448	959	536
ESPANA	1100	722	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
USA	0	0	0	65	1053	1279	945	534	340	180	93	0	0	0	0	0	0	0	0	3020	3888	5015	3986	4912	4468	4416	4565	4819	4827	5810
USSR	0	0	0	0	0	0	5	8	22	21	11	24	24	28	26	17	32	19	15	20	10	21	0	69	0	16	13	18	0	0
VENEZUEL	0	0	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	86
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	333
-UNCL	4804	2786	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	183	335
CANADA	4014	2328	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
FRANCE	0	0	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
IRELAND	0	0	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
ITALY	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
LIBERIA	0	0	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	30
MARTINIQ	100	**	**	**	**	**	**	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
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
POLAND	0	0	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	++
PORTUGAL	0	0	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
ROUMANIE	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
ESPANA	0	0	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	200
ST.LUCIA	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++	++	++	++	++	0	0	0	0	0	0	0	0	0
USA	690	458	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	60	81
USSR	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	4	0
S. ATL.	171	459	1016	769	1417	2029	2578	1930	1539	2335	4290	5130	1945	2381	2799	2451	2650	2674	2704	2548	2862	5058	3819	6295	5330	8675	8838	5523	4585	9523
-LL	71	359	816	769	1417	2029	2578	1930	1539	2235	4090	5130	1943	2381	2799	2451	2650	2674	2689	2531	2833	4914	3782	6192	5235	8425	8120	4579	4001	9085
ARGENTIN	0	281	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
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
CHI.TAIW	0	0	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	267
CUBA	0	0	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
JAPAN	71	78	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	2900
KOREA	0	0	0	0	0	1	4	54	79	77	370	382	256	249	602	563	279	812	699	699	303	399	311	486	409	149	285	66	68	119
PANAMA	0	0	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
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	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	5	5	3	3	5
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	66	0	4393
USSR	0	0	0	0	0	4	39	56	158	155	89	176	176	202	188	123	231	138	106	149	70	154	36	26	46	146	60	0	0	0

Table 31. Continued...

	1959	1960	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
-UNCL	100	100	200	**	**	**	**	**	**	100	200	0	2	0	0	0	0	++	15	17	29	144	37	103	95	250	718	944	584	438
ANGOLA	100	100	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
ARGENTIN	0	0	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
BENIN	0	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
BRASIL	0	0	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
BULGARIA	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	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	0	0	10	10	10	10	10
GHANA	**	**	**	**	**	**	**	**	**	100	200	0	0	0	0	0	0	0	0	0	0	110	5	55	5	23	20	14	123	123
JAPAN	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
NIGERIA	0	0	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
S.AFRICA	0	0	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
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	0	0		6	32	1++
USSR	0	0	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
MEDIT.	200	100	194	288	294	382	1724	1692	3169	3200	3469	3102	4603	5490	4447	4613	3918	4228	4873	5469	5121	5390	5722	5430	5956	11777	13219	14568	15954	16366
-LL	0	0	94	188	94	282	1423	1192	869	1196	1350	1114	1426	1529	1288	893	212	3413	3898	4333	3997	4082	4302	4025	4467	4803	4501	5495	4920	4612
CYPRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++	5	70	114	91	109	79	88	124	33	74	80	176	106	121
GREECE	0	0	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	1535	1110	0
ITALY	0	0	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
JAPAN	0	0	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	0
MAROC	0	0	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
ESPANA	0	0	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
-UNCL	200	100	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	11754
ALGERIE	0	0	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
ITALY	**	**	**	**	**	**	**	**	1900	1400	2000	1800	2900	3700	2800	3330	3002	279	372	675	424	447	412	318	327	5894	7473	7849	8477	8947
LIBYA	0	0	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
MALTA	**	**	**	**	**	**	++	++	++	++	++	100	200	200	200	171	191	156	199	121	135	198	171	158	53	84	96	87	117	185
MAROC	0	0	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
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	1	2	8	0	0	1
TUNISIE	0	0	0	0	0	0	0	0	0	0	0	++	++	++	++	5	3	5	0	0	0	0	7	19	15	15	61	64	63	0
TURKEY	200	100	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	0
UNCL. REG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-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	0
-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	0	0	0	0	0

++ Catch < 0.5 MT.
** Catch unknown.

Table 32. Catch-at-age (in numbers) for the Atlantic swordfish, 1978-1988

a) Total North Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	6402	10406	25881	14761	20357	29247	28733	32602	44456	70282	76813
2	19280	27379	46023	34832	31039	54190	51951	57783	89623	113908	128210
3	36184	33384	49655	40424	43192	55267	55518	65338	84521	105598	103443
4	35416	32012	39174	34777	39982	48456	44301	51359	65236	72142	65698
5	26021	22812	25817	20987	26889	30545	25892	26827	34572	37427	34967
6	13661	14327	14852	11283	13260	15415	12703	12735	15948	17967	15580
7	8664	8992	9327	7282	7745	8368	6432	7156	7921	7793	8479
8	4269	4694	4697	4143	4971	4023	3222	3525	4146	3872	4184
9	3290	3494	3228	2429	2932	2599	2020	2234	2809	2168	2210
10	2051	2057	1927	1557	1678	1381	1135	1160	1583	1676	1254
11	1074	1470	1151	928	1209	873	766	668	988	1052	847
12	820	825	707	622	619	522	416	433	634	593	489
13	712	851	496	511	478	367	317	285	414	362	331
14	507	651	399	376	315	352	296	229	311	323	265
15+	5228	5985	5113	4758	6193	3808	2914	2814	4098	3888	2673
TOT	163578	169337	228448	179668	200850	255411	236316	265148	357259	439052	445440

b) Northwest Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	3552	6579	19304	7727	15738	17664	19670	20372	29153	43600	42350
2	11836	19811	34202	21037	21621	26710	35414	33171	58896	64493	82290
3	25585	24278	34832	23631	27616	23716	31093	38275	55691	56369	58815
4	23084	22961	24717	17529	19480	18974	20383	27506	42510	35501	34067
5	15645	16101	16659	10841	12106	12211	11655	14905	20860	17681	15848
6	7810	10177	9378	6530	6396	7414	6150	7230	10089	8488	7326
7	4913	6861	5584	4348	3845	4309	3330	4059	4949	4226	3969
8	2369	3638	3000	2436	2675	2498	1739	2129	2717	2205	1896
9	1826	2654	1866	1586	1657	1649	1042	1348	2039	1242	1151
10	1000	1626	1163	1049	906	923	663	746	1160	908	735
11	497	1282	781	594	706	619	446	463	705	568	568
12	548	704	500	423	379	358	228	290	498	302	286
13	407	740	313	353	315	247	179	183	311	213	188
14	228	560	269	258	205	272	157	149	234	211	162
15+	3097	5042	3419	3685	4091	2799	2005	2079	3237	2722	1861
TOT	102397	123013	155985	102027	117736	120362	134154	152904	233050	238727	251512

Table 32. Continued..

c) Northeast Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	2849	3827	6577	7033	4618	11583	9063	12231	15302	26682	34463
2	7444	7568	11821	13795	9418	27479	16537	24612	30727	49415	45920
3	10600	9106	14824	16792	15577	31551	24425	27063	28830	49230	44629
4	12332	9051	14458	17249	20502	29481	23918	23853	22726	36642	31631
5	10376	6711	9158	10146	14784	18334	14237	11922	13711	19746	19120
6	5851	4150	5475	4752	6864	8002	6554	5505	5859	9479	8253
7	3751	2131	3743	2935	3900	4059	3101	3097	2972	3567	4510
8	1900	1056	1697	1707	2296	1524	1483	1397	1429	1666	2287
9	1464	840	1362	843	1275	950	978	886	770	926	1058
10	1051	431	764	508	772	458	472	413	423	768	519
11	577	188	370	333	503	254	320	205	283	484	279
12	272	121	208	199	240	165	189	143	136	291	203
13	305	111	183	157	163	120	138	102	103	149	142
14	280	91	131	119	111	80	138	80	77	112	103
15+	2130	943	1694	1073	2102	1009	909	735	861	1166	812
TOT	61181	46324	72462	77641	83124	135049	102462	112244	124209	200325	193928

d) North Atlantic swordfish stock structure hypotheses considered at the workshop 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/Recapt. (Interchange)	Size Dist.	Recruit. Trends
North Atlantic single stock	-	Yes	Yes	No 1/	Yes	-
Separate Stocks						
a) Areas 1,2,3,4A vs. 4B (Boundary at 30 W)	No	No	No	Yes	No 2/	No 3/
b) Areas 1,2,3 vs. 4A,4B (Boundary at 60 W)	-	No	No	Yes	No 2/	Yes 4/

1/ Lack of E-W or W-E recaptures only addresses isolation of fish once they recruit to the fishery, i.e., a common spawning population could be feeding separate E-W production units. Also, differences in probability of recapture for various east/west areas are not accounted for.

2/ If recruitment and exploitation 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 (Figure 53).

3/ In VPAs run separately for eastern and western stocks, recruitment trends were generally parallel.

4/ Substantial inconsistency occurs between eastern and western stock recruitment trends for the West 1, 2, 3 hypothesis

Table 33-A. VPA estimates for swordfish stock size (in number - as of Jan. 1), total North Atlantic

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	374891	404438	412478	420918	495792	533157	577322	577286	664090	886747	1185395	0
2	262863	301142	321710	314290	331262	387501	410048	446673	443142	503485	662414	901016
3	196420	197769	221780	221750	225802	243129	268225	288712	313421	281720	309150	426329
4	141632	128074	131713	136649	144977	145789	149050	169370	177257	180129	135104	159512
5	89428	83912	75893	72391	80411	82520	75517	81946	92197	86098	82201	51168
6	48297	49673	48061	38775	40279	41505	39923	38400	42818	44202	36626	35661
7	29397	27181	27705	25910	21537	20979	20033	21192	19916	20626	19932	15889
8	14639	16228	14118	14244	14624	10625	9605	10582	10876	9139	9836	8647
9	46537	52585	38777	38130	39120	25876	23225	23268	28124	23464	18740	12397
1	374891	404438	412478	420918	495792	533157	577322	577286	664090	886747	1185395	0
2-4	600915	626985	675203	672689	702041	776419	827323	904755	933820	965334	1106668	1486857
5+	228298	229579	204554	189450	195971	181505	168303	175388	193931	183529	167335	123762

Table 33-B. VPA estimates for swordfish fishing mortality, total North Atlantic

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.0191	0.0288	0.0719	0.0395	0.0464	0.0625	0.0566	0.0644	0.0769	0.0917	0.0743
2	0.0845	0.1059	0.1721	0.1307	0.1093	0.1679	0.1508	0.1543	0.2530	0.2877	0.2407
3	0.2276	0.2065	0.2843	0.2250	0.2375	0.2893	0.2597	0.2878	0.3539	0.5349	0.4617
4	0.3235	0.3233	0.3985	0.3303	0.3635	0.4578	0.3982	0.4082	0.5221	0.5845	0.7709
5	0.3880	0.3573	0.4715	0.3863	0.4613	0.5261	0.4763	0.4491	0.5351	0.6547	0.6351
6	0.3748	0.3838	0.4178	0.3880	0.4523	0.5284	0.4333	0.4565	0.5304	0.5964	0.6351
7	0.3941	0.4551	0.4653	0.3719	0.5065	0.5813	0.4382	0.4671	0.5790	0.5405	0.6351
8	0.3890	0.3852	0.4584	0.3878	0.4711	0.5420	0.4632	0.4591	0.5470	0.6316	0.6351
9	0.3890	0.3852	0.4584	0.3878	0.4711	0.5420	0.4632	0.4591	0.5470	0.6316	0.6351
Average F (weighted by catch)											
1	0.0191	0.0288	0.0719	0.0395	0.0464	0.0625	0.0566	0.0644	0.0769	0.0917	0.0743
2-4	0.2346	0.2171	0.2792	0.2284	0.2468	0.2993	0.2629	0.2790	0.3619	0.4506	0.4347
5+	0.3864	0.3848	0.4555	0.3851	0.4675	0.5366	0.4596	0.4549	0.5413	0.6254	0.6351

Table 33-C. VPA estimates for swordfish biomass (MT in round weight), total North Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	4612	5025	5129	5128	6328	6612	7384	7254	8237	10691	13685
2	5788	6278	6743	6530	7066	7684	8646	9140	8624	9643	12858
3	6537	6533	7014	6973	7242	7537	8472	8956	9458	7741	8684
4	6395	5843	5699	5971	6240	5929	6237	7093	7132	6890	4807
5	5179	4941	4201	4059	4300	4271	4017	4485	4877	4214	4096
6	3420	3552	3352	2712	2684	2656	2671	2579	2810	2740	2252
7	2409	2212	2197	2129	1653	1549	1579	1670	1497	1553	1446
8	1336	1527	1261	1303	1285	905	847	942	941	751	798
9	5673	6556	4599	4816	4999	2956	2723	2763	3302	2634	2036
1	4612	5025	5129	5128	6328	6612	7384	7254	8237	10691	13685
2-4	18720	18655	19456	19474	20548	21150	23355	25189	25214	24274	26348
5+	18018	18787	15610	15019	14921	12337	11836	12439	13427	11892	10627

Table 34. Swordfish CPUE indices from Spanish longliners in the west and east Atlantic

	Area	Year	1	2	3	4	5+
1	NW	1983	2.19	1.94	1.81	1.28	1.79
2	NW	1984	0.82	1.67	2.65	1.40	1.55
3	NW	1985	0.45	1.68	2.67	2.00	2.35
4	NW	1986	1.06	1.34	1.65	1.09	1.47
5	NW	1987	1.44	1.97	1.58	0.84	0.94
6	NW	1988	2.92	2.64	1.85	0.85	1.21
7	NE	1983	0.25	0.13	0.42	0.74	2.43
8	NE	1984	0.27	0.14	0.34	0.72	2.48
9	NE	1985	0.31	0.16	0.48	0.70	2.28
10	NE	1986	0.45	0.24	0.48	0.62	1.73
11	NE	1987	0.71	0.38	0.68	0.79	1.89
12	NE	1988	0.75	0.40	0.44	0.57	1.53

Table 35-A. VPA estimates for swordfish stock size (in number - as of Jan. 1), northwest Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	212472	218550	219988	213895	260127	294611	291969	304401	340591	421000	363803	0
2	156336	170743	172981	162644	168131	198734	225224	221246	230789	252474	305235	259537
3	129782	117287	121867	110678	114127	118091	138541	152354	151126	135663	148352	175446
4	91274	83107	74059	68259	69233	68451	75225	85294	90104	73341	60066	68243
5	55964	53841	47266	38269	40025	39057	38875	43146	44944	35307	27924	18353
6	31001	31663	29513	23624	21523	21816	20928	21282	21838	17922	12908	8522
7	19227	18315	16715	15677	13433	11834	11153	11570	10882	8751	6993	3939
8	8802	11297	8787	8633	8901	7519	5790	6118	5800	4432	3341	2134
9	28038	38801	24113	27946	27254	20480	15585	14964	17233	12211	8570	3635
1	212472	218550	219988	213895	260127	294611	291969	304401	340591	421000	363803	0
2-4	377392	371137	368907	341581	351491	385275	438990	458894	472020	461477	513654	503226
5+	143033	153918	126394	114149	111137	100706	92330	97079	100697	78622	59735	36584

Table 35-B. VPA estimates for swordfish fishing mortality, northwest Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.0186	0.0338	0.1020	0.0407	0.0692	0.0686	0.0774	0.0768	0.0994	0.1216	0.1377
2	0.0874	0.1372	0.2466	0.1543	0.1533	0.1608	0.1909	0.1812	0.3313	0.3317	0.3537
3	0.2457	0.2598	0.3796	0.2691	0.3112	0.2510	0.2851	0.3252	0.5230	0.6147	0.5765
4	0.3278	0.3643	0.4602	0.3338	0.3725	0.3658	0.3559	0.4407	0.7369	0.7656	0.9857
5	0.3695	0.4012	0.4935	0.3755	0.4069	0.4239	0.4025	0.4809	0.7194	0.8062	0.9868
6	0.3263	0.4388	0.4326	0.3645	0.3981	0.4709	0.3927	0.4707	0.7145	0.7411	0.9868
7	0.3318	0.5344	0.4608	0.3660	0.3803	0.5148	0.4005	0.4906	0.6984	0.7630	0.9868
8	0.3530	0.4399	0.4737	0.3738	0.4036	0.4575	0.4034	0.4855	0.7293	0.7983	0.9868
9	0.3530	0.4399	0.4737	0.3738	0.4036	0.4575	0.4034	0.4855	0.7293	0.7983	0.9868
Average F (weighted by catch)											
1	0.0186	0.0338	0.1020	0.0407	0.0692	0.0686	0.0774	0.0768	0.0994	0.1216	0.1377
2-4	0.2461	0.2594	0.3523	0.2485	0.2789	0.2477	0.2633	0.3090	0.5090	0.5323	0.5514
5+	0.3516	0.4402	0.4707	0.3714	0.4011	0.4556	0.4003	0.4809	0.7184	0.7855	0.9868

Table 35-C. VPA estimates for swordfish biomass (MT in round weight), northwest Atlantic

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	2958	2982	2810	2642	3375	3695	3850	3909	4327	5292	4508
2	3737	3638	3586	3479	3626	4087	4754	4636	4494	4954	5906
3	4513	3921	3801	3542	3663	3897	4545	4812	4443	3786	4219
4	4312	3836	3236	3147	3142	3110	3457	3691	3451	2751	2079
5	3418	3205	2686	2275	2334	2290	2313	2431	2307	1723	1272
6	2341	2267	2115	1738	1553	1522	1525	1482	1381	1108	728
7	1688	1469	1377	1341	1150	948	943	941	809	633	461
8	853	1056	805	824	841	689	550	559	480	354	248
9	3589	4805	2950	3697	3723	2529	1996	1835	1926	1361	854
1	2958	2982	2810	2642	3375	3695	3850	3909	4327	5292	4508
2-4	12562	11395	10623	10168	10431	11095	12755	13138	12388	11491	12205
5+	11887	12802	9934	9875	9601	7978	7328	7249	6904	5179	3563

Table 36-A. VPA estimates for swordfish stock size (in number - as of Jan. 1), northeast Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	160530	182371	188159	199016	222300	218422	248676	269994	382530	499886	454116	0
2	106237	128853	145850	148100	156577	177826	168348	195398	209986	299343	385129	340615
3	67604	80244	98648	108716	108772	119672	120727	122869	137709	144119	200369	273767
4	50823	45758	57459	67353	73815	74960	69431	76742	76109	86660	73449	123666
5	33642	30452	29274	33961	39536	41884	34697	35203	41248	41749	37796	31514
6	17435	18155	18859	15681	18624	18992	17702	15525	18035	21365	16314	13644
7	9826	8980	11109	10487	8539	9038	8309	8563	7730	9464	8915	5889
8	5739	4651	5424	5708	5930	3462	3727	3997	4209	3640	4521	3218
9	18195	11924	14930	10718	13198	6810	7812	7265	7740	8399	6067	3822
1	160530	182371	188159	199016	222300	218422	248676	269994	382530	499886	454116	0
2-4	224664	254855	301957	324169	339164	372458	358506	395009	423803	530122	658947	738048
5+	84836	74161	79596	76556	85828	80186	72247	70553	78961	84617	73614	58089

Table 36-B. VPA estimates for swordfish fishing mortality, northeast Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.0198	0.0235	0.0394	0.0398	0.0232	0.0604	0.0411	0.0514	0.0452	0.0608	0.0876
2	0.0806	0.0671	0.0938	0.1086	0.0688	0.1873	0.1149	0.1499	0.1764	0.2014	0.1413
3	0.1903	0.1340	0.1816	0.1872	0.1723	0.3444	0.2531	0.2790	0.2631	0.4740	0.2826
4	0.3122	0.2467	0.3259	0.3327	0.3667	0.5703	0.4792	0.4208	0.4005	0.6298	0.6462
5	0.4168	0.2791	0.4242	0.4007	0.5332	0.6612	0.6042	0.4689	0.4579	0.7396	0.8189
6	0.4635	0.2912	0.3869	0.4078	0.5231	0.6267	0.5262	0.4974	0.4448	0.6740	0.8189
7	0.5480	0.3042	0.4658	0.3701	0.7028	0.6859	0.5318	0.5103	0.5532	0.5388	0.8189
8	0.4555	0.2889	0.4243	0.4012	0.5584	0.6665	0.5795	0.4882	0.4704	0.7050	0.8189
9	0.4555	0.2889	0.4243	0.4012	0.5584	0.6665	0.5795	0.4882	0.4704	0.7050	0.8189
					Average F (weighted by catch)						
1	0.0198	0.0235	0.0394	0.0398	0.0232	0.0604	0.0411	0.0514	0.0452	0.0608	0.0876
2-4	0.2129	0.1540	0.2071	0.2170	0.2385	0.3709	0.3012	0.2817	0.2687	0.4167	0.3236
5+	0.4552	0.2875	0.4223	0.3984	0.5568	0.6569	0.5744	0.4836	0.4676	0.6997	0.8189

Table 36-C. VPA estimates for swordfish biomass (MT in round weight), northeast Atlantic

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	1643	1863	2092	2371	2610	2635	2939	3271	4478	5544	4499
2	2019	2476	2932	2918	3185	3391	3452	3825	3920	5621	7146
3	1998	2476	3034	3290	3369	3498	3582	3632	3913	3827	5595
4	2100	1993	2400	2773	2998	2765	2615	3013	2970	3068	2572
5	1788	1720	1544	1779	1942	1929	1626	1799	2079	1860	1657
6	1119	1265	1254	1026	1139	1097	1063	964	1139	1211	876
7	712	728	832	814	570	601	591	625	546	666	570
8	481	428	464	493	476	263	294	330	350	273	323
9	2064	1423	1675	1211	1526	668	787	773	855	818	549
1	1643	1863	2092	2371	2610	2635	2939	3271	4478	5544	4499
2-4	6117	6945	8366	8981	9552	9654	9649	10470	10803	12516	15313
5+	6164	5564	5769	5323	5653	4558	4361	4491	4969	4828	3975

Table 37. Atlantic and world southern bluefin catches (MT) by gear, area and country

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
ATLANTIC TOTAL	3168	4680	6203	2823	2569	1138	514	1636	1476	413	1152	661
CATCH BY GEAR												
Longline	3168	4680	6203	2810	2563	1138	514	1636	1476	413	1152	—
Baitboat	0	0	0	13	6	0	0	0	0	0	0	—
Sport	0	0	0	0	0	++	0	0	0	0	0	—
CATCH BY COUNTRY												
China-Taiwan	0	29	11	22	57	3	9	0	8	24	42	8
Japan	3168	4651	6192	2788	2506	1135	505	1636	1468	389	1110	653
South Africa	0	0	0	13	6	++	0	0	0	0	0	—
WORLD CATCHES (all oceans)												
Longline	29622	23125	27789	33412	28081	20854	24758	23421	20405	15791	14034	10803*
Surface	12569	12190	10783	11325	17042	21806	17827	13504	12683	12613	10880	10684
Total	42191	35315	38572	44757	45123	42660	42585	36925	33088	28404	24914	21487*

*Preliminary

Source for "world" section: Report of the Eighth Meeting of Australian, Japanese, and New Zealand Scientists on Southern Bluefin Tuna (SBT). Shimuzu, Japan, September, 1989.

Table 38. Atlantic small tuna catch (1,000 MT) - as of October 20, 1989

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TOTAL														
ATL+MED	50.7	74.0	84.3	52.4	65.4	49.7	71.4	66.2	91.4	74.6	115.5	88.7	97.3	87.3
MED	12.1	37.0	50.6	12.9	29.3	18.4	30.9	26.1	46.4	30.6	60.6	25.4	33.3	20.7
ATL	38.6	37.0	33.6	39.5	36.0	31.2	40.5	40.2	45.0	44.0	55.0	63.2	64.0	66.6
ATLANTIC BONITO (S. SARDA)														
ATL+MED	17.9	40.7	50.7	14.8	28.2	16.8	31.4	29.1	49.1	31.9	61.7	28.7	44.0	25.0
MED	11.5	34.4	45.8	7.5	22.8	13.5	27.0	22.1	41.2	26.3	55.6	20.7	28.2	16.2
-PS	++	++	0.1	++	++	++	++	0.1	0.1	++	++	++	++	++
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	0.0
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
OTHERS	++	++	0.1	++	++	++	++	0.1	0.1	++	++	++	++	++
-SURF	0.0	0.1	++	0.6	0.5	0.3	0.4	0.6	0.8	0.4	0.4	0.7	0.9	0.3
MAROC	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	++	++	++	0.1	0.1
ESPANA	0.0	0.1	++	0.6	0.5	0.3	0.4	0.6	0.7	0.4	0.3	0.7	0.9	0.3
-UNCL+LL+TR	11.5	34.2	45.7	6.9	22.3	13.2	26.5	21.3	40.3	25.9	55.2	20.0	27.3	15.9
ALGERIE	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.1	0.1	0.0	++	0.2
BULGARIA	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.5	2.3	1.8	2.1	0.0	0.1	0.0
GREECE	0.9	1.4	1.9	2.0	2.2	0.9	3.2	2.3	1.8	1.7	2.0	0.9	0.6	0.6
ITALY	0.0	0.6	2.0	1.1	1.0	1.0	0.9	1.0	1.4	0.8	1.0	0.9	1.1	1.0
TUNISIE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2
TURKEY	10.6	32.2	41.8	3.8	19.1	11.2	20.6	16.1	34.5	21.3	50.1	18.1	25.2	13.9
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0
ATL	6.3	6.4	4.9	7.3	5.3	3.3	4.4	7.0	7.9	5.7	6.1	8.0	15.8	8.8
-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
ARGENTIN	0.0	0.0	0.0	0.2	0.6	0.0	0.1	0.5	0.3	0.5	2.4	4.2	3.2	2.9
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
OTHERS	++	++	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0
-TROL	++	++	++	++	++	++	0.0	++	++	++	++	0.0	0.0	0.0
SENEGAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	++	++	++	++	++	++	0.0	++	++	++	++	0.0	0.0	0.0
-TRAP	0.6	0.6	0.3	0.6	1.0	1.0	0.7	1.6	1.3	0.5	1.0	0.7	0.9	0.5
ANGOLA	0.5	0.5	0.3	0.4	0.5	0.7	0.3	1.2	0.8	0.4	0.6	0.7	0.8	0.4
OTHERS	0.1	0.1	++	0.1	0.5	0.3	0.3	0.4	0.4	0.1	0.4	0.1	0.1	0.1
-SURF	5.4	5.6	4.2	6.2	3.6	2.0	3.3	4.5	5.6	4.3	1.9	2.4	11.1	4.6
ANGOLA	++	0.1	++	0.1	++	++	0.1	0.2	0.1	++	0.1	0.2	0.1	0.2
BRASIL	0.3	0.1	0.8	3.0	1.6	0.8	1.4	1.5	3.4	2.5	0.0	0.0	0.1	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
MARTINIQ	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	0.3
MAROC	1.0	1.8	0.7	0.7	0.7	0.4	0.3	0.7	0.3	0.5	0.4	0.2	0.2	0.1
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
ESPANA	4.1	3.6	2.7	2.4	1.3	0.8	1.5	2.1	1.8	0.8	1.0	1.6	10.0	3.5
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
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.3	0.5	0.5
OTHERS	++	++	++	++	++	++	++	++	++	++	++	0.0	0.0	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
TOTAL																
ATL+MED	66.7	90.7	78.7	74.5	90.8	83.3	83.6	113.1	111.0	128.4	126.3	98.0	92.9	86.2	103.9	52.9
MED	11.1	13.4	10.3	12.7	14.5	15.4	19.8	25.4	33.6	37.2	40.8	20.6	24.5	21.9	26.0	3.3
ATL	55.6	77.3	68.4	61.8	76.3	67.9	63.8	87.7	77.4	91.2	85.5	77.5	68.4	64.3	78.0	49.7
ATLANTIC BONITO (S. SARDA)																
ATL+MED	12.3	21.4	15.6	16.0	20.7	17.3	20.0	31.4	39.1	44.1	42.5	21.7	25.0	21.5	29.3	14.7
MED	6.3	7.7	6.0	6.5	8.7	9.4	13.5	18.9	29.0	31.2	35.5	14.9	18.5	16.0	21.7	0.8
-PS	++	++	++	++	++	++	++	0.1	++	0.1	1.0	0.7	13.5	11.9	17.4	++
ESPANA	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
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	12.8	11.4	17.3	0.0
OTHERS	++	++	++	++	++	++	++	0.1	++	0.1	++	++	++	++	0.1	++
-SURF	0.6	0.4	0.5	1.0	1.1	0.8	0.9	0.5	1.0	1.0	0.3	0.4	0.5	0.3	0.1	0.2
MAROC	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
ESPANA	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	0.1
-UNCL+LL+TR	5.7	7.3	5.6	5.4	7.6	8.5	12.6	18.3	28.0	30.1	34.2	13.8	4.5	3.8	4.3	0.6
ALGERIE	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
BULGARIA	0.0	0.0	0.0	++	++	++	++	++	0.2	++	++	++	++	++	++	0.0
GREECE	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	0.0
ITALY	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	0.0
TUNISIE	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	0.0
TURKEY	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
OTHERS	0.0	++	++	++	++	++	++	++	++	++	++	++	0.1	0.1	0.1	0.0
ATL	6.1	13.7	9.6	9.5	12.0	7.9	6.5	12.6	10.0	12.9	7.0	6.8	6.6	5.5	7.6	13.8
-PS	1.2	2.3	0.2	0.3	2.0	2.6	1.3	2.7	0.9	++	0.3	0.1	0.5	0.5	0.2	0.2
ARGENTIN	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
USSR	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
OTHERS	++	0.0	++	0.0	0.0	++	++	0.1	0.1	++	0.3	0.1	0.5	0.5	0.2	0.2
-TROL	0.0	0.0	0.0	0.0	0.0	++	++	0.1	0.6	0.9	0.5	0.2	0.0	0.1	0.2	++
SENEGAL	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	0.0
OTHERS	0.0	0.0	0.0	0.0	0.0	++	++	0.1	++	0.0	0.2	0.1	0.0	++	0.1	++
-TRAP	0.3	0.2	++	0.1	0.1	0.1	0.3	0.3	0.5	0.3	0.2	0.3	0.3	0.1	0.1	0.3
ANGOLA	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
OTHERS	++	++	++	++	++	++	0.1	0.1	0.4	0.1	0.2	0.2	0.2	0.1	0.1	0.1
-SURF	3.9	8.7	6.5	7.3	4.8	3.8	2.0	8.7	6.8	8.8	4.5	3.3	4.1	3.7	5.1	1.0
ANGOLA	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	++
BRASIL	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
GHANA	0.0	++	++	0.0	++	++	0.0	0.1	++	0.1	++	++	++	0.0	0.9	0.0
MARTINIQ	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	0.5	0.0
MAROC	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
SENEGAL	0.0	++	++	0.2	0.6	0.5	0.2	0.1	0.1	++	0.2	++	0.4	0.3	0.5	0.0
ESPANA	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
USSR	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
VENEZUEL	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	0.0
OTHERS	0.4	0.4	0.4	0.3	++	++	++	++	0.1	++	0.1	0.1	0.2	0.1	0.2	0.2

Table 38. Continued...

	1959	1960	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
-UNCL+LL+TR	0.3	0.2	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	2.8	1.9	5.0	1.3	2.9	0.8	1.2	2.8	1.4	2.9	1.7	1.1	2.0	12.3
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	0.0	1.8	0.3	2.1	1.4	0.7	1.6	2.8
MEXICO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	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
USA	0.0	++	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	0.0	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
OTHERS	0.3	0.2	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
ATL. BLACK SKIPJACK (T. ALLETTERATUS)*																														
ATL+MED	9.7	3.0	2.5	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	3.4
MED	++	++	++	++	++	++	++	++	++	0.2	1.0	0.7	0.5	0.7	0.8	0.9	1.0	1.5	1.5	1.5	1.3	1.0	0.2	1.0	0.1	0.2	0.4	0.3	0.4	0.1
-SURF	++	++	++	++	++	++	++	++	++	0.2	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	++	++	++	++	++	++
ESPANA	0.0	++	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	++
OTHERS	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	0.1	++	++	++	++	0.0	0.1	++	++	++	++	++	++	++
-UNCL+LL+TR	0.0	0.0	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	++
OTHERS	0.0	0.0	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	++
ATL	9.7	3.0	2.5	5.1	4.0	1.7	4.1	3.3	4.0	3.0	2.6	7.7	4.8	2.2	1.5	4.2	7.7	8.4	5.8	15.1	11.8	16.7	15.9	14.8	25.3	16.8	11.7	9.3	20.0	3.3
-BB	++	++	++	++	++	++	++	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	1.6	2.1	1.8	1.7	0.5
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	0.4
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	++	0.1	0.1	0.1	0.1	0.1	0.1	++	++	++	0.0	0.3	0.7	0.5	0.3	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	0.7	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	++
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	0.1	0.0	++	++	0.5	0.3	0.3	++	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	0.0	0.4	0.0	++	0.1	0.1	0.1	++	5.5	++	0.8	1.9	3.0	2.7	1.2	2.5	1.1	2.7	0.8
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	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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	0.5	0.3	0.7	1.0	0.5	1.0	0.6	2.6	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	5.5	0.0	0.0	0.0	0.4	1.6	0.4	0.9	0.3	0.1	0.8
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.4	0.0	++	0.1	0.1	0.0	++	0.1	++	0.3	0.1	++	++	++	0.5	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	0.0	0.1	1.3	1.5	2.5	0.9	1.2	0.8	1.0	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	0.0	0.0	0.0	1.3	1.5	2.5	0.9	1.2	0.8	1.0	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	0.1	++	0.0	++	0.0	0.0	0.0	0.0	0.0
-TRAP	9.4	2.9	2.4	4.8	3.7	1.4	2.9	2.8	3.1	2.4	1.4	1.8	1.1	0.5	0.6	0.7	0.1	++	0.2	0.1	0.2	0.4	0.4	0.6	0.5	0.4	0.2	++	0.1	0.6
ANGOLA	9.3	2.9	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
OTHERS	0.1	++	++	++	++	++	0.2	++	++	++	0.1	++	++	++	++	++	0.0	0.0	0.0	++	0.0	++	++	0.0	0.1	++	0.1	++	++	++
-SURF	0.3	++	++	0.2	0.2	0.3	1.2	0.4	0.2	0.3	0.6	3.9	2.3	0.9	0.5	1.1	6.1	7.7	4.4	9.1	10.9	13.8	8.1	3.0	13.0	11.1	4.8	5.5	9.2	0.3
ANGOLA	0.3	++	++	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	++	++	++	++	++	++	++	++
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	0.0	0.0	0.7	0.4	0.4	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	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	0.0
MAROC	0.0	0.0	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	++
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	0.4	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
ESPANA	0.0	0.0	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
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	0.4	0.7	0.7	2.2	6.3	3.6	0.6	4.9	0.3	0.1	0.0	0.0	0.0
VENEZUEL	0.0	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	0.3	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	0.0
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	0.2

Table 38. Continued...

	1959	1960	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
-UNCL+LL+TR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.2	++	0.3	0.1	1.9	0.9	0.4	0.5	0.1	0.1	0.4	3.1	4.6	5.4	1.6	0.9	0.1	5.3	1.1
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	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
GER.D.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	0.0	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	0.0	0.2	0.2	0.6	0.3	0.3	0.1	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	0.0	0.0	0.9
OTHERS	0.0	0.0	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
FRIGATE TUNA (A. THAZARD)**																														
ATL+MED	6.2	8.8	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	14.1	21.2	18.1	23.0	20.8	15.9	18.1	13.8
MED	0.1	1.5	3.6	4.0	4.4	2.8	2.6	2.7	4.6	3.1	2.8	3.5	4.1	3.3	3.5	4.3	2.5	4.1	3.7	3.9	4.7	3.5	2.9	3.3	3.7	4.0	3.6	3.3	1.7	2.2
-PS	0.1	++	++	++	0.1	0.1	0.1	++	0.1	0.1	0.1	++	++	++	++	++	++	++	++	++	++	++	++	++	1.6	1.6	1.4	1.3	++	++
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	0.0	0.0	1.6	1.6	1.4	1.3	0.0	0.0
OTHERS	0.1	++	++	++	0.1	0.1	0.1	++	0.1	0.1	0.1	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
-TRAP	0.0	0.9	0.0	++	0.5	0.4	0.7	0.7	0.7	1.0	0.6	0.2	0.4	0.4	0.4	0.8	0.1	0.4	0.5	0.3	0.1	++	0.1	0.2	0.5	0.7	0.6	0.3	0.6	1.3
MAROC	0.0	0.0	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
ESPANA	0.0	0.9	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
-SURF	0.0	0.0	2.6	3.1	2.9	1.8	1.2	1.1	2.6	0.8	1.1	1.9	1.9	1.1	1.8	1.9	1.3	1.5	0.9	1.4	1.7	2.1	1.6	1.7	0.1	0.1	0.1	0.3	0.0	0.8
MAROC	0.0	0.0	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
ESPANA	0.0	0.0	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	0.0
-UNCL+LL+TR	0.0	0.6	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	1.1	2.1	2.3	2.1	2.9	1.4	1.2	1.3	1.5	1.6	1.4	1.5	1.0	0.0
ITALY	0.0	0.6	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	0.0
TUNISIE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	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
OTHERS	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	++	++	++	++	++	++	++	++	++	++	++	0.1	0.1	0.1	0.0
ATL	6.1	7.3	6.5	4.2	3.6	4.0	6.9	4.5	7.0	5.5	13.4	8.2	6.2	10.2	6.6	9.6	7.9	6.5	16.6	4.8	8.9	17.0	11.1	17.9	14.4	19.0	17.2	12.6	16.5	11.6
-BB	0.0	0.0	++	0.0	0.1	0.0	0.9	0.4	0.6	1.6	3.2	3.1	0.3	0.2	1.7	0.7	0.1	++	0.1	0.1	0.3	0.2	0.3	0.5	0.4	0.4	0.3	0.2	0.4	0.2
JAPAN	0.0	0.0	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
OTHERS	0.0	0.0	++	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
-PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.3	0.2	0.7	0.7	1.3	0.2	++	++	++	0.0	1.2	0.8	6.0	5.4	4.6	4.7	8.7	5.3	3.6	6.1	4.9
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	0.0	0.0	0.7	0.7	1.1	0.1	0.0	0.0	0.0	0.0
JAPAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	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
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	0.2	0.0	1.1	0.5	++	++	0.4	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	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	0.1	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
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	0.6	0.0	0.0	0.0	0.4	0.3	3.1	1.6	0.1	0.2	0.4
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.2	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	++	0.5	0.7
-TRAP	1.5	1.7	2.8	1.9	0.9	1.3	2.8	2.1	1.6	0.8	1.1	0.9	0.6	0.9	1.0	0.8	0.3	0.3	0.3	0.3	0.4	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.2	0.1
ANGOLA	1.4	1.6	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	0.0	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	++
ESPANA	0.1	0.2	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
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

Table 38. Continued...

	1959	1960	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
-UNCL	4.6	5.6	3.7	2.3	2.6	2.7	3.2	1.9	4.3	1.8	8.9	3.5	4.7	7.7	3.8	8.0	7.4	6.1	16.2	3.1	7.4	10.6	5.2	12.5	9.0	9.8	11.5	8.6	9.8	6.4
ANGOLA	0.1	0.1	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
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	0.0	0.0	0.4	0.4	0.4	0.4	0.6
GHANA	0.0	0.0	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
MAROC	0.0	0.0	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
ESPANA	2.8	4.2	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
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	0.2	0.2	0.2	0.5	0.7	0.4	5.2	1.3	2.8	4.4	3.3	2.7	5.5
VENEZUEL	1.7	1.3	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	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	++	++	0.1	0.2	0.1	0.1	0.1	++	++	++
SPOTTED SPANISH MACKEREL (S. MACULATUS)***																														
ATL	7.6	11.2	11.2	11.7	11.1	10.0	11.9	13.5	12.8	12.8	12.5	15.9	13.9	16.8	20.0	21.0	18.1	14.6	15.4	15.0	14.6	18.1	15.0	16.4	14.0	13.8	14.8	16.7	15.3	7.0
-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	0.0	0.0	0.6	0.5	0.4	0.1	0.0	0.1	0.2	0.1	6.2	5.9	5.9	6.3	7.0	0.2
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	0.6	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
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	5.9	5.8	5.8	6.2	6.5	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	0.2	0.1	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	1.3	0.4	0.1	0.2	++	0.1	0.4	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	0.0	0.0	0.5	0.4	0.5	0.4	0.4	0.1	0.1	++	0.1	0.4	0.1
USA	0.2	0.1	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
-SURF	7.5	9.1	8.2	8.5	7.4	7.8	8.3	9.1	7.8	7.0	7.2	4.5	3.9	5.5	7.9	9.7	5.3	2.5	3.4	3.8	4.1	10.0	6.3	3.2	6.6	6.8	7.9	9.2	6.6	6.4
BRASIL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.2	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	++	++	1.0
CUBA	1.2	1.5	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
DOMIN.R.	0.0	0.0	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	0.0
USA	3.1	3.4	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
VENEZUEL	3.2	4.1	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	0.0
-UNCL+TRAW	++	2.0	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	11.6	11.6	10.6	10.1	7.5	7.3	12.8	1.1	0.9	1.1	1.1	1.3	0.3
COLOMBIA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	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
MEXICO	0.0	2.0	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	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	0.8	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	0.0
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	0.1
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	0.0	0.0	0.0	++	++	0.0	++	++	++	++	++	++	++	0.0	0.0
KING MACKEREL (S. CAVALLA)																														
ATL	1.6	2.7	2.7	2.9	3.3	2.8	3.2	3.0	3.9	5.3	5.4	6.5	6.4	7.4	9.7	13.6	9.0	8.3	8.7	6.8	7.4	7.4	8.5	10.7	8.5	6.4	6.4	9.1	8.6	7.0
ARGENTIN	0.0	0.0	++	++	++	++	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
BRASIL	0.0	0.0	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
MEXICO	0.0	1.0	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	0.0
USA	1.6	1.7	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	2.2	3.2	3.4	3.7	3.0	2.4	2.4	5.4	4.6	6.4
VENEZUEL	0.0	0.0	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	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	0.2	0.2	0.1	++	++	++	++	++	0.0	0.0	0.0	0.0
WEST AFRICAN SPAN. MACK. (S. TRITOR)																														
ATL	0.0	0.0	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	1.9	2.6	6.7	4.2	4.9	2.6	5.0	5.1	4.2	4.4	3.2	1.7	0.2
GER.D.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	0.0	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
GHANA	0.0	0.0	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	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	0.1	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	0.0
USSR	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	0.6	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
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	0.3	0.0	0.0	++	0.1	++	0.1	0.1	0.2	++	++	0.1	0.1	++	++

Table 38. Continued...

	1959	1960	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
BLACKFIN TUNA (T. ATLANTICUS)																														
ATL	0.6	0.6	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	1.1	0.8	1.0	1.2	1.3	1.2	1.2	2.0	1.9	1.7	1.9	1.4	1.9	2.2	1.4
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	0.0	0.0	0.7	0.6	0.6	0.5	0.2	0.5	0.6	0.3
GUADELOU	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	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	0.0
MARTINIQ	0.6	0.6	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	0.3	0.0
VENEZUEL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
OTHERS	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.5	0.6	0.4	0.3	0.2	0.4	0.4	0.4	0.4	0.5	0.5	0.3	0.6	0.5	0.6	0.7	0.5
WAHOO (A. SOLANDRI)																														
ATL	0.0	0.0	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	0.5	0.5	2.8	2.1	2.1	2.0	0.8	0.8	0.9	0.2
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	++	2.3	1.5	1.6	1.4	0.1	0.2	0.3	0.0
OTHERS	0.0	0.0	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	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.2
CERO (S. REGALIS)																														
ATL	0.0	0.0	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	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.5	0.5	0.0
MARTINIQ	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	0.5	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	0.5	0.0
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	0.3	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	++	0.0
SCOMBEROMORUS UNCLASSIFIED (SCOMBEROMORUS SPP.)																														
ATL	3.7	1.5	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	0.5	0.8	0.5	0.5	0.4	0.4	0.3	0.5	0.5	0.4	1.0	0.3	0.3	0.4	0.5
BRASIL	1.0	0.7	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
COLOMBIA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	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
MEXICO	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	0.0	0.0	0.0	0.0	0.0
OTHERS	0.7	0.8	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	0.3	0.3	0.3	0.4	0.4	0.5	0.3	0.3	0.3	0.3
PLAIN BONITO (O. UNICOLOR)																														
ATL+MED	1.0	1.0	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	0.2	0.1	0.2	0.5	1.0	0.5	0.7	1.4	0.6	++	++	0.1	0.1	0.6	1.4
MED	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	++
OTHERS	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	++
ATLANTIC	1.0	1.0	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	1.4	0.6	++	++	0.1	0.1	0.6	1.4
MAURITAN	0.0	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	0.1	0.1	0.1	0.1	0.5	0.1	++	++	++	0.1	0.1	0.0
MAROC	1.0	1.0	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
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	++	++	++	++	++	++	++	++	++	++
MIXED OR UNKNOWN TUNA-LIKE SPECIES																														
ATL+MED	2.5	4.5	3.0	4.5	5.4	6.6	8.6	7.2	6.3	7.7	7.9	13.2	11.9	16.1	7.9	8.2	13.1	10.6	12.5	8.3	7.6	9.8	8.3	9.4	7.6	6.3	6.3	6.7	5.8	3.3
MED	0.5	1.1	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	0.8	0.5	0.5	0.4	0.3	2.0	1.5	1.8	1.4	1.4	2.1	2.2	2.2	0.2
ISRAEL	0.5	0.5	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
LEBANON	0.0	0.6	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
ESPANA	0.0	0.0	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
TUNISIE	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	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	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	++	++	++	++	++	++	++	++	0.2	0.1	0.1	0.2	0.2	0.2	0.0

Table 38. Continued...

	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
ATL	2.0	3.4	1.8	3.1	3.3	4.5	7.3	6.0	5.8	6.6	6.7	12.7	11.4	15.5	7.4
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	0.1	0.0	0.1
CHI.TAIW	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.2	0.4	1.1	0.8	0.7	0.9	1.0
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	0.0	0.0
CUBA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.4	0.6	1.1
E.GUINEA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3
GHANA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.9	0.0	0.0
GUADELOU	0.8	0.8	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
ISRAEL	0.0	0.0	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
JAPAN	0.2	0.6	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
KOREA	0.0	0.0	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
LIBERIA	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	0.2
PANAMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
PORTUGAL	0.8	1.5	0.3	0.8	0.7	0.8	0.4	0.1	0.1	0.3	0.5	0.3	0.5	0.2	++
SI.LEONE	0.0	0.0	0.0	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	0.2	0.1	0.0	0.0	0.0	1.0	0.8	0.7	0.1	0.0	6.6	0.0
TOGO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.5	0.6
USA	0.0	0.0	0.0	0.0	++	0.1	0.1	++	++	++	++	0.0	0.1	0.0	0.0
USSR	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	++	0.2	0.3	0.3	0.2	0.2
VENEZUEL	0.2	0.5	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
OTHERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.5	0.1	0.1	++

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
ATL	7.8	12.3	10.1	12.1	7.9	7.4	7.8	6.8	7.6	6.2	4.8	4.1	4.5	3.6	3.2
BRASIL	0.1	0.1	0.2	0.5	0.3	0.5	0.9	0.4	1.1	0.9	++	++	0.2	++	++
CHI.TAIW	0.9	0.4	1.0	++	0.5	1.3	0.8	0.8	1.1	0.8	++	++	0.1	0.3	1.2
COLOMBIA	++	0.1	++	++	++	++	++	++	0.3	++	0.3	0.0	0.0	0.0	0.8
CUBA	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
E.GUINEA	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	0.0
GHANA	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
GUADELOU	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAPAN	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	0.0
KOREA	3.5	5.8	2.9	4.2	2.5	1.7	2.1	2.0	1.9	1.2	0.9	1.3	1.1	1.0	0.6
LIBERIA	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	0.0
PANAMA	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
PORTUGAL	++	0.2	0.3	0.3	0.5	0.2	0.2	0.2	0.1	0.0	0.0	++	0.4	0.0	++
SI.LEONE	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	0.0
ESPANA	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
TOGO	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
USA	++	++	++	0.1	++	++	0.5	0.1	0.2	0.4	0.9	0.2	0.3	0.3	0.1
USSR	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
VENEZUEL	0.0	++	0.7	0.0	0.1	++	0.0	0.0	0.0	0.9	0.9	0.4	0.4	++	0.0
OTHERS	0.1	0.1	0.2	0.3	0.2	0.3	0.1	++	++	0.1	0.1	0.3	0.3	0.2	0.0

++ Catches < 50 MT and >= 1 MT.
* Includes frigate tuna for Cote d'Ivoire.
** Includes bullet tuna (A. Rochei) & includes Atl. black skipjack for Atlantic PS Espana beginning in 1978.
*** Includes Serra Spanish Mackerel (s. Brasiliensis).

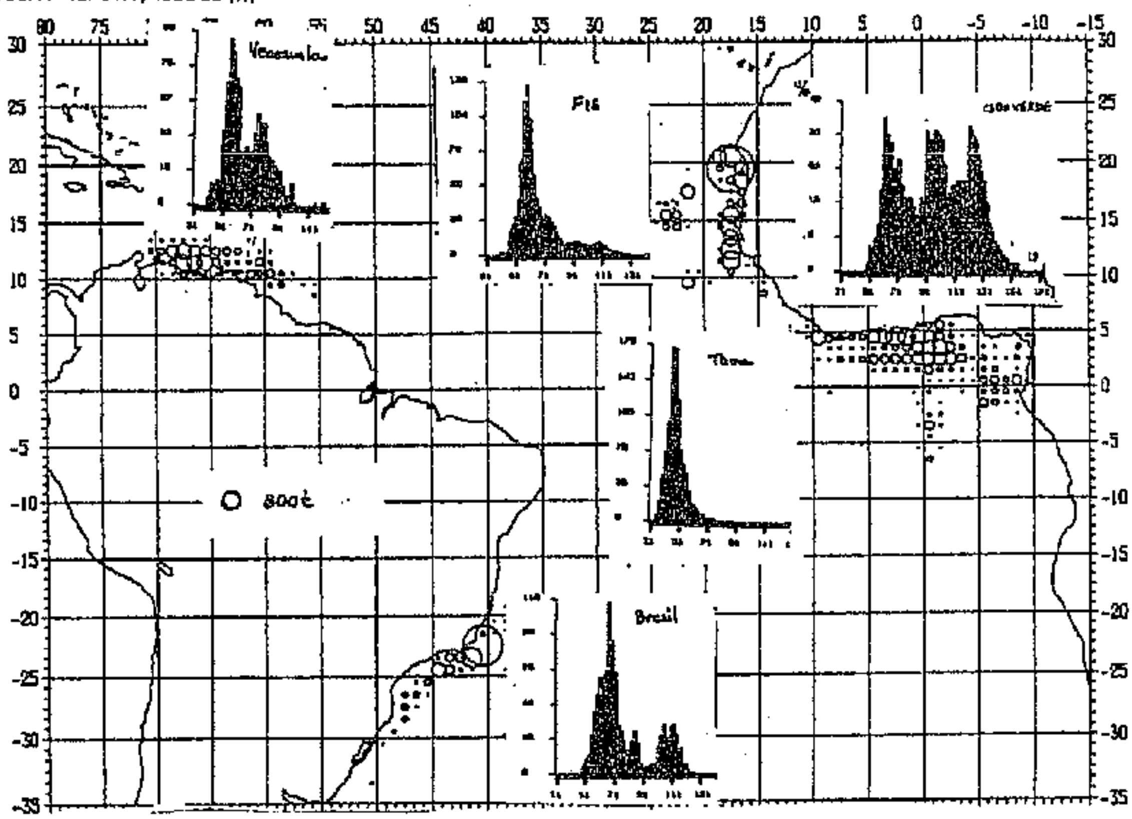


Fig. 1. Yellowfin catch distribution of the principal Atlantic baitboat and handline fisheries and average size distribution of yellowfin for the period 1983-1986. (SCRS/89/51)

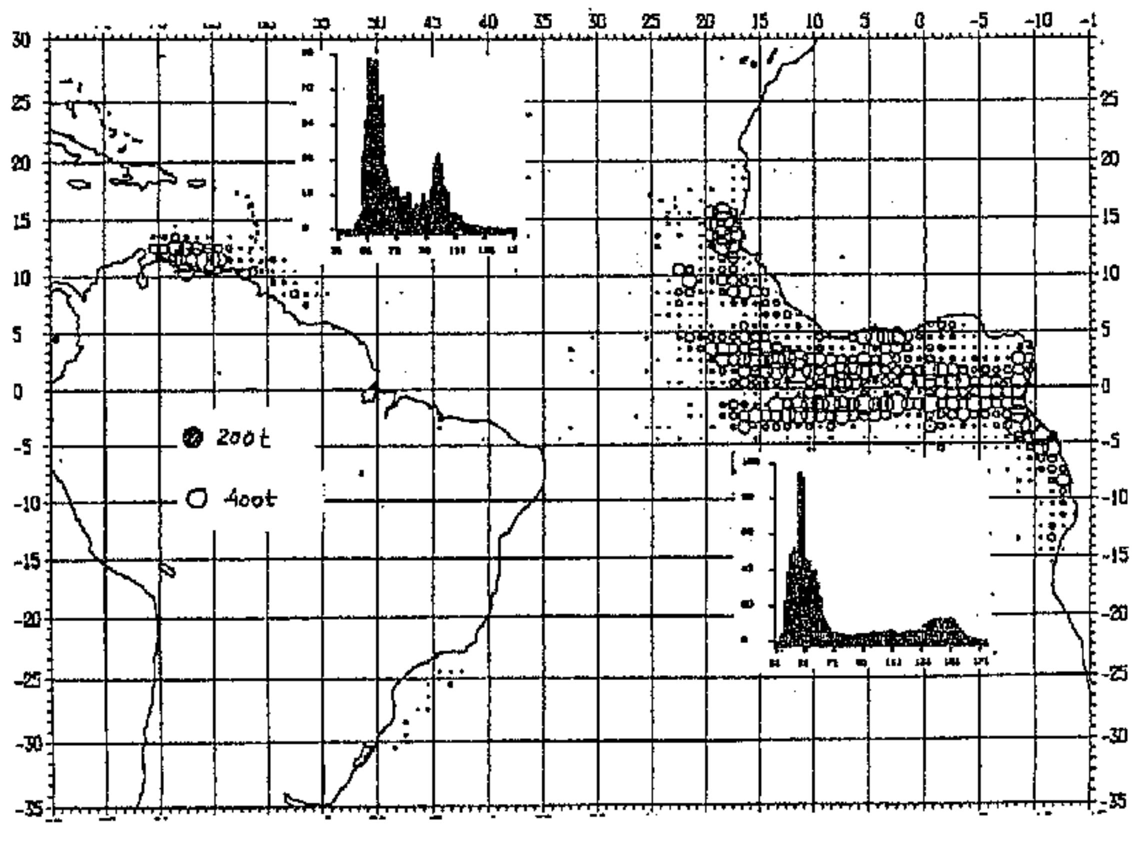


Fig. 2. Yellowfin catch distribution of all Atlantic purse seiners (average of the 1983-1986 period) and average yellowfin size distribution in each area. (SCRS/89/51)

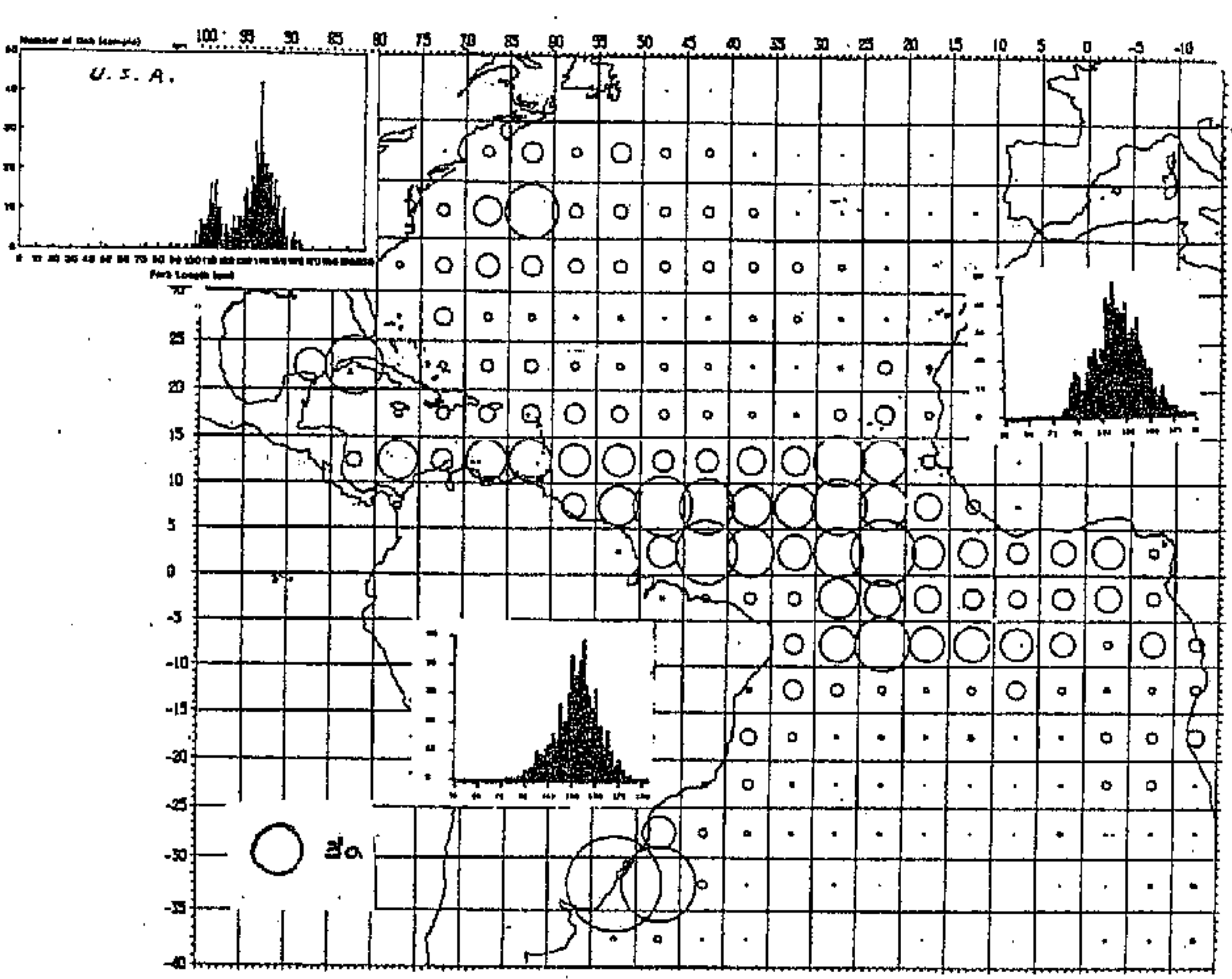


Fig. 3. Yellowfin catch distribution by Atlantic longline fisheries and average size distribution of yellowfin for the period 1983-86. The size distribution of the U.S. longline fleet corresponds to 1987.

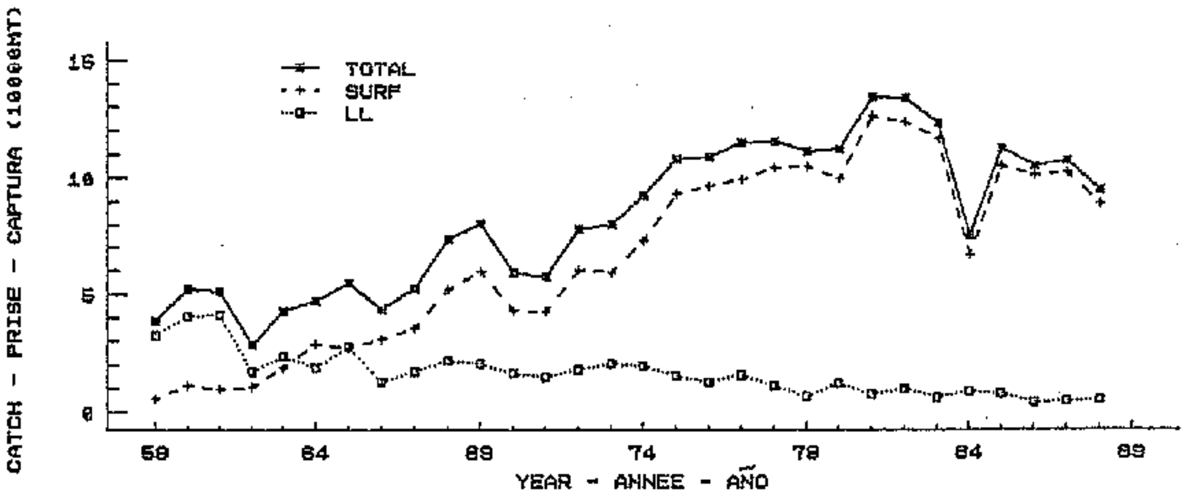


Fig. 4. Development of yellowfin catches by the surface fisheries (SURF) and longline fisheries (LL) and total (TOTAL) in the east Atlantic for the period 1959-88.

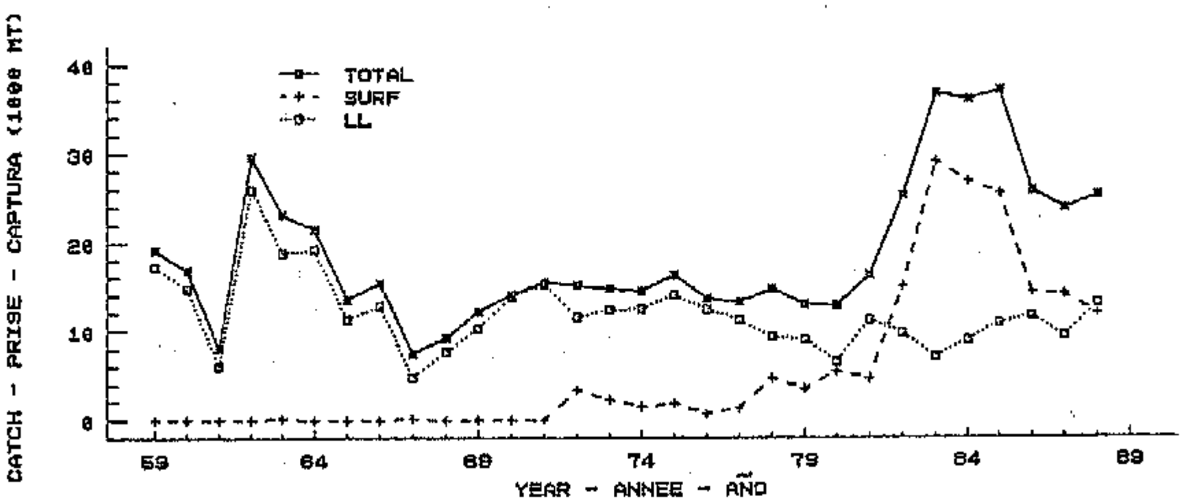


Fig. 5. Development of yellowfin catches by the surface fisheries (SURF) and longline fisheries (LL) and total (TOTAL) in the west Atlantic for the period 1959-88.

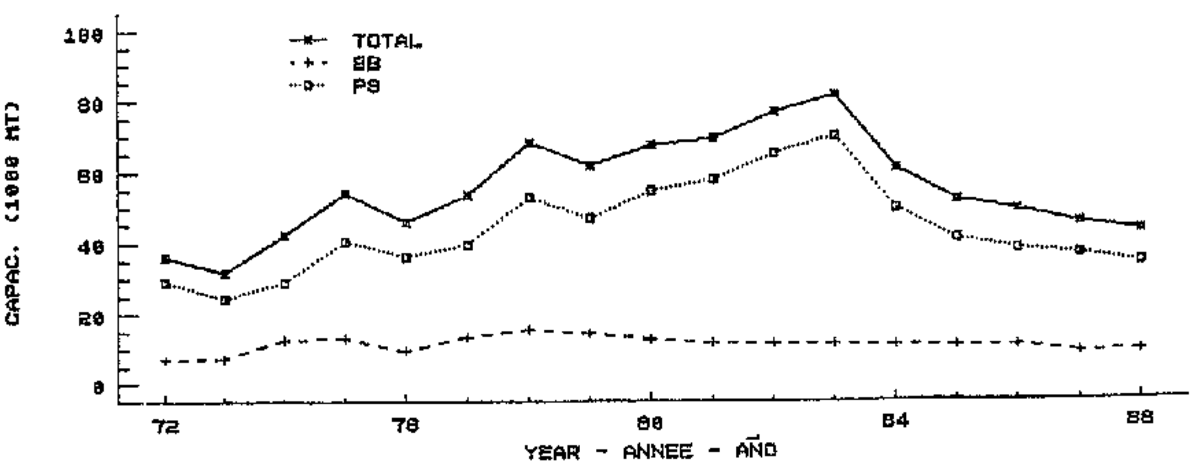


Fig. 6. Carrying capacity, by gear, of the eastern tropical Atlantic surface tuna fleets.

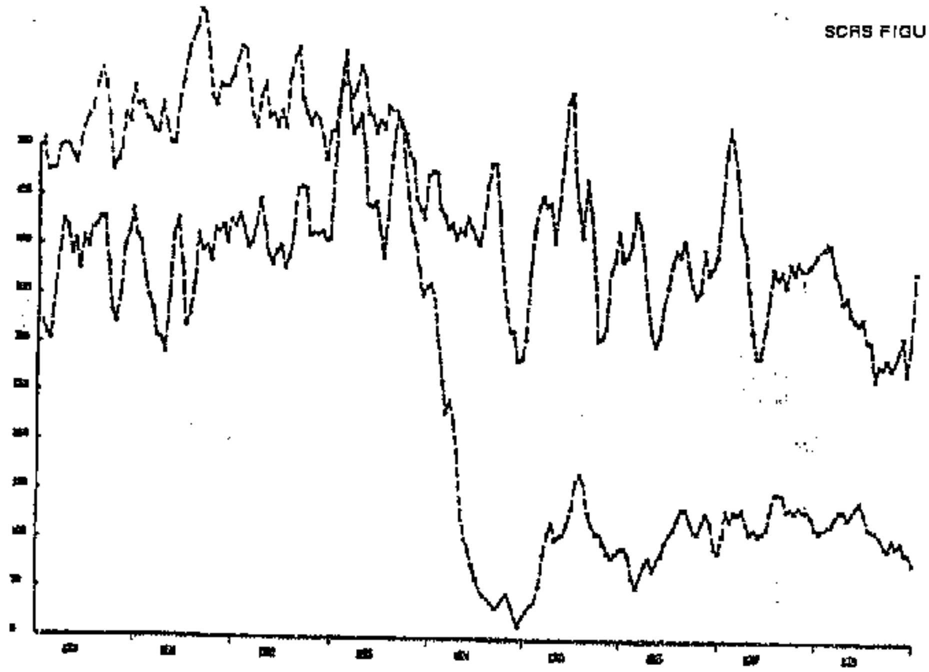


Fig. 7. Nominal standardized effort, by 15-day period, of the FIS and Spanish purse seiners from 1980 to 1988. (SCRS/89/48)

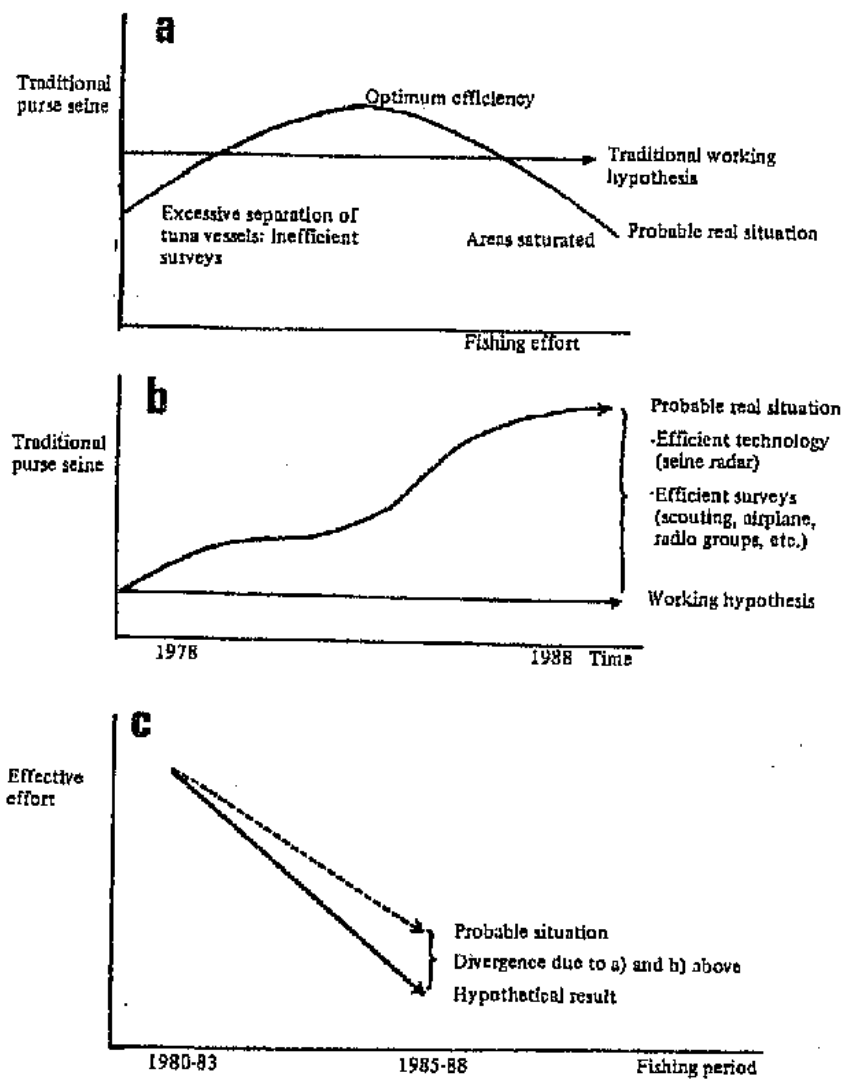


Fig. 8. Hypothetical concept of the changes in fishing efficiency as a function of a) the level of fishing effort; b) of time, and c) effects on the effective effort calculated. (SCRS/89/48)

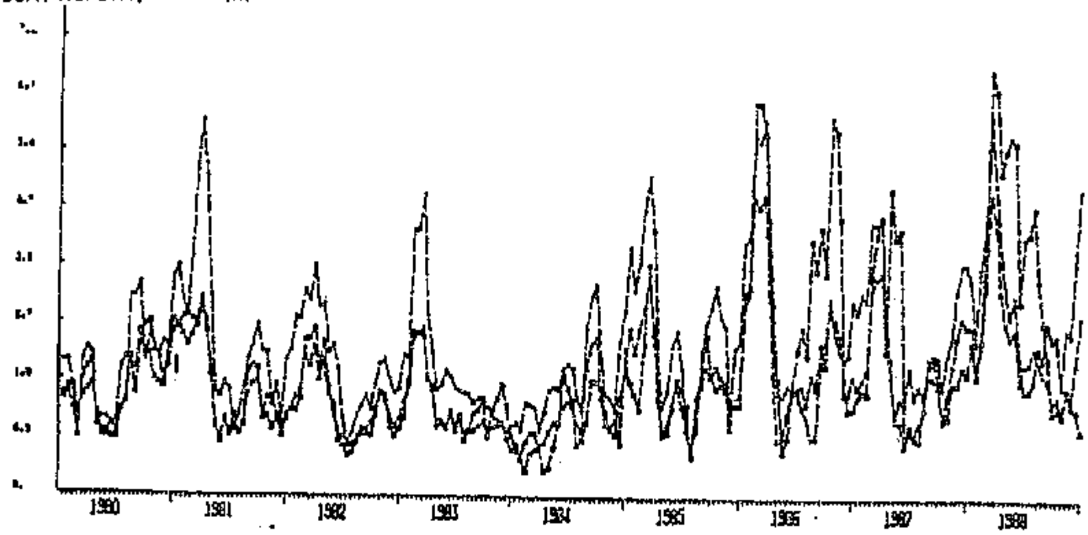


Fig. 9. Effective yellowfin catch per unit of effort, by 15-day period, by 10 hours of fishing, for the FIS, Spanish and combined purse seine fleets (moving average). (SCRS/89/48)

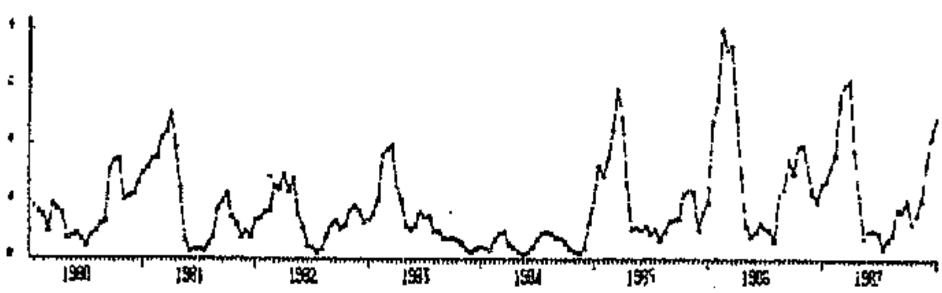


Fig. 10. Effective CPUE of yellowfin over 30 kg by the FIS and Spanish purse seine fleets combined (moving average) calculated according to the FONTENEAU method. Effort is in fishing time.

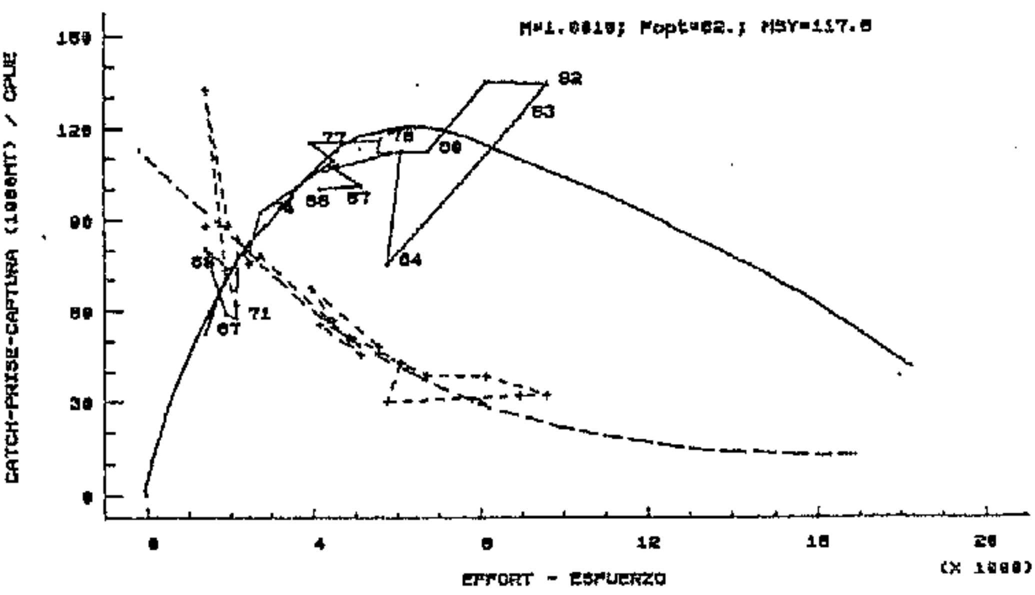


Fig. 11. Generalized production model for east Atlantic yellowfin, with effort expressed in fishing time (k = 3, m = 1.0). (SCRS/89/49)

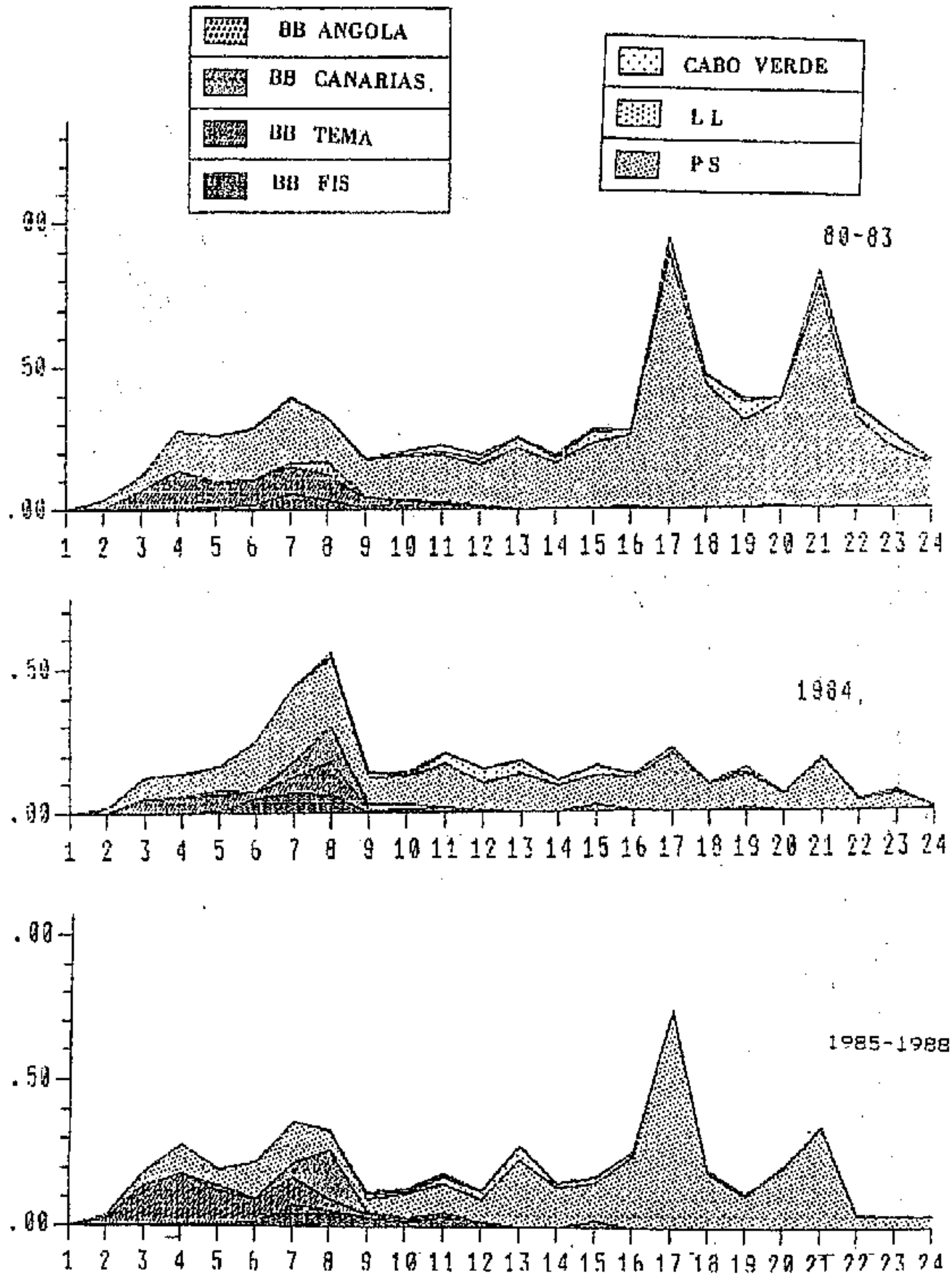


Fig. 12. Fishing mortality rate, by quarter and by gear, estimated for three periods: 1980 to 1983; 1984, and 1985 to 1988. (SCRS/89/49)

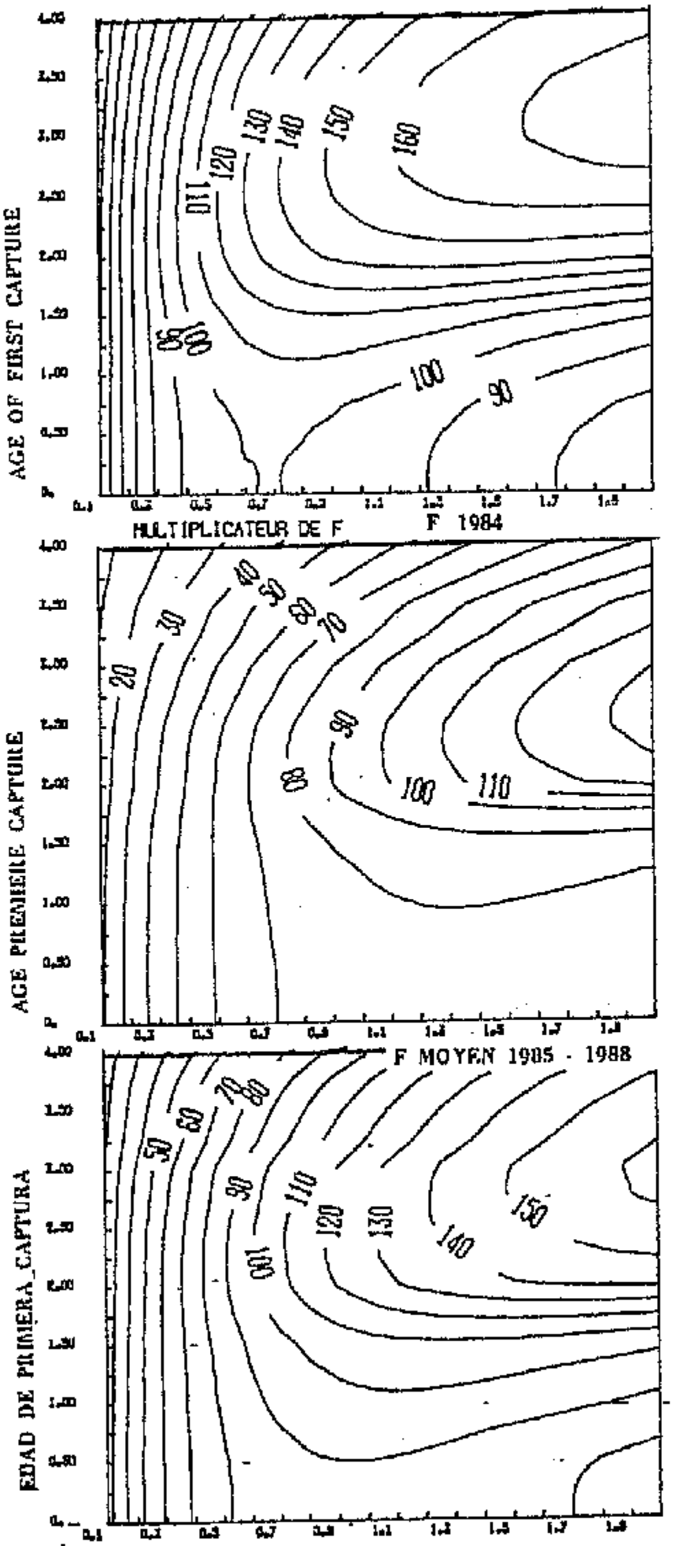


Fig. 13. Production model isopleths of the Ricker model calculated with F from Figure 12 and an average recruitment of 58.5. (SCRS/89/49)

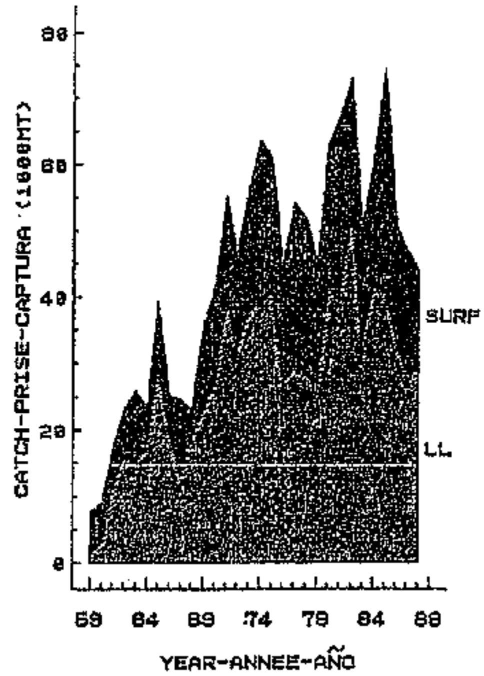


Fig. 14. Bigeye tuna catches (cumulative), entire Atlantic, by surface and longline fisheries, 1958-88.

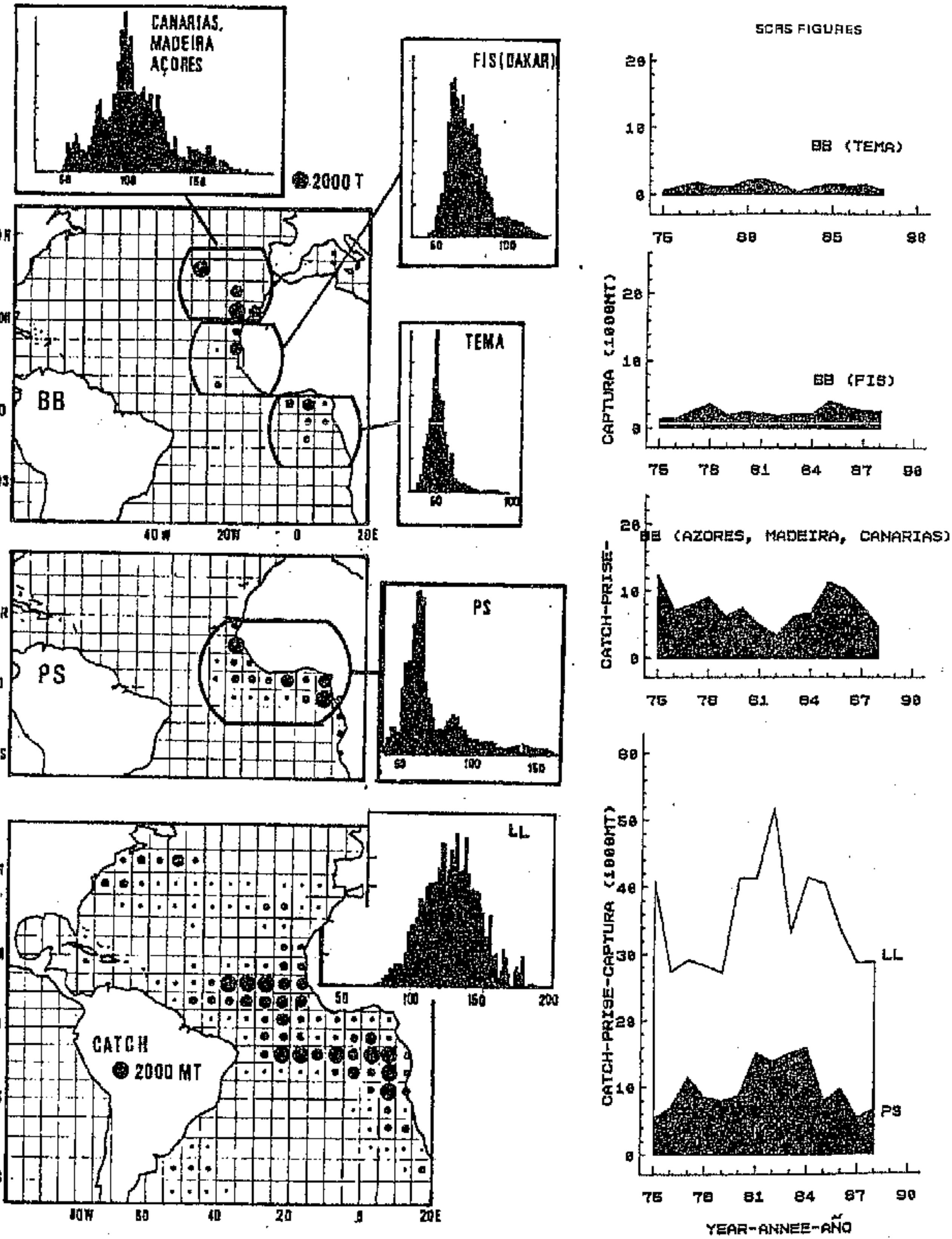


Fig. 15. Catch distributions, size frequency and annual total catches (1975-88) of the major bigeye tuna fisheries in the Atlantic Ocean.

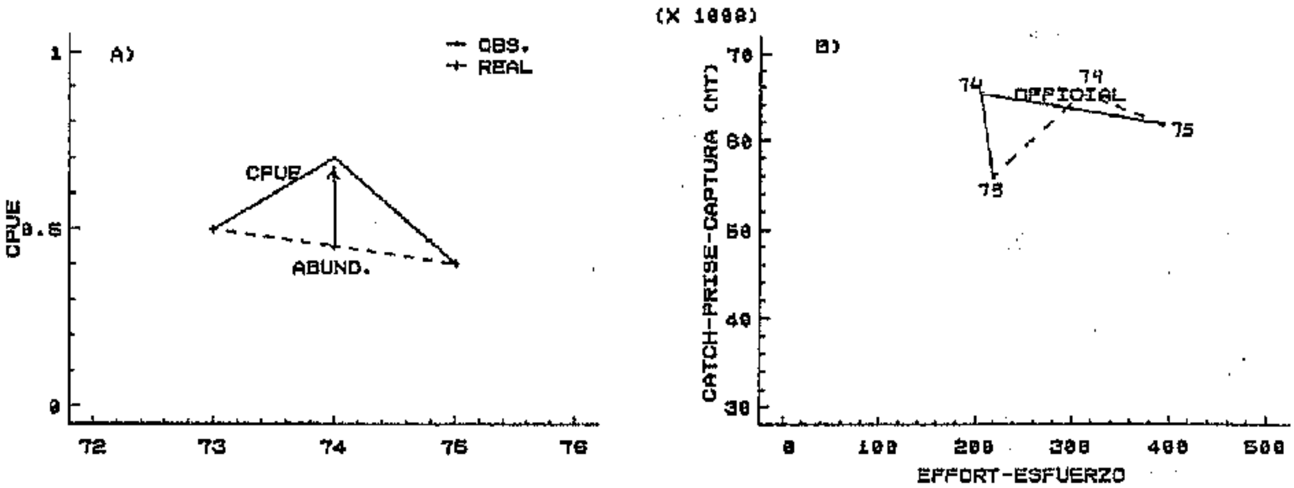


Fig. 16. Interpretation of the 1974 CPUE: a) OBS. is the CPUE calculated according to longline catch rates; ABUND. is the CPUE (1974) corrected under the hypothesis that an intermediate biomass between those of 1973 and 1975 was found to be very vulnerable to longliners because of the environmental anomaly. b) OFFICIAL effort calculated according to traditional CPUE; the broken line shows effort calculated according to corrected CPUE.

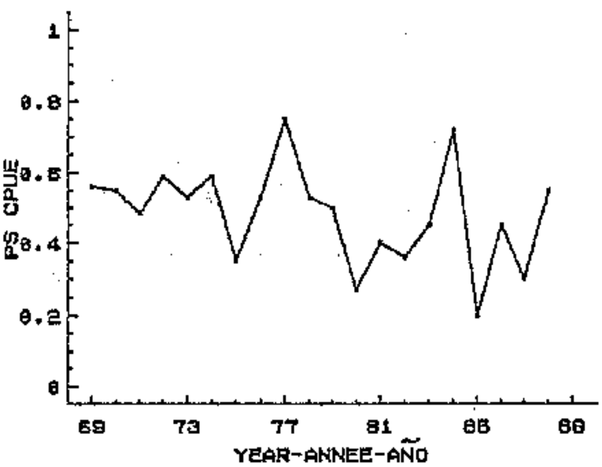


Fig. 17. Changes in the bigeye tuna CPUE of large FIS purse seiners. (CPUE = sum of catches/sum of standardized effort.)

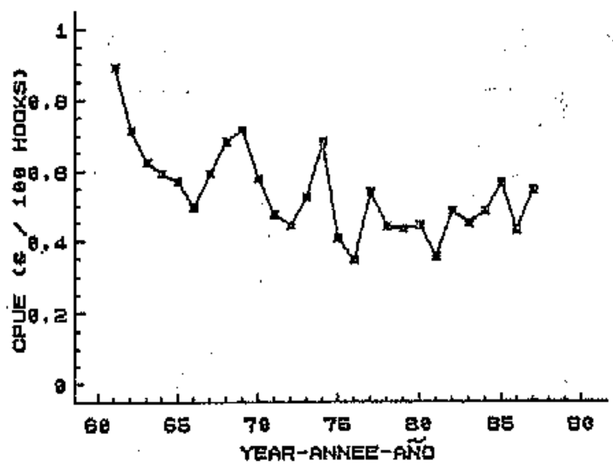


Fig. 18. Trend of annual standardized CPUE of bigeye tuna by Japanese longline fishery in the whole Atlantic, 1961-87. (SCRS/89/97)

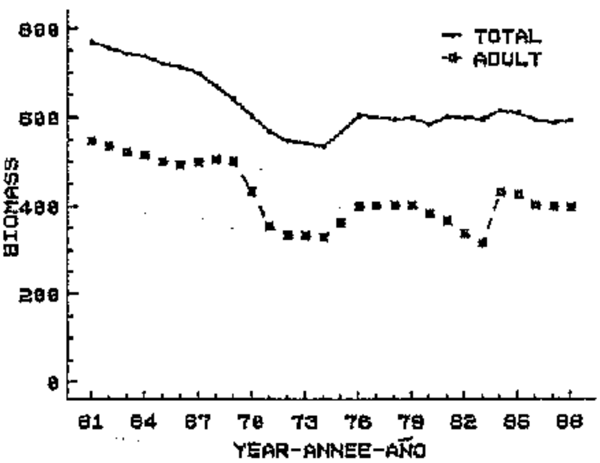


Fig. 19. Changes in the total ages and adult (more than 3 years) biomass of bigeye tuna, 1961 to 1988, calculated by cohort analysis. (SCRS/89/99)

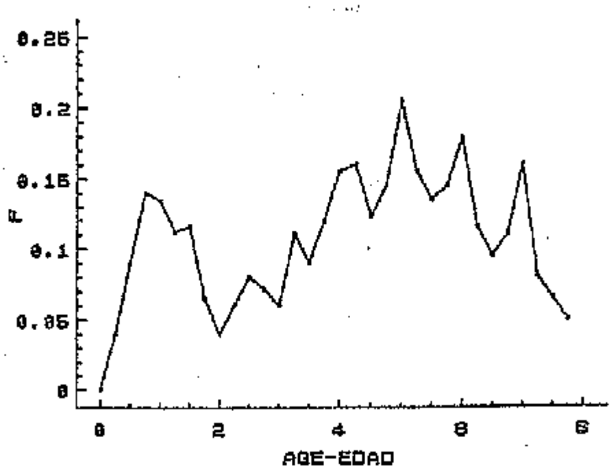


Fig. 20. Age-specific mean fishing mortality rate of bigeye tuna by all gears, 1980-88.

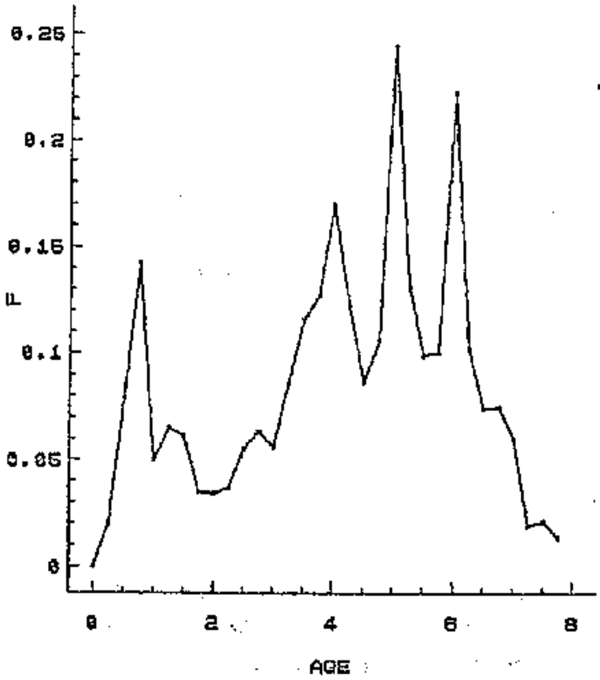


Fig. 21. Age-specific mean fishing mortality rate for bigeye tuna, calculated for 1988.

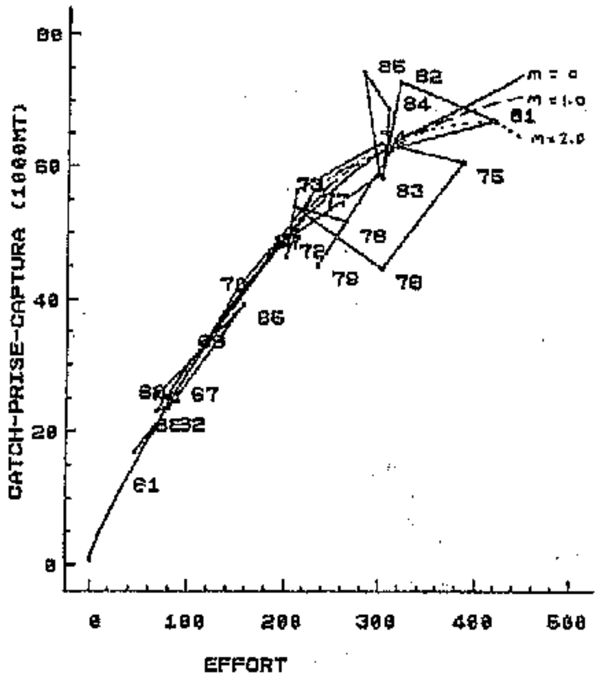


Fig. 22. Yield curves of the production model analysis for bigeye tuna in the whole Atlantic, 1961-87. (SCRS/89/97)

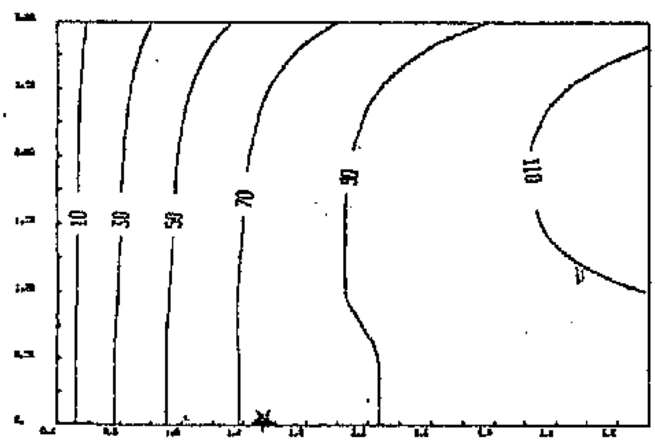


Fig. 23. Yield-per-recruit isopleths. Yield estimated for the bigeye tuna fishery in the Atlantic, 1980-88 and fishing year 1988. The star indicates present situation. (SCRS/89/99)

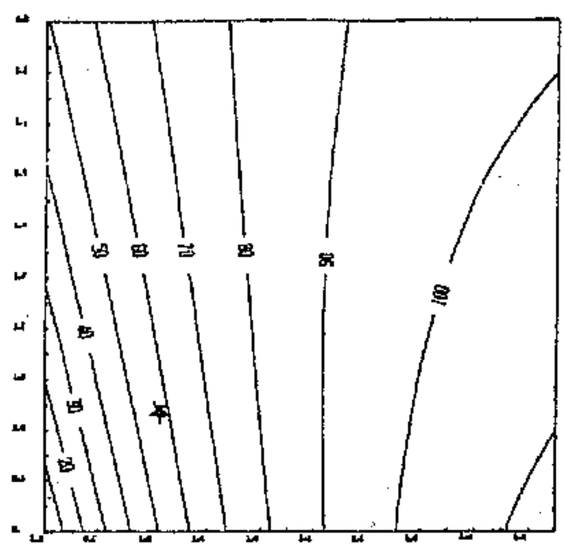


Fig. 24. Multi-gear yield-per-recruit isopleths, fishing year 1988. A star indicates present situation. (SCRS/89/99)

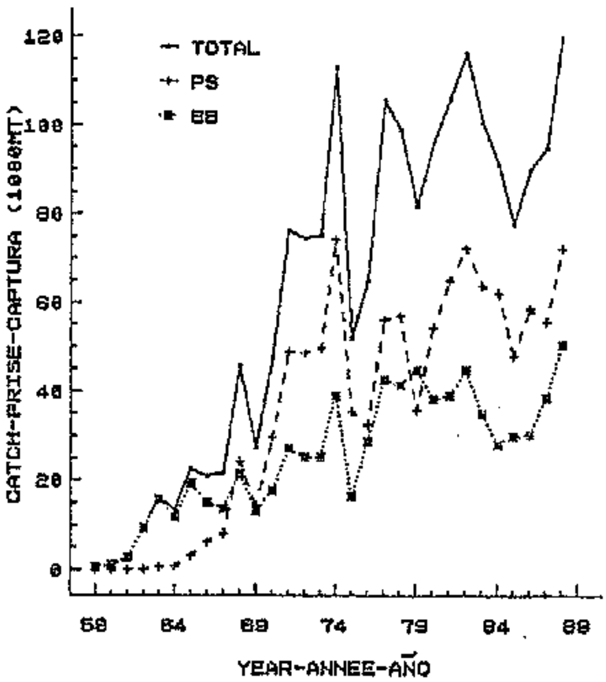


Fig. 25a. Trends in skipjack catches, by gear and total in the east Atlantic.

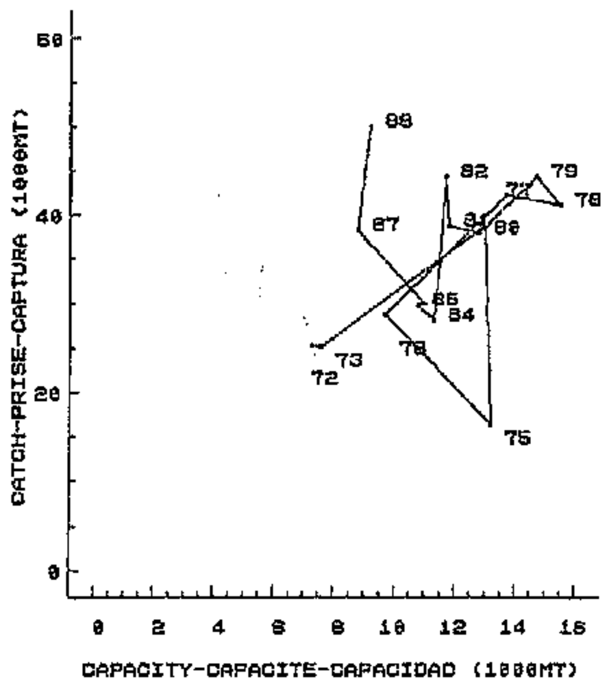


Fig. 26. Relation between skipjack catches and carrying capacity for baitboats in the east Atlantic.

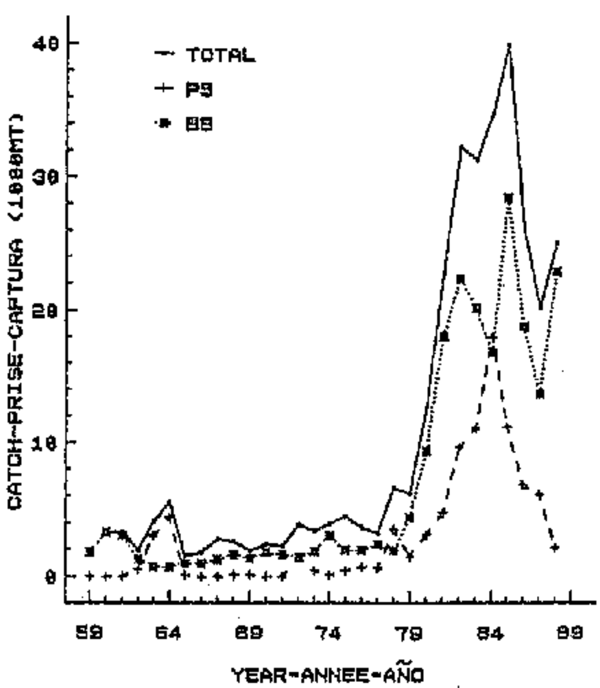


Fig. 25b. Trends in skipjack catches, by gear and total, in the west Atlantic. 1988 data are provisional.

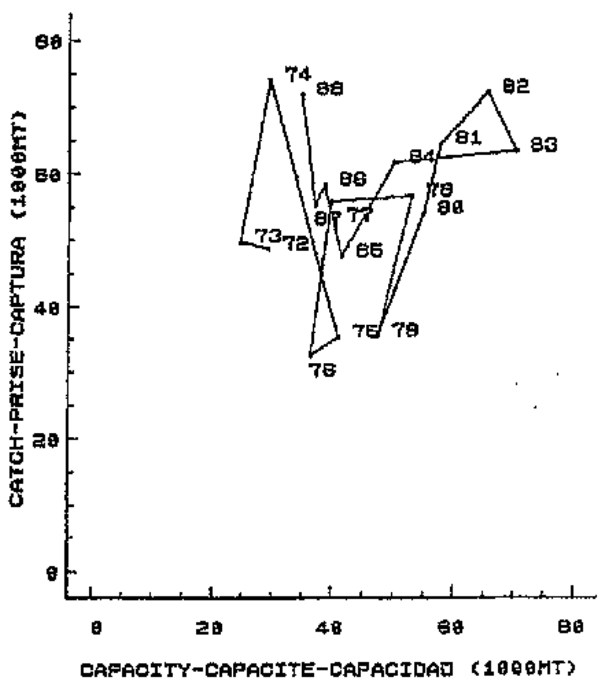


Fig. 27. Relation between skipjack catches and carrying capacity for purse seiners in the east Atlantic.

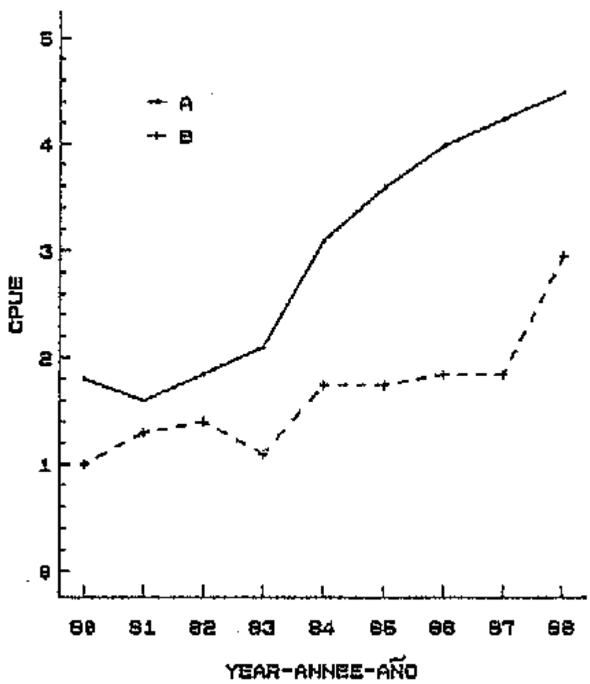


Fig. 28. Skipjack CPUE obtained from A) FIS purse seine catches and effort in standardized fishing days; B) average CPUE, by two-week period, of skipjack for FIS and Spanish purse seiners combined.

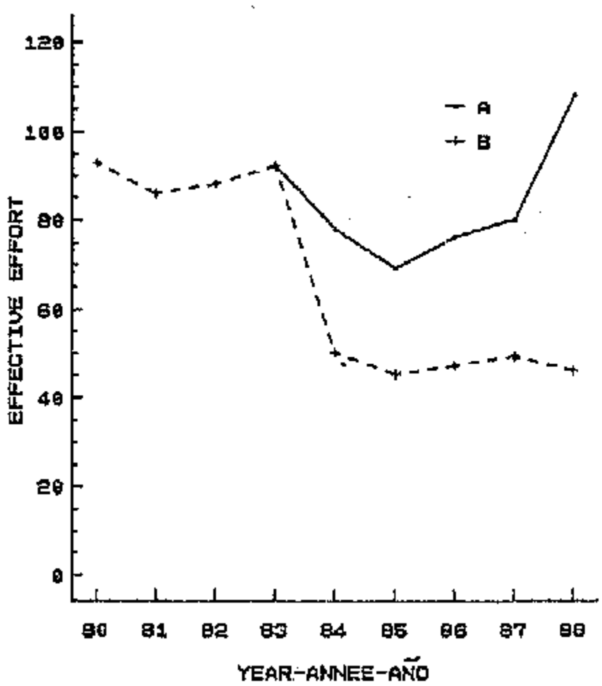


Fig. 29. Trend in effective skipjack effort, based on two hypotheses: A) constant biomass, and B) constant catchability.

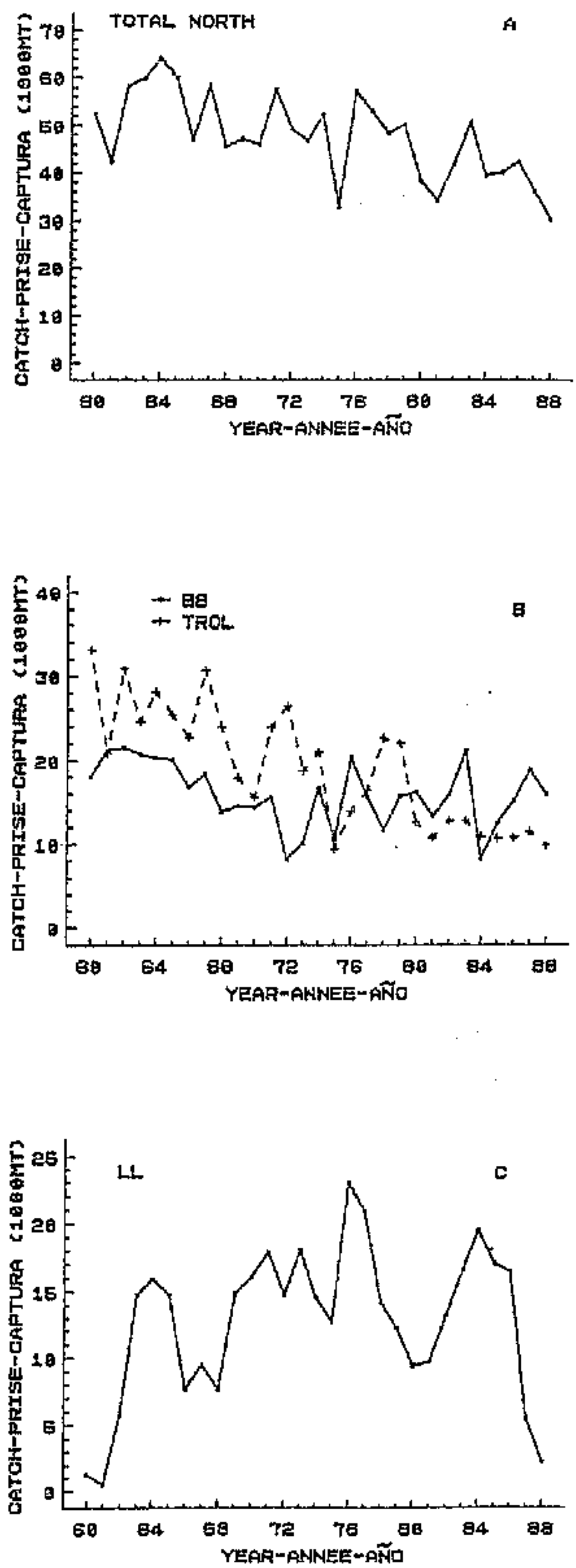


Fig. 30. North Atlantic albacore catches, total and by gear, 1959-1988.

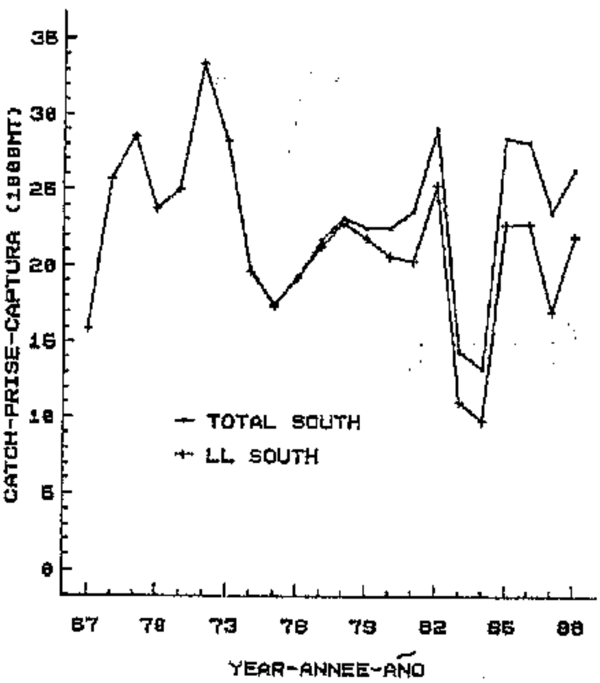


Fig. 31. Total south Atlantic albacore catches and longline catches, 1967-88.

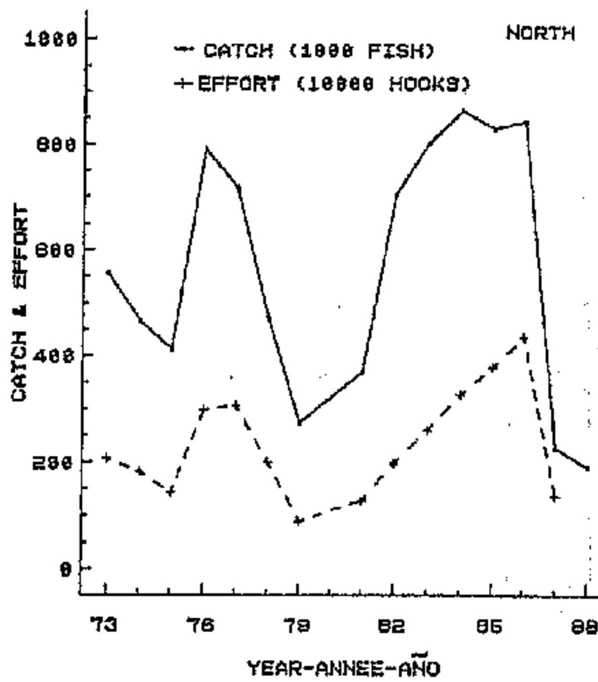


Fig. 33a. Nominal North Atlantic albacore catches and effort by Taiwanese longline fishery.

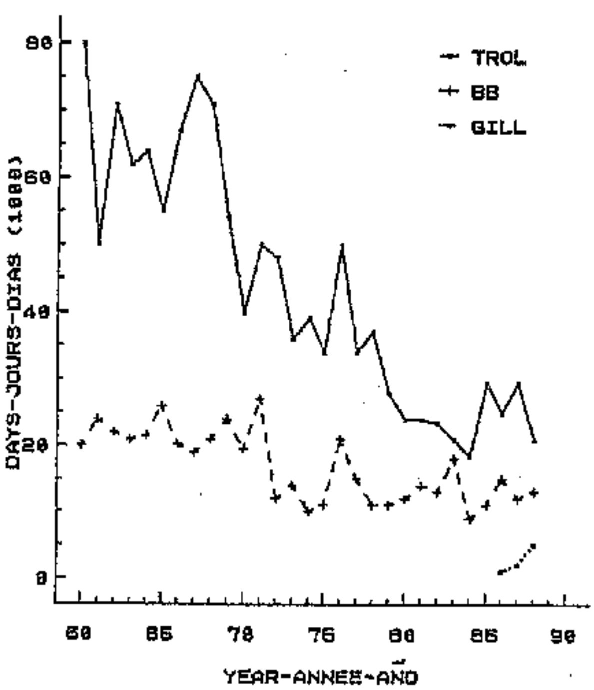


Fig. 32. Nominal fishing effort of North Atlantic surface albacore fisheries, by gear, 1959-88.

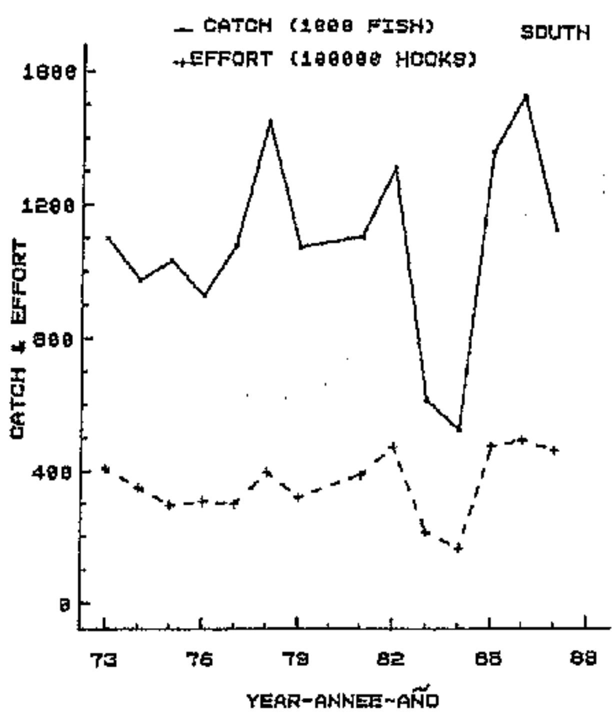


Fig. 33b. Nominal south Atlantic albacore catches and effort by Taiwanese longline fishery.

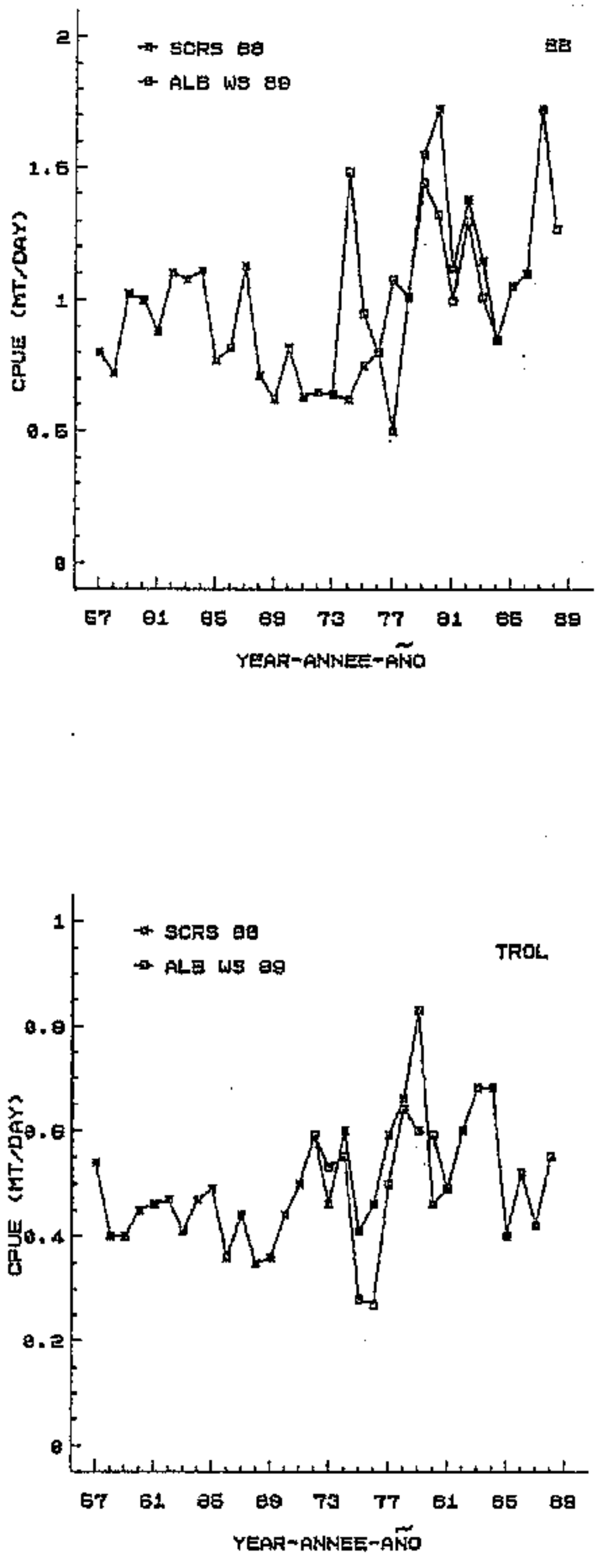


Fig. 34. Comparison of surface gear catch rates from 1988 SCRS Report and 1989 working group data for BB (upper) and TROL (lower).

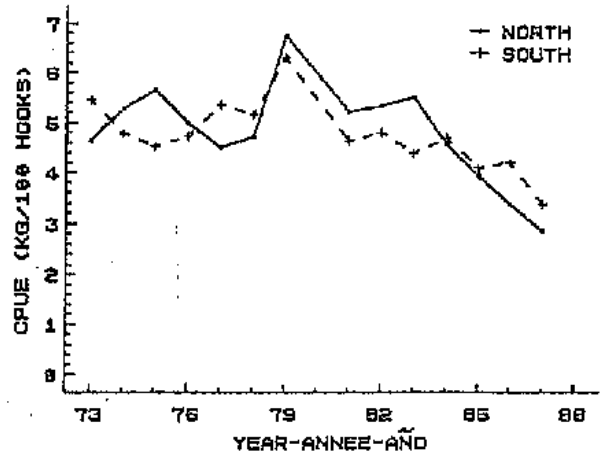


Fig. 35. Nominal longline CPUE for northern and southern albacore fishery.

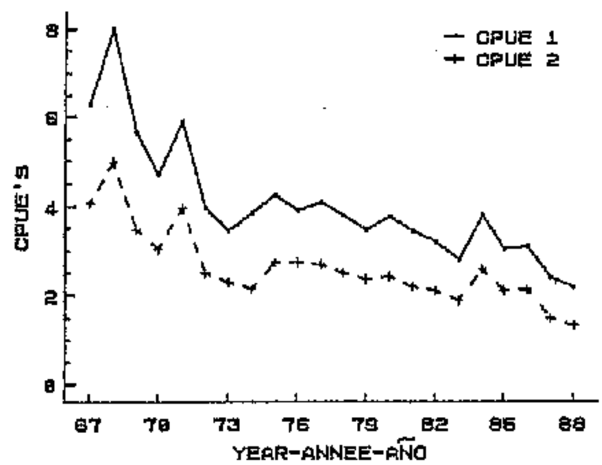


Fig. 36a. Annual CPUE trends for south Atlantic albacore. CPUE 1 = no. fish/100 hooks; CPUE 2 = 10 kg/100 hooks.

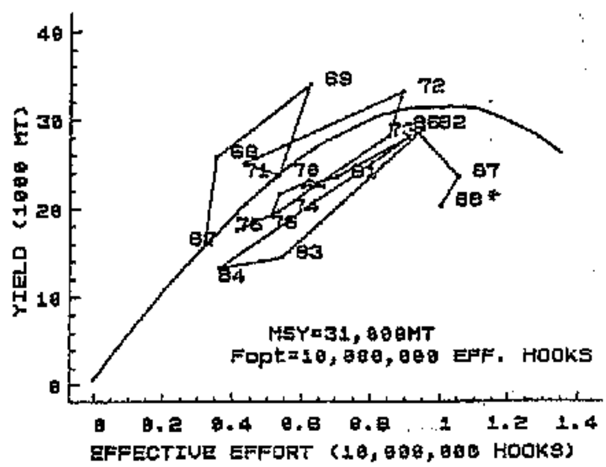


Fig. 36b. Equilibrium yield curve and the observed data for south Atlantic albacore fisheries, 1967-1988. (1988 data are based only on LL.)

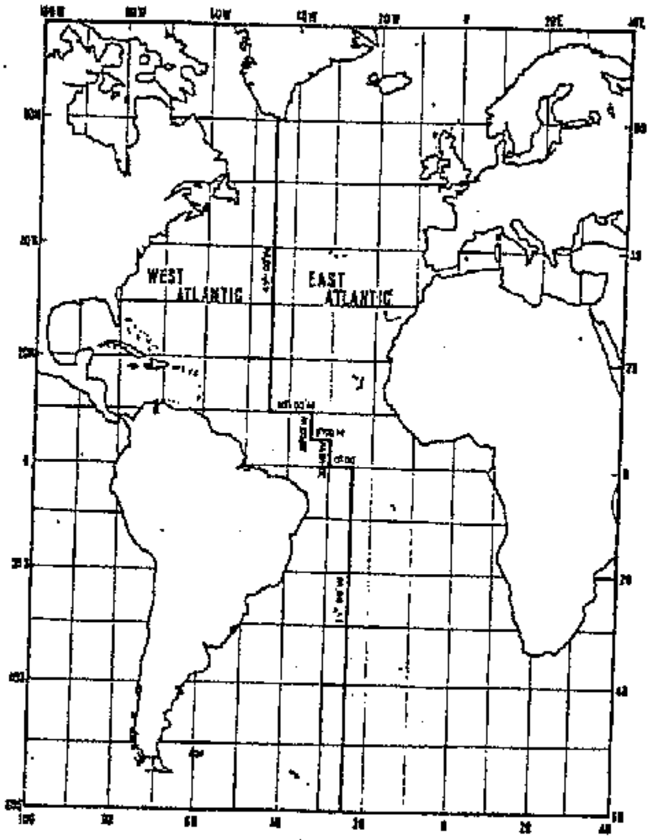


Fig. 37. Map of the Atlantic Ocean showing the line used to separate the eastern and western components of the Atlantic bluefin tuna.

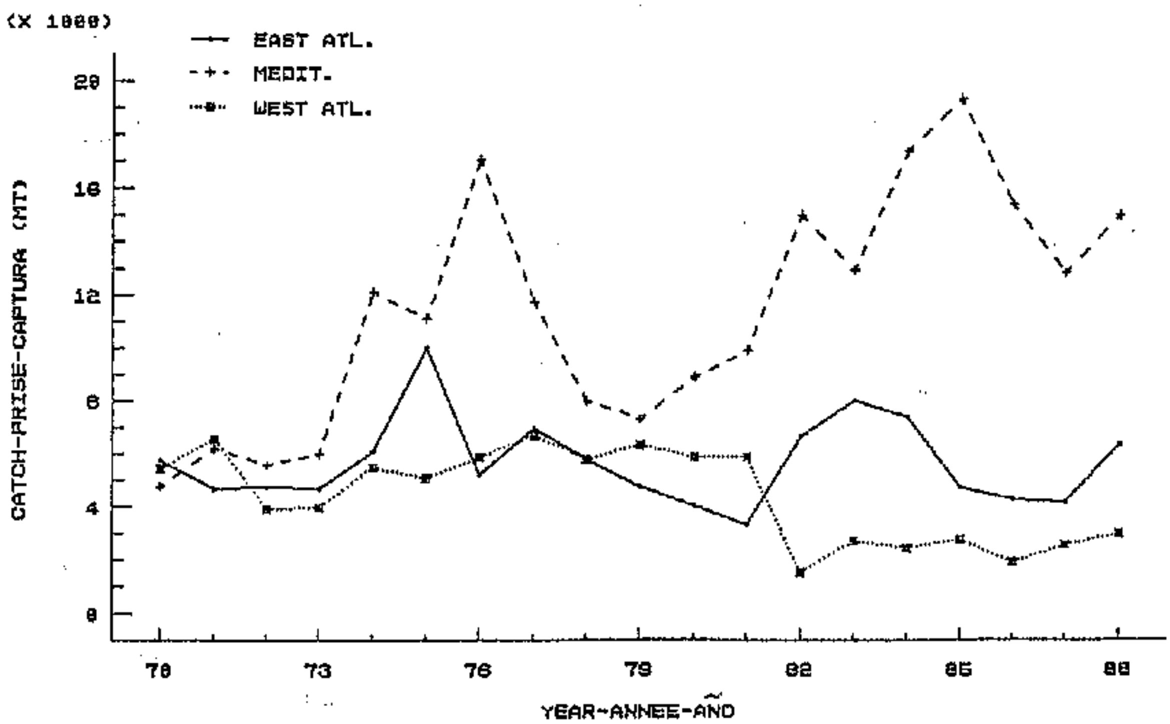


Fig. 38. Atlantic bluefin tuna landings by major fishing area, 1970-88.

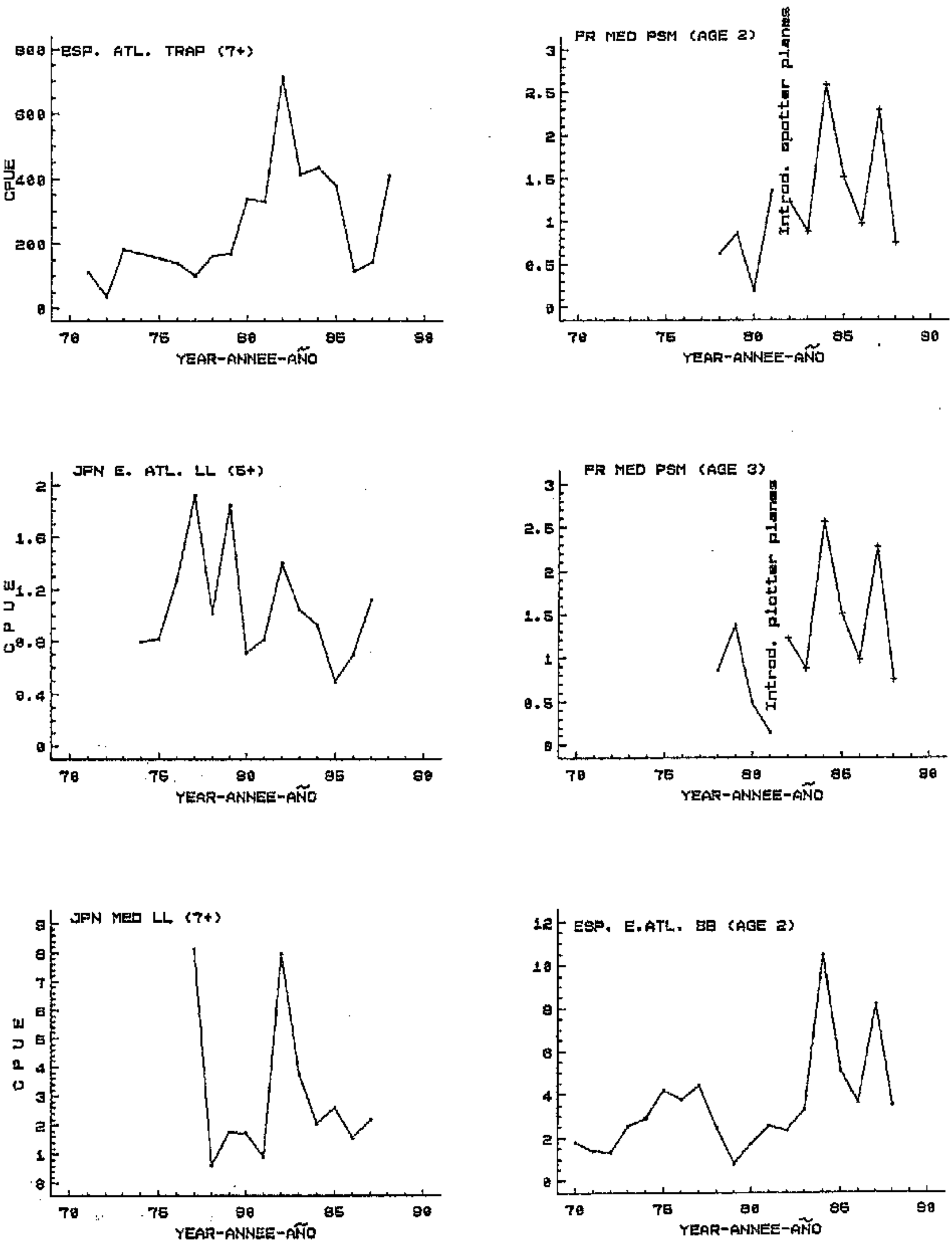


Fig. 39. Indices of abundance for bluefin tuna in the east Atlantic and Mediterranean Sea.

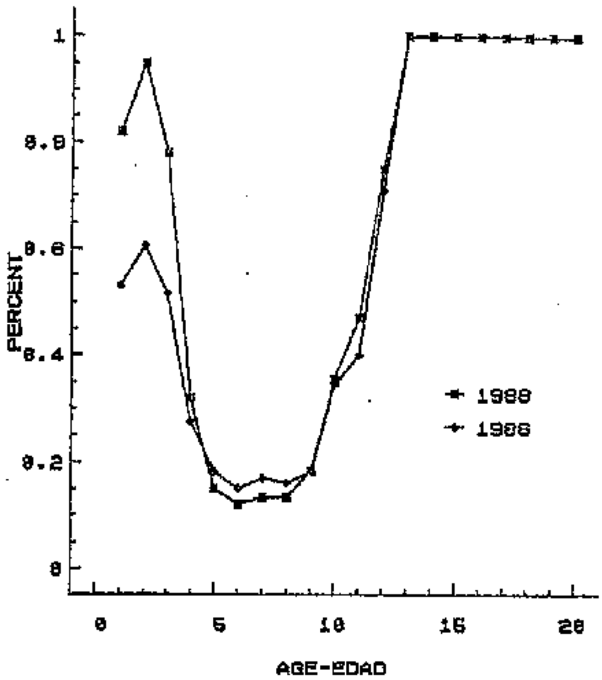


Fig. 40. Partial recruitment of bluefin tuna in the east Atlantic and Mediterranean as calculated for the current and 1988 SCRS assessments.

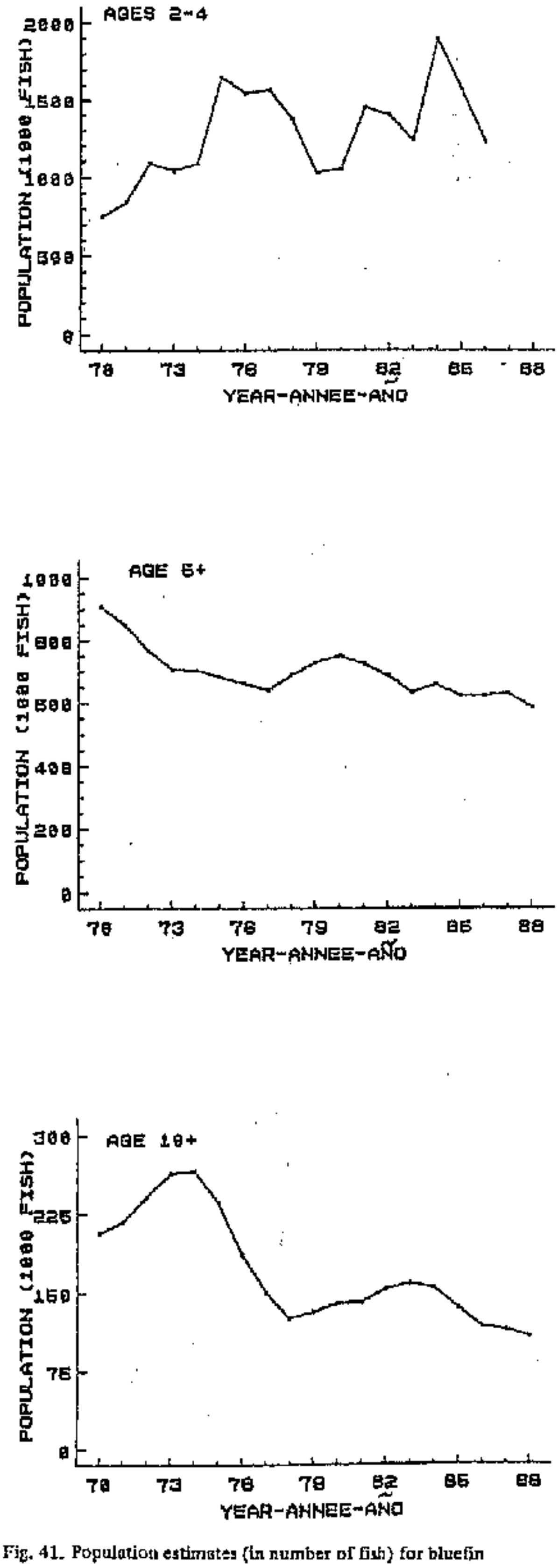


Fig. 41. Population estimates (in number of fish) for bluefin tuna from the east Atlantic and Mediterranean.

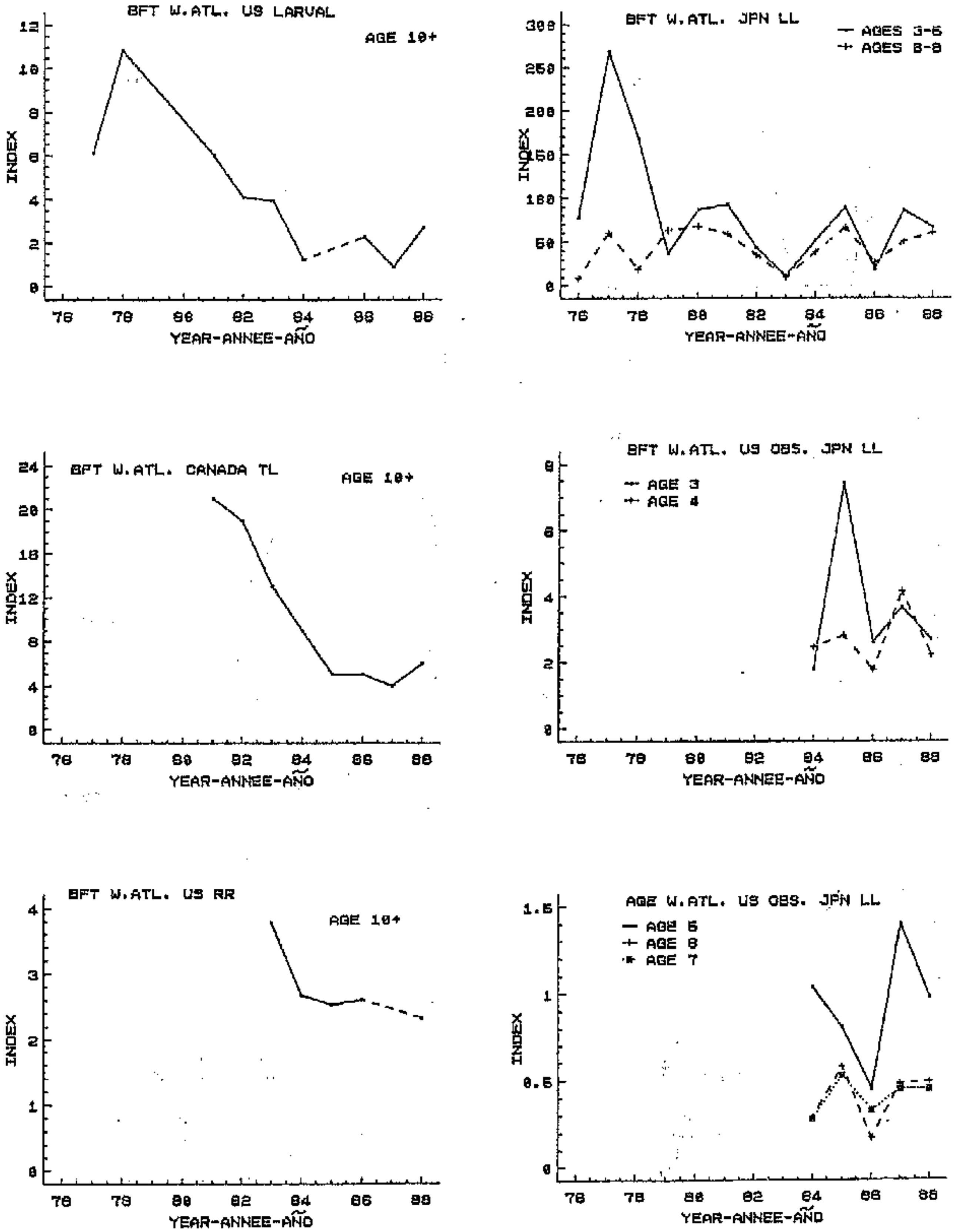


Fig. 42. Indices of abundance for bluefin tuna in the west Atlantic.

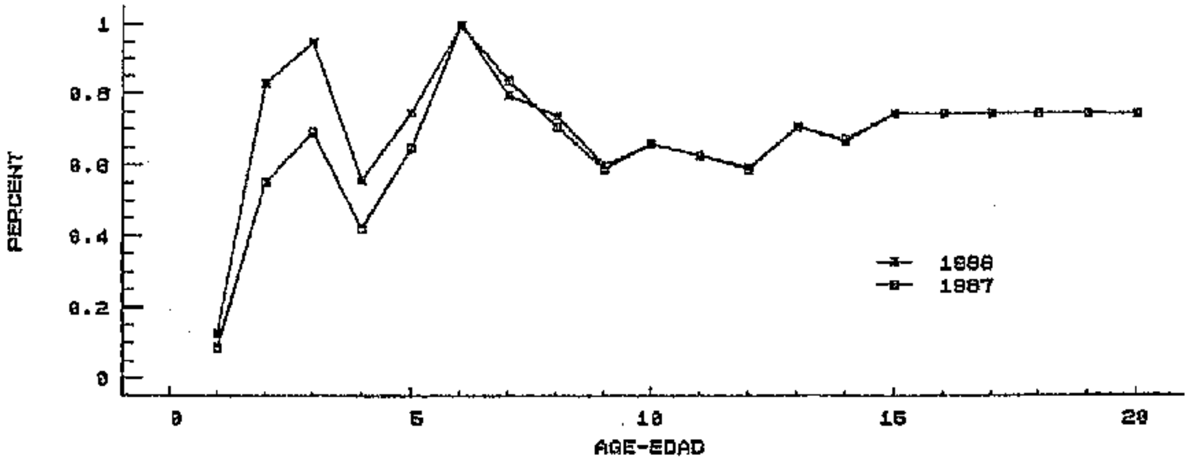


Fig. 43. Partial recruitment of bluefin tuna in the west Atlantic as calculated for the current and 1988 SCRS assessments.

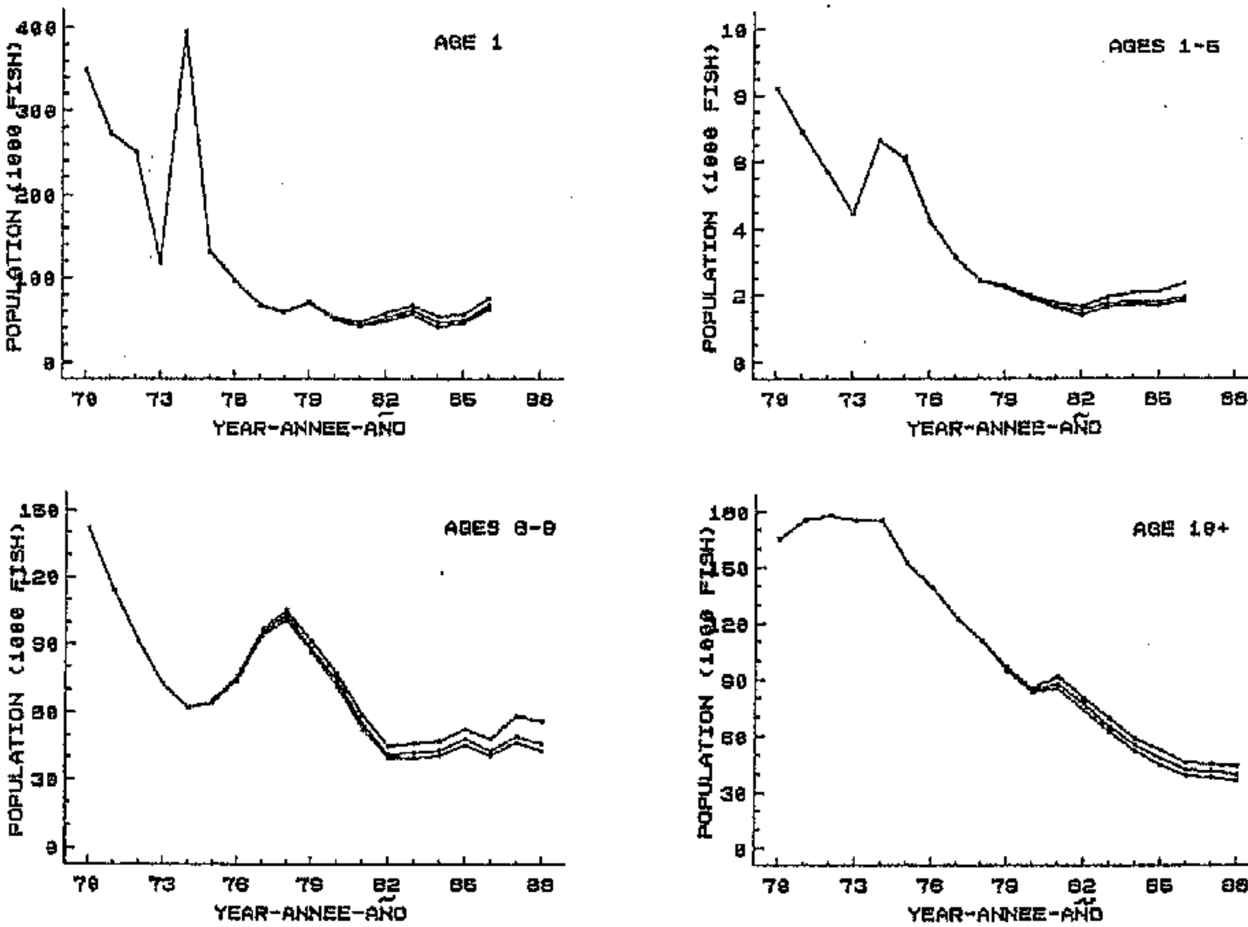


Fig. 44. Population estimates (in number of fish) of bluefin tuna from the west Atlantic based on VPA. The terminal year estimates for the younger ages are largely dependent on the fishing mortality input by SCRS. The upper and lower bands indicate 1 standard deviation above and below the mean (approximately equal to 66 percent confidence intervals), given the assumptions of this assessment. Additional unquantifiable uncertainty does exist due to the many assumptions of the biology of this species (i.e., stock structure, growth, mortality, etc.).

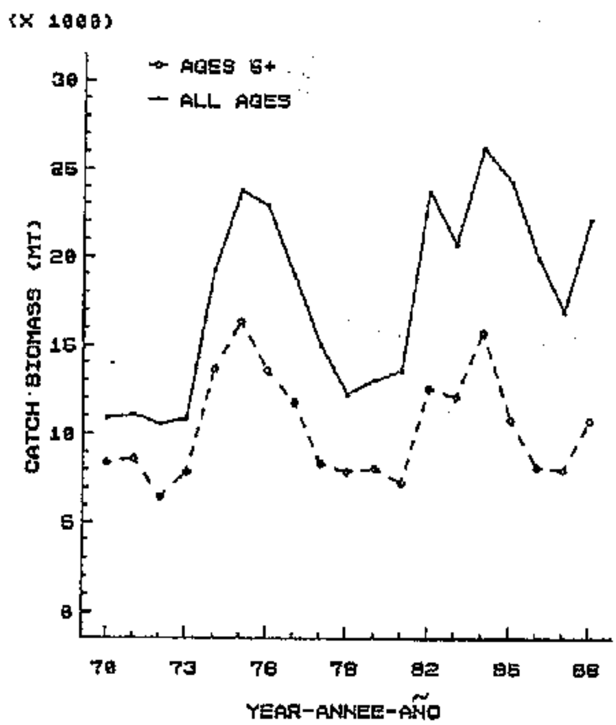


Fig. 45. Catch biomass (MT) of bluefin tuna in the east Atlantic and Mediterranean. The spawners (age 5 and over) and the total catch are shown. It can be seen in this figure how the composition of ages 1 to 4 has increased relative to the catch of spawners. (It is important to note the catch biomass does not include the unknown, but large, number of 0-age fish.)

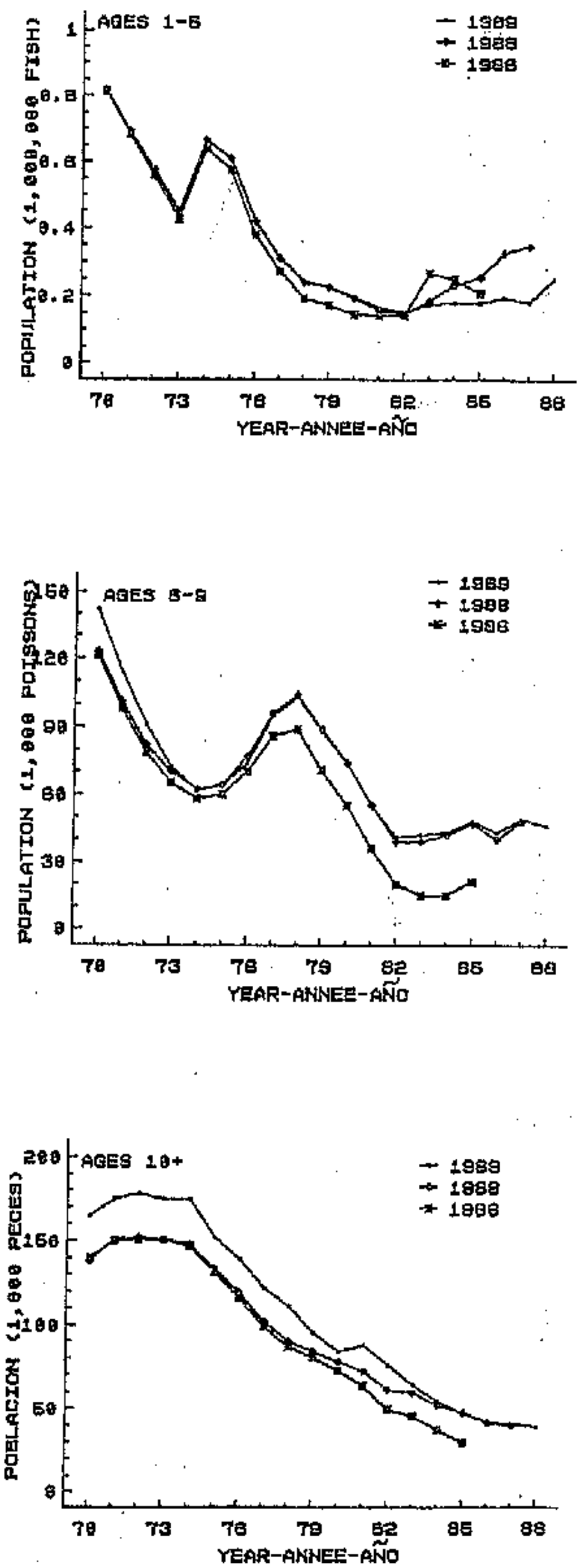
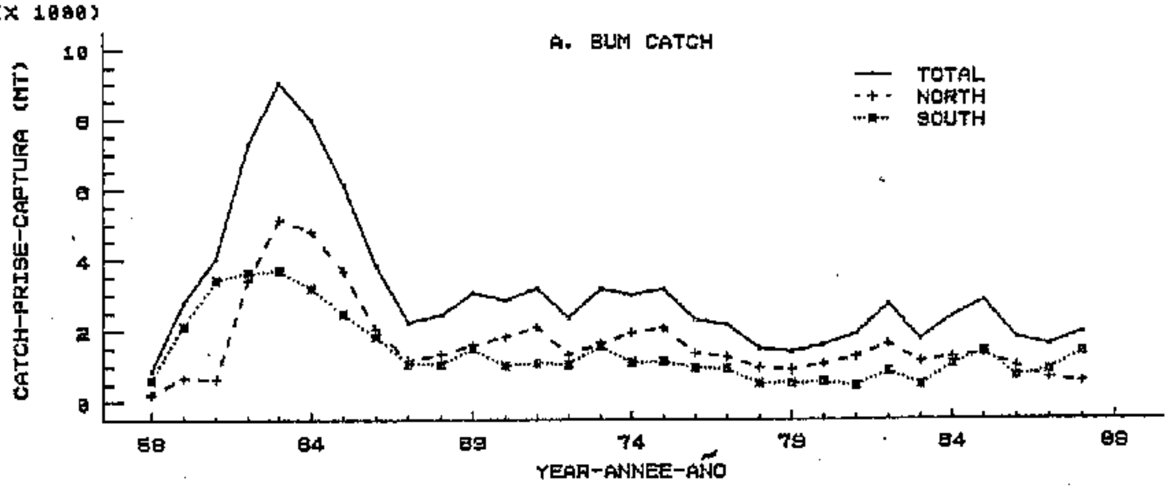
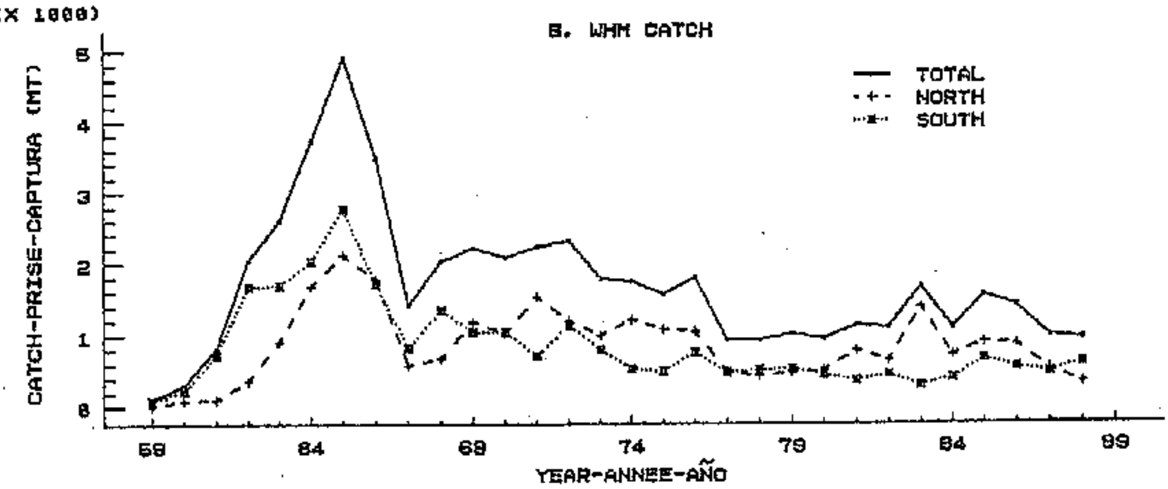


Fig. 46. Population estimates (in number) from the current assessment compared to those of SCRS-1988 and SCRS-1986.





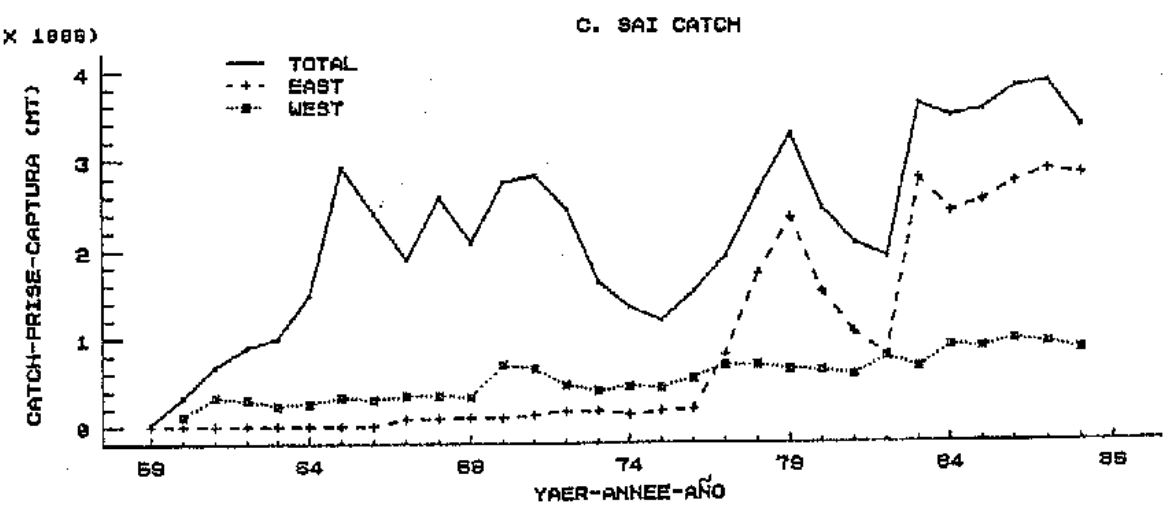


Fig. 47. Nominal landings (MT) of A) Atlantic blue marlin, and B) Atlantic white marlin in the total Atlantic, North Atlantic and south Atlantic for 1959-88. Nominal landings for C) Atlantic sailfish/spearfish in the total Atlantic, west Atlantic and east Atlantic, 1959-1988.

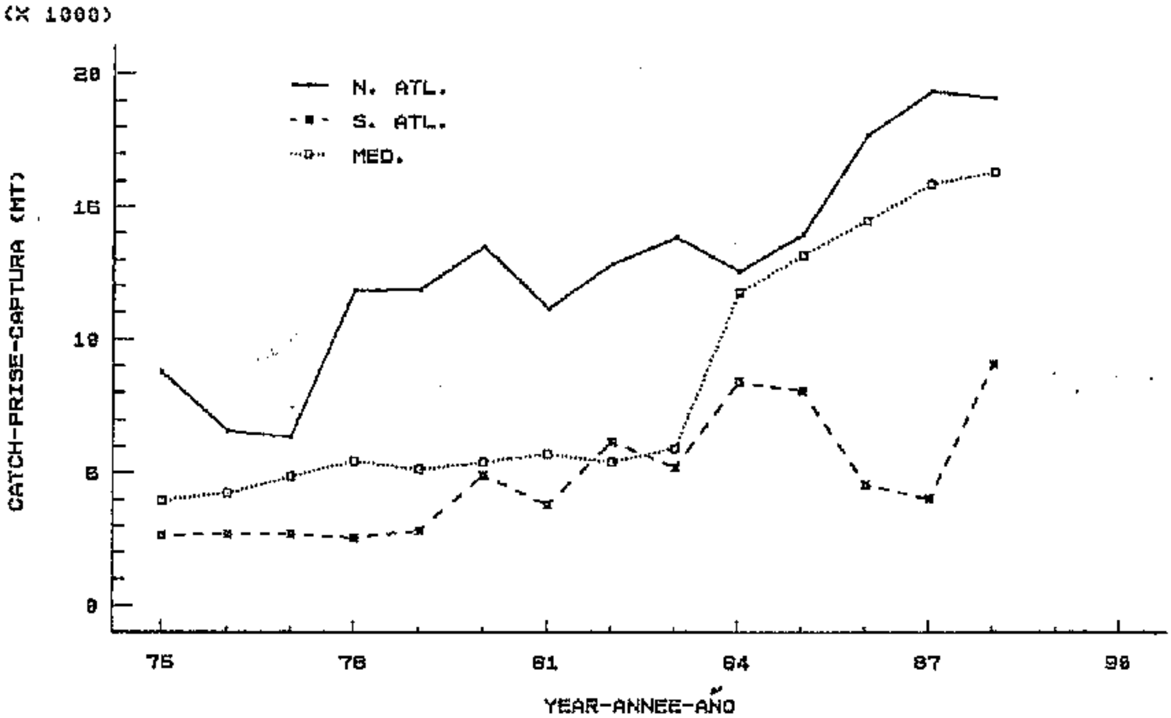


Fig. 51. Annual swordfish catches (MT) in the North and south Atlantic oceans and Mediterranean Sea.

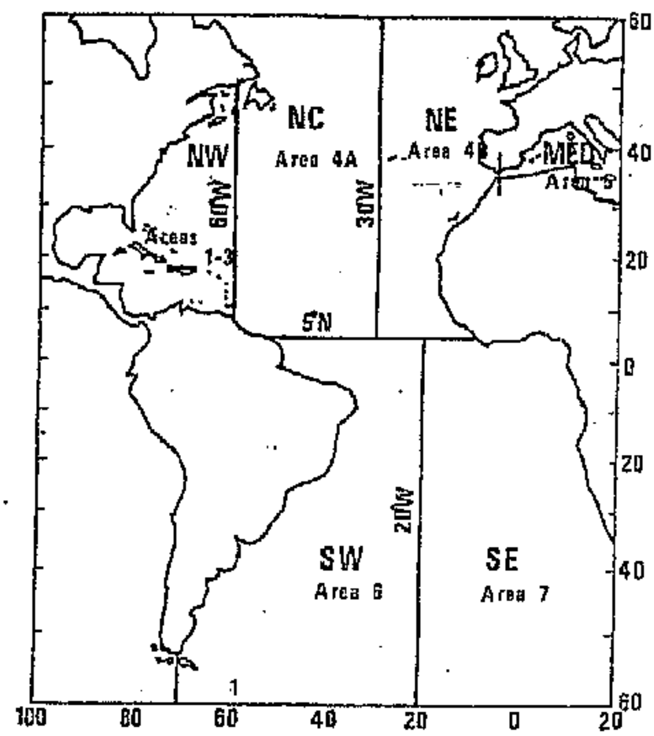


Fig. 52. Swordfish areas used in this study.

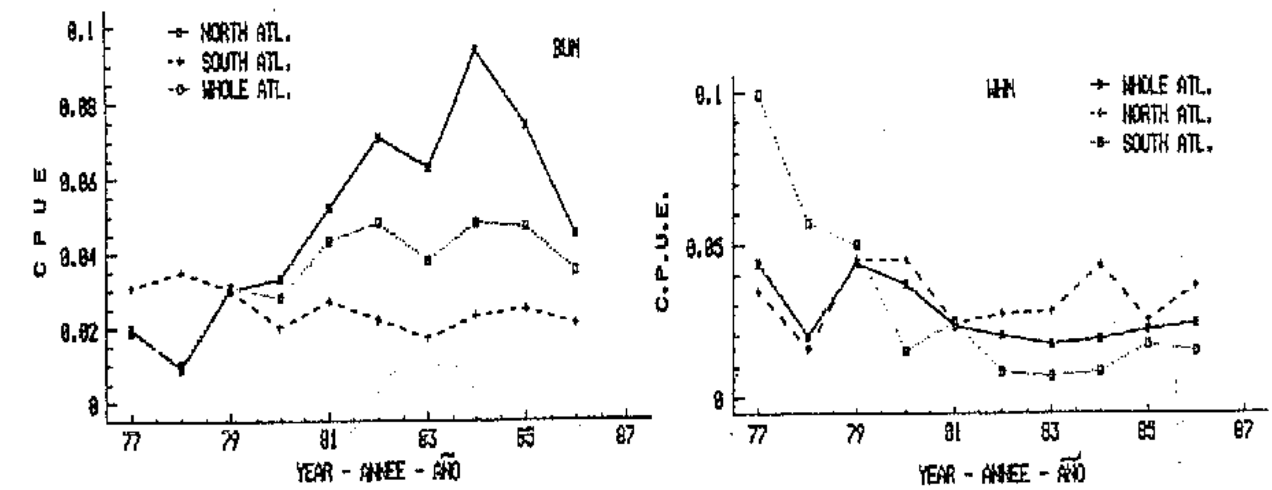


Fig. 48. CPUE (number of fish per 1,000 hooks) for blue marlin (BUM) and white marlin (WHM) by the Japanese longline fishery in the south, north and whole Atlantic, 1977-86.

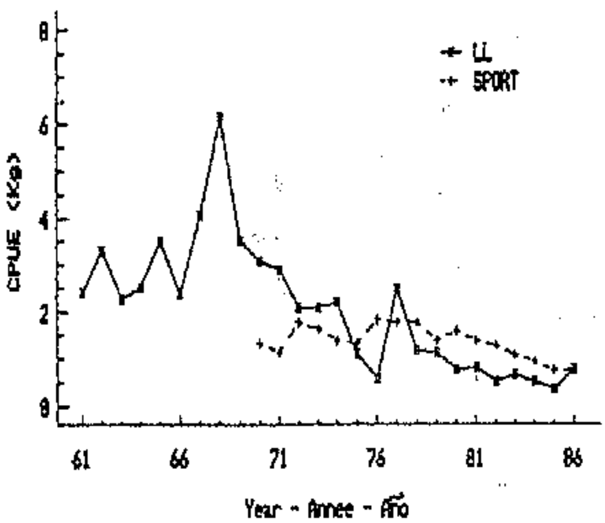


Fig. 49. CPUE (in kg) calculated by the Honma method, for the total longline fishery of the central and east Atlantic and for the Dakar-based recreational fishery, 1961-86.

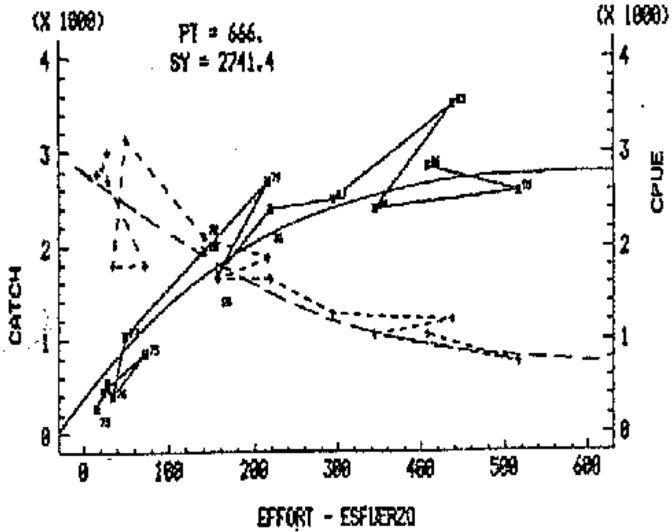


Fig. 50. Generalized production model (Pella and Thomlinson) with the best parameters for the east Atlantic sailfish, 1971-86 (M=0.39).

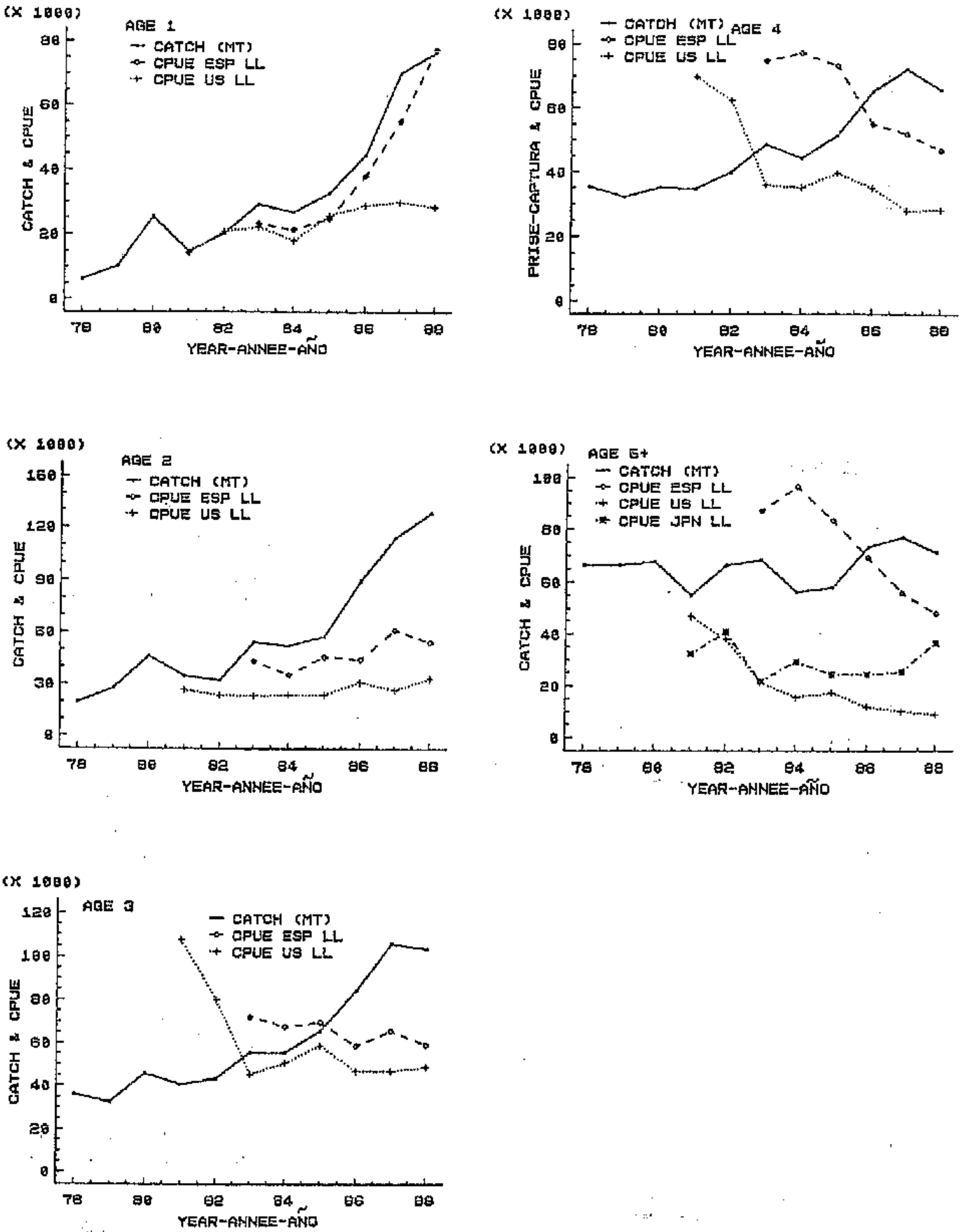


Fig. 53. Swordfish catch (in number of fish) of each age-class compared with various CPUE indices, total North Atlantic.

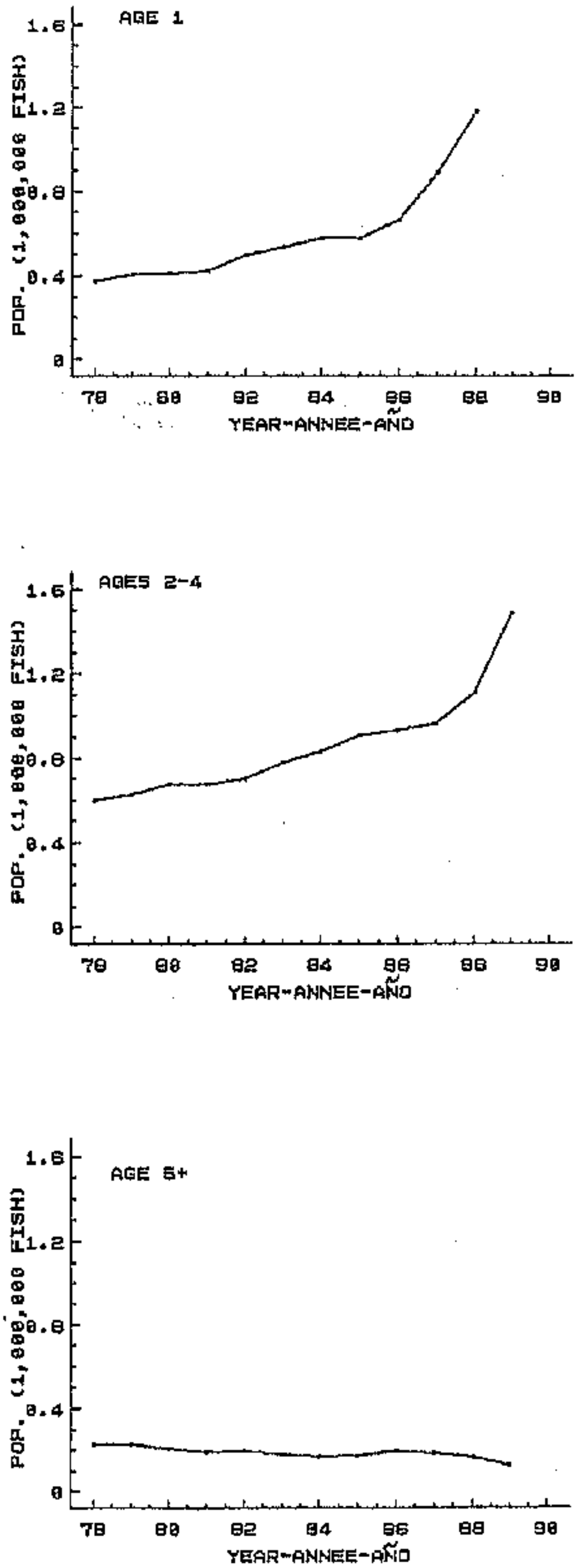


Fig. 54a. Trends in swordfish stock size (in number) by age group, total North Atlantic.

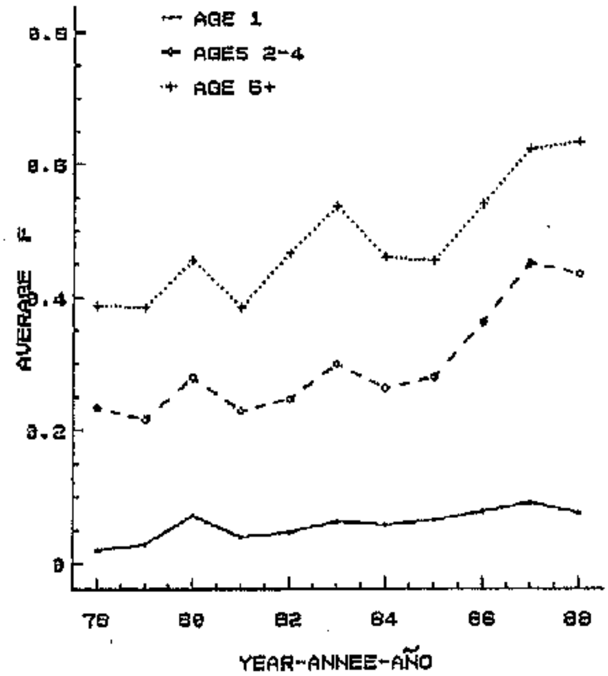


Fig. 54b. Trends in fishing mortality by age group (weighted by catch) of swordfish, total North Atlantic.

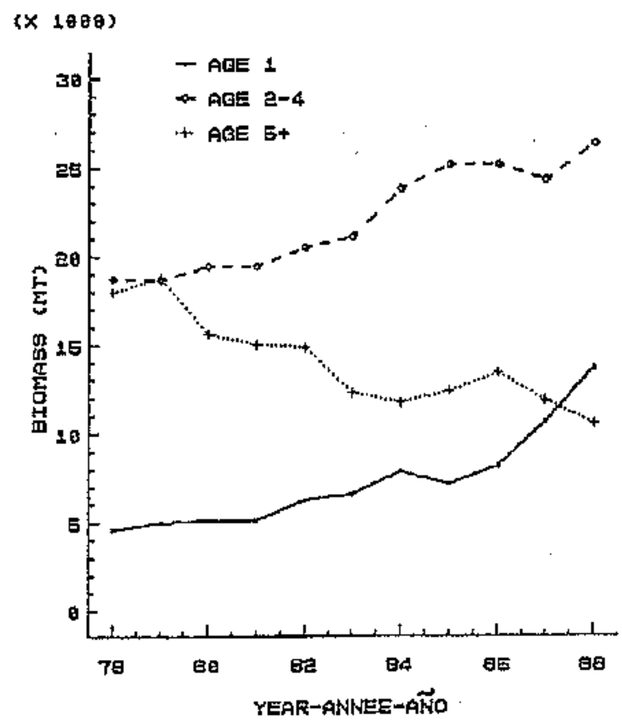


Fig. 54c. Trends in mid-year biomass (in 1,000 MT) of swordfish by age group, total North Atlantic.

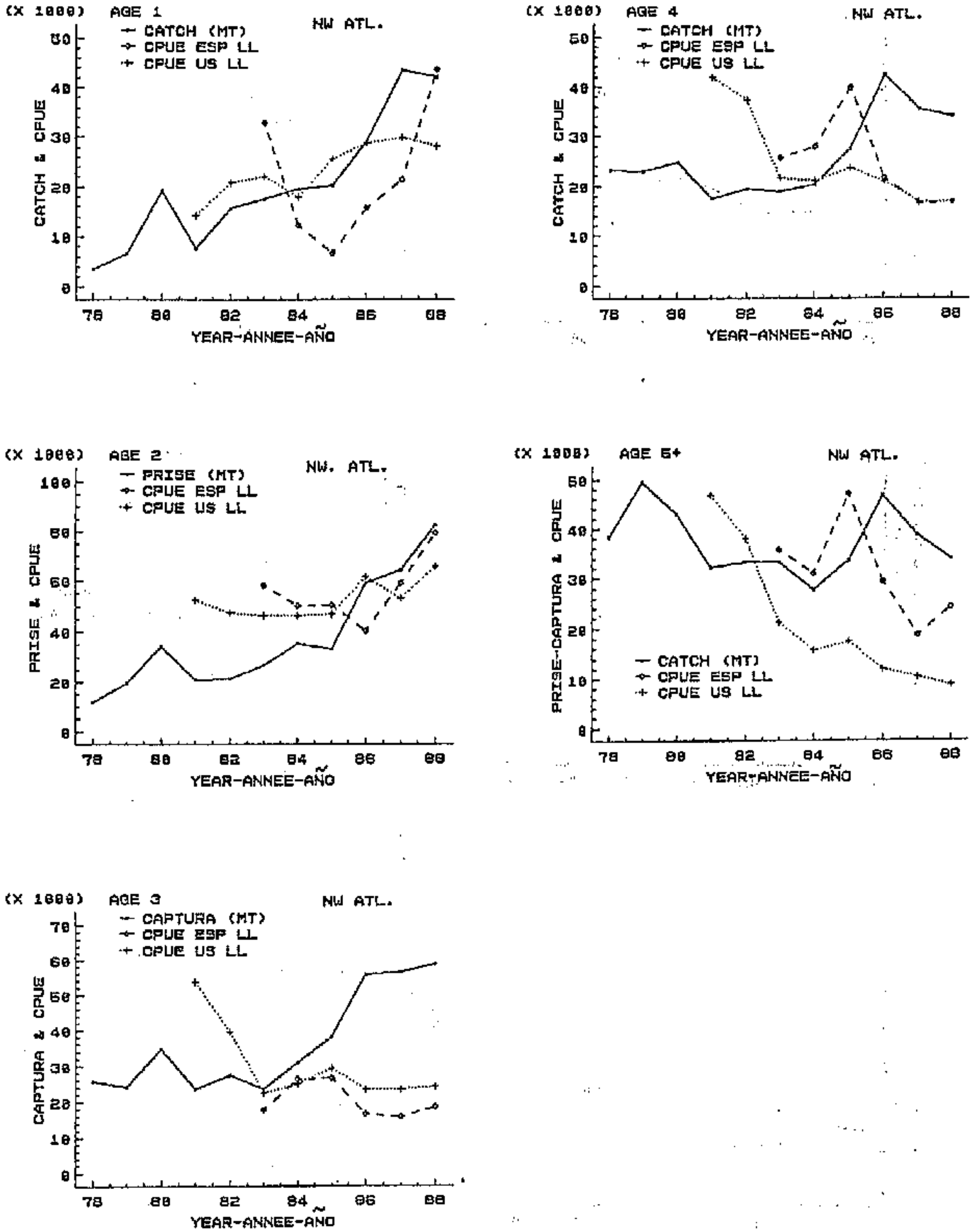


Fig. 55. Swordfish catch (in number of fish) of each age-class compared with various CPUE indices, northwest Atlantic.

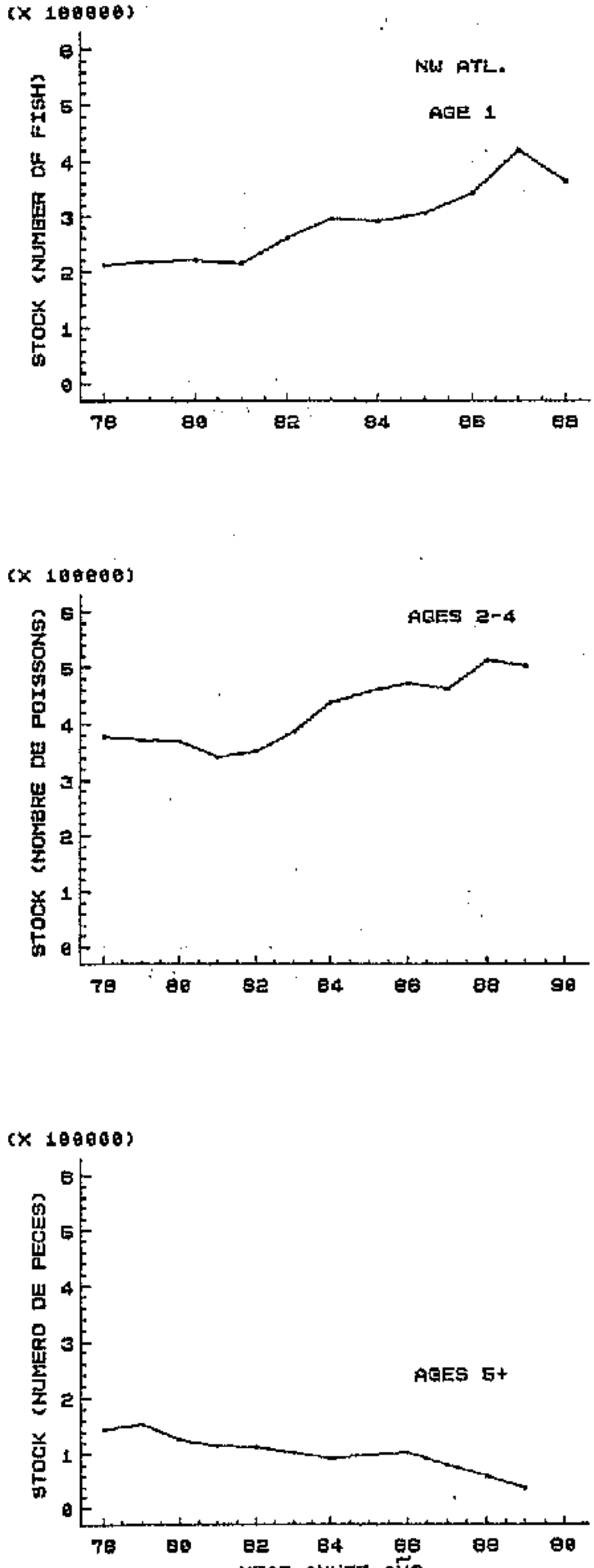


Fig. 56a. Trends in swordfish stock size (in number) by age group, northwest Atlantic.

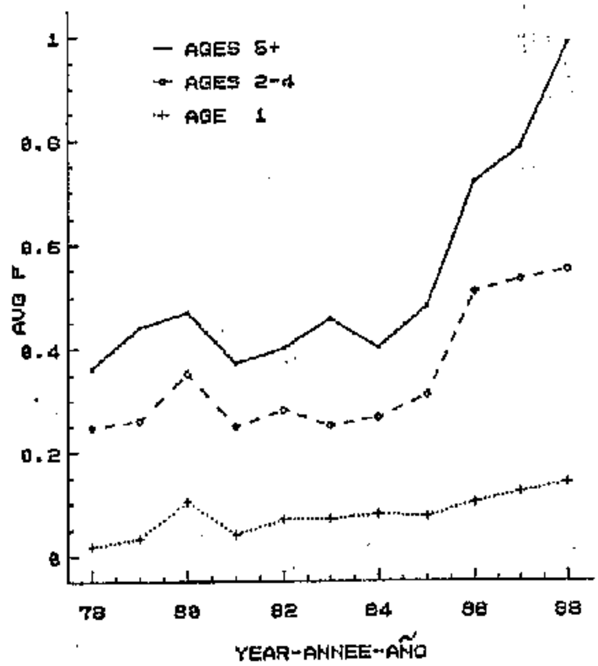


Fig. 56b. Trends in average fishing mortality (weighted by catch) of swordfish by age group, northwest Atlantic.

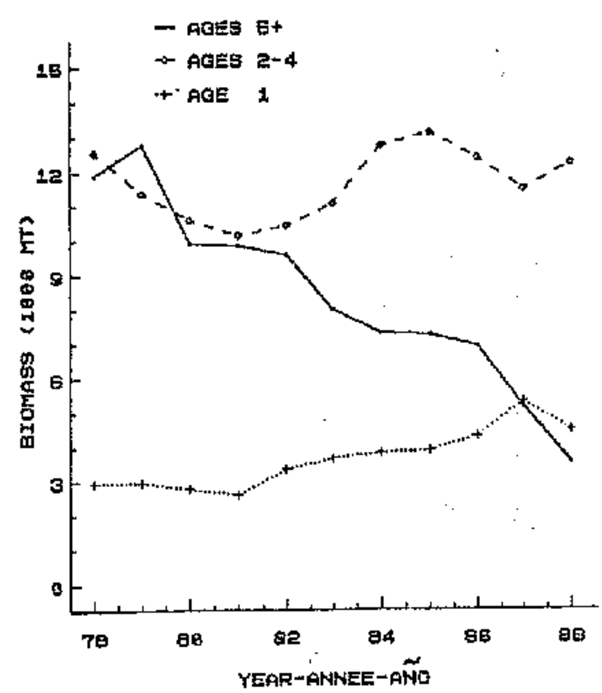


Fig. 56c. Trends in swordfish biomass (1,000 MT) by age group, northwest Atlantic.

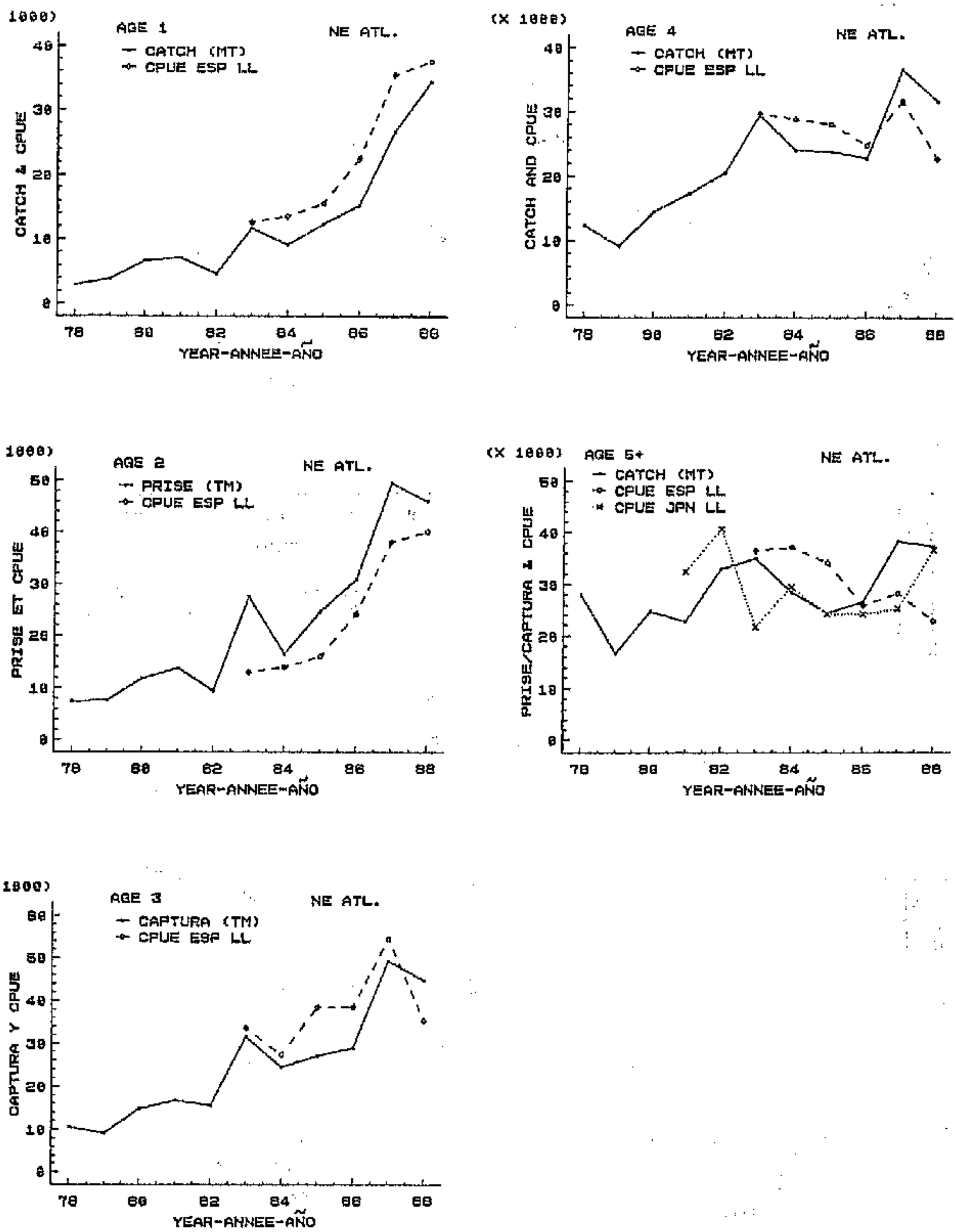


Fig. 57. Swordfish catch (in number of fish) of each age-class compared with various CPUE indices, northeast Atlantic.

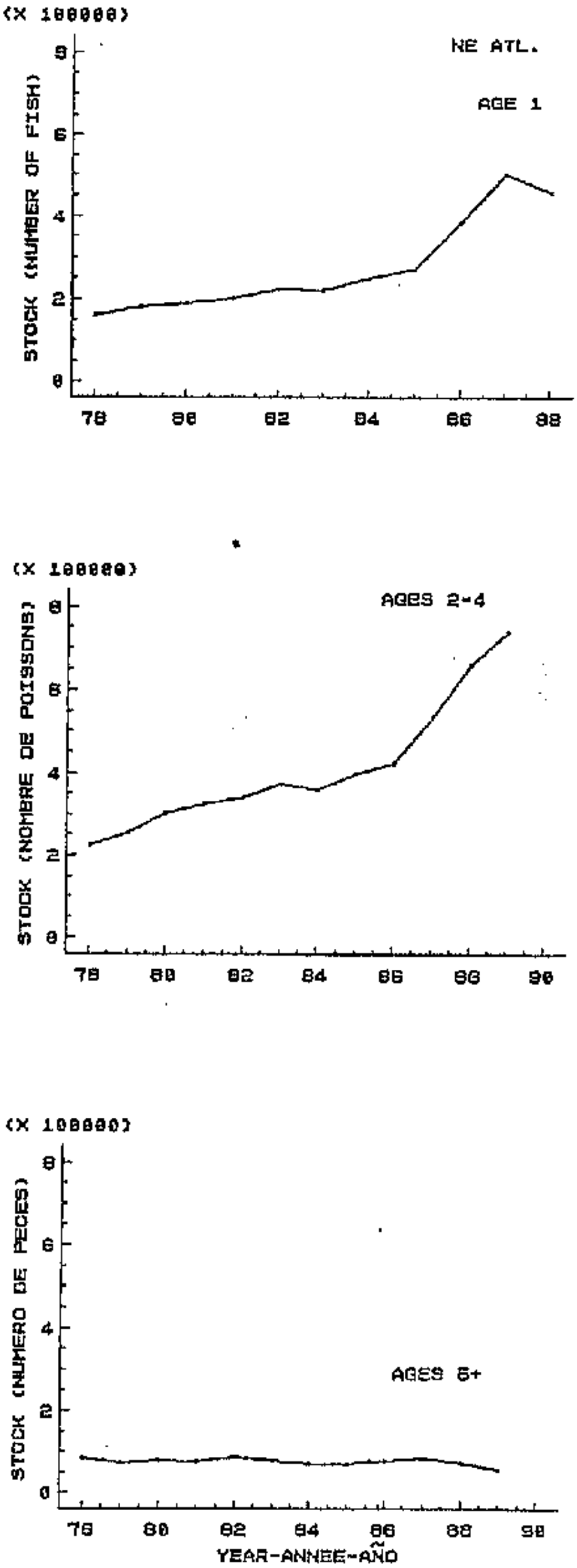


Fig. 58a. Trends in swordfish stock size (in number) by age group, northeast Atlantic.

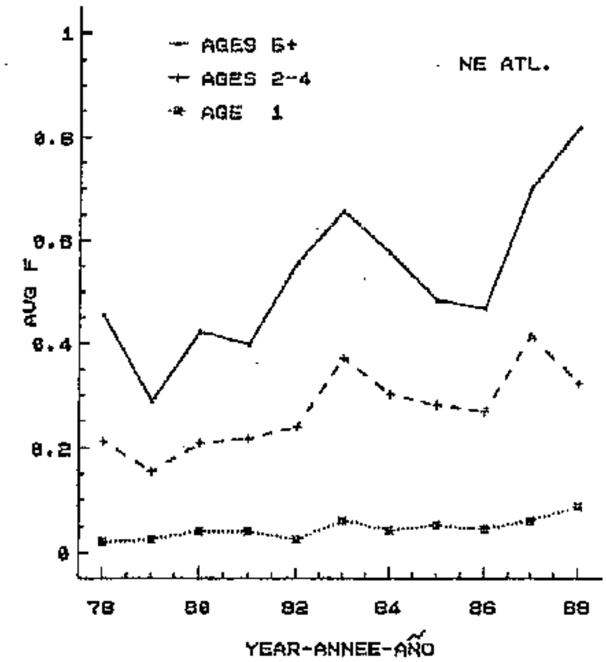


Fig. 58b. Trends in average fishing mortality (weighted by catch) of swordfish by age group, northeast Atlantic.

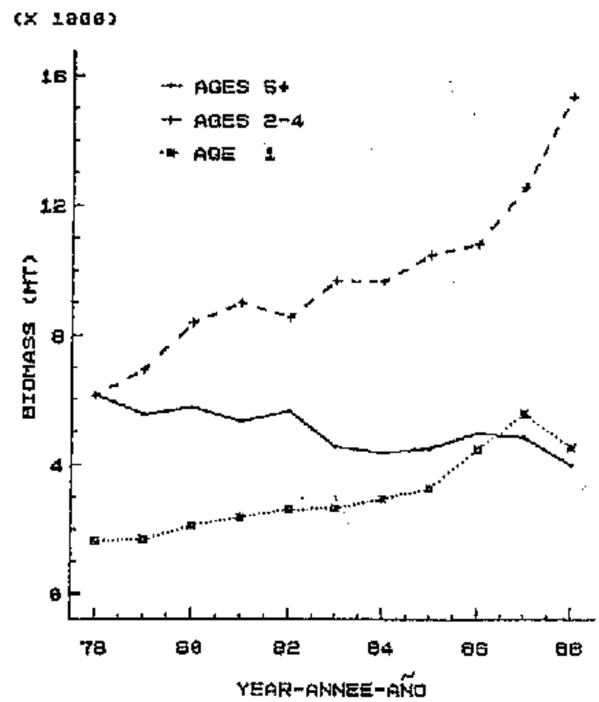


Fig. 58c. Trends of swordfish biomass by age group, northeast Atlantic.

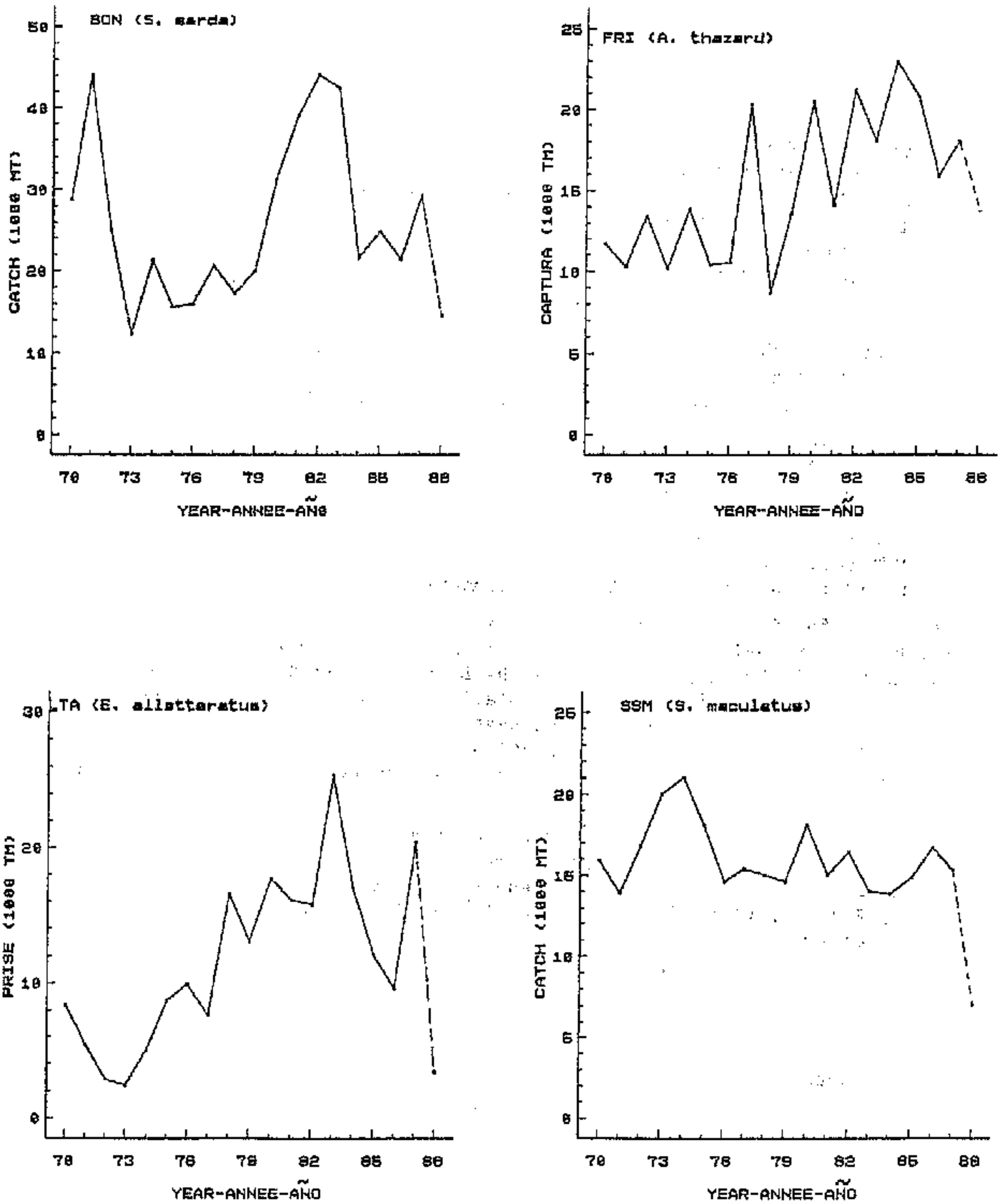


Fig. 59. Annual catches (in MT) of the major small tunas, by species, 1970-88.

Appendix 1 to Annex 8

SCRS Agenda

1. Opening of the meeting
2. Election of Chairman
3. Adoption of Agenda and arrangements for the meeting
4. Introduction of delegations
5. Admission of observers
6. Admission of scientific papers
7. Review of national fisheries and research programs
8. Report of the Albacore Workshop
9. Report of the Final Meeting of the Yellowfin Year Program
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. Plans for finalizing Yellowfin Year Program
12. Review of environmental conditions in relation to fisheries
13. Review of the progress made by the Enhanced Billfish Research Program
14. Report of the Sub-Committee on Statistics and review of Atlantic tuna statistics and data management system
15. Review of editorial and publication policy
16. Review of future SCRS research programs and consideration of SCRS meeting procedures

    a) Organization of the next SCRS meeting
    b) Future albacore research program
    c) Future plan for monitoring environmental factors
    d) Plan for GFCM/ICCAT joint meeting on Mediterranean stock assessment
    e) Other matters

17. Cooperation with other organizations
18. Recommendations
19. Other matters
20. Adoption of Report
21. Adjournment

Appendix 2 to Annex 8

List of SCRS Participants

Member Countries

ANGOLA

ANAPAZ, L. F.
Director Técnico
Centro de Investigação Pesqueira
Ministerio das Pescas
C. P. 83
Luanda

DA COSTA, A.
Premier Secrétaire
Ministère des Affaires Etrangères
Luanda

MAKIADI J. LOPES, S.
Chefe de Departamento de Relaçoes
Economicas Internacionais do
Ministerio das Pescas
C.P. 83
Luanda

CANADA

CLAY, D.
Marine Fisheries Division
Dept. of Fisheries and Oceans
P. O. Box 5030
Moncton, New Brunswick E1C 9B6

PORTER, J.
Marine Fisheries Division
Dept. of Fisheries and Oceans
St. Andrews Biological Station
St. Andrews, New Brunswick E0G 2X0

CAPE VERDE

SANTA RITA VIEIRA, M. H.
Direcção de Biologia Maritima
B. P. 30
Praia

COTE D'IVOIRE

AMON KOTHIAS, J. B.
Centre de Recherches Océanographiques
B. P. V-18
Abidjan

BARD, F. X.
Centre de Recherches Océanographiques
B. P. V-18
Abidjan

KOFFI, L.
Directeur des Pêches
Ministère de la Production Animale
B. P. V-19
Abidjan

EQUATORIAL GUINEA

ESONO MASIE, P.
Ministerio de Agricultura,
Ganadería, Pesca y Forestal
Malabo

FRANCE

ANTOINE, L.
IFREMER
B. P. 70
29263 Plouzané

FONTENEAU, A.
Centre de Recherches Océanographiques
B. P. 2241
Dakar (Senegal)

GAERTNER, D.
ORSTOM
Apd. 373
Cumaná 6101, Estado Sucre
(Venezuela)

LIORZOU, B.
IFREMER
1, Rue Jean Vilar
34200 Sète

STRETTA, J. M.
Centre ORSTOM
B. P. 5045
34032 Montpellier Cédex

GHANA

KWEI, E. A.
Starkist International
P. O. Box 40
Tema

JAPAN

ISHIZUKA, Y.
Far Seas Fisheries Research Lab.
Fisheries Agency of Japan
5-7-1 Orido
Shimizu 424, Shizuoka Pref.

KUME, S.
Tokai Regional Fisheries
Research Laboratory
5-5-1 Kachidoki, Chuo-Ku
Tokyo 104

MIYABE, N.
Far Seas Fisheries Research Lab.
Fisheries Agency of Japan
5-7-1 Orido
Shimizu 424 - Shizuoka Pref.

OZAKI, E.
Federation of Japan Tuna Fisheries
Cooperative Associations
2-3-22 Kudankita, 2-chome
Chiyoda-Ku
Tokyo 102

SUENAGA, Y.
Fisheries Agency of Japan
2-1, 1-chome, Kasumigaseki
Chiyoda-Ku
Tokyo

KOREA

PARK, Y. C.
National Fisheries Research &
Development Agency
65-3 Shirang-Ri, Kijang-Up
Yangsan-Kun, Keongnam 629-900

MOROCCO

SROUR, A.
Institut Scientifique des Pêches
Maritimes
2, Rue Tiznit
Casablanca

PORTUGAL

BARROS, P. de
U. de Ciencias e Tecnologias
dos Recursos Aquaticos
Universidade do Algarve
8000 Faro

GOUVEIA, L.
Laboratorio de Investigação
das Pescas
Estrada da Pontinha
9000 Funchal, Madeira

PEREIRA, J.
Universidade dos Açores
Departamento de Oceanografia e Pescas
9900 - Horta, Açores

SPAIN

ARIZ TELLERIA, J.
Instituto Español de Oceanografía
Centro Costero de Canarias
Apartado 1373
Santa Cruz de Tenerife

CORT, J. L.
Instituto Español de Oceanografía
Apartado 240
Santander

DE LA SERNA ERNST, J. M.
Instituto Español de Oceanografía
Apartado 285
Fuengirola
Málaga

DELGADO DE MOLINA, A.
Instituto Español de Oceanografía
Centro Costero de Canarias
Apartado 1373
Santa Cruz de Tenerife

GONZALEZ RAMOS, A.
Universidad de las Palmas de
Gran Canaria
Departamento de Biología
Aptdo. 550
Las Palmas de Gran Canaria

MARTIN LANDA, I.
Técnico Superior de Azti-Sio
Departamento de Recursos Pesqueros
Txatxarramendi Irla
Sukarrieta
Vizcaya

MEJUTO GARCIA, J.
Instituto Español de Oceanografía
Apartado 130
La Coruña

ORTIZ, V.
Instituto Español de Oceanografía
Apartado 240
Santander

PALLARES SOUBRIER, P.
Instituto Español de Oceanografía
Corazón de María, 8
28002 Madrid

SANTANA FERNANDEZ, J. C.
Instituto Español de Oceanografía
Centro Costero de Canarias
Apartado 1373
Santa Cruz de Tenerife

UNITED STATES

BERKELEY, S.
South Atlantic Fishery
Management Council
1, South Park Circle, Suite 306
Charleston, South Carolina 29412

BROADHEAD, G.
P. O. Box 1427
Rancho Santa Fe, California 92067

BROWN, B. E.
NMFS
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, Florida 33149

CONSER, R. J.
Northeast Fisheries Center
Water Street
Woods Hole, Massachusetts 02543

HESTER, F.
c/o National Fisheries Institute
2000 M Street N.W.
Suite 580
Washington D.C. 20036

NELSON, W.
Southeast Fisheries Center
NMFS
75 Virginia Beach Drive
Miami, Florida 33149

PARRACK, M.
Southeast Fisheries Center
NMFS
75 Virginia Beach Drive
Miami, Florida 33149

POWERS, J.
Southeast Fisheries Center
NMFS
75 Virginia Beach Drive
Miami, Florida 33149

PRINCE, E.
Southeast Fisheries Center
NMFS
75 Virginia Beach Drive
Miami, Florida 33149

SCOTT, G.
Southeast Fisheries Center
NMFS
75 Virginia Beach Drive
Miami, Florida 33149

TURNER, S.
Southeast Fisheries Center
NMFS
75 Virginia Beach Drive
Miami, Florida 33149

GOVORIN, N.
Ministry of Fisheries
12, Rozhdestvensky Bvd.
Moscow - K.45

OVCHINNIKOV, V. V.
AtlantNIRO
5, Dmitrij Donskogo
Kaliningrad

*****

FAO

ROBINSON, M.
Senior Fishery Statistician
FAO Fisheries Department
Via delle Terme di Caracalla
00100 Roma (Italy)

Observers

Non-member countries:

DOMINICAN REPUBLIC

DUARTE, D.
Encargado de Asuntos Agrícolas
y Cooperación Técnica
Embajada de la República Dominicana
Paseo de la Castellana 30
28046 Madrid
(Spain)

MEXICO

GONZALEZ ANIA, L. V.
Instituto Nacional de la Pesca
Secretaría de Pesca
Dr. Valenzuela 85, Col. Doctores
México D.F.

SENEGAL

DIOUF, T.
CRODT
B. P. 2241
Dakar

International organizations:

CIESM

DICENTA BALLESTER, A.
Instituto Español de Oceanografía
Avda. del Brasil 31
28020 Madrid
(Spain)

EEC

REY SALGADO, J. C.
EEC
200, Rue de la Loi
B-1049 Bruxelles
(Belgium)

IATTC

DERISO, R.
IATTC
c/o Scripps Institution of Oceanography
La Jolla, California 92093
(U.S.A.)

ICSEAF

DRAGANIK, B.
Secretario Ejecutivo Adjunto
Paseo de la Habana 65
28036 Madrid
(Spain)

NEAFC

REY, J. C.
(see EEC)

NATIONAL TAIWAN UNIVERSITY

HSU, C. C.
Institute of Oceanography
National Taiwan University
P.O. Box 23-13
Taipei
(Taiwan)

ICCAT Secretariat:

O. Rodríguez Martín
P. M. Miyake
P. Kebe
M. E. Carel
D. DaRodda
M. A. F. de Bobadilla
J. L. Gallego
C. García Piña
F. García Rodríguez
S. Martin
G. Messeri
J. A. Moreno
P. M. Seidita
G. Stephens
G. Turpeau

Interpreters:

M. Castel
L. Faillace
C. Lord
I. Meunier
T. Oyarzun
V. Parra

Appendix 3 to Annex 8

List of SCRS Documents

SCRS/89/1 1989 Tentative SCRS Agenda

SCRS/89/2 1989 SCRS Annotated Tentative Agenda

SCRS/89/3 Tentative Program--1989 SCRS Meeting

SCRS/89/4 1989 Tentative Agenda of the Sub-Committee on Statistics

SCRS/89/5 Organization of the 1989 SCRS Meeting

SCRS/89/6 1989 SCRS Document Policy

SCRS/89/7 Tuna data available in the ICCAT data base for the Mediterranean region, and an evaluation of data needs for stock assessment purposes - Miyake, P. M.

SCRS/89/8 Substitution and raising done by the Secretariat for bluefin tuna for the 1989 SCRS - Miyake, P. M.

SCRS/89/9 Substitution and raising done by the Secretariat for swordfish for the 1989 SCRS - Miyake, P. M.

SCRS/89/10 Data preparation at the Secretariat for the Albacore Workshop - Miyake, P. M., P. Kebe, D. DaRodda

SCRS/89/11 Secretariat Report on Statistics and Coordination of Research

SCRS/89/12 Report of the Final Meeting of the Yellowfin Year Program

SCRS/89/13 Progress of the ICCAT Enhanced Research Program for Billfish during 1989 - Brown, B. E., E. D. Prince, T. Diouf, P. M. Miyake

SCRS/89/14 Number not used.

SCRS/89/15 Report of the Albacore Longline Data Preparatory Meeting (Taiwan, July 19-26, 1989)

SCRS/89/16 Report of the 1989 ICCAT Albacore Workshop (Madrid, September 19-25, 1989)

SCRS/89/17 Number not used.

SCRS/89/18 Rapport de mission sur la coordination du Programme ICCAT de Recherches intensives sur les Istiophoridés en Atlantique est - Diouf, T.

SCRS/89/19 Progress of the ICCAT Enhanced Research Program for Billfish in the West Atlantic during 1989 - Prince, E. D.

SCRS/89/20 Croissance de l'albacore (T. albacares) en Atlantique est - Bard, F. X., P. Pallarés

SCRS/89/21 Relatorio de la R.P. de Angola sobre las pesquerías de túnidos en el año 1988 -

SCRS/89/22 Actualisation des connaissances sur la reproduction de l'albacore (Thunnus albacares) en Océan Atlantique - Bard, F. X., C. Capisano

SCRS/89/23 Traversées de thons albacores marqués des côtes américaines aux côtes africaines - Bard, F. X., E. L. Scott

SCRS/89/24 Estudio del comportamiento del listado (Katsuwonus pelamis) en la región norte central de Cuba - Valle, S. V.

SCRS/89/25 Information on the swordfish fishery in the Portuguese continental EEZ - Azevedo, M.

SCRS/89/26 Skipjack (Katsuwonus pelamis) fishing experiment results in the Portuguese mainland waters - Azevedo, M.

SCRS/89/27 Tune: A series of fish stock assessment computer programs written in FORTRAN for microcomputers (MS DOS) - Clay, D.

SCRS/89/28 Trends in albacore catch by Japanese longline fishery in the Atlantic Ocean, 1956-1987 - Nakano, H., Y. Watanabe, Y. Nishikawa

SCRS/89/29 Saison de ponte et sex-ratio des albacores capturés au Cap Vert - Santa Rita Vieira, M. H.

SCRS/89/30 Length-weight relationships for western North Atlantic yellowfin tuna - Davis, K. S.

SCRS/89/31 Historical landings and trends in abundance of billfish at Barbados - Oxenford, H. A.

SCRS/89/32 Rapport sur la pêche thonière au Maroc - Srour, A.

SCRS/89/33 Report of the NMFS Swordfish Stock Assessment Workshop, March 20-24, 1989 - Nelson, W. R., B. E. Brown, R. J. Conser, J. J. Hoey, S. Nichols, J. E. Powers, M. P. Sissenwine, S. C. Turner, D. S. Vaughan

SCRS/89/34 Consideraciones relativas a los desplazamientos efectuados por el pez espada (Xiphias gladius) en el área del estrecho de Gibraltar y otras observaciones relacionadas con la biología de la reproducción - Serna, J. M. de la, E. Alot

SCRS/89/35 Nota sobre marcado de listado en aguas del archipiélago canario - Santana, J. C., A. Delgado de Molina, J. Ariz

SCRS/89/36 Tipos de bancos y capturas efectuadas sobre los mismos en el Atlántico intertropical, obtenidos a partir de los datos recogidos en las campañas de observadores del Programa Año del Rabil - Ariz, J., A. Delgado de Molina, P. Pallarés, J. C. Santana

SCRS/89/37 Nota sobre la tasa de mezcla que se produce entre peces de distintos lances almacenados en una misma bodega - Santana, J. C., J. Ariz, A. Delgado de Molina, P. Pallarés

SCRS/89/38 Explotación durante una semana de los túnidos asociados a un objeto flotante en el Atlántico intertropical - Pallarés, P., J. C. Santana, J. Ariz, A. Delgado de Molina

SCRS/89/39 Análisis de los datos recogidos en las campañas de observadores del Programa Año del Rabil, sobre actividad de las flotas, ángulos y distancias de detección, índices de localización y tipos de cardumen - Delgado de Molina, A., P. Pallarés, J. C. Santana, J. Ariz

SCRS/89/40 Nota sobre la colocación de marcas en túnidos, capturados por atuneros comerciales, para conocer la tasa de recuperación de las mismas en el Atlántico intertropical - Ariz, J., A. Delgado de Molina, P. Pallarés, J. C. Santana

SCRS/89/41 Duración del lance en los cerqueros de las flotas FIS y española durante el Programa del Rabil - Pallarés, P., A. Delgado de Molina, J. Ariz, J. C. Santana

SCRS/89/42 Comparación de los muestreos realizados a bordo durante el Programa Año del Rabil, con los correspondientes efectuados en puerto - Delgado de Molina, A., P. Pallarés, J. C. Santana, J. Ariz

SCRS/89/43 Extensions of the Adapt VPA tuning method designed to facilitate assessement work on tuna and swordfish stocks - Conser, R. J., J. E. Powers

SCRS/89/44 Assessment of the South Atlantic albacore resource by using surplus production models, 1967-1988 - Yeh, S. Y., H. C. Liu, T. S. Tsou

SCRS/89/45 National Report of Korea - National Fisheries Research and Development Agency

SCRS/89/46 Producción de las almadrabas españolas en 1988 - Serna, J. M. de la, E. Alot

SCRS/89/47 Indices de abundancia de la pesquería de atún rojo del Mar Cantábrico - Cort, J. L.

SCRS/89/48 Evolution récente des stratégies de pêche thonière dans le Golfe de Guinée - Fonteneau, A.

SCRS/89/49 La surexploitation du stock d'albacore: Mythe ou réalité? - Fonteneau, A.

SCRS/89/50	Analyse des fréquences de longueur, du sex-ratio et des zones de reproduction de l'albacore, Thunnus albacares, d'Atlantique - Capisano, C., A. Fonteneau
SCRS/89/51	Les pêcheries thonières d'albacore de l'Atlantique. Bilan de l'évolution durant la période récente - Diouf, T.
SCRS/89/52	Variations du prix de vente du thon par espèce et catégorie de taille de 1970 à 1987. Effets possibles sur les changements de strategies de pêche des senneurs - Fonteneau, A.
SCRS/89/53	Les anomalies de l'environnement en 1984 dans le Golfe de Guinée - Effets possibles sur la capturabilité de l'albacore - Fonteneau, A.
SCRS/89/54	Proceedings of ORSTOM Working Group on Tunas and Environment - ORSTOM
SCRS/89/55	Oceanography and tuna fisheries in the inter-tropical western Pacific - Pianet, R.
SCRS/89/56	Variabilité interannuelle des océans tropicaux - Hisard, Ph.
SCRS/89/57	Relations "production halieutique/environnement" - Lemasson, L.
SCRS/89/58	Utilisation de la modélisation numérique pour une observation permanente de l'océan - Morlière, A.
SCRS/89/59	Télédétection satellitaire et pêche du germon (Thunnus alalunga) dans le NE Atlantique - Leroy, C.
SCRS/89/60	Les migrations: Un comportement déclenché et guidé par l'environnement - Cayré, P.
SCRS/89/61	L'oligotrophie: Un concept en évolution - Herbland, A.
SCRS/89/62	Rapport sur la pêche et la recherche thonières au Sénégal en 1988 - Diouf, T.
SCRS/89/63	Statistiques de pêche thonière FIS de la période 1969 à 1988 - Diouf, T., A. Fonteneau
SCRS/89/64	Record of occurrence of Gasterochisma melampus (Scombridae) in the south of Brazil - Coelho, J. A. P., A. F. Amorim, C. A. Arfelli
SCRS/89/65	National Report of the U.S.S.R. - Ovchinnikov, V. V., M. E. Grudtsev, V. I. Gaikov
SCRS/89/66	Factores ambientales y pesca atunera de superficie en el Mar Caribe - Medina-Gaertner, M., D. Gaertner
SCRS/89/67	Observations sur la croissance de l'albacore: Thunnus albacares dans l'Atlantique ouest - Gaertner, D., M. Pagavino
SCRS/89/68	Analysis of Billfish Fisheries in Grenada - Andrews, J. K.

SCRS/89/69 Progress on the development of species identification kits for Atlantic Istiophoridae - Hartmann, J. X., R. E. Waldner

SCRS/89/70 Further development of length and weight regression parameters for Atlantic blue marlin, white marlin, and sailfish - Lee, D. W., E. D. Prince

SCRS/89/71 Outline of intended action to identify sex from tissues of eviscerated sailfish - Simon, R. C.

SCRS/89/72 La concentration plurispécifique exploitée par 3° nord et 15° ouest en décembre 1983 et janvier 1984: Caractéristiques biologiques et de l'exploitation - Fonteneau, A.

SCRS/89/73 An update of swordfish tagging data for use in growth analyses - Restrepo, V.

SCRS/89/74 GFCM Circular Letter 89/1 - FAO

SCRS/89/75 Standardized catch rates of bluefin tuna from the Japanese longline fishery in the Exclusive Economic Zone of the United States - Davis, K. S.

SCRS/89/76 The U.S. longline fishery for yellowfin tuna in perspective - Browder, J. A., B. E. Brown, M. L. Parrack

SCRS/89/77 Further simulation results from weighting abundance indices in calibrating VPA - Vaughan, D. S., S. C. Turner

SCRS/89/78 Methods for evaluation of the impact of fisheries management - Turner, S. C., J. E. Powers

SCRS/89/79 Results of a review of the U.S. bluefin tuna larval assessment with a brief response - Richards, W. J.

SCRS/89/80 Standardized catch rates of large bluefin tuna in the New England (U.S.) rod and reel/handline fishery - Brown, C. A., S. C. Turner

SCRS/89/81 Rapport national de la France

SCRS/89/82 Spawning stock biomass per recruit: The biological basis for a fisheries management tool - Goodyear, C. P.

SCRS/89/83 National Report of the United States: 1989 - National Marine Fisheries Service

SCRS/89/84 National Report of Japan - FSFRL

SCRS/89/85 Standardized CPUE of bluefin tuna in the western Atlantic caught by Japanese longline fishery - Miyabe, N.

SCRS/89/86 Standardized CPUE for the Atlantic swordfish caught by Japanese longline fishery - Miyabe, N.

SCRS/89/87 Heterogeneous sex ratio of Atlantic swordfish and the implication to cohort analysis - Suzuki, Z., N. Miyabe

SCRS/89/88 A review of Atlantic bluefin tuna larval surveys - Murphy, G. I.

SCRS/89/89 Bluefin tuna (Thunnus thynnus L.) fisheries in Atlantic Canada: An historical review and hypothesis of minimum assemblage size - Clay, D., T. Hurlbut

SCRS/89/90 National Report of Canada - Clay, D., T. Hurlbut, J. M. Porter

SCRS/89/91 Distribución vertical de los atunes y especies de pico y su abundancia en el Mar Caribe - Eslava de González, N., D. Gaertner

SCRS/89/92 Comparación de los datos de captura de las estadísticas oficiales y las obtenidas por muestreo de la flota atunera palangrera durante 1988 - Eslava de González, N., H. Salazar

SCRS/89/93 Tuna fishery and environmental data collected in Madeira, 1960-1987 - Gouveia, L., A. Amorim, D. Vacas, T. Araujo

SCRS/89/94 Análisis de contenidos estomacales del listado, Katsuwonus pelamis, en aguas las Islas canarias - Ramos, A., J. J. Castro, J. M. Lorenzo

SCRS/89/95 Sobre las regresiones de las longitudes de otolitos, diámetro del ojo y longitudes de la cabeza con la longitud a la furca de listado (Katsuwonus pelamis). Posible aplicabilidad en estudios de predación en aguas del archipiélago canario - Ramos, A. J., J. R. Herrera

SCRS/89/96 Composición de las capturas atuneras de superficie de Venezuela deducida a partir de muestreos multiespecíficos en puerto - Pagavino, M., D. Gaertner, H. Salazar, L. Astudillo, C. Castillo

SCRS/89/97 Production model analysis on Atlantic bigeye tuna as of 1987 - Pereira, J., N. Miyabe

SCRS/89/98 Analyse de l'abondance de patudo atlantique en 1973-1975 - Pereira, J.

SCRS/89/99 Etat du stock du patudo atlantique en 1989 - Pereira, J.

SCRS/89/100 National Report of Portugal - Pereira, J.

SCRS/89/101 Informe nacional de España - Cort, J. L.

SCRS/89/102 Use of spawning stock size considerations in providing fishery management advice in the North Atlantic - A brief review - Brown, B.

SCRS/89/103 Jamaican recreational and artisanal billfish catches, An update, including the 1988-89 report - Harvey, G.

SCRS/89/104 Potentialités du radar SAR en halieutique: Application à la pêche thonière de surface (Experimentation HAREM) - Petit, M., J. M. Stretta, H. Farrugio, A. Wadsworth

SCRS/89/105 Les facteurs hydroclimatiques et biologiques induisant les concentrations de thonidés dans le Golfe du Lion - Liorzou, B., Y. Guénégan, J. L. Bigot

SCRS/89/106 Taiwanese longline fishery status in the Atlantic, 1988 - Hsu, C. C.

SCRS/89/107 Campañas de marcado de atún blanco (Thunnus alalunga Bonn.) realizadas por España en el Mar Cantábrico (1976-1988) - Cort, J. L., J. Mejuto

SCRS/89/108 Resumé de la situation de la pêche ux thonidés - Cap Vert, 1988 - M. H. Santa Rita Vieira

REFERENCE Annexe au document SCRS/89/30: Analyse des fréquences de longueur, du sex-ratio et des zones de reproduction de l'albacore, Thunnus albacares, de l'Atlantique

Appendix 4 to Annex 8

Report of the Meeting of the Billfish Working Group

OVERVIEW OF THE ENHANCED RESEARCH PROGRAM FOR BILLFISH

The ICCAT Enhanced Research Program for Billfish to improve the data base necessary to assess the status of the stocks was first approved and organized during the 1986 SCRS meeting. Actual work on the program began during the 1987 calendar year and was directed primarily at identifying appropriate locations and establishing contacts to accomplish this program's major objectives concerning landing statistics, development of a billfish tagging program, and advancing studies on age and growth.

Research activities during the first year (1987) stimulated considerable interest in the program, as reflected in the number of SCRS working documents on billfish (19) submitted to ICCAT during the 1988 SCRS meeting. Actual research accomplishments during the 1987 calendar year were minimal since full-scale activities in many locations did not get started until the following year. Nevertheless, considerable progress was made and included the following: (1) Development of preliminary sampling instructions and associated data forms; (2) Survey of ICCAT reporting countries for methods of dressing and holding billfish; and (3) Development of various conversions for length and weight of Atlantic istiophoridae.

The second year of the Program (1988) was actually the first time full-scale research activities began in most locations, and these included Cumaná and La Guiara (Venezuela), Barbados, Grenada, Dominican Republic, Jamaica, St. Maarten, Netherlands Antilles, Dakar (Senegal), and Côte d'Ivoire. Shore-based sampling was accomplished in most of these locations, as well as at-sea sampling of Venezuelan industrial longline fisheries. Progress was also made by scientists at Florida Atlantic University in isolating bioproteins from muscle tissue of blue marlin, white marlin and sailfish for development of field species identification kits. Commercial and recreational landings statistics and historical data records, including size frequency data, were obtained from many of the locations chosen for intensive scientific study. Evaluation of 1988 research results enabled scientists to identify weaknesses, refine research activities, and in some cases modify approaches to resolve problem areas.

Research activities during the third year of the program (1989) concentrated on advancing previous years' work and expanding activities based on 1988 results (Addendum 1). Development of species identification kits, necessary for acquisition of accurate size frequency data from landings of off-shore longline fisheries, were scheduled for initial lab testing late in 1989 (results not available at this time). An unusual research opportunity for determining the sex of eviscerated billfish carcasses was pursued in 1989 (at no cost to ICCAT) and resulted in successful development of a laboratory technique to resolve this difficult problem. This research will not only allow sex determination of eviscerated billfish carcasses but also has implications for other ICCAT fisheries as well (i.e., swordfish and tuna).

The components for the ICCAT billfish tagging kit were developed and assembled in 1989, including brochures and posters (in three languages). This will allow full implementation of the ICCAT billfish tagging program in the coming year. Compilation and computerization of the first two years' data collection for this program are scheduled for late 1989 and early 1990.

ADDITIONAL INFORMATION

Additional information was made available to the Working Group during the meeting. Mr. T. Diouf (Senegal) submitted a more detailed account of 1989 results accomplished in Senegal. In particular, a review of four observer trips on Spanish longline vessels (targeting swordfish) were provided and discussed among the group. Catches can be as high as 60 sailfish per trip. The estimated total catch was at least 100 MT. A detailed paper is in preparation which will also include material on Senegalese longliners. The artisanal fisheries were sampled in Senegal. The exploited size ranged from 134 cm to 175 cm. A total of 30 boats were in the sport fishery this year. About 40 MT were landed. The size range was 134 to 205 cm FL. Fifty sailfish were tagged and there were two recaptures. A length-weight relationship was computed for 216 individuals. The results were: $W = 4.674 \times 10^{-6} L^{3.063}$ (L = cm LJFL and W = gm).

Dr. D. Gaertner (ORSTOM, Cumaná, Venezuela) provided a summary of historical data for the Venezuelan recreational billfishery from the three major marinas, dating from 1961 to 1989. A small artisanal gillnet fishery near Margarita Island for mackerel, which also catches unknown quantities of billfish, was also identified.

Dr. E. Kwei (Ghana) informed the group that a detailed report addressing methods of estimating billfish landings in Ghana has been completed and will be made available to ICCAT scientists by December, 1989. The value of this report was discussed among the group, since the landings of billfish (principally sailfish from the artisanal gillnet fishery) in Ghana represent one of the largest billfisheries in the Atlantic Ocean.

Research activities for 1990 were discussed in detail, including financial expenditures, and final modifications of the draft Program Plan for the Enhanced Research Program for Billfish follows herewith.

PROGRAM PLAN FOR THE ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH - 1990

The original plan for the Enhanced Research Program for Billfish included the following objectives: (1) To provide more detailed catch and effort statistics (particularly size frequency data); (2) To intensify 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 stocks. The research areas in the objectives given above have long been recognized in SCRS reports as being inadequate for stock assessment. Therefore, it was clearly recognized that this program would require considerable effort and funds for an extended period of undetermined length. The original objectives of the program, as well as the two major areas identified for intensive scientific study (Caribbean Sea and the west coast of Africa), have remained the same since the program was started in 1986.

At the 1989 SCRS Plenary Session, Dr. B. Brown (U.S.A.) was appointed to act as general coordinator of the Program and Dr. E. Prince (U.S.A.) and Mr. T. Diouf (Senegal) to act as coordinators for the western and eastern Atlantic Ocean, respectively. Research results, as well as a financial summary for 1989 are presented to the 1989 SCRS and Commission meetings (attached herewith as Addendum 1). Research activities for 1990 have been drafted on the basis of previous years' work.

Funds for some 1989 research activities were either totally or partially spent, while for other activities, 1989 funds that were transferred to the contractees have not yet been totally spent. Therefore, 1990 research activities that require 1990 funding are distinguished from those that still have partial or total funding left at the contractees from 1989. The summary of the 1990 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 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 and projected funds for future research activities will be available in subsequent annual program plans. No funds are allocated for artisanal longline observers.

All institutes and/or personnel receiving ICCAT funding from the billfish program are required to summarize annual research activities by submitting SCRS working documents, including an explanation of expenditure of funds. In addition, all funded participating cooperatives in this program will be required to submit data (either to area coordinators or directly to the ICCAT Secretariat) collected in 1990 and in previous years, prior to the 1990 SCRS meeting.

A) SPECIES IDENTIFICATION KITS/SEX DETERMINATION

A-1 Species Identification Kits

As reported in SCRS/89/69, a study to develop field species identification kits for istiophoridae is progressing on schedule. The 1989 activities concentrated on determining the specificity and sensitivity of polyclonal antisera produced against white muscle proteins for Atlantic istiophorids. In addition, an alternative approach of using albumin was investigated since cross-reactivity was detected using white muscle tissue. Laboratory tests of species identification methods are scheduled for December, 1989. During early 1990 two methods developed in 1989 will continue to be evaluated for cross-reactivity and the method that demonstrates the least cross-reactivity in laboratory tests will be used to construct test field kits (about 150 kits) later in the year. Funding for 1990 activities are projected to be $6,600.

A-2 Sex Determination of Eviscerated Carcasses

Preliminary experiments to determine sex of eviscerated sailfish carcasses, based on sailfish antisera, were successful as reported in document SCRS/89/71. These data will be confirmed in 1990 with a larger sample size. In addition, since sailfish antisera were also successful in distinguishing male and female Atlantic salmon and striped bass, further experimentation using this antisera seems justified for blue marlin, white marlin, swordfish, and other scombrids as well. Funds for laboratory chemicals will be contributed by the U.S. National Marine Fisheries Service, while other costs of the research will be contributed by the U.S. Fish and Wildlife Service. ICCAT funds for this activity will not be necessary.

B) SHORE-BASED SAMPLING

Cumanã, Venezuela. Shore-based sampling of size frequency data for billfish carcasses off-loaded from industrial longline boats at the port of Cumanã will be continued in 1990. Funding for 1990 will be $200. A few multi-purpose trips may be conducted by the western Atlantic coordinator to observe the sampling (see section on Coordination).

Caracas, Venezuela. Shore-based sampling and detailed analysis of the recreational fishery (centered in La Guarira, Venezuela) will be continued in 1990. Dr. J. Alio (FONAIAP) will direct this research effort, assisted by Dr. D. Gaertner (ORSTROM). This sampling will provide detailed analysis of catch, effort, size, and sex of landings and development of historical statistics. Funding for 1990 will be $2,100.

Grenada. Shore-based sampling of size frequency and total landings from the artisanal fishery for billfish will be conducted by governmental personnel in 1990. Funding for 1990 will be $1,000.

Barbados. Shore-based sampling of the size frequency and total landings from the artisanal and recreational fishery will be conducted by personnel from the Bellaires Research Institute in 1990. Cooperative sampling of landings data from Tobago, with personnel from the University of West Indies, may also be attempted this year. Funding for 1990 will be $1,000.

Jamaica. Shore-based sampling of size frequency and total landings from the recreational and artisanal fishery will be conducted by Dr. G. Harvey, and also with personnel from the University of West Indies, if possible. Funding for 1990 will be $1,000.

Dominican Republic. Shore-based sampling of size frequency and total landings from the recreational fishery will be conducted by personnel from MAMMA for 1990. Historical data from billfish tournaments and acquisition of data from juvenile billfish for age and growth studies will also be obtained. Funding for 1990 will be $1,000.

St. Maarten, Netherlands Antilles. Shore-based sampling of size frequency data for off-loaded billfish carcasses from China-Taiwanese, Korean, and Panamanian longline operations will continue in 1990 through the Curaçao Pioneering Company. Funding for 1990 will be $1,500, as only two vessels were sampled in 1989. One trip to the contractee will be required by the ICCAT Assistant Executive Secretary (see section on Secretariat Coordination) to fully implement this program.

Las Palmas, Canary Islands. The Assistant ICCAT Secretary will visit the port to investigate the reason why sampling was not carried out, even though a sampler was hired in 1989, and to correct the situation, if possible (see section on Secretariat Coordination). Funding for 1990 will be $700.

Dakar, Senegal. Shore-based sampling of the artisanal, recreational and Senegalese swordfish longline fisheries will be continued in Dakar, Senegal, by the eastern Atlantic coordinator. Funding will be $2,000 in 1990.

Côte d'Ivoire. Abidjan shore-based sampling of the artisanal and recreational billfish fisheries will be continued in 1990. Funding will be $1,500 in 1990.

Ghana. Shore-based sampling of the artisanal gillnet billfisheries will be initiated in 1990. Funding will be $1,500 in 1990.

Benin. Shore-based sampling of blue marlin and sailfish at one port in Benin will be initiated in 1990. Funding will be $500 in 1990.

C) AT-SEA SAMPLING

Cumaná, Venezuela. Five observer trips are planned aboard industrial longline vessels out of Cumaná harbor for 1990. More trips will be made if the opportunity arises. Funding for 1990 will be $2,800.

Mexico. The Coordinator will discuss research with Mexico at the MEXUS-Gulf meeting in November, 1989. Cooperation with an on-going Mexican observer program aboard longline vessels targeting yellowfin tuna in the Gulf of Mexico might be possible in 1990. Funds for this activity are not anticipated at this time.

Trinidad and Tobago. A research proposal from Dr. J. Kenny, University of the West Indies, is anticipated during the first part of 1990 to put observers on industrial longline vessels fishing for tuna out of Trinidad. Funds will be released only if arrangements can be made for observers aboard longline vessels. Funding for 1990 will be $1,000.

Cuba. Correspondence with Cuban scientists indicates an interest in conducting research on billfishes through ICCAT. However, no proposal has been received as of this date. Funds will be released only if an appropriate proposal is received. Funding reserved for this work for 1990 is $1,000.

Other Caribbean Countries. Barbados and Grenada reported numerous longline vessels targeting tuna and swordfish (SCRS/89/31 and SCRS/89/68). If the opportunity presents itself, cooperators from these locations already working on the ICCAT billfish program will attempt to put observers on these vessels. Funds for Grenada for this activity will not be necessary since the $300.00 released last year for this purpose was not spent. Funding for Barbados for 1990 is $500.

Senegal. Work will continue using Senegalese observers on Spanish longline vessels targeting swordfish. No additional funds are necessary for 1990.

D) BILLFISH TAGGING PROGRAM

The majority of the items comprising the tagging kit were purchased in 1989 and therefore the only funds needed for 1990 will involve the lottery and rewards for tagged and recaptured fish. Funds for 1990 will be $1,500.

E) AGE AND GROWTH

Dependable freezer facilities were developed in the Dominican Republic during 1989 (SCRS/89/19) and this should result in an increase in age and growth samples in 1990. Sampling juvenile billfish using small longliners in Jamaica will be initiated. Funding for 1990 will be $500.

F) COORDINATION

F-1 Travel/Coordination

Experience in the western Atlantic (SCRS/89/19) indicates that it will be necessary to make a series of trips to specific Caribbean island locations to maintain quality control of on-going research. The purpose of this travel will be to train samplers in data collection, pick up data, assist in data summarization, hand-carry frozen samples back to Miami, and maintain contacts with project cooperatives. Similarly, travel will be necessary in the eastern Atlantic. Coordinator Diouf will visit Benin to assist in the development of work in that country. Mr. Martin Mensah will be asked to assist the eastern Atlantic Coordinator with developing possible work in Sierra Leone and Nigeria. Travel by the ICCAT Secretariat is given below (F-3). Funding for 1990 is $10,000. Travel will include the following areas:

-- Cumaná and Caracas, Venezuela
-- Grenada
-- Barbados
-- Jamaica
-- Dominican Republic
-- Trinidad and Tobago
-- St. Maarten, Netherlands Antilles
-- Las Palmas, Canary Islands
-- West African countries (e.g., Ghana, Sierra Leone, Côte d'Ivoire, Benin, Nigeria)

F-2 Miscellaneous/Mailing

Eastern Atlantic miscellaneous and mailing. Funding for 1990 is $500.

Similar needs for the western Atlantic Coordinator are covered by the U.S. domestic budget.

F-3 Secretariat

Funding for mailing and shipment of materials, data management and samples ($1,000) and for miscellaneous expenses and contingencies ($1,000) for 1990 is included. Travel by the ICCAT Secretariat will be required at the end of 1989 or early in 1990 to establish shore-based sampling of billfish at Las Palmas, Canary Islands, and for resolving problems of billfish sampling at transshipment ports. Funding for 1990 will be $2,700.

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 area coordinators.

Table 1. Proposed Budget for Enhanced Research Program for Billfish, 1990

	SUB-TOTAL	TOTAL
A. SPECIES IDENTIFICATION KITS	6,600.00	6,600.00
B. AGE AND GROWTH		500.00
Purchase of hard parts	500.00	
C. TAGGING		1,500.00
Tag rewards	500.00	
Lottery rewards	500.00	
Hard part rewards	500.00	
D. STATISTICS AND SAMPLING ENHANCEMENT		19,300.00
West Atlantic Research		
Cumaná, Venezuela	200.00	
Caracas, Venezuela	2,100.00	
Grenada	1,000.00	
Barbados	1,000.00	
Jamaica	1,000.00	
Dominican Republic	1,000.00	
Venezuelan at-sea sampling	2,800.00	
Trinidad Tobago at-sea sampling	1,000.00	
Mexico at-sea sampling	0.00	
Cuba at-sea sampling	1,000.00	
Caribbean at-sea sampling	500.00	
St. Maarten port-sampling	1,500.00	
Las Palmas port-sampling	700.00	
East Atlantic Research		
Dakar, Senegal	2,000.00	
Senegal at-sea sampling (Spanish longline vessels)	0.00	
Côte d'Ivoire	1,500.00	
Ghana	1,500.00	
Benin	500.00	
E. COORDINATION		15,200.00
Travelling by Coordinators	10,000.00	
Travelling by Secretariat	2,700.00	
Mailing and miscellaneous - East	500.00	
Secretariat support (data management, mailing etc.)	2,000.00	
GRAND TOTAL		43,100.00

Addendum 1 to Appendix 4

PROGRESS OF THE ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH

INTRODUCTION

Research activities during 1989 began on a limited scale shortly after the 1988 SCRS meeting and significant progress was made since the first of the year. The objectives presented in the initial program plan in 1986 (Appendix 6 to Annex 12 of Report for Biennial Period, 1986-87, Part 1) have not changed, and include: (1) Provide more detailed catch and effort statistics; (2) Expand the ICCAT billfish tagging program; and (3) Assist in collecting data for age and growth studies in order to provide the data necessary for assessing the status of the billfish stocks.

The two locations for intensive scientific study given in the original plan remain the Caribbean Sea and the west coast of Africa. The overall program coordinator during 1989 was Dr. Bradford Brown (U.S.A.); Dr. Eric Prince (U.S.A.) was the coordinator for the western Atlantic Ocean and Mr. Taib Diouf (Senegal) coordinated activities in the eastern Atlantic Ocean. Detailed activities are reported in SCRS/89/19 and SCRS/89/18, respectively. This report summarizes the progress made by ICCAT on the Enhanced Billfish Research Program.

OBJECTIVE 1 — IMPROVEMENT OF CATCH, EFFORT AND SIZE DATA

EAST ATLANTIC

Coordination travel in the East Atlantic

The East Atlantic Coordinator, Mr. T. Diouf, made an extended trip to identify billfish fisheries, evaluate research activities on these fish, and coordinate and arrange sampling of billfish along the west coast of Africa. His trip included Cote d'Ivoire, Ghana, Togo and Benin.

Details of his findings can be found in SCRS/89/18.

Collection of statistics and sampling

Ghana. Apam, Shama, Axim and Dixcove are identified as the major landing sites for sailfish caught by the artisanal canoe fishery. Through a billfish research program, collection of statistics and biological sampling (including size and sex) have begun from this fishery. The historical landings are being documented. Various recommendations on research activities were made.

Togo. No significant landings of billfish are identified.

Benin. All landings are made at only one site. The landings are estimated by stratified sampling of the artisanal fishery. Among the catch, sailfish, blue marlin and swordfish were identified, and the total amount of landings for 1986-1988 were estimated for these species together with some units of effort.

Cote d'Ivoire. The billfish fisheries were described by Amon Kothias (1986). Landings are made at Abidjan and occasionally at Port Bouet. The billfish catches by artisanal fishing are being sampled. There are many sport fishing clubs and these were contacted. Some historical catch data were collected but access to the majority of existing data was difficult. Some tagging activities by sport fishermen have been recognized.

Billfish are caught incidentally by the industrialized fishery (tuna and sardine) and are usually consumed at sea.

WEST ATLANTIC

Coordination Travel in the Caribbean Sea

Dr. Eric Prince made four trips to Caribbean locations in 1989 and included stops in Grenada, Barbados, Jamaica, Caracas and Cumaná, Venezuela, and Santo Domingo, Dominican Republic, in order to make local contacts, to train personnel, arrange sampling and data collection and to cover some tournaments in order to obtain samples for age and growth studies. Details of his trips are reported in SCRS/89/19.

Collection of statistics and sampling

Grenada. Shore-based sampling activities of the artisanal fishery continued during the 1988-89 season. Size frequency data were collected primarily from sailfish, although several blue marlin were also sampled. Efforts were made to put an observer on board one of the larger longliners based from this port but were not successful because most of the larger boats had changed fishing grounds prior to availability of funds.

Barbados. Historical billfish landing statistics have been summarized from the artisanal fishery, dating back to 1957 in SCRS working document SCRS/89/31. In 1989, shore-based sampling of sailfish, white marlin, and blue marlin continued on a limited scale in Barbados.

Jamaica. Research activities in 1989 are scheduled to be submitted at the 1989 SCRS meeting. Shore-based landings statistics were collected and sampling (primarily from blue marlin) were made from four recreational billfish tournaments in Jamaica and on several tournaments held outside Jamaica in 1989. In addition, artisanal marlin fishing in Jamaican coastal waters was sampled. The Port Antonio billfish tournament will give $1,000 (U.S.) to the ICCAT Billfish Program in January, 1990.

Dominican Republic. Shore-based landings statistics were collected and sampling was made from white and blue marlin at five recreational billfish tournaments in 1989. In addition, muscle tissue samples from 34 white marlin were obtained for development of the species identification kits.

Venezuela. Shore-based sampling activities produced measurements of several hundred (each) blue marlin, white marlin, and sailfish at the port of Cumaná, Venezuela. Cumaná is a base for 19 industrial longline vessels which target yellowfin tuna but which also catch billfish. During the late spring, many of the longline boats were off-loading their catches at other Caribbean ports due to economic considerations and this resulted in less shore-based sampling during this period.

Shore-based sampling of the recreational fishery mostly from the La Guaira area, was accomplished for six tournaments in 1989. These data are being summarized by Alio and Gaertner.

At-sea sampling was done on five trips as of October, 1989. Two additional trips have been scheduled for the remainder of the year. Observer data were used to help compute additional length regressions (total length vs. lower jaw fork length) for istiophoridae (Lee and Prince, SCRS/89/70) as well as calculate dead discards for total landings reports for the U.S. longline fishery in the Caribbean Sea.

St. Maarten, Netherlands Antilles. Shore-based sampling at the Curaçao Pioneering Company in St. Maarten, Netherlands Antilles, continued in 1989 from the large Asian longline fleets. Sampling requirements were simplified for the 1989 season (only one measure of length was required) in hopes of obtaining a larger volume of data. As of October, 1989, two vessels have been sampled resulting in measurements from 100 white marlin and sailfish.

SPECIES IDENTIFICATION KITS

Hartmann and Waldner (SCRS/89/69) summarized 1989 research on the development of field species identification kits. Additional muscle tissue samples from sexed sailfish and white marlin were provided for the studies by the Coordinator. Because of the importance of this research, the General Coordinator approved an additional $2,000 expenditure when more laboratory materials were needed at the beginning of the year. Research on this project is on schedule and the first laboratory test for Atlantic sailfish will occur in December, 1989. Once this first laboratory test is successfully carried out, the other two species will be tested in the laboratory prior to actual development of the kit and field testing later in 1990.

A test to determine the sex of dressed billfish carcasses using muscle tissue is being developed by the U.S. Fish and Wildlife Service (major portion) with some assistance from the U.S. National Marine Fisheries Service. The West Atlantic Coordinator obtained muscle tissue, kidney and gonad samples from ten Atlantic sailfish and the results of this work are summarized by Simon in SCRS/89/71. This work could make an important contribution because sexually dimorphic growth has been demonstrated for istiophoridae, thus the sex ratios of the landings need to be determined. If successful, this research could be applied to other species as well.

OBJECTIVE 2 -- BILLFISH TAGGING PROGRAM

The tagging of billfish has been continued on the national level, with much assistance by sport fishermen, as a part of the ICCAT international tagging program. In the 1989 annual tag lottery, a special reward of $500 was added for billfish and a commercial fisherman from Louisiana, U.S.A., won the prize.

In order to make the ICCAT billfish tagging program more effective, two types of tagging posters, one for general use and one with detailed instructions for collection of hard parts, as well as tagging brochures were developed and printed in the Commission's three official languages at the Secretariat. Much help was provided by the West Atlantic Coordinator, in providing drafts, photos and part of the art work.

All the components of the tagging kits were developed in collaboration with the West Atlantic Coordinator and the Secretariat. Instead of a hat, as originally planned, a special ICCAT logo was developed to be given to sport fishermen who released the fish.

The tagging kits have been assembled at the ICCAT Secretariat and are available for distribution. As the materials cost much more than estimated, only 300 kits were assembled in 1989. The tagging program is anticipated to be totally functional in 1990 and participation on both sides of the Atlantic will be actively encouraged in the coming year.

OBJECTIVE 3 -- AGE AND GROWTH

Some important samples of skeletal structures for conducting age and growth research were obtained during the 1989 season. The otoliths and dorsal spines from two very large blue marlin (1,190 and 1,002 pounds), and a 139-pound white marlin were obtained from Bermuda, North Carolina (USA), and the Dominican Republic, respectively. These exceptionally large specimens are critical for estimating the maximum life span for these species. Four blue marlin were injected with oxytetracycline, tagged, and released by the western Atlantic coordinator during the October billfish tournament in Jamaica. This tournament (sponsored by the Billfish Foundation) is being conducted to validate the accuracy of aging methods for this species.

FUNDING AND EXPENDITURES

The special Trust Fund, established by private contributions for the Enhanced Billfish Research Program was administered by the Secretariat. All expenditures were made through authorization by the General Coordinator.

At the beginning of 1989, $18,319.21 were available in the the Fund while $12,000.00 were received from the Billfish Foundation (U.S.A.) during 1989 (as of October 5, 1989). The expenditures and balance for each chapter items are shown in the attached table.

As support for the Secretariat, $2,000 were applied towards the purchase of FAX equipment and a copying machine (the bulk of the expenditure was covered by the ICCAT Regular Budget). No other overhead costs were charged to the Fund, nor were any trips made by the Secretariat staff.

BALANCE SHEET FOR THE BILLFISH PROGRAM, 1989
(As of October 5, 1989)

Items	Amount Prior. 1	Budgeted Prior. 2	Expenditures*	Budget less Expenditures
Species Ident. Kits ($4,600.00)	4,600.00		6,646.20	-2,046.20
Age and growth (1,000.00)				
Purchase of hard parts	500.00	500.00	0.00	1,000.00
Tagging (3,500.00)				
Tagging kit	1,000.00		1,951.84	-951.84
Tag rewards	500.00		0.00	500.00
Lottery rewards	500.00		500.00	0.00
Hard parts rewards	500.00		0.00	500.00
Posters and brochures	1,000.00		2,190.40	-1,190.40
Statistics and sampling enhancement (20,000.00)				
Cumaná, Venezuela	500.00		0.00	500.00
Caracas, Venezuela	1,000.00	500.00	1,000.00	500.00
Venezuelan at-sea sampling	2,000.00	1,000.00	0.00	3,000.00
Caribbean Is. at-sea sampling		3,600.00	326.46	3,273.54
St. Maarten, Neth. Antilles	800.00	700.00	406.50	1,093.50
Las Palmas-Tenerife, Can.Is.	600.00	600.00	200.00	1,000.00
Senegal	2,000.00		2,006.40	-6.40
Senegal at-sea sampling (Spanish longline vessels)	700.00		700.00	0.00
Côte d'Ivoire	1,500.00		1,506.49	-6.49
Other West African countries (Ghana, Benin, Côte d'Ivoire, Sierra Leone)		4,500.00	0.00	4,500.00
Coordination (15,000.00)				
Travel by Coordinators and Secretariat to establish projects and maintain quality control	8,000.00	4,000.00	6,332.05	5,667.95
Mailing and Miscellaneous-East Atlantic Coordinator	500.00		500.00	0.00
Secretariat support—mailing shipping, publications, data management, miscellaneous	2,000.00	500.00	2,000.00	500.00
TOTAL	28,200.00	15,900.00	26,266.34	17,833.66

*Includes bank charges

STATUS OF BILLFISH TRUST FUND

Balance at end of Fiscal Year 1988 (December 31, 1988)	$18,319.21
Received in 1989 (from Billfish Foundation, U.S.A.)	+ 12,000.00
Expenditures (as of October 5, 1989)	− 26,266.34
Total in account (as of October 5, 1989)	$4,052.87

Appendix 5 to Annex 8

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 2, 1989. Dr. R. Conser (U.S.A.), the Convener of the Sub-Committee, chaired the session. He welcomed the participants and stressed the importance of the work of the Sub-Committee.

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 STATISTICAL PROGRESS MADE BY NATIONAL OFFICES

3.1 National data collection systems

The Secretariat Report on Statistics and Coordination of Research (SCRS/89/11) was reviewed as to the progress made by the national offices in the collection of data. Table 1 shows the progress made by the national offices and by the Secretariat in the collection of 1988 statistics.

Although the overall quality of the Mediterranean statistics is still unsatisfactory compared with other areas, significant improvements have been made in the reporting of data.

3.2 Data processing by national offices

The Sub-Committee on Statistics noted that the Secretariat had great difficulties in meeting the deadline for updating the catch-at-size tables for bluefin, swordfish and albacore in 1989. This was mainly due to the fact that many national offices sent raw, unprocessed data and that the delivery of the data was very late.

The Committee confirmed that it is the responsibility of each member country to assure that the catch-at-size data are created by the national offices and submitted to ICCAT on time. It was recommended that the actual size frequencies be sent together with the raised files. At the same time and in order to make the evaluation of the quality of data possible, the Sub-Committee recommended that documentation be made of the actual number of fish sampled and used for estimating catch at size, as well as the raising factors and any data substitutions made. To facilitate this, the

Secretariat was asked to prepare a table format, similar to that in document SCRS/89/8 and 9, which includes information on substitution and raising. The table format thus prepared should be attached to the data requests which the Secretariat sends to the national offices for their use.

3.3 Reporting to ICCAT

The Sub-Committee noted that more Task I data were available at the time of the SCRS meeting, but that many of these data arrived at the Secretariat only a few days before the meeting. This made the Secretariat's preparation of the data base for the SCRS extremely difficult. As discussed above, this is also a problem for size and catch-at-size data.

The Sub-Committee urged the national scientists to submit the data and assure that they are received at the Secretariat, at the latest, two weeks before the SCRS stock assessment session starts.

It was also stressed that all the new data included in the national reports or scientific papers be formally re-submitted by the respective countries in the proper format to the Secretariat.

3.4 Improvements to be made

The recommendations made in sections 3.1 to 3.3 are reconfirmed. It is also recommended that data files submitted to the Secretariat on magnetic tape or diskette be in ASCII files, rather than word processing files.

4. EXAMINATION OF PROGRESS MADE BY THE SECRETARIAT

4.1 Data processing carried out in 1989

The Sub-Committee recognized that the data processing carried out at the Secretariat increased to a large extent. The volume of routine work (updating the data bases including the tagging file) has been increasing as the volume of data increases. Also, the Secretariat prepared the data bases for the three intersessional scientific meetings held in 1989. The Secretariat provided computer support to the meetings, and did considerable data processing (e.g., creating catch-at-size base) before, during and after each meeting. The Secretariat also updated the bluefin and swordfish catch-at-size data base during the SCRS.

Although the reorganized data bases have been updated, the bluefin and small tunas size data still have to be reorganized. It was recognized that this task has first priority.

The Sub-Committee also recommended that the tagging data be reorganized and made into one file. In order to clarify some confusion on the historic tagging information, literature research and collaboration of national scientists are required.

4.2 Port sampling program

Routine port sampling from longliners at various transshipment ports was carried out as usual by ICCAT. Mr. J. Ariz of the Spanish Oceanographic Institute (IEO) in Tenerife visited the port of Las Palmas and trained a new sampler. The Sub-Committee expressed its appreciation to him. However, the sampling rate was very low at the Canary Islands, Montevideo, and St. Maarten (two samples each), for the following reasons:

i) Many oriental longliners have left the Atlantic or have been converted to extremely low-temperature freezers and are no longer unloading at Atlantic ports.

ii) Due to the lack of supervision through direct contact with the samplers at the ports, it is becoming difficult to control the quality of sampling.

The Sub-Committee recognized the usefulness of port sampling as has been proven for the albacore data analysis (SCRS/88/15) and noted that the possibility of sampling billfish can also be achieved. Concern was expressed about the recent low sampling rate. It was recommended that the Secretariat intensify the monitoring of the samplers at ports to secure better sampling. In particular, the Assistant Executive Secretary should visit the port of St. Maarten, possibly combined with other missions to the west Atlantic, to reconstruct the sampling system there. It seems that a considerable number of longliners are still unloading at this port. On the other hand, landings at Montevideo and Las Palmas have been very low in the last several months. For this reason the Sub-Committee recommended monitoring these ports by the present collaborators and IEO and then re-evaluating the situation if landings increase in the future.

Sampling at Cape Town is being carried out by the Sea Fisheries Institute of South Africa and the coverage is satisfactory.

The Sub-Committee learned that the contract between the CRO-Abidjan and ICCAT signed in early 1986 to finance biological sampling from the Ghanaian surface fleet unloading at Abidjan, was extended into 1989. The Sub-Committee was informed that since September, 1989, all the Ghanaian baitboats are unloading at Tema, rather than at Abidjan. Therefore, sampling in Abidjan will be discontinued in 1990, except on consignments purchased by Abidjan canneries, for species composition, until some major landings by the fleet resumes. The contract between ICCAT and CRO-Abidjan can be revised for 1990 just to accommodate the possible event of resumption of landings at Abidjan. The Sub-Committee understood that the Ghanaian scientists are sampling from these landings at Tema, with procedures similar to those used in Abidjan for size and species composition. Ghana scientists thanked the CRO-Abidjan for the assistance give to the Ghanaian sampling program when these boats were unloading outside their home country. The Sub-Committee hoped that the ICCAT logbooks, which have been well accepted by the fishermen, will continue to be collected at Tema and processed by the Fishery Research Unit. The Sub-Committee authorized the Secretariat to assist, if necessary, in the data processing at its headquarters from field logbooks to the TASK II format and make these data available for the Commission.

The Sub-Committee was concerned that the stock of logbooks for the Ghanaian baitboats is depleted. It recommended that the Secretariat print more logbooks and make arrangements for them to be distributed at Tema and Abidjan to all the Ghanaian baitboats.

4.3 Secretariat data management policy

No changes were proposed to the present data management policy.

4.4 Data dissemination and publication

The Sub-Committee noted that the provisional volume of the Statistical Bulletin was not issued in 1989, as had been agreed at the 1988 SCRS meeting. All other statistical publications have been issued regularly, i.e., Collective Volume of Scientific Papers, Statistical Bulletin, and Data Record.

It also noted that this year's catch summary tables (so-called species tables) have been reorganized, in accordance with a 1988 SCRS recommendation. The program to generate these tables is designed with sufficient flexibility so that the cut-off level of the catch, below which the fisheries are combined as "others", is an input parameter rather than an arbitrary decision. This procedure was approved by the Sub-Committee.

4.5 Biostatistical assignments

The Secretariat reported that most of the data processing and work on the data bases, as discussed previously, required preliminary biostatistical studies. Also, the improvement of Mediterranean statistics involves biostatistical work (see Section 5.2). All of these were carried out by the Secretariat.

The Sub-Committee noted that biostatistical work, such as analysis of the sampling scheme, etc., has been greatly reduced since the permanent biostatistician has left the Secretariat. It requested the Secretariat to prepare a list of accumulated biostatistical problems and of those arising from the SCRS stock assessment work and that this list be presented at the next meeting of the Sub-Committee. The Committee can then study the work priorities and how to carry them out in the most efficient way.

5. Review of progress made on recommendations for statistics as contained in the 1988 SCRS Report

5.1 Expansion of computer facilities

HARDWARE: The Secretariat reported that 2 MB extra real memory (RAM) and a hard disk of 622 MB with a controller were obtained to increase the efficiency and capacity of the Commission's Micro-VAX II. These purchases were made in the U.S., in order to make the most effective use of the funds available. As a result, some funds are still available for 1989. The Committee thanked the U.S. scientists, Drs. Conser, Turner, Parrack and

Prince, who helped us make these purchases. The Sub-Committee also noted that the increased capacity of the computer made it possible to carry out two major assessments (swordfish and bluefin tuna) concurrently.

The Sub-Committee studied the need for hardware and software for the immediate future. It felt a purchase of a stabilizer with a back-up battery is essential for the newly obtained disk unit. Also, it considered an IBM compatible PC with 3-1/2 inch (1.44 MB) and 5-1/4 diskette drives will be very convenient to have. A printer which supports high-quality graphics (Laser or X-Y plotter) was also suggested. The Sub-Committee formed a group to study the priorities among these.

The Secretariat also proposed the purchase of a data base software which can be used by the Micro-VAX/VMS operating system, as the data have only been managed at the Secretariat up to the present as independent FORTRAN files. Since data management is becoming more and more complicated and the volume of data is increasing, an efficient data base system software would add much more efficiency for the Secretariat in meeting many diverse requests by the scientists on the data base.

The Sub-Committee, while noting the importance of introducing such a system, recommended that the Secretariat present alternative options of systems with technical data to be considered at the next SCRS session. However, it also agreed that the purchase of such a system is first priority and recommended that the Commission provide funds for it. At its 1990 session, once the SCRS has agreed on which system is to be obtained, the Secretariat could immediately proceed with the purchase of the selected system.

SOFTWARE: The Secretariat reported that various scientists had provided many stock assessment analytical programs. Those for the PC application have been loaded on the COMPAQ. Other programs to be used on the VAX were adjusted and loaded with the VAX/VMS system for the benefit of scientists during the scientific sessions. In addition, Digital Word Processing software for use with the MS-DOS operating system was purchased.

5.2 Improvement of Mediterranean Statistics

The Assistant Executive Secretary reported on the results of the Seventh Session of the Committee on Resource Management and the Nineteenth Session of the General Fisheries Commission (formally Council) for the Mediterranean (GFCM)), both held in Livorno, Italy from February 22 to March 3, 1989. The Assistant Executive Secretary was instructed by the SCRS to represent ICCAT at these sessions. He presented a report on his bio-statistical evaluation of the Mediterranean data.

The GFCM decided to hold a Joint Workshop on Large Pelagic Species in the Mediterranean (not only for the eastern Mediterranean but for the entire area), in early 1990 and asked ICCAT's collaboration in this workshop.

On his trip to Italy to attend the GFCM meetings, the Assistant Executive Secretary also visited Palermo and met with various Italian tuna and swordfish researchers.

The Sub-Committee further noted that the Secretariat had sent the catch and catch-at-size data base, developed by the ICCAT scientists, to all countries that fish bluefin and swordfish in the Mediterranean for their review.

The Sub-Committee was pleased to note a considerable amount of new data has become available to ICCAT for many Mediterranean countries. However, it was also noted that the improvements were only through personal contacts but not through establishing good statistical systems.

The Secretariat also reported that the Italian official biological sampling program on large pelagic fish, initiated in 1985, ended in 1988 and that there was no sampling plan for 1989. The Secretariat made some minimum, but necessary, size sampling from the Italian bluefin fishery, through a contract with an Italian scientific institute. The sampling was done from purse seine, hand-line, gillnet, harpoon and other fisheries and 1,007 fish were measured.

However, the Committee was in agreement in not establishing this as a precedent as there is a danger that such funding may cause some problems in principle and in logistics in the future. Recognizing the importance of sampling the Italian fishery, the Sub-Committee recommended that the Secretariat contact the Italian Government to persuade it to resume sampling and that the Secretariat solicit the GFCM Secretary's and FAO's collaboration in making the same request to the Italian Government. It is hoped that at the upcoming GFCM/ICCAT joint meeting, the urgent need for sampling will be addressed and corrective methods will be taken.

5.3 Creation of working data base for albacore

The Secretariat reported that it had prepared port sampling data for the Albacore Longline Data Preparatory Meeting held in July, 1989, in Taipei (Taiwan). After the meeting, some errors found in the previous data set for the Taiwanese fishery were corrected and all the size data were replaced with the newly submitted data.

It was also reported that the Secretariat created a catch-at-size file for the Taiwanese fleet for 1963 through 1979. During and after the meeting, the entire catch-at-size data file was created at the Secretariat for all the fisheries in the North Atlantic and started for the South Atlantic.

5.4 Revision of Field Manual

The Secretariat reported that the draft of the revised "Field Manual for Statistics and Sampling" has been completed (in English only for the time being) and distributed among the scientists for review in July, 1989. Since some of the comments received from the scientists were too significant to be incorporated without prior discussion at the SCRS, the Manual has not yet been finalized, although the bulk of the book has been translated.

The Sub-Committee discussed two major issues raised by some scientists regarding the Field Manual.

a) Predorsal length: The Sub-Committee discussed various measurements (e.g., LD_1 and FL) and the merits and disadvantages of these. The Sub-Committee decided that the present instruction in the "Field Manual" which leaves the choice of measurement to each laboratory is acceptable. The Sub-Committee recommended that the SCRS carry out studies on the reliability of these two measurements.

b) Straight measurement of billfish: The West Atlantic Billfish Coordinator felt strongly that all billfish measurements should be taken with a tape for curved length. As many length measurements made in the past aboard longliners were straight measurements, there is some doubt as to whether or not this standard should be insisted upon. After confirming that sampling of all the commercial longlining countries is still done by straight measurements, the Sub-Committee recommended that both measurements be admitted and that a conversion be established between these two measurements.

The Sub-Committee requested and it was agreed that the deadline for receiving comments for the "Field Manual" manuscript be extended until the end of 1989.

5.5 Computer network communication

The Sub-Committee noted that this was a matter of an electronic mailing system, and not a network between different data bases. The systems would permit transmission of files as well as messages to all the users connected to the international network.

The IBM compatible PC (COMPAQ-386) available at the Secretariat could be equipped with a modem linked by an IBERPAC network line. The relative costs of this equipment would be:

-- P.A.D.	$2,000
-- Hook-up	$ 300
Total	$2,300

To this total, the following three types of user costs must be added:

-- Fixed user's fee (2400 b/s)	$2,000 / year
-- Charges based on quantity transmitted	(depends on use)
-- Charges based on time used	(depends on use)

The high cost of commercial networks with error-check mechanisms was discussed against the low cost scientific or computer companies' networks. There were some questions about the availability of such networks in Spain and/or with organizations which are not university affiliated. The Sub-Committee agreed that the computer network could be very economic (depending on the system), fast, reliable and convenient and recommended that the Secretariat investigate further the options available to the Commission. It also recommended that should a network be available which the Commission's budget for 1990 could afford, the Secretariat make arrangements to join the network, after confirming that most of the ICCAT-related laboratories can be connected through this network.

6. FUTURE PLANS TO IMPROVE STATISTICS, AND RECOMMENDATIONS TO THE SCRS

The representative of FAO requested the participation of ICCAT at its coming meeting of the Coordinating Working Party (CWP) scheduled in Miami in February, 1990. He emphasized the importance of such inter-agency collaboration in increasing the credibility of statistical bases and to facilitate the collection of statistics. He also pointed out that trip expenses, if combined with other assignments, such as the visit to the port of St. Maarten, would be reduced extensively.

The FAO representative also proposed that the third consultation of global tuna statistics be held, in conjunction with the bluefin workshop scheduled at La Jolla, California, in May, for one or two days. He considered that the participation of the ICCAT Secretariat is essential at such a meeting.

The Sub-Committee recognized that there have been several issues which require priority decisions, in case the Commission's funding is insufficient to cover all of the items. These involve the purchase of electronic equipment and software and travel proposed by the SCRS for the Secretariat staff. The Sub-Committee established a small group headed by Dr. Bard to establish priorities. The small group later submitted a list of priorities which was adopted by the Sub-Committee and is attached as Addendum 2 to this report.

7. OTHER MATTERS

France proposed that the Secretariat prepare summary catch data files to be used with graphic software for the last 30 years by major gear categories and/or areas for all major species, derived from the Task I species tables. When the final catch tables are agreed upon, these files should be prepared once again using the most updated data for each species.

8. ADOPTION OF REPORT

The report was reviewed and, after some corrections, adopted.

9. ADJOURNMENT

The meeting was adjourned.

Table 1. Progress in the collection of 1988 statistics (as of November 2, 1989)

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
YFT, BET, SKJ - Surface Fleet								
BAITBOAT								
Angola	Aug 29	May 23	X	Aug 29				Preliminary Task I
Brazil	Jul 6	Oct 10	X	Jul 6	Oct 10	Jul 6	Oct 10	
Brazil-Japan	Jul 6	Oct 10		Jul 6	Oct 10	Jul 6	Oct 10	
Cape Verde	Oct 25			Nov 9		Nov 9		
Cuba	Nov 8	Sep 7	X	Jul 28				
FIS	Oct 17			Oct 10	Jun 1	Oct 10	Jul 20	
Ghana	Nov 1	Oct 30	X		Oct 30	May 4	Oct 30	
							Jan 30	Abidjan landings 1984-87
							Mar 15	Abidjan landings 1988
					Aug 30			Abidjan landings 1984-88
Portugal (Azores)	Oct 11	Aug 3			Aug 3	Nov 4	Aug 3	
(Madeira)	Mar 24	Mar 3		Mar 24	Mar 3	Jul 29	Jul 14	
(Mainland)		Sep 15			Sep 15			
South Africa	Aug 30	Aug 16	X	Aug 19	Aug 16			
Spain (Canary Islands)	Aug 19	May 10		May 11	May 10	Aug 4	May 10	
(Peninsula)	Oct 10	Jul 17		Oct 10	Jun 1	Oct 10	Jul 12	
Venezuela	Oct 24	Jun 3		Nov 15		**	**	C/E for 1987
VEN-FOR				Nov 15		**	**	
PURSE SEINE								
Benin	Apr 19	Jul 6	X					Task I - 1986-88 (Diskette)
Cuba	Nov 8	Sep 7	X					
FIS	Oct 17			Oct 10	Jun 1	Oct 10	Jul 20	
Ghana	Nov 1					May 4		
Japan	Apr 22	Apr 28		Apr 22	Apr 28			
Morocco								
Norway		Apr 17						Preliminary Task I
Portugal (Madeira)	Mar 24						Mar 24	

** Field reports periodically.

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
Portugal (Mainland)	May 19	Sep 15		May 19	Sep 15			
Spain (Tropical)	Oct 10	Jul 5		Oct 10	Jun 1	Oct 10	Jul 12	Prel. C/E and Size
U.S.A.	Aug 2	Oct 16		Aug 8	Aug 9	Aug 8	Aug 9	Mag. tape
U.S.S.R.	Oct 17	Jul 13		Oct 13	Sep 15		Sep 29	
Venezuela	Oct 24	Jun 3		Nov 15		**	**	
VEN-FOR				Nov 15		**	**	
NEI		Mar 30						Data for 1987
		Sep 19						Data for 1988
<u>UNCL & OTHERS</u>								
Angola	May 9	May 23						
Argentina	Oct 21	Aug 7						
Benin	Apr 19	Jul 6						Task I - 1986-88 (Diskette)
Brazil	Jul 6	Oct 10						
Brazil-Japan						May 30		
Bulgaria							May 24	
Cuba								
Cape Verde	Oct 25			Nov 9		Nov 9		
Ghana	Nov 1							
Morocco	Oct 13	Jun 19						
Portugal (Madeira)		Mar 3				Jul 29	Mar 3	
(Mainland)	May 19	Sep 15		May 19	Sep 15			
St. Helena	Jun 8	Apr 18	X	Jun 8	Apr 18			
St. Lucia		Jul 24						
Sao Tomé & Principe								
South Africa	Aug 30	Aug 16	X	Aug 19				
Spain (Peninsula)	Oct 10			Oct 26		Oct 10		
U.S.A.	Aug 2	Oct 16	Aug	8	Aug 9	Aug 8	Aug 9	Mag. tape
U.S.S.R.	Oct 17			Oct 13	Sep 15			
Venezuela						**	**	
VEN-FOR						**	**	

** Field reports periodically.

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
Albacore - Surface Fleet								
BAITBOAT								
Angola	May 9							
Brazil	Jul 6	Oct 10	X	Jul 6				
Brazil-Japan	Jul 6	Oct 10	X		Oct 10			
France	Aug 23							
Portugal (Azores)	Oct 11	Aug 3			Aug 3	Nov 4	Aug 3	
(Madeira)		Mar 3			Mar 3	Jul 29	Jun 9	
South Africa	Aug 30	Aug 16	X	Aug 19	Aug 16			
Spain (Canary Islands)	Aug 19	May 10		May 17	May 10	May 17	May 10	
(Peninsula)	Jun 9	Jul 17		Jun 9	Jul 10	Jun 9	Aug 16	
Venezuela				Nov 15				C/E for 1987
VEN-FOR				Nov 15				C/E for 1987
PURSE SEINE								
FIS								
France	Aug 23	Oct 23					Oct 13	Size for 1987. Prel. Task I
							Oct 16	Size for 1988
Italy		Mar 6						Task I 1984-87
Portugal (Mainland)	May 19			May 19				
South Africa	Jul 5							
Spain		Jul 17						
NEI		Mar 30						Data for 1987
TROL								
France	Aug 23	Sep 19	X		Sep 19		Sep 19	
Portugal (Azores)								
Spain (Peninsula)	Jun 9	Jul 17		Jun 9	Jul 10	Jun 9	Aug 16	

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
UNCL & OTHERS								
Argentina	Oct 21	Aug 7						
Brazil	Jul 6	Oct 10						
France	Aug 23	Sep 19	X		Sep 19		Sep 19	
Italy								
Portugal (Azores)	Oct 11							
(Madeira)						Jul 29	Jun 9	
(Mainland)	May 19	Sep 15		May 19	Sep 15			
St. Lucia		Jul 24						
South Africa	Jul 5	Aug 16	X	Aug 13			Aug 28	Size data for 1985 - 88
Spain (Peninsula)		Jul 17			Jul 31			
U.S.A.	Aug 2	Jun 17		Aug 8	Aug 9	Aug 8	Aug 9	Mag. tape
Venezuela								
VEN-FOR								
Bluefin - Surface Fleet								
BAITBOAT								
France (Bay of Biscay)	Aug 23	Oct 23						Preliminary Task I
Portugal (Azores)	Oct 11					Jul 4		
(Madeira)	Mar 3	Mar 3		Mar 3	Jul 29	Mar 3		
(Mainland)		Sep 15			Sep 15			
Spain (Canary Islands)	May 17	May 10		May 17	May 10	May 17	May 10	
(Bay of Biscay)	May 4	Apr 10				May 4	Apr 10	
PURSE SEINE								
France (Mediterranean)	Aug 23	Oct 23				Oct 17		Preliminary Task I
Italy		Mar 6					Mar 6	Task I 1984-88. Size 1984-87
Morocco							Aug 2	
Norway		Aug 2						

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
Portugal (Azores)						Jul 4		
(Mainland)	May 19			May 19				
Spain				Oct 26		Oct 26		
Turkey	Sep 15	Jul 26				Sep 15	Jul 26	Task I 1987. Size - 1989
U.S.A.	Aug 2	Jun 17		Aug 8	Aug 9	Sep 13	Aug 9	Mag. tape
<u>TRAP</u>								
Canada	Jun 21	Sep 5					Sep 5	
Morocco	Oct 13	Jun 19						
Spain (Mediterranean)	Aug 31	Jul 17		Oct 26	Jul 31	Oct 26	Jul 31	
(Peninsula)	Aug 31	Jul 17		Oct 26	Jul 31	Oct 26	Jul 31	
<u>UNCL & OTHERS</u>								
Algeria		Jul 10						
Argentina	Oct 21	Aug 7						
Canada	Jun 21	Sep 5				Nov 1	Sep 5	
France (Mediterranean)	Aug 23	Oct 23						Preliminary Task I
Greece		Jun 15					Jun 15	Task I 1986-87 revised
								Size - 1986-87
Italy		Aug 1					Aug 2	Task I for 1987-88/1st qr ´89
Malta		Jun 22						
Portugal (Azores)								
(Madeira)		Mar 3		Mar 3		Jul 29	Mar 3	
(Mainland)	May 19	Sep 15		May 19	Sep 15			
St. Lucia		Jul 24						
Spain (Mediterranean)				Oct 26	Jul 31	Aug 4	Jul 31	
(Peninsula)					Jul 31			
Turkey	Sep 15							
U.S.A.	Aug 2	Jun 17		Aug 2	Aug 9	Aug 2	Aug 9	Mag. tape

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
Billfish (including SWO) - Surface Fleet								
Argentina	Oct 21	Aug 7						Task I 1986-88 (Diskette)
Benin		Jul 6						
Brazil	May 30		X					
Canada		Oct 11			Oct 11		Oct 11	
Ghana	Nov 1							
Italy		Mar 6						Task I 1984-86
Malta		Jun 22						
Morocco	Sep 7	Jun 19				Sep 7		
Portugal (Madeira)	Oct 16	Mar 3		Oct 16	Mar 3	Jul 29	Jun 9	
(Mainland)	May 25	Sep 15		May 19	Sep 15	May 25		
Senegal	Nov							
South Africa	Aug 19	Aug 16						
Spain (Canary Islands)	May 17	May 10		May 17	May 10	May 17		
(Mediterranean)	Aug 1	Jul 17		Aug 1	Jul 31	Aug 1		
(Peninsula)	Aug 1	Jul 17		Oct 26	Jul 31	Oct 26	Jul 31	
Turkey	Sep 15	Jul 26	X					Task I 1987
U.S.A.	Aug 2	Jun 17		Aug 2	Aug 9	Aug 2	Aug 9	Mag. tape
U.S.S.R.	Oct 17	Jul 13		Oct 13	Sep 15			
Small Tunas - Surface Fleet								
Angola	Aug 29	May 23	X	Aug 29				Preliminary Task I
Argentina	Oct 21	Aug 7						Task I - 1986-88 (Diskette)
Benin		Jul 6	X					
Brazil	Jul 6	Oct 10	X	Jul 6	Oct 10			
Cape Verde	Oct 25							
Cuba	Nov 8	Sep 7	X				Jun 14	
FIS								
Ghana	Nov 1	Oct 30	X		Oct 30			
Morocco	Oct 13	Jun 19						
NEI		Mar 30						Data for 1987
		Sep 19						Data for 1988

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
Portugal (Azores)	Oct 11	Aug 3			Aug 3		Aug 3	
(Madeira)		Mar 3			Mar 3			
(Mainland)	May 19	Sep 15		May 19	Sep 15			
Senegal	Nov							
St. Lucia		Jul 24						
Spain (Canary Islands)	Aug 19	May 10		May 17	May 10	May 17		
(Mediterranean)	Aug 31	Jul 17		Oct 26	Jul 31			
(Peninsula)	Aug 31	Jul 17		Oct 26	Jul 31			
Turkey	Sep 15	Jul 26				Sep 15	Jul 26	Task I 1987. Size - 1989
U.S.A.	Aug 2	Jun 17		Aug 2	Aug 9	Aug 2	Aug 9	Mag. tape
U.S.S.R.	Oct 17	Jul 14		Oct 13	Sep 15		Sep 29	
Venezuela	Oct 24	Jun 3						
All Species - Longline Fleet								
Brazil	May 30	May 17	X	May 30		Aug 16		Preliminary Task I
Brazil-Japan	May 30	Oct 10	X	May 30	Oct 10	May 30		
Canada		Oct 11	X		Oct 11		Oct 11	
Canada-Japan	Jun 21	Sep 5				Nov 1	Sep 5	
China (Taiwan)	Sep 30	Oct 23		Sep 30	Nov 1	Nov 1		C/E 1981 - 88
Cuba	Nov 8	Sep 7	X	Nov 8	Sep 7			
Cyprus		Apr 10	X		Apr 10			
		Jul 12	X		Jul 12			Data for 1975 - 1987
Greece							Jun 15	Size - 1987
Japan	May 12	Jul 17		May 12	Jul 17	Dec 27	Sep 21	Swo catch-at-size 87 revised
								Swo catch-at-size 88 (prel.)
							Oct 16	Size - 1987
							Oct 19	BFT catch at size
Japan-Canada-Observer								Reported by Canada
Japan-S.Helena-Observer		Apr 18			Apr 18			
Japan-U.S.-Observer				May 31		May 31	May 24	Reported by the U.S.

SPECIES, GEAR & COUNTRY	TASK I DATE REC´D 1988	TASK I DATE REC´D 1989	BOATS	TASK II CATCH & EFFORT DATE REC´D 1988	TASK II CATCH & EFFORT DATE REC´D 1989	BIOLOGICAL (SIZE) DATE REC´D 1988	BIOLOGICAL (SIZE) DATE REC´D 1989	REMARKS
Korea	Aug 10	Aug 18	X	Aug 10	Aug 18	Aug 10	Aug 18	Size (diskette)
Mexico		Sep 5	X					Task I for 1980 - 88
Morocco	Sep 7							
Panama	(Secretariat)			(See Korea+Panama)		(See Korea+Panama)		
Portugal (Azores)		Aug 3			Aug 3		Aug 3	Size data 1987 - 88
(Madeira)	Oct 11					Mar 24	Jun 9	
(Mainland)		Sep 15						
South Africa	Aug 19	Aug 16			Aug 16			
Spain (Mediterranean)		Jul 17		Oct 26	Jul 31	Oct 26	Jul 31	
(Peninsula)		Jul 17		Aug 4	Jul 31	Aug 4	Jul 31	
					Oct 11		Oct 11	Swordfish data (raised)
Uruguay	Aug 12	Aug 9		Aug 12			Aug 31	Size for 1987-88
					Sep 13			Data for 1985
U.S.A.	Aug 2	Jun 17		Aug 8	Aug 9	Sep 13	Aug 9	Mag. tape
		Oct 16						Revised YFT and SKJ figures
U.S.S.R.	Oct 17	Jul 13		Oct 13	Sep 15		Sep 29	
Venezuela	Oct 24	Jun 3		Nov 15		**	**	C/E for 1987
VEN-FOR				Nov 15		**	**	C/E for 1987
VARIOUS:								
FAO	Jan 22	Sep 19						

** Field reports periodically.

Addendum 1 to Appendix 5

AGENDA OF THE SUB-COMMITTEE ON STATISTICS

1. Opening of the meeting

2. Adoption of Agenda and arrangements for the meeting

3. Review of statistical progress made by national offices
   3.1 National data collection systems
   3.2 Data processing by national offices
   3.3 Reporting to ICCAT
   3.4 Improvements to be made

4. Examination of progress made by the Secretariat
   4.1 Data processing carried out in 1989
   4.2 Port sampling program
   4.3 Secretariat data management policy
   4.4 Data dissemination and publication
   4.5 Biostatistical assignments
   4.6 Other matters

5. Review of progress made on recommendations for statistics as contained in the 1988 SCRS Report
   5.1 Expansion of computer facilities
   5.2 Improvement of Mediterranean Statistics
   5.3 Creation of working data base for albacore
   5.4 Revision of Field Manual
   5.5 Computer network communication

6. Future plans to improve statistics, and recommendations to the SCRS

7. Other matters

8. Adoption of Report

9. Adjournment

Addendum 2 to Appendix 5

REPORT OF THE AD HOC GROUP ON STATISTICAL PRIORITIES

Objectives

The group met to identify the financial needs required for the smooth running of the statistical and biostatistical activities of the Secretariat at the end of 1989 and in 1990, taking into account the restrictions of the extreme austerity in the ICCAT Regular Budget in 1990.

Data processing equipment

The 1989 balance of $8,500 is sufficient to cover the purchase of a stabilizer and a multi-diskette PC.

For 1990, the data processing purchases identified are, in order of priority:

1) VAX data base software	$8,000
2) Printer/plotter	$5,000
3) Card for additional ports	$2,000

The total of $15,000 corresponds to the 1990 budget.

Communication equipment

The purchase of a PAD and installation of a special line are essential, and will cost $2,300. This amount can be taken from the "Biostatistical Work" chapter.

Access to a free (EARN type) or very inexpensive network as "communication among scientists" should be investigated.

Travel

Official travel identified by the Secretariat for 1990 are, in order of decreasing priorities:

1) GFCM/ICCAT Working Group in Italy, particularly on the collection of bluefin statistics. Cost for two persons, $2,800.

2) Trip to St. Maarten, and en route participation in the CWP meeting in Miami. Cost for one person, $2,000.

3) Participation of an ICCAT staff member to participate in the Working Group on West Atlantic Yellowfin (Miami or Venezuela). Cost, $1,500.

4) Trip to the World Bluefin Meeting (IATTC) and the Consultation on Global Tuna Statistics (FAO) in La Jolla. Cost for one person, $1,800. It is possible, however, that IATTC may assume the expenses of one person from the Secretariat. In this case, there would be no cost to ICCAT.

The chapter of funds for biostatistical travel should cover the above expenses of $8,100.

In addition, the group identified the need for an expert to travel to Morocco to help the scientists there develop a bluefin sampling and data processing system. It is possible that other Mediterranean countries have scientific requirements concerning bluefin tuna or swordfish, therefore, it is recommended that $4,000 be reserved for this concept in the budget chapter "Biostatistical work."

Appendix 6 to Annex 8

Proposed Plan for the Albacore Research Program

1. Why have an Albacore Research Program?

Paradoxically, our understanding of the current state of the albacore stocks in the Atlantic is becoming worse and worse, while in the past stock evaluations were available. In addition, new fishing methods are developing and their possible impact on the traditional fisheries cannot yet be evaluated. This unfortunate deficiency on the part of the SCRS has many causes which concern the statistics, biological parameters and the absence of reliable analyses for some years.

In view of the significant progress achieved during the International Skipjack Year Program (ISYP) and the Yellowfin Year Program (YYP), carrying out an Albacore Research Program (ARP) appears to be an excellent way to obtain precise answers to the questions posed at present on this species by the scientists as well as by those responsible for stock management.

The SCRS albacore species group examined the Report of the Albacore Workshop held in September, 1989, in Madrid (SCRS/89/16). This report recommended on the one hand holding another workshop in 1990 to examine the results of short-term research, and on the other, the development of a more complete research program coordinated and supported by ICCAT. The foreseen costs and priorities must be identified.

The albacore group recognized that some of the statistics and research objectives recommended for the 1990 Workshop are also included in the Albacore Research Program on a longer term. The possible means for resolving each problem, the priority and the probability of success are evaluated in Table 1, according to a scale of 1 to 3 (1 being the best, 3 the least likely).

The duration of the Albacore Research Program is estimated to be four years (according to the experience gained through the ISYP and the YYP). In this case, the 1990 Workshop could also coordinate the progress of the research. It would be followed by similar meetings in 1991 and 1992. A final conference on the results will take place in 1993. A coordinator for the progress of the work should be designated for the duration of the Albacore Research Program.

The research objectives were categorized according to the three stocks assumed to exist in the Atlantic, as the need for progress in knowledge and urgency of research are not the same for each stock. Some countries have been proposed for the research objectives, but this does not mean that the list is exclusive.

Finally, it should be recalled that bilateral research is being carried out by Spain and France, financed by the EEC. The results of this research, which mainly concerns interaction between the two national fleets, will be communicated to ICCAT.

2. Research Objectives and Budget

A calendar of research activities and their approximate annual costs are given in Table 2. Explanations of the research objectives identified in Table 2 are given below with a description of the research activities involved.

NORTH ATLANTIC

Coherent longline data base (Activity 1)

The most recent longline statistics are those of Taiwan and go from 1967 to 1988. However, the Japanese (and Korean to a lesser degree) longline fleets have exploited Atlantic albacore in the past before turning to fishing bigeye tuna by using deep longlines. It seems possible to generate a statistical set on the traditional longline for the 1955-1988 period, by recuperating data in the ICCAT base or in Japan, completely separating the surface longline data from the deep longline data and verifying all the data.

Coherent surface fisheries data base (Activity 1)

There still exist some statistical problems for the troll and baitboat fisheries. Some French historical data are missing and should be found and verified. Some other files could have been lost while changing the data processing system at ICCAT. Some effort data for Spanish baitboats should be verified. Also, a new historical statistical data series could be obtained for 1967-1988 (e.g., for the trollers).

Length-weight relationship (Activity 1 and 7)

The length-weight relationships of Atlantic albacore seem to differ significantly from albacore in other oceans. This must be verified and, taking into account the sexual dimorphism of adult albacore, should be done according to sex for sizes greater than 80 cm.

Catch-by-size tables (Activity 2)

It is necessary to prepare total catch tables by size and by quarter to cover as long a series as possible. Although the current tables represent great progress, they are still imperfect (in particular, 1980, 1987, and 1988 need to be corrected and data for 1989 should be submitted to the Secretariat as soon as possible).

Stochastic methods for estimating catch by age from size distributions (Activity 2)

The stochastic length-frequency analysis method for aging and generating catch-at-age data from a given catch-at-length composition was developed by Akamine (1984). Provided that the environmental conditions have not changed significantly, the average biological size and the standard error for an age group are usually stable and can be viewed as one of the genetic characteristics of a population, also assuming that the size distribution of each age group is normal. Then a probability function can be constructed, and the maximum probability estimates can be used to obtain the suitable parameter estimates of the mean and the standard error for each age group. Size distribution tables were generated by the September Workshop. They are an excellent basis for application of this method.

Standardized index of abundance (Activity 2)

Up to the present, the abundance indices for surface fishing have only been partially standardized. This could be done using GLM or a similar method. The indices should be calculated by age class by using the same methods as used for generating the catch-at-age tables from the catch at size.

The abundance indices for longline fishing have been standardized in the past by the Honma method by using two sets of reference variables according to the fleets (Japanese and Taiwanese). Unification would be necessary, preferably using GLM.

Cohort analysis and yield per recruit (Activity 3)

On the basis of old verified statistics and the proposed improved statistics, good catch-at-age tables are expected to be available on a quarterly basis. Cohort analyses calibrated with abundance indices will then be possible, and should be made. As the research on the biological parameters would produce results which can be incorporated in the VPA and thus refine the estimates of exploitation rates.

Growth (Activity 2, 5, 7 and 8)

The growth of albacore beyond 100 cm is still rather hypothetical. Moreover, it is probably different for males and females. Two lines of research are possible. Much tagging is needed on large fish to improve the estimation of the growth curve. On the other hand, double-purpose sampling (size frequency plus sub-sampling of hard parts) of large albacore presently caught by the paired trawlers and the baitboats in the Bay of Biscay and the Canary Islands area would allow verification of the age composition of these catches. There are possibilities of reading ages on the hard parts (vertebrae, otoliths, spines) according to previous experience. It would probably be necessary to purchase some fish to sample the hard parts. This double-purpose sampling could also allow an estimate of the variance around the mean age attributed in this way to the fish.

The verification of the hypothesis of annual double marks on the hard parts, however, seems difficult as large albacore are difficult to obtain throughout the year for analyzing hard parts.

Study of sex ratio vs. length (Activity 4)

A study of the size distribution by sex for the large albacore in the Bay of Biscay and the Canary Islands, should be conducted for several years (at least three years) would permit generating the size frequency by sex tables. The separation of the size frequency by sex tables into age classes (above-mentioned stochastic methods) would then be of great interest.

Maturity (Activity 7 and 8)

The spawning hypothesis of albacore in the Atlantic was first presented in the 1950-1960's (Shiohama). According to this theory, the large albacore now caught in the Bay of Biscay would be immature or sexually inactive. This should be verified. Sampling of ovaries from other areas of the North Atlantic seems, unfortunately, difficult.

Natural mortality (Activity 5)

The natural mortality of albacore is not well known and rather poorly estimated. It is found that, in addition, there are hypotheses of an increasing natural mortality for the older age classes (Suda). Two lines of research are proposed:

--Estimation from the results of particularly successful tagging.

--Study of biochemical parameters which give an index of senescence for large individuals. Such indices are studied in medicine from animal models. Could they be extended to tunas? This should be investigated.

Interaction between fishing gears (Activity 3, 5, 6)

The instantaneous interaction (competition for space) is the principal objective of the EEC program. It is studied by observers on board vessels using surface gears. Improvement of the detailed statistics ($1^{o}x1^{o}$ by the finest time strata possible) is thus foreseen for these same vessels. Tagging at the beginning of migration can also give good results. Towards the end of 1989 Spain carried out very successful tagging from which much is expected.

The long-term interaction (competition for the resource) could be studied from the resolution of the VPA on the F vectors. This refers to adjusted cohort analyses.

Stock structure (Activity 5)

Tagging seems to be the most effective way to verify the stock structure, particularly the relationships between the north Atlantic and the Mediterranean.

Effects of environmental data on the abundance indices (Activity 9)

Abundance indices can be affected by changes in the environment (as was shown for yellowfin in 1984). Abnormal CPUEs of the surface gears for some years could have been caused by environmental factors.

Hopefully the past effects of such environmental variations can be identified by studying the northeast Atlantic surface temperature files in the physical oceanographic services. Other parameters which could be considered include some abundance files of preys found in the stomachs of surface albacore exist in France.

Behavior of albacore as a function of fishing gears (Activity 6, 7)

In addition to the means of direct observation proposed and in progress within the EEC program, another approach proposed is the study of stomach contents of albacore taken by different gears, including the new French gears. The possibility of characterizing the different bathymetric levels of albacore development according to the preys still remains hypothetical.

Investigate biases in the evaluation of cohorts if sexual dimorphism of adult albacore is proven (Activity 2)

It seems that the growth of female albacore is slower than the males after the first sexual maturity. This could significantly affect the size composition tables taken from the size distribution tables. Extension of the bias caused by the different growth rates thus introduced in the VPA, could be estimated by simulations.

SOUTH ATLANTIC

Coherent longline data base (Activity 1)

The problem is identical to that of the North Atlantic.

Size composition of surface fishery catches (Activity 1)

The statistical data provided more or less regularly to the Secretariat by South Africa should be analyzed after verifying the homogeneity of the set of data.

Stochastic estimates of age classes from size distributions (Activity 2)

The problem is identical to that of the North Atlantic. It seems that the compiled Taiwanese longline data would be of particular help.

Stock structure (Activity 5)

Regular interchanges of albacore between the south Atlantic and the Indian Ocean seems very probable. Tagging experiments from South African baitboats would be of great interest in this respect. It seems possible to study the oceanographic conditions in the southeast Atlantic that influence these interchanges.

Growth parameters (Activity 2 and 5)

The problem is more urgent than in the North Atlantic, because no growth estimates have yet been proposed for the south Atlantic.

Standardized CPUE for longline (Activity 2)

This problem is identical to that of the North Atlantic as regards longline. (The problem of the two reference sets from the Honma's method for longline.) Moreover, an abundance index for the South African surface fisheries should be calculated.

Analytic model applied to the south stock (Activity 3)

A VPA has never been run for the south stock. This is of high priority, particularly in order to verify the conclusions of the production models already applied.

Maturity (Activity 7 and 8)

South American longliners (Venezuela, Brazil or Uruguay) take large albacore from the south stock. Examination of gonads, if possible, would be a good verification of the Shihohama model. Examination of fish caught by the Taiwanese longline seems very difficult.

MEDITERRANEAN

Albacore in the central and eastern Mediterranean seem to have typical biological characteristics. The study of the characteristics, in particular using Italian literature, may resolve the stock structure of these particular albacore.

The collection or submission and exploitation of Italian statistical data would perhaps allow estimation of the exploitation level of Mediterranean albacore. A stock evaluation committee of the GFCM will meet in 1990. It will be useful to examine the conclusions the GFCM will obtain on Mediterranean albacore.

Table 1. Research objectives proposed for the Albacore Research Program

Objective	Activity	Priority	Probability	Comments	Short Term	Medium Term
NORTH ATLANTIC						
Coherent longline data base	Reexamination of 1957-89 data	1	1	Can be done by Taiwan and Secretariat	+	
Coherent surface fisheries data base	Reexamination of 1957-89 data	1	1	Can be done by France, Spain and Secretariat	+	
Length-weight analysis	Reexamination of old data, new measurement by sex	1	1	By sex for FL >80 cm can be done by France, Spain and Azores	+	
Catch-by-size tables by quarter	Computation on available statistics	1	1	France, Spain, Secretariat	+	
Use of stochastic methods for estimating catch by age	Computation on available statistics	1	1	France, Spain for surface catches, Taiwan for longline	+	
Standardized index of abundance	Computation on available statistics	1	1	Should be done by France, Spain, Taiwan, and Japan	+	
Cohort (VPA) and yield-per-recruit analyses	Computation on catch-at-age table and abundance indices	1	1	Should be done each year	+	
Growth	Tagging already done in 1989	1	1	Spain		+
	Hard part analysis of piece collected on large fish	1	2	Double sampling by France and Spain on BB and trawlers (means buying the large fish); other countries who want to		

Table 1. (Cont.)

Objective	Means	Priority	Probability	Comments	Short Term	Medium Term
NORTH ATLANTIC (cont.)						
Study of sex ratio vs. length	Measurement of sex ratio by length	1	1	On Bay of Biscay large fish >80 cm, 3 years sampling		+
Maturity	Study of ovaries	2	3	Check on Bay of Biscay large fish		+
Natural mortality	Tagging	1	3			+
	Biochemical analysis	3	2	Studies on samples taken from big fish (means buying the fish) France		
Interaction between gears (immediate)	Tagging already done in 1989. Observers on board. 1989, 1990	1	1	Analysis by France and Spain under EEC authority.		+
Interaction between gears (long-term)	VPA solved and F´s vector by gear	1	1	After resolving the collection and processing of the catch-at-size tables then catch-at-age		
Stock structure	Tagging	1	2	France and Spain for Atlantic/Mediterranean; Italy ??		+
Effects of environmental data on the abundance indices	Recuperation of environmental data in available or purchased files	2	2	France, Spain, Portugal		+
Behavior as function of gears	Stomach analysis	2	3	Spain		+
Investigate biases in assessment if sexual dimorphism of albacore is real	Modeling	1	2	??		+

Table 1. (Cont.)

Objective	Means	Priority	Probability	Comments	Short Term	Medium Term
SOUTH ATLANTIC						
Coherent longline data base		3	1	Since 1970's, Japanese longline fishery has changed its target species, also Korean longline fishery did not target on albacore in both the south and north Atlantic. These statistics of catch and effort should be separated from regular longline fishery. Taiwan	+	
Provision of size composition of surface fishery		1	2	The catch and effort of surface fishery in the south Atlantic increases significantly. The countries using surface gears regularly submit the size data or catch-at-length data in use. (South Africa)	+	
Stock structure	Tagging	1	2	South Africa		+
	Analysis of oceanographic data	2	2	South Africa		
Growth parameters	Tagging	1	3	The growth parameters is still not available for the south stock. South Africa, Taiwan		+
Aging and catch-at-age data construction	Computation on available data	1	1	Aging and constructing catch-at-age data from catch-at-length data. Taiwan, South Africa	+	

Table 1. (Cont.)

Objective	Means	Priority	Probability	Comments	Short Term	Medium Term
SOUTH ATLANTIC (cont.)						
Standardized CPUE for longline	Analysis of available data	1	1	Traditionally, the Honma's algorithm was used in standardizing longline effort. A GLM should be tried in standardizing CPUE of the south Atlantic. albacore stock. (Taiwan)	+	
Analytic yield-per-recruit analysis	Computation on catch-by-age table and abundance indices	1	1	The evaluation of the south Atlantic albacore stock has always been done by production model. Some yield-per recruit analyses are necessary.	+	
Maturity	Study of ovaries	2	3	Brazil on coastal longliners; Uruguay, Venezuela		+
MEDITERRANEAN						
Research on biological parameters	Bibliography Tagging	1 1	1 2	France, Spain, Italy France, Italy	+	+
Statistics	Mediterranean catch & effort	2	2	Italy, Yugoslavia		

Table 2. Summary of research activities and costs of the Albacore Research Program (ARP)

Activity	1990	1991	1992	1993	Source of Funding
1. Re-examination of historical data	XXXX				ICCAT Regular Budget and national budgets
2. Computation on available data	X	XXXX	XXXX		
3. VPA on catch-at-age tables and abundance indices	X	XXXX	XXXX		
4. Size-specific and sex ratio measurements	XX $2,000	XXXX $2,000	XXXX $2,000		ARP
5. Tagging: Bay of Biscay	XX $200,000				ARP
Other*	XXXX ?	XXXX ?	XXXX ?		Other countries?
6. Observers on board vessels using surface gears	XXXX $45,000				ARP/Other?
7. Collection of sampling data	XX $38,000	XXXX $18,000	XXXX $18,000		ARP
8. Analysis of sampling data	XXXX $5,000	XXXX $5,000	XXXX $5,000		ARP
9. Purchase and analysis of environmental data		XXXX $3,000	XXXX $3,000		ARP
10. Working group meetings and final conference	X	X	X	X $5,000	ARP
11. Final publication				$5,000	
12. Travel for coordination and Secretariat	$2,000	$2,000	$2,000		
13. Mailing by courrier	$1,000	$1,000	$1,000		
14. Miscellaneous	$2,000	$2,000	$2,000		
TOTAL	$295,000	$33,000	$33,000	$10,000	Grand Total $371,000

*Possible tagging encouraged in other areas.
Each X = one quarter
Estimated annual cost in U.S. dollars.

Appendix 7 to Annex 8

Report of the Session on the
Tuna-Environment Relationship

The SCRS dedicated a half-day session to the problems raised by the effect of the environment on tunas in general (Item 12 of the SCRS Agenda). The SCRS Chairman opened the session and suggested that Mr. J. M. Stretta serve as rapporteur. This year, ten documents dealing with the "tunas-environment" problem were presented to the SCRS.

Before reviewing these documents, Dr. A. Fonteneau stated the problem of the tuna-environment and reported on the research carried out on this subject. This presentation continued along the general line of discussion of the working group on tuna-environment which met in Paris in September, 1988, under the aegis of ORSTOM (document SCRS/89/54). From this meeting of specialists it was seen that the environment and its variability, on all geographic and time scales, were important factors in tuna population dynamics and their exploitation. The environment can no longer be neglected in the modelization and rational management of these resources, as was done in the past.

What purposes can the environmental studies serve? Three types of research objectives were identified (cf Figure 1):

1) To understand the mechanisms of the food chain: this chain goes from nutritive salts to animals which will be prey to the tunas. Also, to understand, according to the available food, the dynamics of schools and of concentrations of tunas exploited by the fisheries.

2) To manage efficiently the tuna resources. The lack of knowledge of environmental factors can lead to incorrect decisions on stock management; for example, the sharp drop in catch rates of large yellowfin observed at the end of 1983 and beginning of 1984, was interpreted at that time as being due to the very low level of adult stock while recent studies and the rapid recuperation of the stock suggest that this drop in catch rates was probably a consequence of an abnormally deep thermocline. ICCAT could at that time have taken severe measures to protect the adult stock; this would have been a serious error.

3) To improve efficiency: a better knowledge of the environment allows identification of the areas favorable to tuna fishing and thus increasing the searching efficiency of the fishing fleets as well as the recreational fisheries. It should be noted that this increase in efficiency will tend to introduce biases in the models, which mostly assume stability in searching efficiency.

In summary, a better knowledge of the tuna-environment relationship can lead to:

-- a better understanding of the biology of the species,

-- a better monitoring, evaluation and management of the stocks,

-- a more efficient exploitation of fishing fleets.

For a better knowledge of the environment of tunas, the problem arises on the choice and time-area coverage of the data to consider. Traditionally, to describe the environment of tunas, surface temperature, depth of the thermocline, salinity, dissolved oxygen, speed and direction of the wind and currents have been available. These parameters should be considered in the three dimensions of the ocean (longitude, latitude and depth) and in time. Although some of these parameters are available in time and areas strata for all the world oceans, such as is the case for surface temperature which is constantly measured by meteorologic satellites, it is not the case for other parameters for which the coverage is incomplete or even non-existent.

The following also pose the problem of the scale of the environmental studies:

--The very short term (one day to several days) will affect the fisherman in his fishing activities for the next day.

--The medium term (fifteen days to a month) will also affect the fisherman in his fishing strategy (should he leave the sector where he is fishing for a more favorable one).

--The long term (a month to a year) will affect the population dynamics specialist in the management of the stocks.

In summary, the models which can be used for a better knowledge of the tuna-environment relationship require data which are susceptible to variations in four dimensions and will be complex models because they deal with non-linear relationships and with interactions between these data.

Item 4 of the Agenda of this "Tuna-environment" session was a brief presentation of SCRS documents (SCRS/89/55, SCRS/89/61, SCRS/89/93, and SCRS/89/105).

The working hypothesis proposed is that, based on the assumption of tunas requiring enormous energy, their major activity is searching for food. As this food is only slightly mobile, it should be found in productive areas. This hypothesis is presented, while the idea of very low production in tropical areas of the world oceans is strongly disputed in recent studies in traditional oceanography. It has been discovered that the oceanic systems are far from being stable and homogeneous, and that there is small-, medium- and large-scale variability (SCRS/89/57). Satellite imagery has shown the great heterogeneity of the ocean, which was unknown until recently. Enrichment cells have also been observed from around ten to more than several hundred kilometers. Also, vast poor areas of the ocean resemble a leopard skin where the dark spots would be the rich areas whose duration can be from some days to several months. Tunas, capable of detecting these oases of richness (how?), go towards them, forming concentrations of schools there. The question is knowing if, in the depths, at the base of the thermocline, there could be a form of enrichment capable of providing food for tunas.

Knowledge of the phenomena which occur in the depths could be gained by the new numeric models. From wind, surface temperature and vertical thermal profiles data, the OPERA model (SCRS/89/58) can provide the thermal structure of the ocean at all points and at all times from traditional equations of physical oceanography. This model can be considered as an area-time interpolator of oceanic environmental observations. It can describe past anomalies in area and time and potentially make projections, foreseeing environmental anomalies months in advance.

The environmental anomalies play an important role, as can be seen above; knowledge of them in real time is vital, for example, in explaining the presence or absence of bigeye tuna in the areas of Madeira and Azores (SCRS/89/93). In Madeira, 80 percent of the catches are comprised of bigeye tuna which are taken in waters where the surface temperature is between 18°C and 21°C. A negative thermal anomaly corresponding to a cold summer was observed in the two years of record catches (1974-1975). On the other hand, in 1980 and 1987, the low bigeye tuna catches were associated to a positive thermal anomaly. In the Azores, the same phenomenon is observed.

The case of Madeira is a typical example where an environmental parameter, the surface temperature, immediately affects the catches. But is not the surface temperature an indication on the surface of "something" which could be developing below the mass of water, and could, for example, result in deep structural changes in the production mechanisms of local ecosystems?

Elsewhere in the Atlantic Ocean, in Ghana for example, the clarity of the water plays a role in the availability of tunas.

Some documents (SCRS/89/59 and SCRS/89/105) were also presented concerning the tuna-environment studies aimed at identifying areas favorable for fishing and increasing tuna fleet efficiency. These papers concern satellite remote sensing to identify thermal fronts where tuna gather. Although this research on frontal areas gives good results on albacore in the Bay of Biscay and on bluefin in the Gulf of Lyon, this is not the case for swordfish taken by longline off the American coasts between Cap Hatteras and Cape Cod, while in this same area the distribution of bluefin seems affected by the thermal fronts and the fronts of less salty water.

The recent development of various systems of operational fisheries oceanography was mentioned by the observer from Senegal (T. Diouf), who informed the SCRS of the symposium on this type of research held at the end of October, 1989, in Newfoundland. Environmental data and behavior were also analyzed by specialized services to inform the fishermen about the most favorable fishing areas, in order to reduce their searching time.

The presentation of documents, as well as the discussions which followed each presentation reflect the concern of SCRS scientists who urged intensification of environmental studies and collaboration as soon as possible.

Recommendations

The Committee agreed that it was necessary and urgent to create a permanent Sub-Committee on Environment within the SCRS. In effect, this Sub-Committee seems essential for creating a dynamic ICCAT in the study of tunas and their environment. However, it is necessary first to draw up the details of the mission and the exact structure of the sub-committee. To this end, the SCRS recommends immediately creating a working group, with a chairman named by the SCRS Chairman, which will be responsible for drawing up the terms of reference of the Sub-Committee.

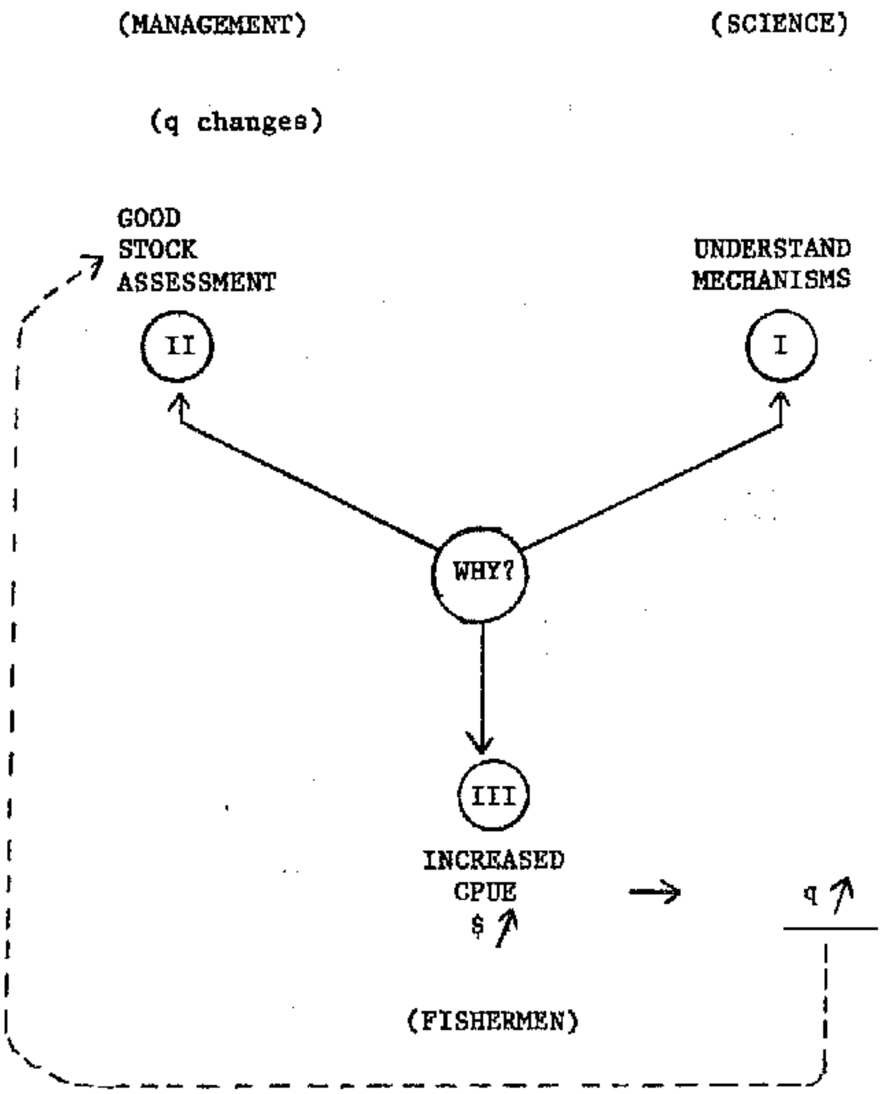


Figure 1.

Addendum 1 to Appendix 7

AGENDA FOR SESSION ON THE TUNA-ENVIRONMENT RELATIONSHIP

1. Opening
2. Choice of rapporteur
3. Presentation of the tunas-environment relationship problem and research carried out on this subject
4. Brief presentation of SCRS document and other information on "Tunas and the Environment"
5. General discussion to set SCRS priorities on "Tunas and the Environment"
6. Recommendations to the SCRS for assuring a better monitoring of the variability of the environment and its effects on tunas and the fisheries that exploit them.
7. Adjournment

Appendix 8 to Annex 8

Documentation of Bluefin Tuna Assessment Work

I. DERIVATION OF PARAMETERS

i) Catch and Effort

The ICCAT Secretariat presented documentation (SCRS/89/8) on updates to the total landings and size data available for 1987 and 1988 and the substitutions used to derive the 1988 SCRS catch at age (1986 for the east Atlantic and Mediterranean Sea and 1987 for the west Atlantic). The changes to the catch at age used by SCRS in 1988 were minor although several non-member countries have provided improved and updated information. This does not imply there were no problems, only that no better solutions to existing and past problems were available.

a) Effort in the east Atlantic

No recent increases in directed effort were reported for the east Atlantic. A gillnet fishery for albacore began in 1988, it does have a by-catch of some bluefin (250 MT of mainly 2- and 3-year-old fish).

b) Effort in the Mediterranean

France reported experimental work by ORSTOM with SAR (Synthetic Aperture Radar) to identify tuna schools in the Gulf of Lyon. This will have to be considered in the standardization of CPUE series if it is used in the fishery in the future. Two new French purse seiners were added to the fishery; Spain has added two new purse seiners to its by-catch fishery.

c) Effort in the west Atlantic

Catch has been restricted to 2,660 MT in the west Atlantic and therefore little scope is available for increased effort.

ii) Catch at age

The tabulation of the catch at age for the eastern stock has lagged one year behind that of the west; it was updated and both 1987 and 1988 data were added (Table 9). This represents a significant improvement in our ability to provide near real time advice for the east Atlantic and Mediterranean. For the west Atlantic, the catch at age was updated from that by the SCRS in 1988 and the 1988 data were added (Table 13).

*This Appendix was prepared by the bluefin species group as a background document on technical aspects for stock assessment for the 1989 session. It was not reviewed by the SCRS. Tables and figures referred to in this Appendix are those of the SCRS Report text tables and figures.

Difficulties have arisen in previous years with discards and unreported catches. These problems have been handled in many ways: best estimates and/or last year's reported catch have often been used. This year is no exception and some analytically unsatisfactory options have had to be implemented.

Catch at age was derived by the use of a single growth equation for each stock (the Parrack and Phares growth equation for the west and the Farrugio growth equation with L_{oo} = 351 cm for the east) to allocate estimated catch at length to catch at age. Catch at length was obtained by "raising" sampled catches to nominal "Task I" catch data, unless the total number of fish caught was available. Frequently size samples were not available for a specific fishery and the less desirable practice of substituting a sample from a similar gear/area/time period was followed. Often even this was not available or worse still, uncertainty existed regarding the size composition of the unsampled fishery and therefore no confident decision could be made regarding valid substitutions.

a) East Atlantic and Mediterranean

A significant factor arose this year which again points out the continuing problems in data collection. It was noted that although 1988 size data were provided for Mediterranean Spanish trap fisheries, no sampling was conducted for 1987. The impact of this is greater than it first appears because the Spanish trap size data have been used to raise many other unsampled fisheries in previous years.

This problem, by no means unique, gives an indication of the uncertainty that must be associated with the catch at age. As in last year's assessment, catch at age used in the analysis was limited to those fish of 1 year and older with concern on the composition of age 1 and possibly on 2-year-old fish. Analysis of percent composition tables (Table 10) in last year's meeting showed the number of fish occurring in age groups 21 to 30 were less than 0.1 percent, thus the working group felt the catch at age should include age groups 1 to 19 and all ages over 19 should be added together as a plus group (20+).

b) West Atlantic

Some members of the working group noted that the approximately 200 MT reported by the Dominican Republic in 1987 and assumed in 1988 create considerable uncertainty in the numbers of fish if the size composition is smaller than previously believed or more importantly, if these fish are actually misreported catches of another species (see research recommendations).

Anecdotal information from the Canadian bluefin tuna fishery off southwest Nova Scotia in 1988 indicates the actual effort and harvest was considerably larger than that recorded. This area caught 988 of the reported 1,298 fish in the traditional inshore fisheries. The additional unreported catch is thought to comprise two components: a discarded catch of presumably smaller fish and an unrecorded catch made up of approximately the same size fish as the recorded catch. This information suggests that 2 to 3 fish may have been caught for every fish reported. Thus, from these reports for the southwestern Nova Scotia reported catch of 988 fish, the actual landings may have ranged from 1,976 to 2,964 fish. No accurate indication of discards is available, however, an estimate of 25 percent (250 fish) for the southwestern Nova Scotia fishery is not considered an overestimate. Some of these unreported fish probably were transshipped to fishermen from other countries and these fish then were reported in the local statistical system(s) of these other countries.

An independent estimate of the number of bluefin tuna sold by Canadian fishermen was made from U.S. industry. This report indicated that the catch from the traditional inshore fresh-fish fisheries was at least twice that reported (approximately 2,600 fish).

A Japanese Trade Statistics report indicates that 303 MT (dressed weight) of fresh bluefin of Canadian origin were sold in Japanese markets in 1988. The reported Canadian catch of fresh bluefin was 289 MT (393 - 104 (longline catch) = 289). Thus the unreported Canadian catch sold in Japan was estimated to be 115 MT (303 / 0.75 (conversion factor) - 289 = 115). The average round weight from the fishery suspected of this unreported catch was 173 kg, thus the estimated number of fish was 665 fish. Similar calculations for 444 kg of fresh bigeye and 200 kg of fresh yellowfin indicate 6 additional fish were sold. As no fresh bigeye or yellowfin were reported by Canada and the price paid on the Japanese market was similar to that paid for bluefin, these fish are also assumed to be bluefin. These 671 fish were added to the 1988 catch at age.

A catch-at-age table for the west Atlantic bluefin (Table 13) was produced similar to what was done in the east. Last year's analysis of the percent composition of ages 21 to 30 range from .1 to 3 percent since 1970 (Table 14). For the purposes of our assessment the numbers at age for ages 20 to 30 were added into a single plus group (20+), this should reduce the variability due to the small numbers of fish in these older age groups.

iii) Weight at age

Mean weight at age of the catch was calculated this year by using length-weight relationships for various seasons, areas and sizes as recommended by the 1988 SCRS and converting the catch numbers by length to catch biomass by length and then using the standard SCRS software to convert catch biomass by age to weight at age. It was felt this would provide a more accurate indication of year to year variation in catch weight at age compared to utilization of a single growth equation as was done in the past. The year-by-year weight at age is presented in Tables 21 and 22 for the eastern and western stocks respectively.

iv) Natural mortality

The natural mortality (M) used for this year's assessment of the west Atlantic was 0.1 and for the east Atlantic and Mediterranean was 0.18 (see SCRS Bluefin Workshops 1984, 1985 for original derivation). These are the same as used in the previous assessments and no new data were presented to permit additional analysis. However, it was felt unlikely that a single species with two intermixing stocks would exhibit such different mortality rates. Additional work is necessary on this subject (see Research Recommendations).

v) Partial recruitment

Partial recruitment (PR) was investigated using separable VPA (SVPA) as was done in previous assessments. The first assumption of this method is that the years used in the analysis have had a stable exploitation pattern. It was decided by the working group that, as a general principal, if the fishery has remained fundamentally unchanged over a series of years, then those years should be included in the analysis. This premise recognizes the inherent variability of these fisheries with their many different countries and gears. In past assessments, years were excluded when patterns of residuals indicated inconsistencies in the data. It was noted by the working group that with our limited number of years of data available, the variability made it difficult to identify which years to eliminate.

a) East Atlantic and Mediterranean

The group accepted the above premise and identified 1982 to 1988 as basically a stable period in the fishery. The years prior to 1982 were rejected as spotter aircraft were first used in 1982 in order to improve the catchability in the purse seine fishery. This fishery contributes up to about one third of the nominal catch.

To investigate the results of SVPA for the youngest ages (1, 2, and 3), the ages for which concern over sampling quality has been expressed, the analysis was conducted on ages 1 to 18. Reference ages selected for study were 1 and 2. The exploitation pattern was found to be stable over the common ages. Thus the SVPA for 1982 to 1988 ages 1 to 18 reference age of 1, $M = 0.18$, and an $F_t = 0.5$ (Table 11) was accepted for determination of the PR. No smoothing was carried out on this estimate. The PR was very similar to that used in last year's assessment except for ages 1 to 3 (Figure 40).

b) West Atlantic

The group identified 1983 to 1988 as a basically stable period in the fishery, over this time a constant monitoring catch of 2,660 MT has been in force (Table 15). Ages 1 to 15 with a reference age of 6, an $F_t = 0.2$ and an $M = 0.1$ were used in the analysis. No smoothing was carried out on this estimate. The PR was very similar to that used in last year's assessment except for ages 2 to 4 (Figure 43).

vi) F on the oldest age (F oldest)

a) East Atlantic and Mediterranean

F on the oldest age group (age 19) was estimated by back calculating the population for the flat-topped portion of the PR vector (ages 13 to 18) and estimating the Z between years. Ages 13 to 18 in one year and ages 14 to 19 in the next year gave a pooled estimate of Z, this value less M (0.18) was used as the F applied to age 19 (SCRS/89/43).

b) West Atlantic

The same technique as applied to the eastern stock was used for the western stock. The flat-topped portion of the PR vector for the west was 15 to 18.

vii) Terminal F

It was decided by the group to use software based on the ADAPTive framework (SCRS 1988, SCRS/89/43). Last year this software was run in parallel with the software used for the last several years (CAL) and the same terminal F was calculated from both analyses. ADAPT was used for this year's analysis as it produces confidence intervals about the population estimates and is more flexible than CAL in changing the functions used in the calibration.

viii) General comments on tuning of VPA's for bluefin tuna

The best estimate of a series of starting fishing mortalities is selected through the use of indices of abundance for age components of the stock. A number of these indices have been developed, discussed and utilized in varying degrees in previous years. The SCRS has endeavored to develop objective criteria for accepting or rejecting each of these indices and the assignment of a weight to each of those employed in a particular VPA. The methods for accepting an index and determining its weighting have evolved over time.

Tables 8 and 12 list the indices considered for tuning this year. These are plotted in Figures 39 and 42. Each contains information on apparent abundance of certain age groups in the bluefin stock, together with random variability and perhaps bias resulting from a multitude of sampling problems. Initially the SCRS established arbitrary criteria for inclusion (or rejection) of each index. Those that passed these criteria were given equal weight in the tuning process. Later it was agreed that this procedure did not take into account the varying degrees of statistical confidence that could be placed in each index. Therefore, in 1988 the Committee decided to weight each "acceptable" index by the inverse of its variance when tested separately against exploitable stock sizes. (See Section III of this Appendix for details of index selection criteria and weighting.) Although this method was thought by many in the Committee to be superior to those used previously, a number of problems remain.

Considering the west Atlantic as an example, the changes in the data used for tuning have been substantial between 1988 and 1989. In 1988 three indices were employed, the Japanese longline catch per effort for two age groups, 3 to 5 and 6 to 8 and the larvae index for ages 10+. The latter received about 50 percent of the weight and the former two indices about 25 percent each. This year in addition to the larvae index, two additional indices, the Canadian tended line and the United States rod and reel were used for tuning the older ages. The two revised Japanese longline indices were also used. The current assessment assigned weights of 4, 16, 76, 1 and 4 percent, respectively to the five indices. These weights indicate the change that can occur as indices are added, indices are revised, and the catch data are updated (i.e., note: for the common index, larval bluefin, the weighting changed from about 50 percent to 4 percent).

Documents SCRS/89/79 and SCRS/89/88 comment extensively on the limitations in the methodology utilized in the sampling of bluefin larvae in the Gulf of Mexico and the development of the larvae index used to track the bluefin spawning population.

Document SCRS/89/89 and 1989 SCRS (page 257) has noted the problems of limited fleet movement and the influence of environmental factors on the Canadian tended line index.

Document SCRS/89/85 discusses the yearly variations in the temporal and spatial coverage by the Japanese longline fleet and the potential impact upon the longline indices of abundance.

Document SCRS/89/80 discusses the estimation of the United States rod and reel index from the recreational surveys.

The tuning procedures can have a substantial impact on the estimates of the stock sizes of the age groups being monitored, on the judgment of the effectiveness of the management procedures and recovery of the stock. Al though theoretical studies have been attempted, the SCRS has not yet been able to complete a study of the practical impact of such recent changes and possible sources of error on the estimates of trends and levels in the western Atlantic bluefin stock.

Such a study is essential to provide SCRS with an ability to differentiate between recent changes in the tuning process (methods and indices) which affect the measure of bluefin abundance.

II. INDICES OF ABUNDANCE

i) East Atlantic and Mediterranean

Ten indices were presented to the SCRS, two indices of age 1 fish were not considered due to the uncertainty surrounding the catch-at-age table for age 1 fish. The group noted the good relationship between these two indices. The eight remaining indices were examined for use in the 1988 assessment. Three indices were based on medium or older fish and five on young fish. (Figure 39 and Table 8).

a) Japanese longline (2 indices) (East Atlantic and Mediterranean)

Two indices were developed from the Japanese longline data, one from the east Atlantic and one from the Mediterranean. Data from 1974 to 1987 were investigated at the meeting. Suspected changes in the Mediterranean fishery in early years were believed to cause the high residuals observed in those years. The index thus used only 1977 to 1987 for the Mediterranean. The age range believed to represent the fish in each index was chosen as the age above which 90 percent of the fish (numbers) occur. In the east Atlantic this age range was 5+ and in the Mediterranean it was 7+.

The index in the east Atlantic is based on eight areas and the years available for the model. The years 1974, 1975 and 1978 caused some concern due to bi-modal nature of the catch at age in those years and the small sample sizes used in deriving the catch at length. During the calibration these years had very high residuals resulting in estimated stock sizes in the terminal year with very low precision (C.V.´s of over 5). The years prior to 1979 were dropped from the index pending a more detailed investigation into possible errors.

The index in the Mediterranean is based on a model using data for the available years and two months (April, May). The years 1978 to 1981 had very low catches of bluefin although the effort was comparable to years before and after. The data from these years should be investigated for the relationship to the rest of the series (see Recommendations).

b) Spanish trap (Atlantic) (Spanish southeast coast)

This index from the Spanish trap in Barbate was chosen as the most representative of the traps in the Atlantic. The data are in number of fish by fishing day for the years 1971 to 1988 (SCRS/89/46).

c) French purse seiners (4 indices) (Mediterranean) (Gulf of Lyon)

These indices represent the CPUE at age 2 and age 3 from French purse seiners operating in the Mediterranean. These series were obtained by dividing the number of fish of each age by the number of positive fishing days. These indices were separated into two time periods (1978-1981 and 1982-1988). Spotter plans were introduced in 1982. Due to the short time period of the earlier series (1978-1981) and the length of time (7 years) from the present it was decided to use only the series in the most recent years (1982 to 1988).

d) Spanish baitboats (Atlantic) (Bay of Biscay)

This series represents the CPUE of age 2 bluefin from Spanish baitboats operating in the Bay of Biscay for albacore and bluefin. The data of this series are separated into age groups by using age at length keys based on age determination of hard parts. Improved precision in calculating effort was achieved by identifying the seasonally bluefin-directed effort in this fishery.

ii) West Atlantic

Ten indices of abundance were examined. This year, updated information was provided for the Gulf of México bluefin larvae index and the Canadian handline fishery. The 3- to 7-year-old bluefin data from records of U.S. observers on Japanese longline vessels and Japanese longline CPUE at age for age ranges 3 to 5 and 6 to 8 was re-analyzed using a general linear model (GLM). The U.S. rod and reel and handline fishery for large fish along the New England coast was re-analyzed (Figure 42, Table 12).

a) Larval bluefin survey (Gulf of Mexico)

The index of abundance of bluefin larvae from U.S. ichthyoplankton surveys (SCRS/89/83) in the Gulf of Mexico exhibits a sharp decline over the time period, although 1988 is higher than the recent past.

In response to the 1988 SCRS recommendation, an external review of this data set was carried out for the U.S. government (SCRS/89/79) and this review was further discussed in SCRS/89/88. The recommendations of this review will be assessed and implemented where possible during the next year.

b) Canadian inshore fishery (Gulf of St. Lawrence)

This index (SCRS/89/90) exhibits a sharp decline in the catch rates of large adults (ages 16+) over the past eight years with some stability in the recent period. This decline is similar to that observed for the above index.

c) Japanese longline (2 indices) (West Atlantic continental shelf)

This index, similar to that used in SCRS 1987, is based on the Japanese fishery year (August 1 to July 31) (SCRS/89/85). The allocation of fish into age groups is by the use of a growth equation. Age ranges 3 to 5 and 6 to 8 are used for the two indices which cover the period 1976 to 1988.

d) U.S.A. observer CPUE (5 age-specific indices) (Continental shelf of U.S. EEZ)

These indices for 3- to 7-year-old bluefin caught by Japanese longliners within the U.S. EEZ were calculated from set by set data on a fishing year with January 1 as the mid-point (SCRS/89/75). It was felt that these indices generally represented a subset of the Japanese longline CPUE index (SCRS/89/85). These five age-specific indices were not used in the final calibration of this assessment because the trends of these two sets of indices were similar over the common ages and years, thus the Japanese data set extending further back in time offers a possible increase in precision of the estimate of catchability (q).

e) U.S. rod and reel and handline (Atlantic coast of the U.S.A.)

This index, although similar in name to an index considered for the 1988 SCRS assessment, is revised and updated resulting in a different pattern of catch rate. The revision resulted in the elimination of the 1982 point. This index represents large fish over 200 cm (+10 years) (SCRS/89/80). Some problems with uniform data collection in 1985 and 1987 were experienced. These problems were so severe for 1987 that no value was estimated for that year.

III. ANALYSIS

1) VPA

The 1988 SCRS requested several recommended improvements to the stock assessment process be investigated and implemented if possible. In order of priority these were:

1) Incorporate the ability to use exploitable population rather than total population for calibration of VPA,

2) Use of weighted indices for calibration (in 1988 the inverse of the mean square error divided by the degrees of freedom (n-2)),

3) The ability to use mid-year population [estimates in calibrating with] indices taking place in the middle of the year,

4) The ability to use yearly weight at age from the fisheries to calculate biomass rather than a single age-based growth curve, and

5) The ability to use a plus group for oldest age to reduce some of the variation due to small numbers of fish in ages 20 to 30.

The first two were implemented in last year's assessment, all of these have been implemented in this year's assessment.

a) Index Selection Criteria and Weighting

The group agreed to examine the results of VPA runs with each index alone in order to determine which indices might be useful in calibrating the VPA. Criteria for acceptance were:

1) that the estimated level of fishing mortality rate on age 6 in 1988 had to be between 0.01 and 0.99, and

2) that the residual pattern had to be acceptable. Unacceptable residual patterns might include a pronounced trend with time, a strong U-shaped pattern, or a clear indication of changing catchability with time.

It was agreed to weight each index in the final VPA. Weights were derived from the inverse of the mean square error for each index when it was run alone (SCRS/89/43) and with the mean of the index values standardized to 1 (divide each value in the index by the mean for that index). This standardization procedure differed from that used in previous SCRS assessments, when indices were divided by their largest value. Weights were constrained such that all the weights used in the final VPA summed to 1.

ii) Projections

a) East Atlantic and Mediterranean

No projections were attempted due to uncertainties in the assessment.

b) West Atlantic

1) General

As recommended by the 1988 SCRS, investigation was carried out on the impact of the current management regime by projecting abundances of ages 10+ at the beginning of 1993 (the methods used are described in SCRS/89/77). These projections were made to provide guidance on the possible trends in abundance, rather than to predict absolute levels.

Within each analysis, multiple projections were made to incorporate the effects of uncertainties in current and future conditions. In each projection year, the average 1983-1988 yield (catch weight) by age and age group (6-9, 10+) were removed, if sufficient stock existed. Uncertainty about the 1989 abundances were based on variance estimates from the VPA. Uncertainties about the 1983-1988 average partial recruitment values at age were also incorporated. Further uncertainty levels were incorporated by conducting three sets of analyses which differed in the assumed 1989 stock size; one was based on the VPA estimate of stock size; another on abundance at age of 79 percent of the VPA estimates for 1989, and the third on abundances 113 percent of the VPA estimates.

All three analyses indicated that substantial declines would probably occur in ages 10+ by 1993 under the current management regime, given the various assumptions of the analysis.

2) Specific parameter derivation

The purpose of the projections were to evaluate the impact of the current management regime on age 10+ population sizes in the short term. The Committee decided to limit the projection to the older ages, because of the greater uncertainty about the abundance of the ages 1 to 5, associated in part with the uncertainty about the estimates of partial recruitment for those ages. A projection from 1989 to the beginning of 1993 was selected as a suitable short-term period because only ages 6-9 in 1989 would recruit to the 10+ group by 1993. The partial recruitment values for those ages have historically been less variable than the values for the younger ages.

The ICCAT regulations on west Atlantic bluefin limit catches to 2,660 MT, so the Committee decided to use yield (catch biomass) projections using the FORTRAN system described in SCRS/89/78. The 1983-1988 mean yields were calculated for ages 6 to 9 individually and for ages 10+ as a group. The use of a single yield for the 10+ fish was used because it permitted the system to take catches in proportion to the abundance of a year class. To simulate the catches of ages 6 to 9 prior to their recruitment to the 10+ group, single-age mean yields were necessary. A yield for ages 6 to 9 would have been inappropriate, because fish whwere ages 2-5 in 1989 would enter the 6-9 age range in 1990-1992. Single-age yields were needed to simulate the effect of the management system on only the 7-, 8- and 9-year-olds in 1990, the 8- and 9-year-olds in 1991 and the 9-year-olds in 1992 without confounding those effects with the abundances of younger year classes.

When yield projections are performed, it is possible that total catch might exceed the number of fish in the population. To avoid such unrealistic fishing mortality rates, an upper limit of 1.0 for the fishing mortality rate at age was set.

A simulation consisted of 1,000 projections. Uncertainty was introduced into each projection in the 1989 abundance at each age and in the partial recruitment values at age in each year. Both were assumed to be from a log normal distribution. Estimates of the mean and variance of abundances at age in 1989 were based on the final VPA; either the final VPA estimates were used as the mean or multiples of those estimated abundances were used. In all scenarios the variances about the VPA estimated abundances were used. The mean and variance about the partial recruitment values at age were estimated from the 1983-1988 partial recruitment values from the VPA. The 1983-1988 mean weight at age in the catch was used to convert catch in number to yield.

Three levels of mean 1989 abundances at age were projected. More than one level was used in an attempt to investigate the effect of uncertainty not included in the VPA variances at age. One level was the VPA estimates. The other two were 79 percent and 113 percent of those estimates. Those percentages were derived from differences in the final VPA between 1) the VPA estimates of abundance for the appropriate age ranges in 1988 and 2) the estimates of abundance calculated from the 1988 index values and catchability coefficients for the Canadian tended line and the U.S. rod and reel and handline fisheries.

Addendum 1 to Appendix 8

LIST OF DOCUMENTS PRESENTED TO SCRS AND REVIEWED BY THE BLUEFIN WORKING GROUP AND JOINTLY BY THE BLUEFIN WORKING GROUP AND THE SWORDFISH WORKING GROUP*

SCRS/89/8
SCRS/89/27*
SCRS/89/32
SCRS/89/43*
SCRS/89/46
SCRS/89/47
SCRS/89/75
SCRS/89/77*
SCRS/89/78*
SCRS/89/79
SCRS/89/80
SCRS/89/82*
SCRS/89/83
SCRS/89/85
SCRS/89/88
SCRS/89/89
SCRS/89/90
SCRS/89/102*
SCRS/89/105

Appendix 9 to Annex 10

Glossary of Some Technical Terms Used in Stock Assessment

Compiled for

ICCAT Standing Committee on Research and Statistics (SCRS)

ABUNDANCE INDEX - A relative measure of the availability of fish, it is assumed to be an estimate of relative population size from year to year. It can be fishery independent, i.e., research surveys, or fishery dependent, i.e., CPUE of a segment of the fishery.

AGE AT LENGTH KEYS - These express the percent composition by age of each length interval of fish in the CATCH. These are used to convert catch at length to CATCH AT AGE.

AGE OF RECRUITMENT or AGE AT ENTRY - The age at which a fish is first VULNERABLE to the fishery. see RECRUIT.

AVAILABILITY - see VULNERABILITY.

CALIBRATION - The use of an ABUNDANCE INDEX to select the TERMINAL F for a range of values tested. This is sometimes referred to as TUNING.

CATCH - Is usually expressed in terms of live weight. It generally refers to the total amount caught, however, sometimes it is incorrectly used to refer to the amount landed. The catches which are not landed are called discards.

CATCH AT AGE - This is expressed as the CATCH in numbers of fish for an age in a single year.

CATCH PER UNIT EFFORT (CPUE) - The catch obtained by some part or all of a fishery per unit of FISHING EFFORT expended. This term is often used as a measure of abundance of the STOCK(S). Sometimes this term may also be referred to as catch rate.

CATCHABILITY - The fraction of a STOCK removed by a unit of standardized FISHING EFFORT. It is usually denoted as "q" in the equation:

$$F = qf$$

where F represents FISHING MORTALITY and f represents FISHING EFFORT, respectively. "q" will depend on the habits of the fish: it may also depend on the abundance of the fish (e.g. less abundant fish may be more catchable due to less saturation of gear).

COHORT - A single year class of a STOCK, all the fish spawned in a single calendar year.

COLLAPSE - Reduction of a fish STOCK by fishing or other causes to levels at which the sustained production is only a negligible proportion of its former levels. The word is normally used when the process is sudden compared with the likely time scale of recovery, it is often used for any case of overfishing.

EFFORT or FISHING EFFORT - This term can be defined to varying levels of precision. It can be simply the total number of boats operating in a season, or the actual number of hooks fished per unit of time. When different types of fishing gear are deployed, the amounts of EFFORT expended by each are usually standardized according to their relative FISHING POWER before being summed as an index of total EFFORT.

ESCAPEMENT - That part of the STOCK which survives at the end of the fishing season.

EXPLOITATION LEVEL - This means the level of FISHING MORTALITY, it is sometimes used without any precise quantity in mind or in reference to CATCH which is incorrect. A constant EXPLOITATION LEVEL can imply varying CATCHES.

EXPLOITATION PATTERN - The distribution of FISHING MORTALITY over each of the age groups in the STOCK. Also referred to as PARTIAL RECRUITMENT (PR). It is the age specific measure of the VULNERABILITY of a STOCK to the fishery.

FISHING MORTALITY - see MORTALITY.

FISHING POWER - The relative fishing power of two vessels or gear types is the ratio between the catches they would obtain per unit of fishing effort on the same population of fish.

$F_{0.1}$ - The FISHING MORTALITY at which the slope of the tangent of the YIELD-PER-RECRUIT curve is 10% of the slope at its origin. The $F_{0.1}$ is always less than F_{max}, the catch is only slightly less than the catch at F_{max}, but the CPUE is much higher with $F_{0.1}$ with consequent economic benefits. For this reason, $F_{0.1}$ is often used as a biological reference point for management objectives.

F_{max} - the FISHING MORTALITY at which the maximum YIELD-PER-RECRUIT will be taken, based on the relationship between YIELD-PER-RECRUIT and FISHING MORTALITY.

GROWTH OVERFISHING - see OVERFISHING.

MAXIMUM SUSTAINABLE YIELD (MSY) - The maximum long-term average annual CATCH which can be taken from a STOCK.

MODEL - Models are mathematical expressions (formulae) containing variables which explain the behavior of a phenomenon (often a STOCK). A DETERMINISTIC MODEL attempts to fully explain the phenomenon, while a STOCHASTIC MODEL contains terms for unexplained or random effects.

MORTALITY - It is usually defined as an instantaneous rate of fish dying, usually expressed in terms of years. Thus a proportion exp(-Z) of a population would survive a constant TOTAL MORTALITY, Z, operating for one year. The TOTAL MORTALITY is divided into FISHING MORTALITY, denoted by the symbol F, and NATURAL MORTALITY, denoted by the symbol M. When both are expressed as instantaneous rates, the TOTAL MORTALITY is simply the sum of these two. NATURAL MORTALITY is usually taken to include not only mortality due to natural causes (predation, disease, etc.) but also mortality due to non-fishing artificial causes such as nuclear weapons testing or chemical waste dumping. FISHING MORTALITY, expresses the relative quantity of fish dying from being caughT.

For example: F = 0.6 means that $e^{-0.6}$ = 0.55 or 55% of the fish survive or (100 - 55) = 45% of the fish are dying each year from being caught. This example implies a natural mortality of zero.

NATURAL MORTALITY - see MORTALITY.

OVERFISHING - Any level of fishing greater than some defined, optimal level. In the classical sense, a level of FISHING EFFORT or FISHING MORTALITY such that a reduction of this level would, in the medium term, lead to an increase in the total CATCH. Two distinct types of classical overfishing are recognized: GROWTH OVERFISHING is the situation where the proportion of the biomass caught exceeds the increase in the population growth: RECRUITMENT OVERFISHING is the situation where the proportion of fish (in numbers) caught exceeds the number of RECRUITS to the fishery.

PARTIAL RECRUITMENT (PR) - see EXPLOITATION PATTERN.

PRODUCTIVITY - Generally used to refer to the capacity of a STOCK to provide a YIELD.

RECRUIT - A young fish entering the exploitable stage in its life cycle. Recruitment can mean either the rate of entry of recruits into the fishery or the process by which such recruits are generated. Recruitment is associated with a particular age, that is the youngest age group which is considered to belong to the exploitable STOCK. The age at recruitment depends both on the biological characteristics of the fish itself and on the nature of the fishery (location, mesh size, etc.). Alternatively, recruitment can be defined as the attainment of a certain size, or as the appearance on a particular fishing ground, or as the attainment of a particular level of CATCHABILITY relative to that of older fish. Pre-recruits are fish which have not yet reached the recruitment stage.

RECRUITMENT OVERFISHING - see OVERFISHING.

SELECTIVITY - see VULNERABILITY.

SPA - SEQUENTIAL POPULATION ANALYSIS (also called VPA - VIRTUAL POPULATION ANALYSIS) - An iterative model for estimating population size from CATCH AT AGE, PARTIAL RECRUITMENT and TERMINAL F assuming these are known. This method totals the contributions made by a single year class (COHORT) to the fishery, the summing is done backwards from the terminal year and the oldest age.

SPAWNING BIOMASS - The total biomass of fish of reproductive age present during the breeding season of a STOCK.

STOCK - In its strict sense, a distinct, reproductively isolated population. In practice, the term is applied to the members of a species or group of species inhabiting any conveniently defined area, which is regarded as a discrete population for management purposes.

STOCK-RECRUITMENT RELATIONSHIP - The relationship between the number of RECRUITS and the size of the SPAWNING BIOMASS which originally generated them. Such a relationship always exists, in that the existence of a parent STOCK is a prerequisite for the generation of recruitment. However, often other mechanisms, such as the environment result in the number of RECRUITS being related to the parent STOCK size over the range of STOCK sizes observed.

SURPLUS PRODUCTION MODELS - These models are used for estimation of population size when age-specific CATCH data are not available. These models relate CATCH and EFFORT and provide an estimate of SURPLUS PRODUCTION, that is, the biomass which if removed will result in no change in the stock. Common examples of these models are: Graham-Schaefer, Gulland-Fox, Pella-Tomlinson.

SVPA - SEPARABLE VPA - A log ratio method of estimating the EXPLOITATION PATTERN from CATCH AT AGE and NATURAL MORTALITY. This least squares estimate requires that the years selected for the CATCH AT AGE have been relatively constant as regards the fishery.

TERMINAL F - The FISHING MORTALITY applied in the most recent year to the age of full recruitment, i.e., the age for which the EXPLOITATION PATTERN equals 1.

TUNING - SEE CALIBRATION.

VPA - see SPA.

VULNERABILITY - Is a measure of the probability of a particular fish or age group of fish being caught by the fishery (or gear). It is a combination of two factors:- SELECTIVITY, the likelihood of a fish being retained by fishing gear after coming in contact with the gear, and AVAILABILITY, the chance of a fish encountering a piece of fishing gear. see EXPLOITATION PATTERN.

WEIGHT AT AGE - The mean weight of an individual for a specific year and age. For ages not fully recruited to the fishery the WEIGHT AT AGE of the CATCH will not be equal to the WEIGHT AT AGE of the population. This is due to selectivity which normally takes the larger fish of an age group.

YIELD - Sometimes synonymous with CATCH, but usually with the implication of a degree of sustainability, especially when potential yields are under discussion. The yield curve is the relationship between the expected yield and the level of FISHING MORTALITY or (sometimes) FISHING EFFORT.

YIELD PER RECRUIT (YPR) - The long-term average yield in weight in the catch for each recruit entering the fishery for a given EXPLOITATION PATTERN at a given FISHING MORTALITY. The average yield per recruit multiplied by the number of recruits (if known) gives the total YIELD.

Appendix 10 to Annex 8

Documentation of Swordfish Assessment Work*

I. UPDATE OF CATCH, EFFORT AND CATCH-AT-SIZE/AGE

a) Catch and effort

The swordfish catch table including 1988 data prepared by the Secretariat was reviewed and revised with minor changes, including 1987 data. Approximately 2,000 MT were added for the 1987 North Atlantic Spanish catch. Canada, Japan, Spain and the U.S. explained briefly the new information associated with swordfish catch and effort. In 1988, the Spanish swordfish fleet extended into the South Atlantic (Gulf of Guinea) with new boats and some of its boats from the North Atlantic, resulting in a sizable catch (4,400 MT). Some of the U.S. fleet in the Caribbean area started changing flags in 1988, and it was noted that the acquisition of the data from re-flagged boats is important. Estimates of the unreported catch in the Caribbean for 1988 were incorporated into the data base.

b) Catch at size

Substitution procedures for catches of nations that do not provide size samples were similar to those used previously. The substitution and raising table (SCRS/89/9) prepared by the Secretariat was reviewed and revised for data through 1988.

It was noted that the Mediterranean data base for swordfish was improved recently due to the availability of the data from Greece and Italy, but more size data from other countries and the establishment of parameters on the L-W relationship and growth equation are needed to generate catch-at-size data.

c) Catch at age

A new growth analysis (SCRS/89/73) incorporated the updated mark-recapture data set (15 new recaptures added). Based on the variance associated with a new growth equation, it was agreed that it did not differ from the one derived at the 1988 Workshop. It was noted that revision of the growth equation based on mark-recapture data should be carried out only when substantial data are accumulated, although some recaptures will be made every year. For the conversion from size to age, the same growth equation as last year was used. It was noted that a general growth model was used, instead of specific growth models by sex. Catch-at-age data were summarized in two areas for the west (ICCAT data Areas 1-3 and 4A) and for the east (ICCAT data area 4B) and then combined into one area for the total North Atlantic.

---

*This Appendix was prepared by the swordfish species group as a background document on technical aspects for stock assessment carried out during the 1989 SCRS session, but was not reviewed by the SCRS.

II. STOCK STRUCTURE

The stock structure was reviewed from the point of view of whether or not the stock assessment should be conducted as was done at the last SCRS.

It was suggested that the Committee concentrate on the North Atlantic stock analysis as a first priority considering the present status of the stock and the need for management advice to the Commission. However, it was mentioned that the recent development of the new swordfish fishery in the South Atlantic should not be ignored, and the SCRS should conduct VPA runs, if time allows. For the South Atlantic, it was recognized that extensive research effort should be expended to facilitate the assessment work by the next SCRS. The U.S. agreed to work cooperatively with Spain during the year to facilitate an assessment of the South Atlantic stock.

As to the North Atlantic, although the one-stock hypothesis was favored at the last SCRS and the stock analysis was done based upon it, it was pointed out that the two-stock hypothesis should not be neglected as an alternative possibility. At present, there is no biological information to identify an explicit east-west boundary. Because of the ICCAT data base system, the only practical solution at this stage was a choice of a line at 30°W longitude (dividing ICCAT area 4A and 4B) or at 60°W (Area 1-3 and Area 4A). In view of the tag recapture information (4 recaptures crossed the 60°W line) and the similarity of the size data encompassing the 60°W line, the Committee selected the 30°W line arbitrarily. It was mentioned that swordfish tagging has been almost non-existent in the eastern Atlantic and hence movement of the fish cannot be ruled out. Document SCRS/89/34 indicated a possible interchange between the Atlantic and the Mediterranean Sea.

III. EVALUATION OF THE SHORT-TERM RESEARCH PROJECTS RECOMMENDED AT THE LAST SCRS

The last SCRS recommended short-term research projects be carried out concerning the following three subjects, before the full analytical assessment is accomplished:

1) Accuracy of the catch-at-size data

The substitution procedures were carefully examined in a general manner. However, the substitution procedure, such as assignment of catch-at-size data among areas, still needs further investigation.

2) Development of age-specific CPUE

The CPUEs of the U.S. and Spanish fisheries were derived in terms of each age of 1-4 and 5+ ages, using generalized linear modeling. The CPUE of the Japanese longline fishery was also obtained by the use of the same statistical procedure for pooled ages.

3) Detailed analysis of tag-recapture data

It was reported that a partial analysis of the probability of swordfish tag recapture based on hypothetical mixing rates was presented at the International Billfish Symposium in Kona, Hawaii. However, the report was not available for the Committee to review. The complete analysis, to incorporate information on the distribution of fishing effort as related to tag returns has not been conducted and the Committee considered this research important to complete in the near future.

IV. DEVELOPMENT OF CPUE INDICES

a) U.S. indices

Catch-per-unit-effort (CPUE) indices derived from trip records from the U.S. swordfish fishery were used to investigate abundance trends of Atlantic swordfish. Generalized linear modeling techniques were used to develop estimates of standardized annual CPUEs. These indices of relative abundance were then quantitatively compared to population abundance estimates derived from virtual population analyses (VPAs).

U.S. trip records of size frequency samples were converted to age-specific catches by trip to develop age-specific indices for U.S. trip data from 1981 through 1988 that would be useful in VPA tuning procedures.

U.S. trip records from 1981 to 1988 with size frequency samples and associated effort information (total hooks and number of sets) were sub-sampled, selecting those vessels which were represented in three or more years. The 97 selected vessels were then grouped into seven operational categories based primarily on gear, port, and operational information, and secondarily on the vessels' history in the fishery and corporate affiliation. Procedures identical to those used to convert the ICCAT catch-at-size data to catch at age were applied to each trip-specific size frequency. Separate indices were developed for ages 1, 2, 3, 4, and 5+ for U.S. records. Seven geographical areas were employed in this analysis. CPUE by age was calculated by dividing the numbers caught in an age group by the number of hooks fished on a trip and multiplying by 1,000. Units are, therefore, numbers of swordfish per 1,000 hooks. As in previous analyses, records of zero catches from a particular age group were eliminated before indices were developed.

The models which were developed included terms for year, area, quarter, operation type, average set size, operation-area interaction, and area-quarter interaction terms. Although 1,966 trip records were available, the elimination of zero observations reduced the number of records used in each age-specific analysis differentially. The number of observations used for each index ranged from 1,536 to 1,871. The indices developed in this report explained from 43 percent to 63 percent of the total variability of age-specific CPUEs. Hypotheses concerning changes in age-specific catchability from 1981 through 1988, which have not been standardized for and which conceivably result in biased estimates indicating increased abundances of younger ages in the last years of the time series, can be evaluated by examining yearly residual plots for each age group. Evidence supporting this hypothesis was not apparent in the annual residual plots and the effect of this bias is probably minor in relation to the dominant sources of variability addressed by the current models.

b) Japanese indices

Japanese longline catch and effort statistics, which were aggregated to month, area (10^o latitude x 10^o longitude) and the kind of bait, were used. Catch per 1,000 hooks was converted to age-specific (age 5+) CPUE using the ratio of that size to the total in the catch-at-size in Area 4B.

A general linear model (GLM) was first applied for the standardization of CPUE; however, it turned out to be highly variable among years. Then it was thought appropriate to use the simple stratified arithmetic mean for each year.

c) Spanish indices

The Spanish longline CPUE data were used to develop age-specific indices (1, 2, 3, 4, 5+) for the total North Atlantic, the western (area 4A), and northeastern Atlantic swordfish stock hypotheses. All three indices were constructed via general linear models, standardizing for the effects of area, quarter, and years. The division between the east and west was taken as 30^oW longitude. Data from 1983-1988 were included in the analyses. Zero catches per unit effort were excluded from analysis. The sized CPUE data were aged in the same fashion as the U.S. CPUE indices.

For the northwestern Atlantic hypothesis, three areas were used with boundaries as follows: 1) 45^oN latitude to 50^oN latitude and 50^oW longitude and 30^oW longitude, 2) 40^oN latitude to 45^oN latitude and 30^oW longitude to 50^oW longitude, and 3) 35^oN latitude to 40^oN latitude and 30^oW longitude to 50^oW longitude. The GLMs used for this analysis included only the main effects of area, calendar quarter and year.

For the northeastern Atlantic hypothesis, six areas were used with boundaries as follows: 1) between 45^oN and 50^oN latitude and east of 30^oW longitude, 2) the four 5^o latitude by 10^o longitude areas south of 45^oN but north of 35^oN and east of 10^oW longitude and 3) combining the two 5^o coastal Spanish areas. The final GLMs used in this analysis included the main effects of area, quarter, and year as well as the area-quarter interaction.

For the total north Atlantic hypothesis, eight areas were used. These areas were those described above except that a single area east of 50^oW longitude, west of 20^oW longitude, north of 35^oN latitude, and south of 40^oN latitude, was used. The final GLMs used in the analysis included the main effects of area, quarter, and year as well as the area-quarter interaction.

V. VPA ESTIMATION PROCEDURE

a) Partial recruitment from separable VPA

Pope and Shepherd's (1982) separable VPA (SVPA) technique was used to estimate the partial recruitment vector in the terminal year (1988). The SVPA least-squares estimate of the exploitation pattern provides a partial recruitment estimate for a period of years during which the PR has remained relatively constant. The sensitivity of the PR of the older ages was examined, and it was found that it depended on the value of selectivity (S_J) at the oldest age. However, it seems that, in general, fishes are fully recruited in the older ages (5+). Estimates of partial recruitment vectors were generated for each of the two stock hypotheses used in the VPA from catch-at-age data from 1983 to 1988. Other parameters used in the SVPA were: M = 0.2, F_t = 0.2, S(J) = 3.0. The ADAPT VPA methodology accepted by the Committee allowed for the estimation of fishing mortality rates on partially recruited ages in the final year, so that SVPA estimates were only used for ages that were not directly estimated.

b) Calibrating procedure

The catch-at-age tables and the set of CPUE indices were used to calibrate the VPA to derive estimates of fishing mortality rates and stock sizes consistent with both the CPUE indices and the catch-at-age table. A summary of the calibrating procedure is as follows:

1) A separable VPA was run on the basic catch-at-age table to establish a default pattern for F at age (partial recruitment) in the most recent year in the catch at age.

2) Preliminary VPAs were calibrated using each CPUE individually, to estimate variance (mean square error) for each index.

3) A VPA was calibrated using all CPUE indices simultaneously, weighing each index by 1/(mean square error) in the individual testing runs.

4) Aspects of the VPA results, including residuals, standard errors of estimates, correlation among parameters, and sensitivity to trial values for the Marquardt algorithm were examined. If there were indications that better choices of parameters to be fitted could have been made, steps 2-4 were repeated with a new set of parameters.

ADAPT was configured to closely resemble the program CAL which was used in the past ICCAT swordfish workshop. Some of the advantages of the ADAPT procedure are that it uses an efficient Marquardt algorithm that finds the solution quickly, allows flexibility in choice of parameters to be fit, and routinely produces a wide variety of diagnostic tables and precision estimates. The information on the precision of the estimates provides some indication of the reliability about the estimated stock sizes in the most recent year.

For the assessment, the objective function within ADAPT minimized the weighted sum of squares of the differences between observed and estimated indices of abundance. Weights were assigned to each index based on the results of a VPA tuned to that index alone. A plus group (age 9 and older) was used to minimize the effects of possible aging error on the oldest ages. The abundance of fish in the plus group was included in the sum of square calculations for indices covering these ages.

Portions of the partial recruitment pattern in the most recent year were estimated within ADAPT. The ability to select the parameters to be estimated with ADAPT permits the estimation of fishing mortality rates on specific ages in the most recent year (i.e., portions of the partial recruitment pattern). This approach gives a more complete estimate of the uncertainty about the estimated abundance than if an externally estimated partial recruitment pattern, such as from SVPA, was assumed. The Committee decided that, if possible, ADAPT would estimate the fishing mortality rates on most of the partially recruited ages and the first fully recruited age (age 5). The partial recruitment for 1-year-olds from SVPA was assumed and ages 5 and older fish were assumed to be equally vulnerable to fishing.

ADAPT provides estimates of the variance of estimated stock sizes after the last year in the catch at age matrix (i.e., at the beginning of 1989 for this swordfish assessment). These variances reflect largely the error in the indices of abundance that are used for tuning. Other possible sources of error are assumed to be negligible relative to the error in the indices. Specifically, the more significant of these possible errors are:

1) The process error, i.e., the assumption that the catch equation describes adequately the relationship between cohort numbers in successive years and the corresponding catch and mortality rates,

2) Error in the catch-at-age estimates,

3) Error in the partial recruitment (PR) estimates (in 1988) that are not estimated by ADAPT (e.g., those taken from SVPA), and

4) Error in the natural mortality rate.

The above potential sources of error are assumed to be negligible in all standard virtual population analyses (VPA). ADAPT can be formulated to include all of the above error terms. However, to do so for the swordfish assessment would likely result in overparameterization. If any of the above errors are significant relative to the error in the indices of abundance, then the variances will be underestimated.

VI. VPA RESULTS

Results of the ADAPT runs for each of the three assessments (i.e., North Atlantic, Northwest Atlantic, and Northeast Atlantic) are discussed fully in the main report. Variance estimates and corresponding weights for the indices of abundance used in tuning each of these VPAs are provided in Tables VPA-1, VPA-2 and VPA-3, respectively. No exogenous weights or down-weighting were applied in any of the runs. Input for each of the North, Northwest, and Northeast tuning runs is provided as Tables VPA-4, VPA-5 and VPA-6, respectively. All input parameters and options, as well as the detailed results, are documented in these tables.

All indices were examined individually prior to being used in the final tuning. For these runs, two parameters were estimated: (1) the age-6 stock size on January 1, 1989; and (2) the catchability coefficient (q) for the index. When indices were used collectively in the final weighted tuning runs, four stock size parameters were estimated (N3, N4, N5, and N6 in 1989) along with one q for each index used in the tuning. Parameters were generally well estimated (CVs generally less than 30 percent) and were not highly correlated. Weighting generally appeared to stabilize the variance and few observations had undue influence on the overall sums of squares.

VII. YIELD PER RECRUIT ANALYSIS

Yield-per-recruit (Y/R) analysis was carried out in order to establish biological reference points, F(0.1) and F(max), and to examine long-term stock projections. Mean weight-at-age data were estimated in the same manner as the catch-at-age; and the 1988 vector was used for Y/R. The natural mortality estimate was 0.2 per year. In the first of two runs, partial recruitment estimates (obtained from SVPA) were applied (Tables YR 1, 3, 5). In a second run, the SVPA estimates were modified to reflect no fishing mortality on ages 1 and 2 (Tables YR 2, 4, 6). In both cases, the fully recruited fishing mortality rate, F(full), was greater than F(max) and considerably greater than F(0.1). Comparison of the two Tables for each area shows the potential gains in Y/R if small fish are not caught (i.e., ages 1 and 2). Although not estimated herein, commensurate gains in adult fish biomass would also be expected.

VIII. PROJECTIONS FOR MANAGEMENT OPTIONS

Several management scenarios were evaluated using methodologies that projected the results of the VPAs forward into the future. The management strategies that were evaluated were: 1) the present fishing mortality rate (F at status quo, referred to as FSQ); 2) a minimum size or age analysis in which fishing mortality on age 1 and 2 fish was eliminated (F(1,2) = 0); 3) fishing at the rate at which yield per recruit is maximized (Fmax); 4) fishing at the rate at which the slope of the yield-per-recruit curve is one-tenth of the slope at the origin (F0.1); 5) a combination of Fmax and F(1,2) = 0; and 6) a combination of F0.1 and F(1,2) = 0.

Separate projections were conducted for the total northern Atlantic, the northwestern Atlantic and northeastern Atlantic stock hypotheses. Each was based upon the appropriate results of the VPA in the following manner. First, the stock at age vector for ages 3 through 9+ at the beginning of 1989 was used as the initial condition for stock abundance. Since ages 1 and 2 were not estimated directly in the VPA, but rather indirectly by the partial recruitment, stock size at age 1 was taken as the three-year average of age 1 from 1985-87; stock size at age 2 was taken as the three-year average of age 2 from 1986-88. These averages were chosen, since they were the most recent three years from which VPA estimates of stock size were made directly. Projections were made using the three-year average of age 1 as the estimate of recruitment in the future.

The partial recruitment vectors used for projections were the vectors estimated from the SVPA. These represent average conditions over the recent years and are appropriate for projections. The status quo fishing mortality (FSQ) was the fully recruited F for the 5+ age group from the appropriate VPA. Fmax and F0.1 are defined in the yield-per-recruit analysis discussed elsewhere in this appendix. When F(1,2) = 0 was employed in combination with Fmax or F0.1, then the Fmax or F0.1 value was defined relative to the new partial recruitment vector in which ages 1 and 2 were zero.

The Committee felt that qualitatively there is a difference between the information in projections that are based upon the results of stock sizes estimated from the VPAs versus those resulting from assumptions about recruitment. Therefore, stock sizes were grouped into age groups of 1 to 4 and 5+, noting that the 5+ group projection is unaffected by recruitment assumptions until after 1993 for projections beginning in 1989.

Each projection was made for 1989 using the FSQ mortality rate. Then the alternative rates were implemented in the projected year 1990. In the status quo scenario, the FSQ value was continued into the future.

Summaries of deterministic projections for the northern, northwestern and northeastern Atlantic are given in Tables P1, P2, P3 and Figures P1, P2 and P3.

All three stock hypotheses show the same general trends in the projections. Present rates of fishing reduce the abundance of 5+ fish; this is somewhat offset by the entry of larger year-classes into the 5+ group. However, we are less confident on the actual sizes of these year classes. In the long term status quo projections indicate reductions in stock size, unless recruitment were to increase. Reductions in fishing mortality rate and/or implementation of minimum sizes (ages) initially reduce yield, but this begins to be regained within three or four years. At the same time the potential to increase 5+ biomass is large with these lower fishing mortality rates.

Additionally, stochastic Monte Carlo projections were made for the northern and northwestern Atlantic for FSQ and F0.1 strategies in order to characterize the variability in the estimation. The initial stock sizes were randomly generated by age from lognormal distributions with means equal to the initial stock sizes used in the deterministic projections and with coefficients of variation obtained from the VPA. Recruitment variability was introduced through lognormal generation with a mean and variance of the 85-87 recruitments from the VPA. Ten year projections under these conditions were conducted 1,000 times and the results accumulated into means and standard deviations of biomass, yield, stock size and catch. The mean values of the results (Figures P4, P5) are virtually identical to the deterministic projections. Also, the estimated variation is not so large as to negate the general trends from the deterministic analysis.

Table VPA-1. Results of tests of individual abundance indices, total North Atlantic

SER.	INDEX		AGE	F(5.88)	CV of N(6.89)	MSE	1/MSE	WEIGHT (%)
1	US	LL	1	1.0028	0.2230	0.0223	44.8049	9.04
2	US	LL	2	0.9319	0.2013	0.0173	57.9341	11.69
3	US	LL	3	1.5313	1.3273	0.1729	5.7847	1.17
4	US	LL	4	1.6567	1.5941	0.1307	7.6487	1.54
5	US	LL	5+	3.2927	7.5670	0.2391	4.1827	0.84
6	JAPAN	LL	5+	0.4866	0.3264	0.0545	18.3530	3.70
7	SPAIN	LL	1	0.3091	0.1624	0.0055	181.5211	36.63
8	SPAIN	LL	2	0.8011	0.2830	0.0288	34.6765	7.00
9	SPAIN	LL	3	0.9941	0.2605	0.0148	67.7002	13.66
10	SPAIN	LL	4	1.1858	0.5338	0.0322	31.0955	6.27
11	SPAIN	LL	5+	1.2529	0.5188	0.0239	41.8971	8.45

Table VPA-2. Results of tests of individual abundance indices, northwest Atlantic

SER.	INDEX		AGE	F(5.88)	CV of N(6.89)	MSE	1/MSE	WEIGHT (%)
1	US	LL	1	0.8883	0.1717	0.0140	71.5512	31.27
2	US	LL	2	0.9487	0.2297	0.0227	44.0665	19.26
3	US	LL	3	1.4407	1.3486	0.1977	5.0593	2.21
4	US	LL	4	1.5104	1.5204	0.1476	6.7752	2.96
5	US	LL	5+	3.0925	7.5203	0.2067	4.8377	2.11
6	SPAIN	LL	1	0.5031	1.0464	0.3613	2.7679	1.21
7	SPAIN	LL	2	0.7329	0.2607	0.0280	35.7603	15.63
8	SPAIN	LL	3	1.1035	0.4619	0.0390	25.6687	11.22
9	SPAIN	LL	4	1.3123	0.8240	0.0613	16.3239	7.13
10	SPAIN	LL	5+	0.8435	0.6177	0.0626	15.9762	6.98

Table VPA-3. Results of tests of individual abundance indices, northeast Atlantic

SER.	INDEX	AGE	F(88)	MSE	WEIGHT	ADJ. WEIGHT
1	SPAIN LL 4B	1	0.44	0.060013	16.663056	0.092470
2	SPAIN LL 4B	2	0.24	0.024599	40.652059	0.225593
3	SPAIN LL 4B	3	0.65	0.062011	16.126171	0.089490
4	SPAIN LL 4B	4	0.88	0.016894	59.192613	0.328482
5	SPAIN LL 4B	5+	1.25	0.032550	30.721966	0.170488
6	JAPAN LL 4B	5+	0.63	0.059366	16.844659	0.093477

Table VPA-4. Output of VPA runs testing 11 abundance indices, North Atlantic

ADAPT Run Number 26 1989 10 30 15 54 8
NORTH ATL STOCK - SCRS89
NATL

Output option selected for input parameters: full
Output option selected for results: full

INPUT PARAMETERS AND OPTIONS SELECTED

Natural mortality is 0.2

Oldest age (not in the plus group) is 8

For all yrs prior to the terminal year (1988), backcalculated stock sizes for the following ages used to estimate total mortality (Z) for age 8: 5 6 7 8
This method for estimating F on the oldest age is generally used when a flat-topped partial recruitment curve is thought to be characteristic of the stock.

F for age 9+ is then calculated from the following ratios of F[age 9+] to F[age 8]

1978	1.0000
1979	1.0000
1980	1.0000
1981	1.0000
1982	1.0000
1983	1.0000
1984	1.0000
1985	1.0000
1986	1.0000
1987	1.0000
1988	1.0000

Stock size of the 9+ group is then calculated using the following method: CATCHEQ

Partial recruitment estimate for 1988

1	0.1170
2	0.3380
3	0.6020
4	0.9020
5	1.0000
6	1.0000
7	1.0000
8	1.0000

Objective function is SUM w*(OBS - PRED)**2

Indices normalized (by dividing by mean observed value) before tuning to VPA stocksizes
The residuals for years prior to the terminal year are downweighted using the following algorithm: NONE

All biomass estimates (including SSB) reflect mean stock sizes

Initial estimates of parameters for the Marquardt algorithm and lower and upper bounds on the parameter estimates:

Table VPA-4. Continued...

Par.	Initial Est	Lower Bnd	Upper Bnd
N 3	3.0000000E5	0.0000000E0	2.0000000E6
N 4	1.5000000E5	0.0000000E0	1.0000000E6
N 5	7.5000000E4	0.0000000E0	1.0000000E6
N 6	3.0000000E4	0.0000000E0	1.0000000E6
qUS AGE 1	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE 2	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE 3	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE 4	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE5+	1.0000000E-6	0.0000000E0	1.0000000E0
qJLLAGE5+	1.0000000E-6	0.0000000E0	1.0000000E0
qSP AGE 1	1.0000000E-6	0.0000000E0	1.0000000E0
qSP AGE 2	1.0000000E-6	0.0000000E0	1.0000000E0
qSP AGE 3	1.0000000E-6	0.0000000E0	1.0000000E0
qSP AGE 4	1.0000000E-6	0.0000000E0	1.0000000E0
qSP AGE5+	1.0000000E-6	0.0000000E0	1.0000000E0

The following indices of abundance are available:

1	US AGE 1
2	US AGE 2
3	US AGE 3
4	US AGE 4
5	US AGE5+
6	JLLAGE5+
7	SP AGE 1
8	SP AGE 2
9	SP AGE 3
10	SP AGE 4
11	SP AGE5+

Indices that will be used in this run are: 1 2 3 4 5 6 7 8 9 10 11

SUMMARY OF WEIGHTING USED IN THE OBJECTIVE FUNCTION

EXOGENOUS WEIGHTS BY INDEX AND YR (omega)

	1978	1979	1980	1981	1982	1983
1	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
2	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
3	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
4	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
5	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
6	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
7	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
8	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
9	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
10	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
11	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000

	1984	1985	1986	1987	1988
1	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
2	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
3	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
4	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
5	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
6	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
7	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
8	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
9	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
10	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
11	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table VPA-4. Continued...

DOWNWEIGHTS BY YEAR (delta)

1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

1988
1.0000

ITERATIVE RE-WEIGHTS BY INDEX (chi)

1	2	3	4	5	6	7	8	9	10
0.0904	0.1169	0.0117	0.0154	0.0084	0.0370	0.3663	0.0700	0.1366	0.0627

11
0.0845

FINAL SS WEIGHTS BY INDEX NUMBER AND YR - NATL

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
1	0.0000	0.0000	0.0000	0.0904	0.0904	0.0904	0.0904	0.0904	0.0904	0.0904
2	0.0000	0.0000	0.0000	0.1169	0.1169	0.1169	0.1169	0.1169	0.1169	0.1169
3	0.0000	0.0000	0.0000	0.0117	0.0117	0.0117	0.0117	0.0117	0.0117	0.0117
4	0.0000	0.0000	0.0000	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154
5	0.0000	0.0000	0.0000	0.0084	0.0084	0.0084	0.0084	0.0084	0.0084	0.0084
6	0.0000	0.0000	0.0000	0.0370	0.0370	0.0370	0.0370	0.0370	0.0370	0.0370
7	0.0000	0.0000	0.0000	0.3663	0.3663	0.3663	0.3663	0.3663	0.3663	0.3663
8	0.0000	0.0000	0.0000	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700	0.0700
9	0.0000	0.0000	0.0000	0.1366	0.1366	0.1366	0.1366	0.1366	0.1366	0.1366
10	0.0000	0.0000	0.0000	0.0627	0.0627	0.0627	0.0627	0.0627	0.0627	0.0627
11	0.0000	0.0000	0.0000	0.0845	0.0845	0.0845	0.0845	0.0845	0.0845	0.0845

	1988
1	0.0904
2	0.1169
3	0.0117
4	0.0154
5	0.0084
6	0.0370
7	0.3663
8	0.0700
9	0.1366
10	0.0627
11	0.0845

CATCH AT AGE - NATL

	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	6402	10406	25881	14761	20357	29247	28733	32602	44456
2	19280	27379	46023	34832	31039	54190	51951	57783	89623
3	36184	33384	49655	40424	43192	55267	55518	65338	84521
4	35416	32012	39174	34777	39982	48456	44301	51359	65236
5	26021	22812	25817	20987	26889	30545	25892	26827	34572
6	13661	14327	14852	11283	13260	15415	12703	12735	15948
7	8664	8992	9327	7282	7745	8368	6432	7156	7921
8	4269	4694	4697	4143	4971	4023	3222	3525	4146
9	13682	15333	13021	11181	13424	9902	7864	7823	10837
1+	163579	169339	228447	179670	200859	255413	236616	265148	357260

Table VPA-4. Continued...

	1987	1988
1	70282	76813
2	113908	128210
3	105598	103443
4	72142	65698
5	37427	34967
6	17967	15580
7	7793	8479
8	3872	4184
9	10062	8069
1+	439051	445443

CAA summary for ages 1 1 2 4 5 9

	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	6402	10406	25881	14761	20357	29247	28733	32602	44456
2	90880	92775	134852	110033	114213	157913	151770	174480	239380
5	66297	66158	67714	54876	66289	68253	56113	58066	73424

	1987	1988
1	70282	76813
2	291648	297351
5	77121	71279

WT AT AGE (MID-YR) (MT - RW)- NATL

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.014	0.014	0.014	0.014	0.014	0.014	0.015	0.014	0.014	0.014	0.013
2	0.025	0.024	0.025	0.024	0.025	0.024	0.025	0.024	0.024	0.024	0.024
3	0.041	0.040	0.040	0.039	0.040	0.039	0.039	0.039	0.039	0.039	0.038
4	0.058	0.059	0.058	0.056	0.056	0.056	0.056	0.056	0.057	0.055	0.056
5	0.077	0.077	0.076	0.074	0.073	0.073	0.073	0.074	0.075	0.073	0.073
6	0.093	0.094	0.094	0.093	0.091	0.090	0.090	0.092	0.093	0.090	0.091
7	0.109	0.111	0.109	0.108	0.107	0.106	0.107	0.108	0.108	0.107	0.107
8	0.121	0.124	0.122	0.121	0.121	0.121	0.121	0.121	0.123	0.121	0.120
9	0.161	0.165	0.162	0.167	0.175	0.162	0.160	0.162	0.167	0.165	0.160

WT AT AGE (JAN 1) (MT - RW)- NATL

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.010	0.010	0.011	0.010	0.011	0.011	0.011	0.011	0.011	0.011	0.010	0.011
2	0.020	0.018	0.019	0.019	0.018	0.018	0.019	0.019	0.019	0.019	0.018	0.018
3	0.034	0.032	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.030	0.032
4	0.050	0.049	0.048	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.046	0.048
5	0.069	0.067	0.067	0.065	0.064	0.064	0.064	0.064	0.065	0.064	0.064	0.067
6	0.085	0.085	0.085	0.084	0.082	0.081	0.081	0.082	0.083	0.082	0.081	0.085
7	0.102	0.102	0.101	0.100	0.099	0.098	0.098	0.099	0.100	0.099	0.098	0.101
8	0.115	0.116	0.116	0.115	0.114	0.114	0.113	0.114	0.115	0.114	0.113	0.117
9	0.161	0.165	0.162	0.167	0.175	0.162	0.160	0.162	0.167	0.165	0.160	0.160

Table VPA-5. Output of VPA runs testing 10 abundance indices, northwest Atlantic (Areas 1, 2, 3 and 4a).

Estimate: N3, N4, N5, N6 in 1989.

```
ADAPT          Run Number 41          1989 10 31 16 55 26
NORTHWEST ATL "STOCK" - SCRS89
1234A

Output option selected for input parameters:  full
Output option selected for results:  full

INPUT PARAMETERS AND OPTIONS SELECTED
-------------------------------------
Natural mortality is 0.2
Oldest age (not in the plus group) is 8

For all yrs prior to the terminal year (1988), backcalculated stock sizes for the
following ages used to estimate total mortality (Z) for age 8:    5 6 7 8
This method for estimating F on the oldest age is generally used when a flat-topped
partial recruitment curve is thought to be characteristic of the stock.

F for age 9+ is then calculated from the following ratios of F[age 9+] to F[age 8]
      1978    1.0000
      1979    1.0000
      1980    1.0000
      1981    1.0000
      1982    1.0000
      1983    1.0000
      1984    1.0000
      1985    1.0000
      1986    1.0000
      1987    1.0000
      1988    1.0000
Stock size of the 9+ group is then calculated
using the following method:  CATCHEQ

Partial recruitment estimate for 1988
         1     0.1396
         2     0.3920
         3     0.6727
         4     0.9279
         5     1.0000
         6     1.0000
         7     1.0000
         8     1.0000

Objective function is    SUM w*(OBS - PRED)**2

Indices normalized (by dividing by mean observed value) before tuning to VPA
stocksizes

The residuals for years prior to the terminal year are downweighted using the
following algorithm:  NONE

All biomass estimates (including SSB) reflect mean stock sizes

Initial estimates of parameters for the Marquardt algorithm
and lower and upper bounds on the parameter estimates:
```

Table VPA-5. Continued...

Par.	Initial Est	Lower Bnd	Upper Bnd
N 3	3.0000000E5	0.0000000E0	2.0000000E6
N 4	1.5000000E5	0.0000000E0	1.0000000E6
N 5	7.5000000E4	0.0000000E0	1.0000000E6
N 6	3.0000000E4	0.0000000E0	1.0000000E6
qUS AGE 1	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE 2	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE 3	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE 4	1.0000000E-6	0.0000000E0	1.0000000E0
qUS AGE5+	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4A 1	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4A 2	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4A 3	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4A 4	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4A 5+	1.0000000E-6	0.0000000E0	1.0000000E0

The following indices of abundance are available:

1	US AGE 1
2	US AGE 2
3	US AGE 3
4	US AGE 4
5	US AGE5+
6	SP 4A 1
7	SP 4A 2
8	SP 4A 3
9	SP 4A 4
10	SP 4A 5+

Indices that will be used in this run are: 1 2 3 4 5 6 7 8 9 10

SUMMARY OF WEIGHTING USED IN THE OBJECTIVE FUNCTION

EXOGENOUS WEIGHTS BY INDEX AND YR (omega)

	1978	1979	1980	1981	1982	1983
1	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
2	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
3	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
4	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
5	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
6	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
7	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
8	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
9	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
10	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000

	1984	1985	1986	1987	1988
1	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
2	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
3	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
4	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
5	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
6	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
7	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
8	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
9	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
10	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

Table VPA-5. Continued...

DOWNWEIGHTS BY YEAR (delta)

1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

ITERATIVE RE-WEIGHTS BY INDEX (chi)

1	2	3	4	5	6	7	8	9	10
0.3127	0.1926	0.0221	0.0296	0.0211	0.0121	0.1563	0.1122	0.0713	0.0698

FINAL SS WEIGHTS BY INDEX NUMBER AND YR - 1234A

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.0000	0.0000	0.0000	0.3127	0.3127	0.3127	0.3127	0.3127	0.3127	0.3127	0.3127
2	0.0000	0.0000	0.0000	0.1926	0.1926	0.1926	0.1926	0.1926	0.1926	0.1926	0.1926
3	0.0000	0.0000	0.0000	0.0221	0.0221	0.0221	0.0221	0.0221	0.0221	0.0221	0.0221
4	0.0000	0.0000	0.0000	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296
5	0.0000	0.0000	0.0000	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211	0.0211
6	0.0000	0.0000	0.0000	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121
7	0.0000	0.0000	0.0000	0.1563	0.1563	0.1563	0.1563	0.1563	0.1563	0.1563	0.1563
8	0.0000	0.0000	0.0000	0.1122	0.1122	0.1122	0.1122	0.1122	0.1122	0.1122	0.1122
9	0.0000	0.0000	0.0000	0.0713	0.0713	0.0713	0.0713	0.0713	0.0713	0.0713	0.0713
10	0.0000	0.0000	0.0000	0.0698	0.0698	0.0698	0.0698	0.0698	0.0698	0.0698	0.0698

CATCH AT AGE - 1234A

	1978	1979	1980	1981	1982	1983	1984	1985	1986
1	3552	6579	19304	7727	15738	17664	19670	20372	29153
2	11836	19811	34202	21037	21621	26710	35414	33171	58896
3	25585	24278	34832	23631	27616	23716	31093	38275	55691
4	23084	22961	24717	17529	19480	18974	20383	27506	42510
5	15645	16101	16659	10841	12106	12211	11655	14905	20860
6	7810	10177	9378	6530	6396	7414	6150	7230	10089
7	4913	6861	5584	4348	3845	4309	3330	4059	4949
8	2369	3638	3000	2436	2675	2498	1739	2129	2717
9	7603	12608	8311	7948	8259	6867	4720	5258	8184
1+	102397	123014	155987	102027	117736	120363	134154	152905	233049

Table VPA-5. Continued...

	1987	1988
1	43600	42350
2	64493	82290
3	56369	58815
4	35501	34067
5	17681	15848
6	8488	7326
7	4226	3969
8	2205	1896
9	6166	4951
1+	238729	251512

CAA summary for ages 1 1 2 4 5 9

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	3552	6579	19304	7727	15738	17664	19670	20372	29153	43600	42350
2	60505	67050	93751	62197	68717	69400	86890	98952	157097	156363	175172
5	38340	49385	42932	32103	33281	33299	27594	33581	46799	38766	33990

WT AT AGE (MID-YR) (MT - RW)- 1234A

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.015	0.015	0.015	0.014	0.015	0.014	0.015	0.015	0.015	0.015	0.015
2	0.028	0.025	0.026	0.025	0.026	0.024	0.026	0.025	0.025	0.025	0.025
3	0.043	0.042	0.041	0.040	0.041	0.041	0.041	0.041	0.041	0.041	0.041
4	0.061	0.060	0.060	0.059	0.060	0.059	0.060	0.059	0.059	0.059	0.059
5	0.080	0.079	0.079	0.078	0.078	0.079	0.079	0.078	0.079	0.077	0.078
6	0.097	0.097	0.097	0.096	0.096	0.096	0.097	0.096	0.097	0.095	0.096
7	0.113	0.113	0.113	0.112	0.113	0.112	0.113	0.113	0.113	0.113	0.113
8	0.126	0.127	0.126	0.125	0.126	0.125	0.127	0.126	0.127	0.126	0.127
9	0.167	0.168	0.168	0.174	0.182	0.169	0.171	0.169	0.172	0.176	0.170

WT AT AGE (JAN 1) (MT - RW)- 1234A

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.012	0.012	0.011	0.010	0.012	0.011	0.012	0.011	0.011	0.011	0.011	0.011
2	0.022	0.020	0.020	0.019	0.019	0.019	0.019	0.020	0.019	0.019	0.019	0.019
3	0.036	0.034	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.033
4	0.053	0.051	0.050	0.049	0.049	0.049	0.050	0.049	0.049	0.049	0.049	0.052
5	0.073	0.069	0.069	0.068	0.068	0.069	0.069	0.068	0.068	0.068	0.067	0.071
6	0.090	0.088	0.088	0.087	0.087	0.086	0.087	0.087	0.087	0.087	0.086	0.090
7	0.107	0.105	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.108
8	0.119	0.120	0.119	0.119	0.119	0.119	0.119	0.119	0.120	0.119	0.119	0.122
9	0.167	0.168	0.168	0.174	0.182	0.169	0.171	0.169	0.172	0.176	0.170	0.170

Table VPA-6. Output of VPA runs testing six abundance indices (weighted), northeast Atlantic (Area 4b).

```
Estimate: N3, N4, N5, N6 in 1989.

ADAPT          Run Number 50            1990 4 4 21 37 51
NORTHEAST ATL "STOCK" - SCRS89
4B

Output option selected for input parameters:  full
Output option selected for results:  full

INPUT PARAMETERS AND OPTIONS SELECTED
-------------------------------------
Natural mortality is 0.2
Oldest age (not in the plus group) is 8

For all yrs prior to the terminal year (1988), backcalculated stock sizes for the
following ages used to estimate total mortality (Z) for age 8:     5 6 7 8
This method for estimating F on the oldest age is generally used when a flat-topped
partial recruitment curve is thought to be characteristic of the stock.

F for age 9+ is then calculated from the following ratios of F[age 9+] to F[age 8]
       1978     1.0000
       1979     1.0000
       1980     1.0000
       1981     1.0000
       1982     1.0000
       1983     1.0000
       1984     1.0000
       1985     1.0000
       1986     1.0000
       1987     1.0000
       1988     1.0000
Stock size of the 9+ group is then calculated using the following method:  CATCHEQ

Partial recruitment estimate for 1988
          1     0.1070
          2     0.3156
          3     0.5756
          4     0.8842
          5     1.0000
          6     1.0000
          7     1.0000
          8     1.0000

Objective function is     SUM w*(OBS - PRED)**2

Indices normalized (by dividing by mean observed value) before tuning to VPA
stocksizes

The residuals for years prior to the terminal year are downweighted using the
following algorithm:  NONE

All biomass estimates (including SSB) reflect mean stock sizes

Initial estimates of parameters for the Marquardt algorithm and lower and upper bounds
on the parameter estimates:
```

Table VPA-6. Continued...

Par.	Initial Est	Lower Bnd	Upper Bnd
N 3	3.0000000E5	0.0000000E0	2.0000000E6
N 4	1.5000000E5	0.0000000E0	1.0000000E6
N 5	7.5000000E4	0.0000000E0	1.0000000E6
N 6	3.0000000E4	0.0000000E0	1.0000000E6
qSP 4B 1	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4B 2	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4B 3	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4B 4	1.0000000E-6	0.0000000E0	1.0000000E0
qSP 4B 5+	1.0000000E-6	0.0000000E0	1.0000000E0
qJLLAGE5+	1.0000000E-6	0.0000000E0	1.0000000E0

The following indices of abundance are available:

1	SP 4B 1
2	SP 4B 2
3	SP 4B 3
4	SP 4B 4
5	SP 4B 5+
6	JLLAGE5+

Indices that will be used in this run are: 1 2 3 4 5 6

SUMMARY OF WEIGHTING USED IN THE OBJECTIVE FUNCTION

EXOGENOUS WEIGHTS BY INDEX AND YR (omega)

	1978	1979	1980	1981	1982	1983
1	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
2	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
3	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
4	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
5	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000
6	0.00000000	0.00000000	0.00000000	1.00000000	1.00000000	1.00000000

	1984	1985	1986	1987	1988
1	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
2	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
3	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
4	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
5	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000
6	1.00000000	1.00000000	1.00000000	1.00000000	1.00000000

DOWNWEIGHTS BY YEAR (delta)

1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

1988
1.0000

ITERATIVE RE-WEIGHTS BY INDEX (chi)

1	2	3	4	5	6
0.0925	0.2256	0.0895	0.3285	0.1705	0.0935

Table VPA-6. Continued...

FINAL SS WEIGHTS BY INDEX NUMBER AND YR - 4B

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.0000	0.0000	0.0000	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925	0.0925
2	0.0000	0.0000	0.0000	0.2256	0.2256	0.2256	0.2256	0.2256	0.2256	0.2256	0.2256
3	0.0000	0.0000	0.0000	0.0895	0.0895	0.0895	0.0895	0.0895	0.0895	0.0895	0.0895
4	0.0000	0.0000	0.0000	0.3285	0.3285	0.3285	0.3285	0.3285	0.3285	0.3285	0.3285
5	0.0000	0.0000	0.0000	0.1705	0.1705	0.1705	0.1705	0.1705	0.1705	0.1705	0.1705
6	0.0000	0.0000	0.0000	0.0935	0.0935	0.0935	0.0935	0.0935	0.0935	0.0935	0.0935

CATCH AT AGE - 4B

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	2849	3827	6577	7033	4618	11583	9063	12231	15302	26682	34463
2	7444	7568	11821	13795	9418	27479	16537	24612	30727	49415	45920
3	10600	9106	14824	16792	15577	31551	24425	27063	28830	49230	44629
4	12332	9051	14458	17249	20502	29481	23918	23853	22726	36642	31631
5	10376	6711	9158	10146	14784	18334	14237	11922	13711	19746	19120
6	5851	4150	5475	4752	6864	8002	6554	5505	5859	9479	8253
7	3751	2131	3743	2935	3900	4059	3101	3097	2972	3567	4510
8	1900	1056	1697	1707	2296	1524	1483	1397	1429	1666	2287
9	6079	2725	4712	3232	5166	3036	3144	2564	2653	3896	3116
1+	61182	46325	72465	77641	83125	135049	102462	112244	124209	200323	193929

CAA summary for ages 1 1 2 4 5 9

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	2849	3827	6577	7033	4618	11583	9063	12231	15302	26682	34463
2	30376	25725	41103	47836	45497	88511	64880	75528	82283	135287	122180
5	27957	16773	24785	22772	33010	34955	28519	24485	26624	38354	37286

Table VPA-6. Continued...

WT AT AGE (MID-YR) (MT - RW)- 4B

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	0.011	0.011	0.013	0.013	0.013	0.014	0.013	0.014	0.013	0.013	0.011
2	0.022	0.022	0.023	0.023	0.023	0.023	0.024	0.023	0.022	0.023	0.022
3	0.036	0.036	0.037	0.036	0.037	0.038	0.037	0.037	0.035	0.036	0.035
4	0.053	0.054	0.054	0.053	0.053	0.053	0.052	0.053	0.052	0.052	0.052
5	0.071	0.071	0.071	0.070	0.069	0.069	0.068	0.070	0.069	0.069	0.070
6	0.088	0.088	0.088	0.087	0.086	0.085	0.085	0.086	0.086	0.085	0.086
7	0.103	0.103	0.103	0.102	0.101	0.100	0.100	0.102	0.101	0.100	0.102
8	0.114	0.116	0.115	0.115	0.115	0.114	0.114	0.114	0.114	0.114	0.114
9	0.155	0.151	0.151	0.150	0.165	0.147	0.145	0.147	0.152	0.148	0.144

WT AT AGE (JAN 1) (MT - RW)- 4B

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.011	0.010	0.010	0.008	0.009
2	0.017	0.016	0.016	0.017	0.018	0.017	0.018	0.018	0.018	0.017	0.017	0.017
3	0.029	0.028	0.028	0.029	0.029	0.030	0.029	0.030	0.029	0.029	0.028	0.029
4	0.046	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.044	0.044
5	0.064	0.061	0.062	0.061	0.061	0.060	0.060	0.060	0.060	0.060	0.060	0.062
6	0.081	0.079	0.079	0.079	0.077	0.077	0.076	0.077	0.078	0.076	0.077	0.081
7	0.097	0.095	0.095	0.095	0.094	0.093	0.092	0.093	0.093	0.092	0.093	0.096
8	0.108	0.109	0.109	0.109	0.108	0.107	0.107	0.107	0.108	0.107	0.106	0.112
9	0.155	0.151	0.151	0.150	0.165	0.147	0.145	0.147	0.152	0.148	0.144	0.144

Table Y/R-1. Results of swordfish yield per recuit calculations, North Atlantic

AGE	WEIGHT-AT-AGE	PARTIAL RECRUITMENT
1	13.200	0.117
2	24.000	0.334
3	38.400	0.602
4	55.600	0.902
5	73.500	1.000
6	90.700	1.000
7	107.000	1.000
8	119.600	1.000
9	131.800	1.000
10	140.700	1.000
11	148.800	1.000
12	153.000	1.000
13	156.500	1.000
14	159.900	1.000
15	169.200	1.000
16	178.600	1.000
17	187.900	1.000
18	197.200	1.000
19	206.600	1.000
20	215.900	1.000

NATURAL MORTALITY RATE : 0.2

F0.1 COMPUTED AS .1961 AT Y/R OF 22.7843
FMAX COMPUTED AS .4071 AT Y/R OF 24.9690

YIELD PER RECRUIT ANALYSIS

	FINSING MORTALITY	CATCH (NUMBER)	YIELD (KG)	AVG. WEIGHT (KG)	YIELD PER UNIT EFFORT
	0.1000	0.230	17.487	76.142	1.505
F0.1----	0.1961	0.346	22.784	65.840	1.000
	0.2000	0.350	22.902	65.490	0.985
	0.3000	0.424	24.598	57.969	0.706
	0.4000	0.476	24.968	52.436	0.537
FMAX----	0.4071	0.479	24.969	52.097	0.528
	0.5000	0.515	24.818	48.205	0.427
F88-----	0.6000	0.545	24.461	44.863	0.351
	0.7000	0.570	24.026	42.155	0.295
	0.8000	0.591	23.574	39.912	0.254
	0.9000	0.608	23.131	38.021	0.221
	1.0000	0.624	22.707	36.403	0.195
	1.1000	0.637	22.308	35.000	0.175
	1.2000	0.650	21.934	33.770	0.157
	1.3000	0.660	21.585	32.682	0.143
	1.4000	0.670	21.259	31.711	0.131
	1.5000	0.680	20.955	30.838	0.120

Table Y/R-2. Results of swordfish yield per recuit calculations, North Atlantic, assuming that there is no fishing mortality on ages 1 and 2

AGE	WEIGHT-AT-AGE	PARTIAL RECRUITMENT
1	13.200	0.000
2	24.000	0.000
3	38.400	0.602
4	55.600	0.902
5	73.500	1.000
6	90.700	1.000
7	107.000	1.000
8	119.600	1.000
9	131.800	1.000
10	140.700	1.000
11	148.800	1.000
12	153.000	1.000
13	156.500	1.000
14	159.900	1.000
15	169.200	1.000
16	178.600	1.000
17	187.900	1.000
18	197.200	1.000
19	206.600	1.000
20	215.900	1.000

NATURAL RAL MORTALITY RAT: 0.2

F0.1 COMPUTED AS .2179 AT Y/R OF 24.1141
FMAX COMPUTED AS .5707 AT Y/R OF 27.0601

YIELD PER RECRUIT ANALYSIS

	FINSING MORTALITY	CATCH (NUMBER)	YIELD (KG)	AVG. WEIGHT (KG)	YIELD PER UNIT EFFORT
	0.1000	0.204	17.542	86.081	1.585
	0.2000	0.308	23.533	76.384	1.063
F0.1----	0.2179	0.322	24.114	74.985	1.000
	0.3000	0.371	25.819	69.552	0.778
	0.4000	0.414	26.711	64.553	0.604
	0.5000	0.445	27.016	60.758	0.488
FMAX----	0.5407	0.462	27.060	58.589	0.428
F88----	0.6000	0.468	27.054	57.790	0.408
	0.7000	0.487	26.970	55.411	0.348
	0.8000	0.502	26.830	53.464	0.303
	0.9000	0.514	26.668	51.844	0.268
	1.0000	0.525	26.502	50.476	0.240
	1.1000	0.534	26.340	49.308	0.216
	1.2000	0.542	26.186	48.298	0.197
	1.3000	0.549	26.042	47.419	0.181
	1.4000	0.555	25.908	46.647	0.167
	1.5000	0.561	25.785	45.964	0.155

Table Y/R-3. Results of swordfish yield per recuit calculations, northwest Atlantic

AGE	WEIGHT-AT-AGE	PARTIAL RECRUITMENT
1	14.600	0.140
2	25.200	0.392
3	40.900	0.673
4	59.100	0.928
5	77.800	1.000
6	96.400	1.000
7	112.600	1.000
8	126.700	1.000
9	137.900	1.000
10	146.200	1.000
11	153.000	1.000
12	158.600	1.000
13	162.600	1.000
14	165.300	1.000
15	169.200	1.000
16	178.600	1.000
17	187.900	1.000
18	197.000	1.000
19	206.600	1.000
20	215.900	1.000

NATURAL RAL MORTALITY RAT: 0.2

F0.1 COMPUTED AS 0.1937 AT Y/R OF 23.8890
FMAX COMPUTED AS 0.3924 AT Y/R OF 26.1012

YIELD PER RECRUIT ANALYSIS

	FINSING MORTALITY	CATCH (NUMBER)	YIELD (KG)	AVG. WEIGHT (KG)	YIELD PER UNIT EFFORT
	0.1000	0.237	18.443	77.691	1.495
F0.1----	0.1937	0.355	23.889	67.265	1.000
	0.2000	0.361	24.085	66.678	0.976
	0.3000	0.438	25.790	58.874	0.697
FMAX----	0.3924	0.488	26.101	53.505	0.539
	0.4000	0.491	26.100	53.125	0.529
	0.5000	0.531	25.874	48.733	0.420
	0.6000	0.562	25.442	45.272	0.344
	0.7000	0.587	24.940	42.474	0.289
	0.8000	0.608	24.430	40.165	0.248
	0.9000	0.626	23.936	38.225	0.216
F88----	1.0000	0.642	23.469	36.570	0.190
	1.1000	0.655	23.034	35.140	0.170
	1.2000	0.668	22.629	33.891	0.153
	1.3000	0.679	22.254	32.789	0.139
	1.4000	0.689	21.906	31.809	0.127
	1.5000	0.698	21.583	30.931	0.117

Table Y/R-4. Results of swordfish yield per recuit calculations, northwest Atlantic, assuming that there is no fishing mortality on ages 1 and 2

AGE	WEIGHT-AT-AGE	PARTIAL RECRUITMENT
1	14.600	0.000
2	25.200	0.000
3	40.900	0.673
4	59.100	0.928
5	77.800	1.000
6	96.400	1.000
7	112.600	1.000
8	126.700	1.000
9	137.900	1.000
10	146.200	1.000
11	153.000	1.000
12	158.600	1.000
13	162.600	1.000
14	165.300	1.000
15	169.200	1.000
16	178.600	1.000
17	187.900	1.000
18	197.000	1.000
19	206.600	1.000
20	215.900	1.000

NATURAL RAL MORTALITY RAT: 0.2

FO.1 COMPUTED AS 0.1937 AT Y/R OF 23.8890
FMAX COMPUTED AS 0.3924 AT Y/R OF 26.1012
$ 1^[[K$ TYPE YR4A.^H^HB

YIELD PER RECRUIT ANALYSIS

	FINSING MORTALITY	CATCH (NUMBER)	YIELD (KG)	AVG. WEIGHT (KG)	YIELD PER UNIT EFFORT
	0.1000	0.207	18.509	89.235	1.587
	0.2000	0.313	24.855	79.314	1.066
FO.1----	0.2186	0.328	25.491	77.821	1.000
	0.3000	0.377	27.273	72.272	0.780
	0.4000	0.420	28.211	67.098	0.605
	0.5000	0.452	28.525	63.165	0.489
FMAX----	0.5658	0.468	28.566	61.061	0.433
	0.6000	0.475	28.557	60.089	0.408
	0.7000	0.494	28.462	57.626	0.349
	0.8000	0.509	28.310	55.616	0.303
	0.9000	0.522	28.138	53.947	0.268
F88-----	1.0000	0.532	27.963	52.543	0.240
	1.1000	0.541	27.793	51.348	0.217
	1.2000	0.549	27.634	50.319	0.197
	1.3000	0.556	27.486	49.427	0.181
	1.4000	0.562	27.351	48.646	0.168
	1.5000	0.568	27.227	47.958	0.156

Table Y/R-5. Results of swordfish yield per recuit calculations, northeast Atlantic (Area 4B)

AGE	WEIGHT-AT-AGE	PARTIAL RECRUITMENT
1	11.400	0.107
2	21.900	0.316
3	35.200	0.576
4	51.900	0.884
5	69.900	1.000
6	85.600	1.000
7	102.000	1.000
8	113.800	1.000
9	125.200	1.000
10	133.000	1.000
11	140.100	1.000
12	145.100	1.000
13	148.400	1.000
14	151.500	1.000
15	169.200	1.000
16	178.600	1.000
17	187.900	1.000
18	197.200	1.000
19	206.600	1.000
20	215.900	1.000

NATURAL RAL MORTALITY RAT: 0.2

F0.1 COMPUTED AS 0.1951 AT Y/R OF 21.4566
FMAX COMPUTED AS 0.4025 AT Y/R OF 23.5031

YIELD PER RECRUIT ANALYSIS

	FINSING MORTALITY	CATCH (NUMBER)	YIELD (KG)	AVG. WEIGHT (KG)	YIELD PER UNIT EFFORT
	0.1000	0.226	16.509	72.961	1.501
F0.1----	0.1951	0.340	21.457	63.078	1.000
	0.2000	0.345	21.594	62.656	0.982
	0.3000	0.418	23.174	55.403	0.702
	0.4000	0.469	23.503	50.640	0.534
FMAX----	0.4025	0.471	23.503	49.948	0.531
	0.5000	0.508	23.341	45.974	0.424
	0.6000	0.538	22.982	42.738	0.348
	0.7000	0.562	22.550	40.109	0.293
F88-----	0.8000	0.583	22.103	37.929	0.251
	0.9000	0.600	21.664	36.088	0.219
	1.0000	0.616	21.245	34.512	0.193
	1.1000	0.629	20.851	33.143	0.172
	1.2000	0.641	20.482	31.943	0.155
	1.3000	0.652	20.137	30.881	0.141
	1.4000	0.662	19.815	29.933	0.129
	1.5000	0.671	19.514	29.080	0.118

Table Y/R-6. Results of swordfish yield per recuit calculations, northeast Atlantic, (Area 4B), assuming that there is no fishing mortality on ages 1 and 2

AGE	WEIGHT-AT-AGE	PARTIAL RECRUITMENT
1	11.400	0.000
2	21.900	0.000
3	35.200	0.576
4	51.900	0.884
5	69.900	1.000
6	85.600	1.000
7	102.000	1.000
8	113.800	1.000
9	125.200	1.000
10	133.000	1.000
11	140.100	1.000
12	145.100	1.000
13	148.400	1.000
14	151.500	1.000
15	169.200	1.000
16	178.600	1.000
17	187.900	1.000
18	197.200	1.000
19	206.600	1.000
20	215.900	1.000

NATURAL RAL MORTALITY RAT: 0.2

F0.1 COMPUTED AS 0.2158 AT Y/R OF 22.6828
FMAX COMPUTED AS 0.5497 AT Y/R OF 25.4045

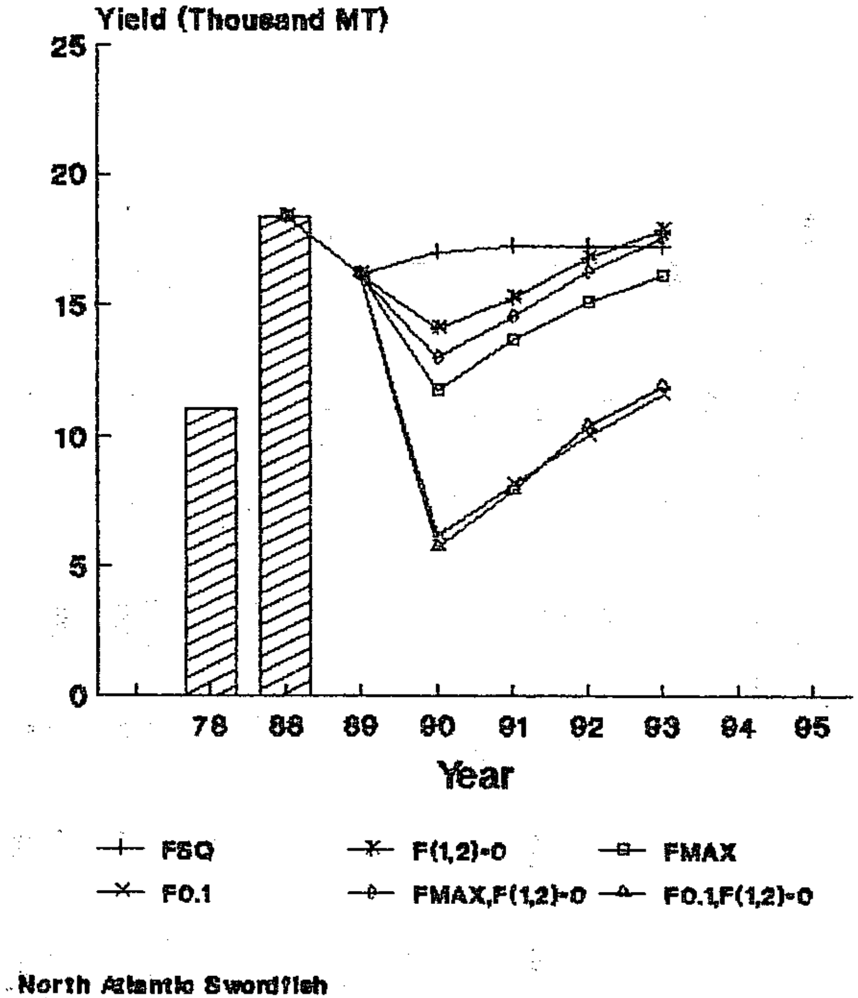
YIELD PER RECRUIT ANALYSIS

	FINSING MORTALITY	CATCH (NUMBER)	YIELD (KG)	AVG. WEIGHT (KG)	YIELD PER UNIT EFFORT
	0.1000	0.202	16.586	82.036	1.578
	0.2000	0.306	22.200	72.607	1.056
F0.1----	0.2158	0.318	22.683	71.405	1.000
	0.3000	0.369	24.319	65.994	0.771
	0.4000	0.411	25.127	61.155	0.598
	0.5000	0.442	25.382	57.475	0.483
FMAX----	0.5497	0.454	25.405	55.957	0.440
	0.6000	0.465	25.386	54.588	0.430
	0.7000	0.484	25.276	52.266	0.344
F88-----	0.8000	0.499	25.115	50.359	0.299
	0.9000	0.511	24.935	48.769	0.264
	1.0000	0.522	24.753	47.422	0.236
	1.1000	0.531	24.576	46.268	0.213
	1.2000	0.539	24.408	45.269	0.194
	1.3000	0.546	24.251	44.397	0.178
	1.4000	0.552	24.105	43.629	0.164
	1.5000	0.558	23.970	42.948	0.152

Table P-1. Projections for various management options, total North Atlantic swordfish

NORTH ATLANTIC SWORDFISH, DETERMINISTIC PROJECTIONS

	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
Biomass (MT):						
1989, 1-4	38756	38756	38756	38756	38756	38756
1989, 5+	11059	11059	11059	11059	11059	11059
1993, 1-4	38456	46223	42567	47126	46727	49863
1993, 5+	13018	14492	22164	36645	16586	35789
1999, 1-4	38456	46223	42567	47126	46727	49863
1999, 5+	13085	17434	27557	63050	20630	63051
Abundance:						
1989, 1-4	1831562	1831562	1831562	1831562	1831562	1831562
1989, 5+	123762	123762	123762	123762	123762	123762
1993, 1-4	1803689	2031292	1911420	2028333	2041792	2107124
1993, 5+	162580	184578	270658	437977	209562	431690
1999, 1-4	1803689	2031292	1911420	2028333	2041792	2107124
1999, 5+	162237	216305	314323	642732	251033	652788
Yield (MT):						
1989, 1-4	11121	11121	11121	11121	11121	11121
1989, 5+	5038	5038	5038	5038	5038	5038
Total	16159	16159	16159	16159	16159	16159
1993, 1-4	11241	11172	8884	5265	10476	5120
1993, 5+	6006	6698	7232	6332	7078	6808
Total	17247	17870	16116	11597	17554	11928
1999, 1-4	11241	11172	8884	5365	10476	5120
1999, 5+	6029	8034	8915	10690	8765	11778
Total	17270	19206	17999	16055	19241	16898
Catch:						
1989, 1-4	327551	327551	327551	327551	327551	327551
1989, 5+	53289	53289	53289	53289	53289	53289
1993, 1-4	323458	243787	243709	138234	227582	108500
1993, 5+	70003	79475	82593	70917	83380	76084
1999, 1-4	323458	243787	243709	138234	227582	108500
1999, 5+	69855	93170	95917	104071	99880	116262



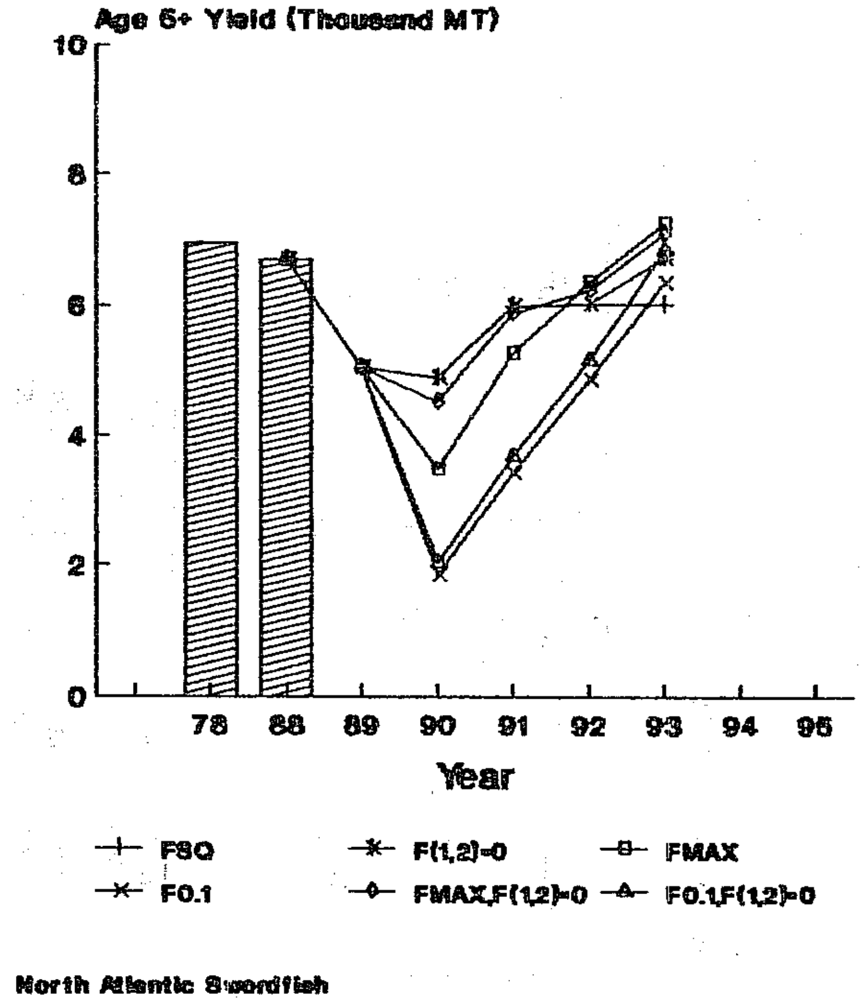


Figure P-1. Yields (1,000 MT) for all ages and age 5+ fish for various management options, total North Atlantic swordfish.

Table P-2. Projections for various management options, northwest Atlantic swordfish

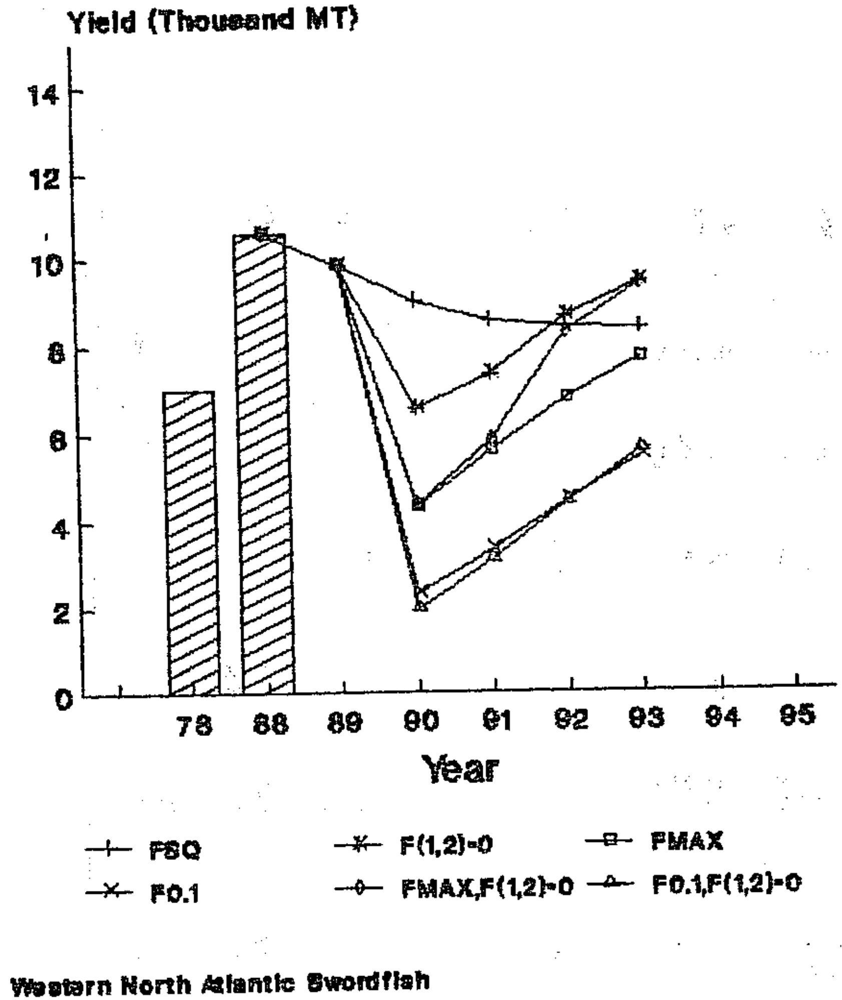
WESTERN NORTH ATLANTIC SWORDFISH, DETERMINISTIC PROJECTIONS

Biomass (MT):	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	17709	17709	17709	17709	17709	17709
1989, 5+	3374	3374	3374	3374	3374	3374
1993, 1-4	16466	22510	21843	24410	24227	26050
1993, 5+	2253	2906	9016	14510	6775	14243
1999, 1-4	16466	22510	21843	24410	24227	26050
1999, 5+	2222	3753	14295	32029	10470	32107

Abundance:	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	833856	833856	833856	833856	833856	833856
1989, 5+	36583	36583	36583	36583	36583	36583
1993, 1-4	809180	984846	945647	1007803	1017716	1052780
1993, 5+	28188	37383	108015	171184	83809	169583
1999, 1-4	809180	984846	945647	1007803	1017716	1052780
1999, 5+	28025	47347	153374	310148	120270	316048

Yield (MT):	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	7760	7760	7760	7760	7760	7760
1989, 5+	2070	2070	2070	2070	2070	2070
Total	9830	9830	9830	9830	9830	9830
1993, 1-4	6981	7610	4820	2939	5756	2872
1993, 5+	1408	1822	2872	2196	2893	2735
Total	8389	9432	7692	5135	8649	5607
1999, 1-4	6981	7610	4820	2939	5756	2072
1999, 5+	1390	2348	4493	5380	4432	6027
Total	8371	9958	9313	8319	10188	8899

Catch:	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	225910	225910	225910	225910	225910	225910
1989, 5+	21135	21135	21135	21135	21135	21135
1993, 1-4	211164	161282	127529	74327	118541	57701
1993, 5+	16284	21597	31982	27410	33130	30290
1999, 1-4	211164	161282	127529	74327	118541	57701
1999, 5+	16190	27353	45412	49660	47543	56451



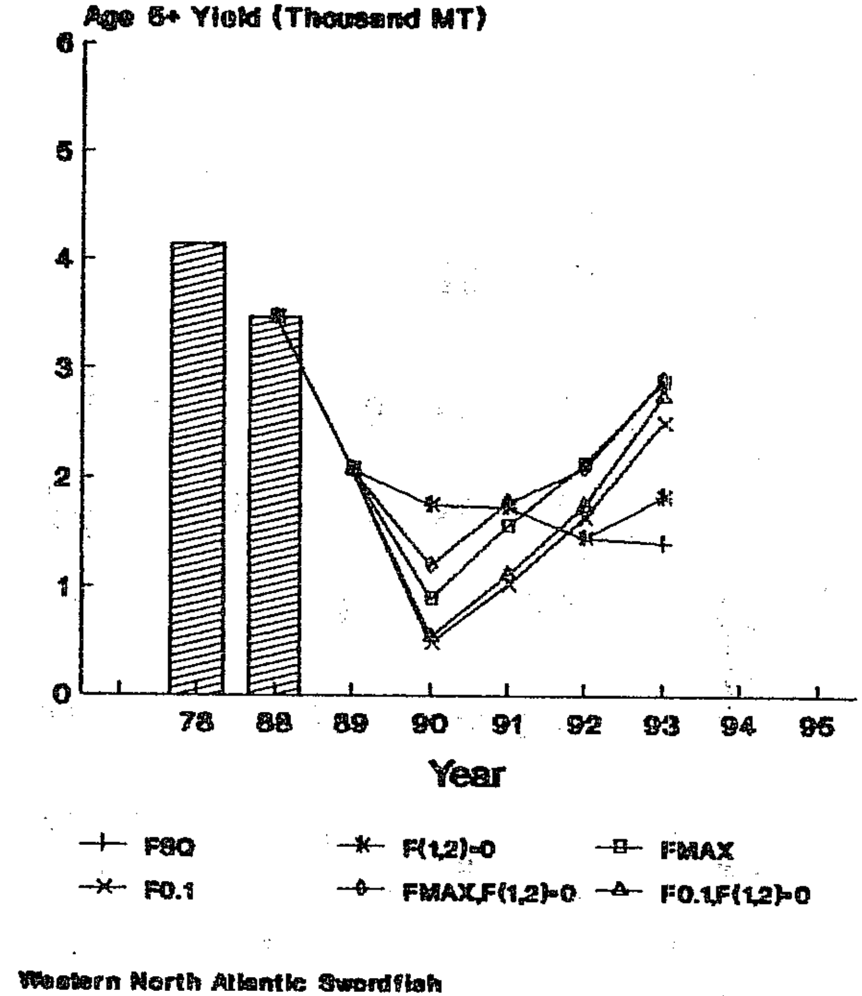


Figure P-2. Yields (1,000 MT) for all ages and age 5+ fish for various management options, northwest Atlantic swordfish

Table P-3. Projections for various management options, northeast Atlantic swordfish

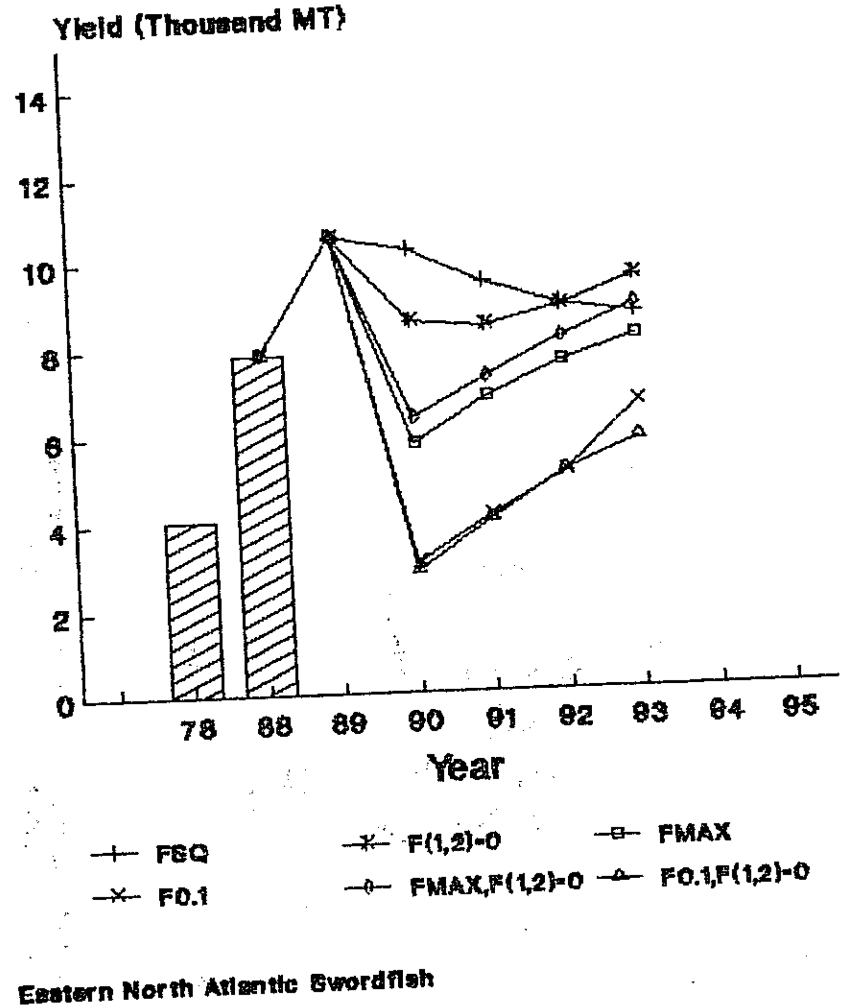
EASTERN NORTH ATLANTIC SWORDFISH, DETERMINISTIC PROJECTIONS

Biomass (MT):	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	21906	21906	21906	21906	21906	21906
1989, 5+	4535	4535	4535	4535	4535	4535
1993, 1-4	17735	22061	21085	23204	23031	24464
1993, 5+	4504	5179	12848	18922	8970	18485
1999, 1-4	17735	22061	21085	23204	23031	24464
1999, 5+	4170	5890	14625	32410	11341	32387

Abundance:	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	1079723	1079723	1079723	1079723	1079723	1079723
1989, 5+	58087	58087	58087	58087	58087	58087
1993, 1-4	947537	1087715	1043681	1102780	1109769	1142328
1993, 5+	61280	72174	151364	241006	120754	237564
1999, 1-4	947537	1087715	1043681	1102780	1109769	1142328
1999, 5+	57828	81702	178044	354581	146373	359314

Yield (MT):	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	8010	8010	8010	8010	8010	8010
1989, 5+	2515	2515	2515	2515	2515	2515
Total	10525	10525	10525	10525	10525	10525
1993, 1-4	6112	6328	4313	2546	5037	2485
1993, 5+	2525	2917	3806	3292	3781	3529
Total	8637	9245	8119	5838	8818	6014
1999, 1-4	6112	6328	4313	2546	5037	2485
1999, 5+	2345	3311	4736	5507	4743	6040
Total	8457	9639	9049	8053	9780	8525

Catch:	FSQ	F(1,2)=0	FMAX	F0.1	FMAX,F(1,2)=0	F0.1,F(1,2)=0
1989, 1-4	243481	243481	243481	243481	243481	243481
1989, 5+	29832	29832	29832	29832	29832	29832
1993, 1-4	195509	150589	126707	71742	117676	56728
1993, 5+	31427	37067	45762	38843	46704	41944
1999, 1-4	195509	150589	126707	71742	117676	56728
1999, 5+	29699	41960	53828	57148	56613	63439



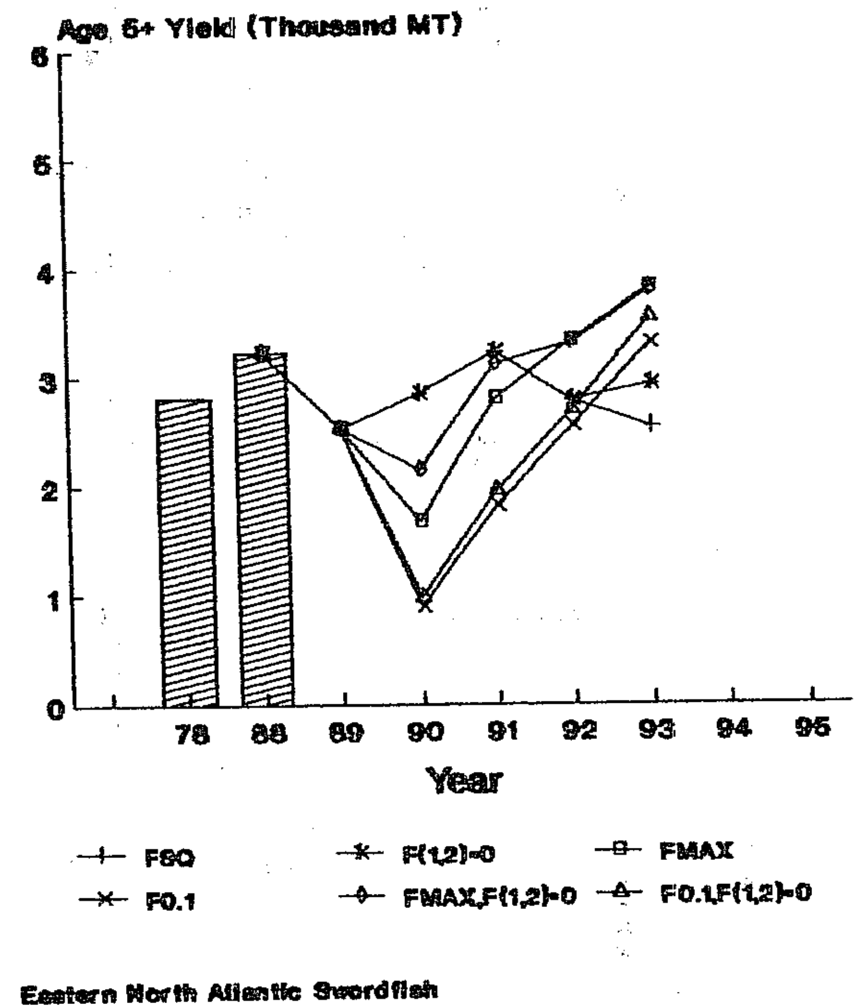


Figure P-3. Yields (1,000 MT) for all ages and ages 5+ fish for various management options, northeast Atlantic swordfish

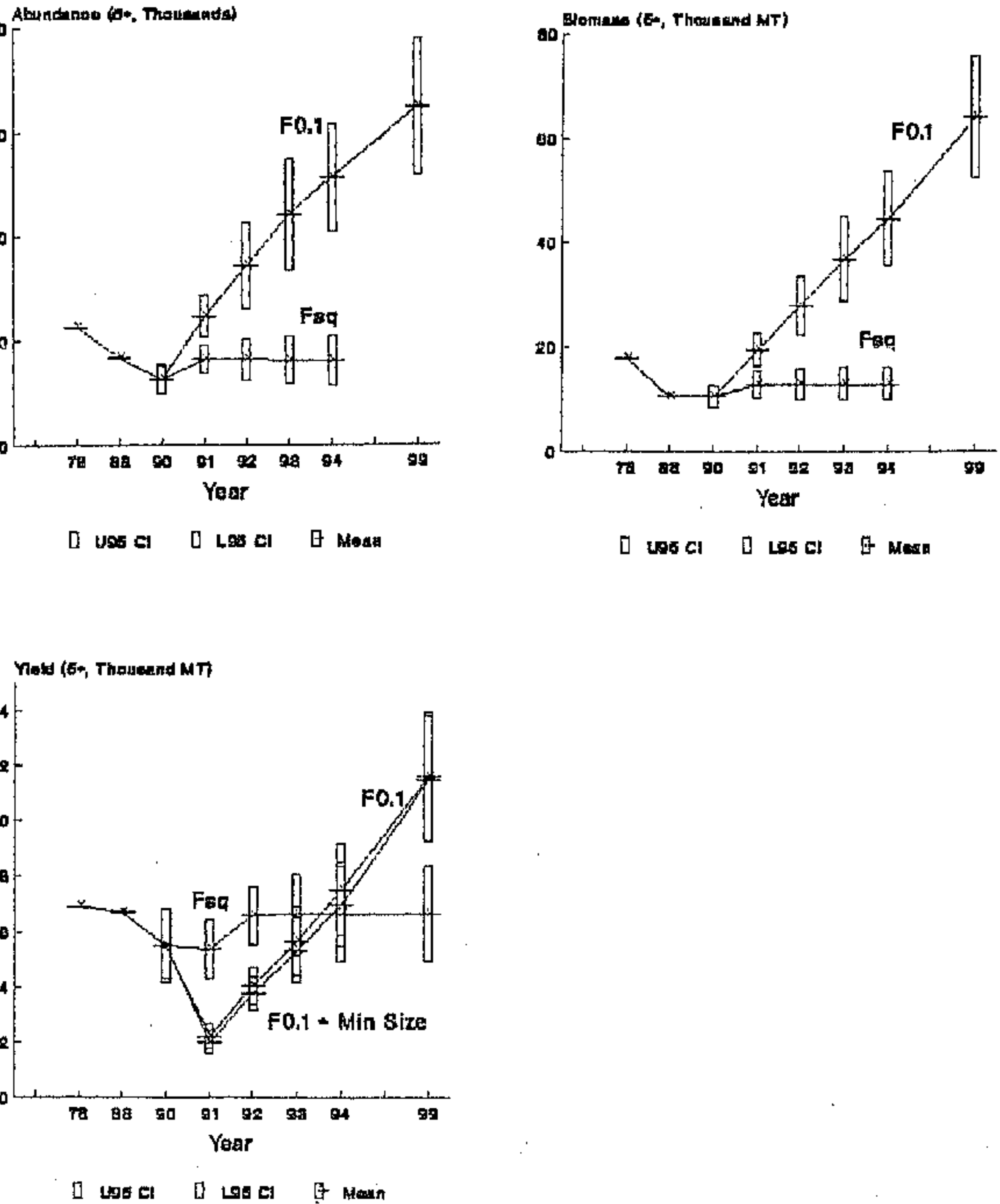


Figure P-4. Stochastic projections for various managment options for the total North Atlantic swordfish.

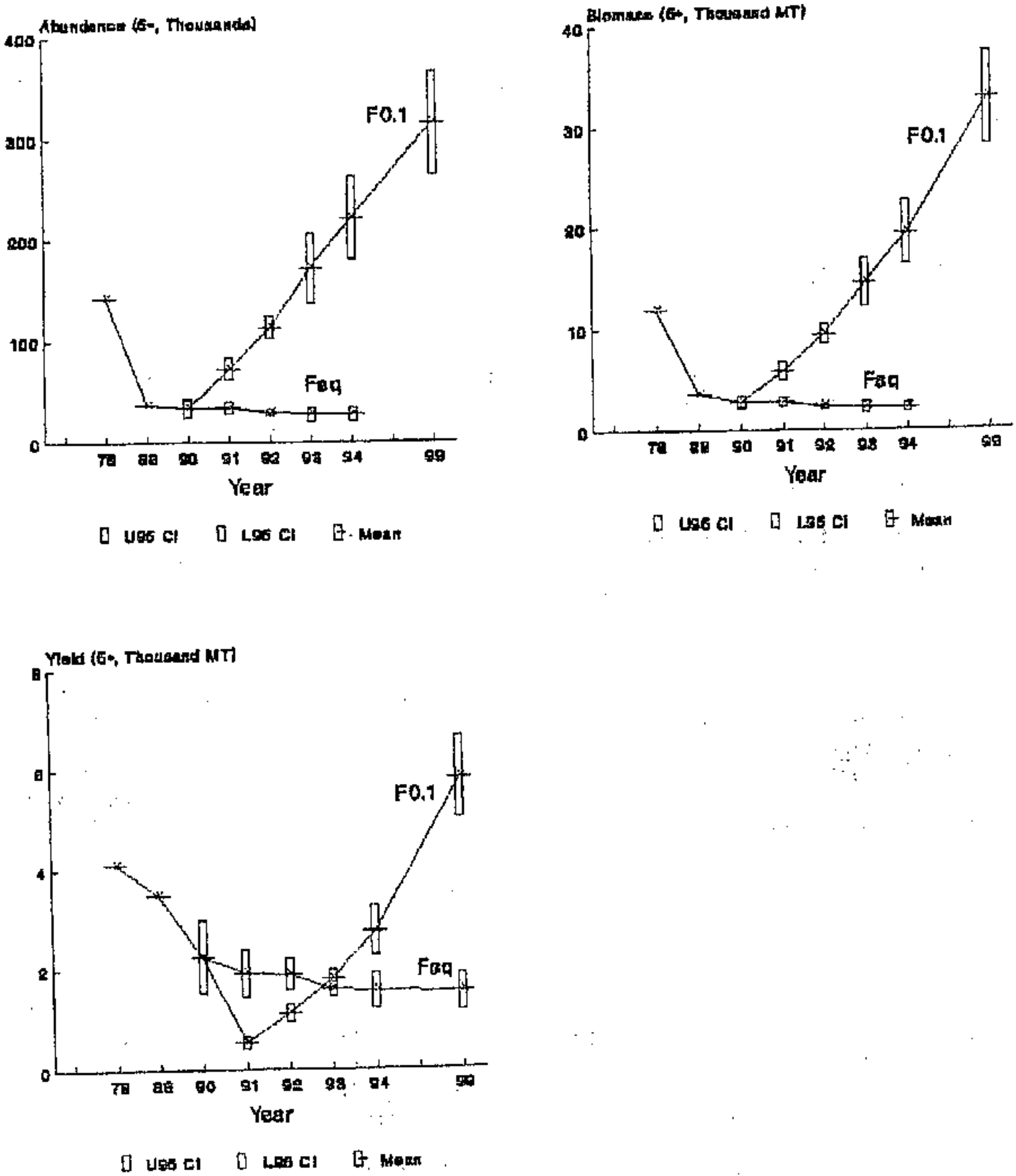


Figure P-5. Stochastic projections for various management options for the northwest Atlantic swordfish

CHAPTER III
National Reports

NATIONAL REPORT OF ANGOLA

1. The fishery

1.1 The fleet

The Angolan fleet was comprised of 14 artisanal baitboats and trollers which pertain to the 0-50 MT category, without refrigeration or any other type of conservation, with an autonomy of 24 hours at sea.

1.2 Fishing area

Due to its reduced autonomy, the boats always fish within a radius of 40 nautical miles of its respective bases, Benguela and Namibe, at 12° and 15° south latitude, respectively.

1.3 Catches

Juvenile tropical tuna catches such as yellowfin (*Thunnus albacares*), Atlantic black skipjack (*Euthynnus alletteratus*), frigate and bullet tunas (*Auxis thazard* and *A. rochei*) and Atlantic bonito (*Sarda sarda*), are the most catchable. Tables 1, 2 and 3 show tuna landings for the last five years of baitboats, traps and unspecified gears. The data contained in these tables have a coverage rate of less than 80 percent in the collection of statistical information.

2. Statistics

As concerns statistics, we have tried to improve the quality of information, mainly in the collection of catch and effort data, but the "Centro de Investigação Pesqueira" (CIP) and its provincial laboratories face great difficulties in transportation and communication with the fishing centers far from the laboratories. For this reason, from 1984 to present, the statistical data are preliminary, awaiting future correction.

In spite of the difficulties mentioned, we have carried out sampling in the Benguela area to obtain size frequencies of the species studied. As regards 1988, it was only possible to send Task I catch and effort data to ICCAT and the catches of the first six months.

Original report in French.

3. Research

No research on tunas has been carried out in this period due to the lack of infrastructures and technicians in this field. However, efforts are being made to improve the historical landing data in Angola from 1970 to 1984.

Table 1. Baitboat landings, 1984-88 (MT)

Year	Catch	YFT	SKJ	LTA	FRT	BON
1984	1769	199	45	1267	157	101
1985	1843	339	128	1255	64	57
1986	1280	59	55	1129	14	23
1987	1521	51	81	1267	101	21
1988	769	190	30	501	17	31

Table 2. Trap landings, 1984-88 (MT)

Year	Total	YFT	SKJ	LTA	FRT	BON
1984	500	2	1	324	61	112
1985	245	11	3	142	26	63
1986	87	0	0	31	0	56
1987	0	0	0	0	0	0
1988	781	1	0	629	3	148

Table 3. Unspecified gears, 1984-88 (MT)

Year	Total	YFT	SKJ	LTA	FRT	BON
1984	127	36	0	41	38	12
1985	36	0	0	36	0	0
1986	37	0	1	7	7	22
1987	0	0	0	0	0	0
1988	74	55	0	18	0	1

NOTE: The zeros indicate absence of data.

NATIONAL REPORT OF CANADA

by

D. Clay, T. Hurlbut

1. Status of the fisheries

1.1 Bluefin tuna

The Canadian nominal catch of Atlantic bluefin tuna in 1988 was 2,788 fish weighing 391.9 MT (not including 6 fish that died and were not harvested in the St. Margaret's Bay traps). This represents the greatest number of bluefin landed by Canadian fishermen in more than twenty years. This substantial increase is primarily the result of catches of small, adult bluefin off southwest Nova Scotia (between Browns Bank and the northeast peak of Georges Bank - averaging 173 kg) and the Virgin Rocks area (central Grand Banks of Newfoundland - averaging 327 kg). Although these fisheries occur a considerable distance offshore (< 100 km), the vessels participating are similar to those used in the Gulf of St. Lawrence inshore fishery (< 13 m overall length).

One thousand four hundred and ninety of the fish landed were caught by offshore longline vessels under charter to two Canadian companies. This was the second year of this experimental charter agreement. Construction of a replacement vessel is completed and the retrofitting of a second vessel is underway; it is planned that the participants and vessels will be wholly Canadian for the next fishing season. Fishing effort in this fishery was directed towards the non-regulated tuna species (i.e., bigeye, albacore and yellowfin) due to the 35 MT by-catch limit for bluefin tuna. The fish landed in this fishery were considerably smaller (average weight 69.7 kg) than those landed by the traditional inshore fisheries. The catches (in MT and numbers of fish) of this offshore large pelagic fishery in 1987 and 1988 were:

	1987		1988	
	mass /	number	mass /	number
*bluefin	33	332	104	1490
bigeye	144	3942	95	2584
albacore	21	811	47	1856
yellowfin	40	1022	30	771
*swordfish	15	163	16	261

*species regulated by Canadian quota regulations.

Original report in English.

Forty-three bluefin were harvested in the St. Margaret's Bay, Nova Scotia, trap fishery (6 fish died or were lost).

The mean weight of bluefin caught in the Gulf of St. Lawrence in 1988 was 429 kg, representing the fourth consecutive year of declining mean weights after over a decade of increasing mean weights.

1.2 Swordfish

The Canadian nominal catch of swordfish in 1988 was 705 MT, taken mainly on longline with minor catches by the harpoon fishery (18 MT) and offshore longline fishery (16 MT).

The mean weight (dressed - gutted, head and tail off) of longlined swordfish caught off Nova Scotia was 37.8 kg (n = 1150 fish) while the mean weight of swordfish caught off the tail of the Grand Banks of Newfoundland was 57.2 kg (n = 165). The mean weight of Nova Scotia harpooned fish was 68.5 kg (n = 45). The mean weight of longlined fish was higher than in 1987 (31.4 kg) but lower than 1983-86.

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 Japanese and Canadian charter longline fisheries while the vessels were within the Canadian EEZ.

Individual round weights were collected for the majority of fish landed in 1988. The unexpected landings in the southwest Nova Scotia fishery resulted in incomplete statistical coverage for this sector of the fishery.

Log records were collected from inshore vessels. The 1988 CPUE for the inshore traditional fisheries in the Gulf of St. Lawrence increased slightly to 0.055 fish per reported vessel day. The CPUE for the nearshore fishery off southwest Nova Scotia was 2.225 fish per log day (Table 1). This value is thought to be largely a result of the management measures imposed on that portion of the Canadian bluefin fishery in 1988. Given the radically different catch rates evident in the two new nearshore fisheries and the single year of data available, the potential use of this value in the inshore CPUE series appears questionable.

2.2 Swordfish

No new studies were initiated and no tagging was conducted in 1988. More information on individual weights of fish was collected from 1988 than in previous years.

3. Management

3.1 Bluefin tuna

In Canada, the bluefin tuna fishery is regulated under the federal Fisheries Act. The regulations for the Atlantic bluefin tuna fishery contain several broad provisions (see Canadian National Report for 1988).

In 1989, 725 licenses were issued to fishermen participating in the traditional inshore bluefin fisheries (this does not include the two offshore longline operations or the St. Margaret's Bay trap fishery).

There have been no new licenses issued since the implementation of quotas by ICCAT in 1982, although twelve temporary licenses were issued in 1989 on a single year basis*. The distribution of licenses by province and by Department of Fisheries and Oceans (D.F.O.) administrative region is as follows:

Province	# of Licenses
New Brunswick (N.B.)	115
Newfoundland (Nfld.)	29*
Nova Scotia (N.S.)	167
Prince Edward Island (P.E.I.)	360
Quebec (Que.)	54
TOTAL	725

D.F.O. Administrative Region	# of Licenses
Gulf (N.S., N.B., and P.E.I.)	610
Newfoundland	29*
Scotia-Fundy (N.S.)	32
Quebec	54
TOTAL	725

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.

The following table lists the dates by D.F.O. management area for the recently adopted quarterly management system:

Bluefin Tuna Management Area	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1. Prince Edward Island	1/8/89 to 31/8/89	1/9/89 to 15/9/89	16/9/89 to 30/9/89	1/10/89 to 15/11/89
2. Newfoundland	15/8/89 to 7/9/89	8/9/89 to 22/9/89	23/9/89 to 7/10/89	8/10/89 to 29/10/89
3. New Brunswick	1/8/89 to 19/8/89	20/8/89 to 11/8/89	1/9/89 to 14/9/89	15/9/89 to 15/11/89
4. Quebec	1/8/89 to 19/8/89	20/8/89 to 31/8/89	1/9/89 to 14/9/89	15/9/89 to 15/11/89
5. Nova Scotia: Gulf of St. Lawrence	1/8/89 to 15/9/89	16/9/89 to 19/10/89	20/10/89 to 24/10/89	25/10/89 to 15/11/89
6. Nova Scotia: Southwest (Atlantic)	15/8/89 to 29/8/89	30/8/89 to 12/9/89	13/9/89 to 26/9/89	27/9/89 to 5/10/89
7. Nova Scotia: St. Margaret's Bay (Traps-Atlantic)	15/6/89 to 15/7/89	16/7/89 to 20/7/89	21/7/89 to 30/7/89	31/7/89 to 1/9/89

Under this system, the fishing season for each bluefin management area is divided into quarters. A quarter is regarded as the average time (5-year historic period) that it has taken an area to land a quarter of their annual catch. The initial allocation for each bluefin management area is 35 MT. Management areas that have caught their initial allocation during a quarter are entitled to an additional allocation of 35 MT from the reserve.

Management areas are permitted only one reallocation during each quarter, this allows a theoretical maximum catch of 175 MT per management area. The "carry over" portion of an allocation from a previous quarter must be completely used before an additional allocation is granted.

The two offshore longline operations were limited to a by-catch of bluefin not to exceed 35 MT each.

3.2 Swordfish

Swordfish longline licenses were issued to 70 vessels in 1988, unchanged since 1987. On the edge of the continental shelf off Nova Scotia where the majority of the swordfish fishery occurs, there were 39 active longline licenses out of 59. Harpoon licenses were issued to 1,182 vessels (some also have longline licenses).

The swordfish fishery on the Atlantic coast was subject to the following management measurement in 1988 (no change from 1987):

1) quota of 3,500 MT,
2) allowance for the harvest of all tunas with the exception of bluefin,
3) number of longline licenses limited to a maximum of 70, and
4) establishment of a 60 MT (maximum) swordfish quota for each Canadian charter longline vessel.

4. Preliminary information for 1989

4.1 Bluefin

The nominal Canadian landings as of October 6, 1989, were approximately 451 MT from the inshore and nearshore fisheries, and 46 MT from the offshore longline fishery. Seventeen MT of bluefin were seized by enforcement personnel and legal action is pending.

This represents the largest catch (weight) of bluefin landed in Canada since 1977 when 668 MT were caught and the first time that landings were limited by the ICCAT conservation quota. This increase is largely due to the substantial catch (158 MT) of small adult bluefin from southwest Nova Scotia and the Virgin Rocks area.

The provisional catch of bluefin in the St. Margaret's Bay trap fishery was only three fish.

4.2 Swordfish

The domestic quota for 1989 is 3,500 MT with 70 longline and more than 900 harpoon licenses issued. Thirty-three vessels of the Nova Scotia longline fleet have been active this season. Records thus far (7 October 1989) indicate the fishery has landed more than 435 MT and is still in progress.

In April 1989, a research scientist (Dr. J. M. Porter) was hired at the Biological Station, St. Andrews (Department of Fisheries and Oceans). A research program has been initiated and there has been much contact with industry to encourage cooperation in enhancement of record keeping and in the collection of biological data. A short research cruise was conducted in August/September.

Individual weights of swordfish have been collected from buyers and some dressed lengths taken. Inshore vessel log records are being collected and will be coded and edited for computer analysis.

Table 1. 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 ony two gears utilized in these series. The rod and reel pre-1981 are not considered comparable to the rod and rees post-1981. See SCRS/88/71.

Year	P.E.I.		Nova Scotia		New Brunswick		Quebec	
	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		

NATIONAL REPORT OF CAPE VERDE

by

M. H. Santa Rita Vieira

1. The fisheries

During 1988, tuna fishing has been practiced by 1,257 small boats (fishing with handline), 57 baitboats without freezers (fishing with pole and line) and 1 baitboat with freezer.

2. The catches

The catches during the period 1981-1988 are summarized in Tables 1 and 2. The total tuna catches for 1988 were 4,290 MT, with 1,840 MT taken by the baitboats.

Compared to 1987, baitboat catches have decreased. The small boat catches have remained at the same level since 1986.

3. Fishing areas

Most of the fishing activities are carried out around Cape Verde. Three baitboats experimented in fishing in Senegalese waters with no positive results (94 MT during 162 days at sea).

4. Statistics

Efforts were made to follow ICCAT recommendations. Catch, effort and size data were processed.

The reliability of the catch data from the small boats was questioned, since a sampling system is used.

There are still uncertainties about defining fishing effort by species for the artisanal fisheries.

Original report in French.

Table 1. Baitboat catches, 1981-1988 (MT)

	1981	1982	1983	1984	1985	1986	1987	1988
T. albacares	887	809	948	862	747	1,322	907	471
T. obesus	13	137	291	97	32	30	10	6
K. pelamis	1,584	1,584	1,338	1,030	1,961	860	2,052	1,350
E. alletteratus	235	218	4	6	24	12	1	0
A. solandri	26	29	26	25	13	12	27	13
TOTAL	2,745	2,777	2,607	2,020	2,777	2,236	2,997	1,840

Table 2. Small boat catches, 1981-1988 (MT)

	1981	1982	1983	1984	1985	1986	1987	1988
T. albacares	4,404	2,691	1,958	3,392	1,154	2,004	2,052	1,812
T. obesus	59	63	4	2	80	56	25	99
K. pelamis	4	52	342	62	69	17	50	99
E. alletteratus	1	40	10	30	136	17	4	143
A. solandri	2,281	1,435	1,340	1,562	119	193	287	297
TOTAL	6,749	4,281	3,654	5,048	1,558	2,287	2,418	2,450

NATIONAL REPORT OF FRANCE

1. Status of the fishery

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Yellowfin	43.6	40.6	29.2	31.9	5.8	9.8	16.6	16.6	21.6
Skipjack	22.5	27.2	26.1	20.5	13.2	8.5	11.7	15.1	16.3
Bigeye	0.8	0.4	3.0	6.0	2.1	4.4	4.6	3.4	3.8
Albacore	4.2	3.3	3.6	3.0	2.9	2.2	1.2	2.0	2.8
Bluefin	1.7	2.4	5.0	4.1	4.2	5.6	3.8	4.9	6.2
Total	72.8	73.9	66.9	65.5	28.2	30.5	37.9	42.0	50.7

Catches of tunas by the French fleet fishing in the Atlantic in 1988 amounted to 50,700 MT.

1.1 Bluefin

In 1988, twenty-six French purse seiners took 5,750 MT of bluefin tuna. In the Atlantic, the catches for the same year were 479 MT for baitboats and there was a by-catch made by other gears targeting albacore (145 MT by gillnets and 100 MT by pelagic trawls).

1.2 Albacore

The renewed interest in the Atlantic albacore fishery, thanks to the new fishing gears, was confirmed in 1988. Of a total catch of 2,800 MT, the gillnet-trollers caught 750 MT (20 boats), the trawlers-trollers took 1,700 MT (27 pairs of boats) and the traditional trollers took 350 MT (11 boats).

1.3 Tropical tunas

The catch as well as the effort of the French tropical tuna fishery were stable in 1988.

The catch of the Dakar-based baitboats rose to 9,500 MT for the 15 vessels in operation; the purse seine catch reached 32,500 MT, being a new record since 1984 in spite of the stable fishing effort. This high catch was composed of 52 percent yellowfin and 39 percent skipjack; the catch rates of these two species were excellent.

Original report in French.

Detailed fishery statistics and sampling of the two fleets were submitted to ICCAT.

2. Research

2.1 Bluefin tuna

Sampling continued in the Mediterranean on the landings of bluefin tuna. The sampling level established from the data collected at the wholesale fish markets is 44 percent of the total caught in 1988.

2.2 Albacore

Atlantic

A joint French-Spanish research program, co-financed by the EEC, began in June, 1989. Its objective is to study the interactions between the different surface fisheries, according to the 1988 SCRS recommendation. This program includes placing observers on board and direct observation of the behavior of the tunas in conjunction with the new fishing gears. It will finish in September, 1990.

Mediterranean

The surveys carried out annually by the "Roselys II", IFREMER vessel, led to a better definition of areas of concentration of this species along the French coasts of the Mediterranean, in relation to hydroclimatic factors. In 1988, 1,674 albacore were caught in 20 days fishing; more than 1,400 fish were tagged and the rest of the catches were subjected to biological and morphometric studies.

2.3 Tropical tunas

Research on the tropical tunas is done by the French scientists from ORSTOM working in collaboration with research centers in Senegal, Côte d'Ivoire and Venezuela. Present studies are on the biology and stock evaluations of yellowfin, skipjack and bigeye. Particular importance was placed on yellowfin research due to active participation by French scientists in the final phase of the Yellowfin Year Program. For this, scientists have tried to analyze the effects of environmental anomalies such as "El Niño" on yellowfin fishing. The analyses indicate that adult yellowfin stocks were not in such a bad condition in 1983-1984 as was thought; the low catch rates of adult yellowfin was only a result of a change in the catchability of this fraction of the stock.

These studies are currently being analyzed in detail and the conclusions, submitted to ICCAT, are being summarized and will be presented in the Yellowfin Year Program (YYP) publication.

NATIONAL REPORT OF GHANA

1. The fishery

The number of baitboats in operation increased by 2 from 27 in 1987 to 29 in 1988. They were all Ghana flag vessels. The gross tonnage of the 29 vessels ranged between 245 and 500. No purse seiners operated throughout the year.

We had no access to most of the logbooks of the baitboats but these fleets operated largely in the traditional ICCAT quadrants 1 and 4. Skipjack continued to be the predominant species caught, followed by yellowfin and bigeye.

In addition to the pole and line fleet, the semi-industrial fleet (inshore fleet) caught tunas in a non-target fishery.

Further, the artisanal fleet fished for billfishes in a target fishery and other tunas in a non-target fishery.

The artisanal fleet uses drift gillnets in the billfish fishery. They operate from four main beaches in the country. Their area of operation is beyond the continental shelf whose width varies between 15 and 80 km. The main species caught are predominantly sailfish (Istiophorus platypterus) followed by lesser quantities of blue marlin (Makaira nigricans), swordfish (Xiphias gladius) and white marlin (Tetrapturus albidus). A separate report, describing this fishery, is under preparation for submission to ICCAT.

2. Catches

The total landings, in metric tons, by the three types of fleets and by species in 1988 are tabulated in Table 1. These quantities of yellowfin, skipjack and bigeye are the adjusted values based on multispecies sampling.

3. Research and statistics

Most of the landings of Ghana flag vessels continued to be made in Abidjan throughout the year--only very few landings were made in Tema. However, most of the market fish were brought to Tema while only very little market fish were discharged in Abidjan.

Consequently, the "Centre de Recherches Océanographiques" (CRO), Abidjan, continued to do most of the normal port sampling for multispecies

Original report in English.

estimation, length frequency distribution, collection and initial processing of Ghana tuna data.

Most of the port sampling (multispecies estimation and fork length distribution) done at Tema was carried out on the market fish.

All the necessary data and information have been submitted on the relevant forms to ICCAT.

4. Billfish landing statistics

Estimation of the landed weight of billfish has been a problem for some time now. Early in the year (1988), it was discovered that the length-weight relationship being used to obtain landed weight of sailfish was not accurate.

Since 1988, new relationships based on lower jaw-fork length and reported in the ICCAT Collective Volumes of Scientific Papers for areas that are sufficiently close to or include Ghanaian waters are being used for the four billfishes, namely, *Istiophorus platypterus*, *Xiphias gladius*, *Makaira nigricans*, and *Tetrapturus albidus*.

It was observed, for example, that between 1984 and 1987, the old length-weight relationship used for sailfish over-estimated landed weight by about 140 percent of the estimates obtained from the new relationship. Table 2 shows the old and new or corrected values for the period 1984-1987:

Table 1. Total landings by fleet and species, 1988 (MT)

Species	Baitboats (MT)	Semi-industrial fleet (MT)	Artisanal fleet (MT)	Total (MT)
Yellowfin	8,374.9	29.4	150.4	8,554.7
Skipjack	26,009.0	91.4	466.9	26,567.3
Bigeye	1,062.4	-	-	1,062.4
Atl. black skipjack	289.0	558.1	10,740.8	11,587.9
Sailfish	-	0.5	869.98	870.5
Swordfish	-	-	234.90	234.9
Marlins	-	-	87.91	87.9
Spanish mackerel	-	8.2	1,449.2	1,457.4
TOTAL	35,735.3	687.6	14,000.09	50,423.0

Table 2. Billfish landings in weight, indicating old and new values

		Sailfish	Swordfish	Marlins*	Total
1984	Old	3,896.8	14.9	-	3,911.70
	New	1,657.9	14.9	-	1,672.80
1985	Old	4,566.3	24.6	-	4,590.90
	New	1,497.1	24.6	-	1,521.70
1986	Old	3,136.1	13.0	21.6	3.170.70
	New	925.2	13.0	21.6	959.80
1987	Old	2,324.60	122.89	6.41	2,453.90
	New	1,391.61	122.89	6.41	1,520.91
1988	New	869.98	234.90	87.91	1,192.79

*Breakdown for blue and white marlins began with the 1989 sampling.

NATIONAL REPORT OF JAPAN

by

Far Seas Fisheries Research Laboratory

1. Fishing activities

The Japanese tuna fishery has recently operated in the Atlantic with two types of gears, longline and purse seine. The 1988 Japanese catch of Atlantic tunas and billfishes is estimated to amount to 37,574 metric tons (MT), 84 percent of which was taken by the longline fishery (Table 1). The increase (about 9 percent) compared to the 1987 catch was ascribed mainly to the catch of the longline fishery. The purse seine catch in 1988 was a little more than 5,800 MT. In 1989, no substantial change in the fishing pattern of either fishery has been reported.

1.1 The longline fishery

There were 183 Japanese longliners operating widely in the Atlantic in 1988, which is the same as the average number of longliners in the last five years (Table 2). The longline catch in 1988 was estimated to be about 31,700 MT, which resulted in a small change (about 8 percent decrease) from the 1987 catch (Table 3). Although the 1988 catch of bigeye tuna increased slightly to 20,000 MT (63 percent), the predominance of the species in the total longline catch has been unchanged for more than a decade. Of the other species taken by longline, important catches were made of yellowfin, bluefin, and followed by southern bluefin. The swordfish catch decreased from 2,294 MT in 1987 to 1,500 MT in 1988. In 1989, up to now the operational pattern of the longline fleet was reported to be almost the same as the 1988 pattern.

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 1988 was 5,874 MT, which was exclusively composed of skipjack and yellowfin tuna (Table 4), reflecting the nature of a tropical tuna fishery. In 1989, only two purse seiners are operating.

2. ICCAT regulations

Since the initiation of the various fishery regulations set by the International Commission for the Conservation of Atlantic Tunas (ICCAT) for

Original report in English.

bluefin, yellowfin and bigeye tunas, Japanese fishermen have been concurrently under national regulatory measures. To comply with bluefin tuna regulations, area closures have been in effect in the Mediterranean Sea from May 21 to 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, 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 1987 and 1988. 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 Far Seas Fisheries Research Laboratory (FSFRL) 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 the results of scientific research have also been presented at the regular meetings and intersessional workshops of the Standing Committee on Research and Statistics (SCRS).

3.1 Fishery data

The FSFRL reported final 1987 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 longline data for 1988 is in progress. The preliminary 1988 catch estimates are given in this report. Size data for swordfish, albacore and bluefin tuna in 1988 were prepared and presented to the SCRS meeting. The quick reporting system of logbooks and size data by on-board sampling at a port of call has been continued since its inception in April, 1984. The Task I and II data from the purse seine fishery for 1988 were finalized and reported to ICCAT.

3.2 Tuna biology and stock assessment

The biological and stock assessment studies carried out by the FSFRL on Atlantic tunas and billfishes have been continued. Among the six papers presented at the 1989 SCRS meeting including this national report, one paper is related to albacore, two papers to swordfish, and two papers to bluefin stock analyses.

This year, the FSFRL scientists participated with the interim research workshops: Yellowfin Year Program, Albacore Longline Data Preparatory Meeting, and the Albacore Workshop.

4. Papers prepared for 1988 SCRS

Documents presented to the SCRS in 1989 are listed in Appendix 3 to Annex 8 and/or are published in the Collective Volume of Scientific Papers, Vols. XXXI and XXXII.

Table 1. Japanese catch (MT) of tuna and tuna-like fishes by types of fisheries, Atlantic and Mediterranean, 1983-1988

Type of fishery	1983	1984	1985	1986	1987	1988
Total	33,995	42,566	53,731	39,046	34,471	37,574*
Longline (Home-based)	25,685	39,095	48,505	33,241	29,300	31,700*
Pole-and-line	5,577	565	---	---	---	---
Purse seine	2,733	2,906	5,226	5,805	5,171	5,874

*Preliminary.

Table 2. Annual number of Japanese tuna boats operating in the Atlantic, 1983-1988

Type of fishery	1983	1984	1985	1986	1987	1988
Longline (Home-based)	182	212	208	190	146	183
Pole-and-line	4	2	---	---	---	---
Purse seine	1	1	2	2	2	2

Table 3. Catches (MT) of tuna and tuna-like fishes taken by Japanese longline fishery, 1983-1988*

	1983	1984	1985	1986	1987	1988
Atlantic						
Albacore	1,318	800	1,467	1,209	851	1,128
Bigeye	15,141	24,310	31,602	22,800	18,575	31,664
Bluefin	3,320	2,210	1,517	1,323	1,860	2,278
S. Bluefin	505	1,636	1,468	389	1,120	548
Yellowfin	2,069	3,967	5,308	3,404	3,364	5,982
Swordfish*	1,893	3,770	4,309	2,653	2,294	4,047
Blue marlin**	440	833	1,090	508	438	819
White marlin	44	76	126	129	134	144
Sailfish***	69	97	122	99	43	79
Others	114	342	468	378	341	1,429
Atl. Subtotal	24,913	38,041	47,477	32,892	29,020	48,118
Mediterranean						
Bluefin	677	1,036	1,006	341	280	236
Swordfish	6	19	14	7	--	4
Bigeye	--	--	--	1	--	--
Med. Subtotal	683	1,055	1,020	349	280	240
TOTAL	25,596	39,096	48,497	33,241	29,300	48,358

*This table includes revised figures for 1988 received after the 1989 SCRS Meeting.
**Includes minor amount (less than 30 MT) of black marlin.
***Includes shortbill spearfish.

Table 4. Catches (MT) of tuna taken by Japanese Atlantic purse seine fishery, 1983-1988

	1983	1984	1985	1986	1987	1988
TOTAL	2,733	2,906	5,226	5,805	5,171	5,874

NATIONAL REPORT OF KOREA

by

National Fisheries Research and Development Agency

1. Fishing activities

The number of vessels in the Korean tuna fleet fishing in the Atlantic Ocean has decreased continuously since 1977 and was comprised of 29 long-liners in 1988 (Table 1).

The total Korean commercial catch of tuna and tuna-like fishes amounted to 7,801 MT in 1988, which showed a level similar to the 1987 catch (Table 2).

The catch composition by major species is as follows:

Bigeye	4,919 MT (63 percent of the total catch)
Yellowfin	1,368 MT (18 percent of the total catch)
Albacore	197 MT (3 percent of the total catch)

There have been no significant changes in the fishing pattern or 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. In particular, deep longline data have been continuously collected from the fishermen since 1984. Task I, II, and size data for 1988 were regularly sent to ICCAT Secretariat.

Original report in English.

Table 1. Number of Korean tuna vessels in the Atlantic Ocean, 1977-1988

Type of Gear	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Longline	120	97	66	54	56	52	53	51	45	28	29	29
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

Table 2. Korean catches (MT) of Atlantic tunas and tuna-like fishes by type of gear, 1977-1988

Type of Gear	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
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
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

Table 3. Nominal catches (MT), by species, of tunas and tuna-like fishes taken by the Korean Atlantic longline fishery, 1977-88

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

NATIONAL REPORT OF MOROCCO

by

A. Srour
Institut Scientifique des Pêches Maritimes

1. The fishery

Tuna fishing in Morocco is generally carried out in the north by gillnets from small longliners and in the south of Morocco by ring nets from coastal purse seiners of an average 50 GRT. However, in the southern ports some purse seiners were converted to use gillnets for tuna fishing.

As regards purse seine fishing, tunas are mixed with other pelagic species such as sardines, mackerel, chinchard, and anchovies.

The total catches landed by the coastal fleet during 1988 were around 4,117 MT, of which 75 percent were landed in the Atlantic ports and 25 percent in the Mediterranean ports (See Table 1.). The total yield of tunas and tuna-like species showed a decrease of 14.7 percent compared to 1987 and a net increase of 137.6 percent compared to 1986 (Table 2.).

Two traps were in operation in 1988. Their total catch was 139 MT (Table 3). Bluefin tuna was the main species caught in these two traps.

Tuna fishing by offshore boats was limited in 1988 to one vessel which landed around 3,000 MT. This vessel fished mostly in the Gulf of Guinea and was based in Abidjan.

2. Research

Up to now, in its research program, Morocco has given priority to pelagic species and especially to sardines. In 1983, biological sampling also covered demersal species such as Merluccius spp., sea bream, Boops boops, and Mullidae spp. During this year, Morocco plans to extend its biological sampling of commercial catches to tunas and tuna-like species in the main landing ports.

Original report in French.

Table 1. Coastal tuna fishing in 1988 (MT)

	Code	Mediterranean	Atlantic	Total	Percent
E. alletteratus	LTA	12	48	60	1
S. sarda	BON	107	587	694	17
X. gladius	SWO	62	195	257	6
K. pelamis	SKJ	--	428	428	11
A. thazard	FRI	811	191	1002	24
O. unicolor	BOP	8	1422	1430	35
T. thynnus	BFT	44	202	246	6
TOTAL		1044	3073	4117	100

Table 2. Coastal tuna fisheries, 1986-88 (MT)

	Code	1986	1987	1988
E. alletteratus	LTA	47	100	60
S. sarda	BON	324	400	694
X. gladius	SWO	277	246	257
K. pelamis	SKJ	427	1028	428
A. thazard	FRI	542	681	1002
O. unicolor	BOP	34	500	1430
T. thynnus	BFT	140	460	246
T. albacares	YFT	-	1529	-
T. alalunga	ALB	-	41	-
T. obesus	BET	-	8	-
TOTAL		1791	4993	4117

Table 3. Trap catches in 1988 (MT)

	CAP SPARTEL		M´DIQ	
	Number	Weight (kg)	Number	Weight (kg)
T. thynnus	1291	35	501	96
E. alletteratus	2172	2	257	1
A. thazard	5461	3	-	-
S. sarda	499	1	-	-
X. gladius	20	1	-	-
TOTAL	9443	42	758	97

NATIONAL REPORT OF PORTUGAL

by

J. Pereira

1. Fishery

Portuguese tuna fishing takes place mostly in the Azores and Madeira, where the local baitboat fleets seasonally catch tunas with live bait. Around continental Portugal, tunas are taken incidentally by different gears, such as longline, purse seine and gillnets.

Surface longline fisheries, targeting swordfish, operate around continental Portugal and the Azores. The longliners based in Portugal increased their area of operation in the last few years, and in 1988 they took 388 MT of swordfish.

Catches of tunas and tuna-like species reached 14,623 MT in 1987 and 17,736 MT in 1988, which reflects the very high catches made recently.

The increase in catches is mainly due to the development of the tuna fishery in the Azores where baitboat catches went from 7,600 MT in 1985 to 13,878 MT in 1988.

Table 1 summarizes the catches of tunas and tuna-like species made in the Azores and Madeira during the last few years. Catches by gear made in the continental Portuguese EEZ are given in Table 2.

Preliminary estimates of catches made during the first three quarters of 1989 indicate a catch of 3,750 MT in Madeira and 7,300 MT in the Azores.

2. Fleet

The Portuguese tuna fleet is comprised of baitboats in the Azores and Madeira and 20 longliners based continental Portugal and some longliners in the Azores.

The number of baitboats, classified by gross tonnage (GRT), of the fleets from the Azores and Madeira are shown in Tables 3 and 4.

The Azorean baitboat fleet has developed during the last few years in the sense that the boats have more autonomy and capacity to refrigerate the fish, which allows them to extend the duration of the cruises and the fishing areas. Since 1984, many new baitboats have entered the Azorean fishery, of which 3 entered in 1986, 6 in 1987, 7 in 1988 and 4 in 1989.

Original report in French.

A baitboat with live bait operated within the EEZ of continental Portugal in 1988 and 1989, as part of the experimental fishing program.

The number of vessels in the Azorean longline fleet remained stable. In 1987 there were seven boats, of which 4 were in the 150-200 GRT category; the rest are less than 50 GRT. The development of the longline fleet which operated in the continental EEZ is also part of the experimental program which has been in operation during the last few years, especially in 1988.

Concerning the sport fishery, the Azorean fleet is presently comprised of seven speed boats.

3. Research

The main organisms participating in research programs on tunas are the University of Azores (Department of Oceanography and Fisheries) in the Azores, the Laboratory of Fishery Research in Madeira, and the National Institute of Fisheries Research (INIP) in continental Portugal.

The collection of tuna statistics and size frequency sampling of the main species continued at the same level as in the past few years. The data are sent regularly to ICCAT and the scientific results are also presented to the SCRS and working group meetings.

The developing fisheries in the Azores, sport and longline fisheries targeting swordfish, are closely monitored. Scientific activities carried out include the collection of catch, effort and biological data.

Since 1988, satellites maps of surface temperatures were distributed regularly to baitboats in Azores and Madeira. Comparisons between the environment, distribution and vulnerability of skipjack to surface gears on the southern coast of Portugal was analyzed.

In 1989, an experiment with a longliner targeting swordfish took place in Madeira. Some attempts to catch skipjack using live bait were also made in southern continental Portugal in 1988 and continued in 1989. Monitoring of these experiments by INIP scientists included collection of biological data on the species caught and of catch rates for the fishery.

Table 1. Catches of tunas and tuna-like species (MT) made in Azores and Madeira, 1986-1988

	1986		1987		1988	
	Azores	Madeira	Azores	Madeira	Azores	Madeira
BET	5,453	1,698	3,877	593	764	1,395
SKJ	5,032	329	7,932	79	13,751	357
ALB	436	13	401	29	142	29
YFT	34	10	—	44	-	93
BFT	151	1	58	3	-	29
OTH	170	41	393	12	236	7
TOTAL	11,276	2,092	12,661	760	14,893	1,910

Table 2. Catches of tunas and tuna-like species (MT and gilled and gutted weight) by gear made in the continental Portuguese EEZ in 1988

	BB	LL	PS	UNCL	TOTAL
BET				83.4	83.4
SKJ	10.3		0.8	24.3	35.4
ALB				12.7	12.7
YFT				6.9	6.9
BFT	0.1			15.9	16.0
BON			221.0	133.0	354.0
LTA	0.1		24.3	62.3	86.7
FRI				0.6	0.6
SWO		322.8	0.4		323.2
OTH				14.1	14.1
TOTAL	10.5	322.8	246.5	353.2	933.0

Table 3. Distribution of the Azorean baitboat fleet by gross registered tonnage (GRT), for 1984-1988

GRT	1984	1985	1986	1987	1988
< 50	11	11	12	14	8
50-100	18	19	19	19	18
101-150	1	1	4	7	11
> 150	0	0	0	3	4
TOTAL	30	31	35	43	41

Table 4. Distribution of the Madeiran baitboat fleet by gross registered tonnage (GRT), for 1984-1988

GRT	1984	1985	1986	1987	1988
< 50	17	21	26	19	22
50-100	5	5	6	7	10
TOTAL	22	26	32	26	32

NATIONAL REPORT OF SOUTH AFRICA

by

A. J. Penney

1. The tuna fishery

Total reported tuna catches are compared with those during 1987 in Table 1. After the 1987 increase, catches again declined to 4,434 MT, only slightly more than caught in 1986. The main species remained albacore caught on poles off the west coast and the catch decline resulted entirely from a 30 percent decline in the catch of this species. Catches of yellowfin, bigeye and skipjack tuna all increased over 1987, mostly as a by-catch of the west coast pole fishery. There was again no directed tuna longline or purse-seine effort, the only longline catch being 9 MT of swordfish taken incidentally by the hake and kingklip longline fishery.

2. Tuna research

2.1 Catch and effort data collection

Catch and effort data were submitted on the recently introduced tuna logbooks by 67 tuna vessels. A number of occasional tuna vessels, including rod and line fishermen, submitted data on regular linefish returns. Harbour landings returns and voluntary dealer returns provided further detailed summaries of tuna landings at major offloading points. These return systems resulted in improved monitoring of the fishery, particularly the monitoring of effort indices.

2.2 Length-frequency sampling

South Africa continued to monitor transshipment of tuna caught by Taiwanese vessels on behalf of ICCAT. Measurements were taken of 8,036 albacore from 93 longline vessels transshipping 11,131 MT of albacore and 625 MT of other tuna species. Sampling of South African catches decreased by a third over 1987, 2,711 albacore, bigeye and skipjack tuna being measured from 19 samples taken at Hout Bay and Cape Town. Sampling reduction resulted from the difficulty of attending after hours bulk offloadings of tuna frozen at sea off the west coast.

All South African length-frequency data were collected on the National Marine Linefish System and were used to produce the first analysis of length-frequency distribution of South African catches.

Original report in English.

Environmental research

A number of multi-disciplinary research cruises were conducted in tuna-fishing areas, during which various physical, chemical and biological surveys were conducted.

Table 1. Reported South African tuna catches during 1987 and 1988

Species	Catch (MT) 1987	1988
Albacore	5,126	3,599
Yellowfin tuna	51	122
Bigeye tuna	238	547
Skipjack tuna	125	157
Swordfish	5	9
Total	5,545	4,434

NATIONAL REPORT OF SPAIN

by

J. L. Cort
Instituto Español de Oceanografía

1. Status of the fisheries

The Spanish catches of tunas and tuna-like species were 157,291 MT in 1988, remaining at the same level as the average of the last four years (157,000 MT).

	1985	1986	1987	1988
YFT	67,900	61,198	62,943	46,537
SKJ	35,600	42,183	37,757	52,205
ALB	21,358	24,587	29,013	25,398
BFT	5,101	3,340	3,188	4,900
BET	10,340	11,390	7,342	7,046
SWO	8,668	11,119	10,269	15,759
SMT	7,267	5,616	5,281	5,446
TOTAL	156,234	159,433	155,793	157,291

The most important changes correspond to tropical species; skipjack catches increased by 30 percent over 1987 catches; yellowfin catches, however, decreased by the same proportion.

Swordfish catches continued increasing, mainly due to catches made in the south Atlantic.

2. Fisheries and research by areas

2.1 Temperate area

2.1.a Bluéfin tuna

In the area around the Strait of Gibraltar, the number of traps remained constant in 1988; however, one less trap was installed in the Atlantic and one more in the Mediterranean. The catches increased somewhat with respect to the previous year.

The process of fattening tunas in captivity continued in the Mediterranean traps.

Original report in Spanish.

In the Cantabrian Sea area, catches remained stable in comparison to the last few years; however, the availability of this species varies greatly with respect to the beginning and the end of the season, since from the month of August bluefin tuna disappear from the traditional fishing areas. This unusual event occurred again in 1989.

2.1.b Albacore

The catches of this species remained practically the same as in previous years.

In 1989, a joint research program was begun, financed by the EEC, between IFREMER and IEO (national organizations of France and Spain for the study of the fisheries of tuna and tuna-like species). The objective of this program is to obtain information on the fisheries of both countries following the problem that arose after the introduction of new gears (pelagic trawls and gillnets) which are causing problems of cohabitation with the fleets involved.

2.1.c Tagging

For many years, the IEO has organized tagging cruises for tunas and tuna-like species in different areas.

In the Cantabrian Sea, mainly bluefin tuna and albacore are tagged. The results of the last two years were:

	BFT	ALB	SKJ	BET	RECOVERIES
1988	1,150	500	0	0	75
1989	122	2,969	35	2	(*)

(*) Data not available.

In 1988, three transatlantic recoveries were made of juvenile bluefin tagged at age 1 in 1986.

2.1.d Swordfish

In 1988 13,994 MT of swordfish were caught by surface longline in the Atlantic Ocean, applying a nominal effort of 43.4 million hooks.

From this fishery, 82,853 fish were sampled for size and/or weight.

During 1988, the Spanish fleet extended its fishing grounds towards the South Atlantic.

In the Mediterranean Sea, surface longline catches reached 1,761 MT, an amount slightly above the preceding year.

2.2 Canary Islands area

The catches and number of vessels remained a levels similar to previous years.

Recently (August, 1989) very high catches of skipjack were obtained near the coast. Taking advantage of this circumstance, a tagging cruise was made in which 103 skipjack were tagged in one day.

2.3 Tropical area

In 1988, 37 Spanish purse seine vessels fished in the tropical area which was a further reduction in carrying capacity of the Spanish fleet in this area (20,506 MT), due to the departure of fishing vessels for the Indian Ocean.

Two new baitboats, based in Senegal, fished during 1988, obtaining around 900 MT of skipjack, yellowfin and bigeye.

Within the total catches of the Spanish tropical fleet, catches of skipjack increased over other years.

NATIONAL REPORT OF THE UNITED STATES

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 1988-89 are described in this report.

2. Fisheries monitoring

The NMFS monitors U.S. tuna fisheries for yellowfin and skipjack tunas (the principal tropical species), for bluefin and albacore tunas (the principal temperate species), and for bigeye which occurs in both tropical and temperate waters (included under tropical tunas below). Fisheries for the marlins and sailfish, and other scombrids are also monitored. Significant effort is also expended in monitoring the commercial swordfish fishery. These activities include the design of sampling programs; collection of catch, effort and biological data; and maintaining and summarizing fishery databases for analyses as well as for dissemination to ICCAT and other management organizations. Historical catches of Atlantic tunas by U.S. fishermen (1967-88) are presented in Table 1.

2.1 Tropical tunas

U.S. vessels catch tropical tunas in the northwestern Atlantic off the east coast of the United States, in the Gulf of Mexico, and in the Caribbean Sea. The total U.S. catch of the three principal species of tropical tunas (yellowfin, bigeye and skipjack) in 1988 was 10,185 MT, an increase of approximately 1,500 MT over the 1987 catch (as revised in 1989). Landings by area were: Gulf of Mexico - 7,300 MT (72%), eastern U.S. - 2,631 MT (26%), and the Caribbean - 254 MT (2%). Yellowfin tuna dominated the catch, representing almost 93% of the total tonnage; bigeye tuna were 6.9% and skipjack only 0.4%. In recent years, the U.S. fishery for tropical tunas has been composed of purse seine, longline, and recreational (rod and reel) vessels. This year, the reported catch from purse seine vessels was only 0.01 MT. Longline vessels were responsible for 83% of the total catch and rod and reel 14%.

*Prepared by staff members of the Southeast Fisheries Center, Miami, Florida.
Original report in English.

The 7,284 MT of yellowfin caught in the Gulf of Mexico were almost entirely (7,213 MT) taken on longlines. The bigeye catch in the Gulf of Mexico was only 15 MT, and the skipjack catch there was less than 1 MT.

Rod and reel landings accounted for 61% of the tonnage of yellowfin caught off the eastern U.S. Commercial longline vessels took 31% of the yellowfin, and 75% of the bigeye landed. The total yellowfin catch off the U.S. east coast was 2,013 MT; bigeye and skipjack catches were 588 MT and 30 MT, respectively. This included the recreational catches off the northeast U.S. coast (Virginia through Massachusetts) estimated to be 1,073 MT of yellowfin and 80 MT of bigeye.

In the Caribbean, longlining was the principal fishing method for tunas. The Caribbean catch of tropical tunas by U.S. vessels was 150 MT of yellowfin, 99 MT of bigeye, and only 5 MT of skipjack. All the skipjack was taken by Puerto Rican trollers. Purse seine vessels that primarily operate in the Pacific Ocean sometimes catch tuna in Caribbean waters before unloading at Puerto Rican canneries; however, no purse seine fishing in the Caribbean was reported in 1988.

The NMFS monitors the species composition and size-frequency distribution of Gulf of Guinea tuna received at the Puerto Rican canneries. In 1988, the canneries reported receiving 3,652 MT of yellowfin and 20,378 MT of skipjack in transshipments from Abidjan. Sampling indicated that 16%, by weight, and 14%, by number, of the "yellowfin" catch was bigeye tuna. This was a decrease from 1987, when the bigeye component was 25%, by weight, and 22%, by number. The sampling covered approximately 30% of the reported yellowfin mixture and 20% of the skipjack received from Abidjan. A total of 1,342 skipjack, 3,061 yellowfin, and 498 bigeye were measured in 39 mixed yellowfin and 22 skipjack samples. The measured yellowfin and bigeye represented slightly less than 1% of the weight of the units sampled, and measured skipjack represented an estimated 0.07% of the units sampled. Average fish weights were estimated to be 2.1 kg, 2.3 kg, and 2.6 kg for skipjack, yellowfin, and bigeye, respectively. An estimated 73.3% of the yellowfin from the sampled units were in the 1.8-3.4 kg size-breakdown category. An estimated 18% were in the 3.4-9.1 kg category and the remainder (8.7%) were in the 1.4-1.8 kg category. The estimated weights of some of the sets of measured fish placed them in smaller size categories than any for which unloading weights were reported, but no systematic analysis of this inconsistency was made.

2.2 Temperate tunas

The U.S. bluefin tuna fishery continues to be regulated by quotas and size limits. U.S. vessels fishing in the northwest Atlantic landed 1,290 MT of bluefin tuna in 1988, a decrease of 61 MT from 1987. The catch by gear was: 383 MT by purse seine, 151 MT by harpoon, 159 MT handline, 158 MT longline (of which 143 MT were from the Gulf of Mexico), 432 MT by rod and reel (of which 263 MT was the estimated catch of the small bluefin fishery from off the northeast U.S. coast), and 6 MT were taken by other gears. The estimated catch of small bluefin was lower than the 1987 estimated catch of 401 MT but higher than the 1985 and 1986 estimated catches of 169 and 186 MT, respectively. In addition to the landed catch an estimated 937 bluefin (about 175 MT) were released dead by U.S. longline vessels.

The albacore catch by U.S. vessels in the western North Atlantic totaled only 115 MT in 1988. This included the recreational catch from off the northeast U.S. coast estimated at 46 MT. This was less than one half the 1987 catch. Almost 97% of the 1988 albacore were off the northeastern U.S. In that area, albacore were caught by longline, rod and reel, handline, trawl, and gillnet. Longline and rod and reel catches made up the largest components, 41% and 45%, respectively. Of the rod and reel catch, 86% was by recreational anglers.

2.3 Swordfish

U.S. vessels landed 5,891 MT of swordfish in 1988, the highest recorded annual landings, surpassing the previous 1980 high of 5,624 MT. This represents a 1,000 MT increase over the 1987 landings. Swordfish landings by ICCAT area for 1988 (compared to 1987) were: 2,247 MT (1,927 MT) from the northwest Atlantic, 1,943 MT (1,368 MT) from the north central Atlantic, 1,022 MT (580 MT) from the Gulf of Mexico, and 679 MT (1,012 MT) from the Caribbean.

2.4 Billfishes

Blue marlin, white marlin and sailfish are landed by recreational rod and reel fishermen and as a by-catch of the U.S. commercial longline fisheries. The 1988 estimated recreational total catch from the Gulf of Mexico, the Caribbean Sea, and the northwest Atlantic Ocean (west of the 60°W longitude) were 172.7 MT for blue marlin, 71.6 MT for white marlin, and 7.1 MT for sailfish, for all fishing areas combined. Total catch of the U.S. commercial landings (longline and handline fisheries) reported for the same three areas combined were 32.2 MT for blue marlin, 11.8 MT for white marlin, and 2.6 MT for sailfish. These commercial weights reflect only those billfish landed prior to the implementation of the U.S. Fisheries Management Plan for Atlantic Billfishes. In addition, the mandatory submission of pelagic longline logbooks by captains and owners of vessels in the U.S. longline fishery provide NMFS personnel with numbers of billfish kept and discarded at sea. Based on this logbook database, the estimated dead billfish discards were: 107.7 MT for blue marlin; 28.9 MT for white marlin; and 37.9 MT for sailfish.

3. Research activities

In addition to monitoring the various fisheries, scientists from the SEFC continued research activities on bluefin tuna, swordfish and marlins 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 updating and revising databases, preparation of software and analyses in support of domestic and ICCAT goals, and participation in special working groups.

3.1 Bluefin tuna

Bluefin tuna research activities concentrated on development of indices of abundance for use in ICCAT SCRS assessments and on assessment methodology. The 1988 value for the index of spawning stock size based on the bluefin ichthyoplankton survey in the Gulf of Mexico was calculated (Table 2) General linear model analyses were used to develop standardized indices of abundance from both the Japanese longline fishery in the U.S. and Canadian EEZ's and from the U.S. handline and rod and reel fisheries off the northeast U.S. Further analyses on the effects of weighting indices of abundance were made. A flexible system for examination of the effects of management on fish stocks was developed.

A panel of experts was convened to review the index of abundance based on the ichthyoplankton surveys for bluefin in the Gulf of Mexico. Their report, which is contained in a document presented to the SCRS, indicated that the index was consistent with other information on spawning stock abundance but may not be precise.

The ichthyoplankton survey in the Gulf of Mexico was again conducted during the bluefin spawning season. Additionally, a limited survey for bluefin larvae was conducted in late June; ship and weather problems delayed the survey and only neuston sampling was carried out. During the usual April-May cruise, a MOCNESS net was tested and used to sample near hydrographic features where ichthyoplankton concentrations were expected.

A potential problem in the assignment of size to the 1983-1987 longline catches was evaluated, and only minor differences were found from the 1988 SCRS assessment. Sampling to obtain data for accurate size conversion has been initiated.

3.2 Swordfish research

Detailed monitoring of landings and size of swordfish continued during the year. Progress was made in relating broad-scale swordfish distribution to environmental factors in the northwestern Atlantic. Considerable effort was expended in preparations for an NMFS swordfish stock assessment under various stock boundary scenarios. Catch-per-unit-effort analyses were conducted for the NMFS assessment and in preparation for the ICCAT SCRS.

Significant effort was spent in reviewing and correcting the 1988 Mandatory Swordfish Logbook database. This database includes over 16,000 set records from U.S. longline fishermen, and contains gear information, fishing location, and numbers of swordfish, tunas, billfishes and sharks (by species) kept and/or discarded. An analysis and comparison of the 1988 data with the 1987 database is planned.

3.3 Billfish research and monitoring

Routine billfish tournament sampling continued to be conducted along the U.S. east coast, Gulf of Mexico, Bahamas, and Caribbean. A total of 115 billfish tournaments were sampled, representing over 85,000 hours of fishing effort. This represented an increase of 5 tournaments and 5,000 hours over the 1987 levels. Additionally, as in 1987, recreational billfish fishermen were surveyed at nine docks in the northern Gulf of Mexico. Extensive morphometric measurements were made on billfish for the ICCAT Program of Enhanced Research for Billfish.

Research on age and growth of blue marlin has continued at the Miami Laboratory. Analyses of the microstructural growth zonations were made on otoliths from larval, juvenile and young adult blue marlins ranging in size form 0.5 to 212 cm. Based on strong indirect validation evidence, the microstructural zonations were considered to be daily units. Regression analysis of the length-weight relationships were also examined with indications that sexual dimorphism in Atlantic blue marlin appears to begin at about 140 cm (LJFL). Regression analysis to develop length-weight parameter estimates for males and females of three Atlantic billfish species (blue marlin, white marlin, and sailfish) was examined. Parameters were also developed for total length to round weight and total length to LJFL. A summary of these parameter estimates will be presented as an SCRS working document for ICCAT.

The NMFS, SEFC again played a substantial role in the ICCAT Enhanced Research Program for Billfish for 1989, with Drs. Bradford Brown and Eric Prince acting as general coordinator and coordinator for the western Atlantic Ocean, respectively. Major accomplishments in 1989 include the following: (1) Successfully completing five at-sea observer trips aboard Venezuelan industrial longline vessels out of Cumanã, Venezuela, and several observer trips on Spanish industrial longline boats off of Dakar, Senegal; (2) Continuing shore-base sampling in St. Maarten, N. A., Cumanã, Barbados, Jamaica, Grenada, Dominican Republic, Dakar, Ivory Coast, and Canary Islands; (3) Completion of the ICCAT billfish tagging kit, including brochure, tag flag, ziplock container, applicator pins, tags, logo patch, and tagging posters; (4) Initiating recreational shore-based sampling in Venezuela; (5) Progressing towards a laboratory test of the species identification technology for Atlantic sailfish in December 1989; and (6) Initiating development of a test to determine the sex of dressed billfish that have been eviscerated at sea.

3.4 Tagging

Program cooperators and scientists tagged and released 5,470 billfish and 549 tunas in 1988. The numbers of billfishes recaptured in 1988 were: 37 sailfish, 15 white marlin, 4 blue marlin and 5 swordfish.

There were 10 bluefin tuna recaptured in 1988, all released and recaptured off the northeast coast of the United States. The longest time at large was 4,062 days.

There were 8 yellowfin tuna recaptured in 1988. Two yellowfin tuna made transatlantic migrations to the west coast of Africa, one traveled 3,921 miles in 768 days to an area southwest of Liberia, and the other traveled 3,222 miles in 468 days to the Cape Verde Islands, West Africa.

An annual newsletter was published and distributed to program cooperators in 1989.

3.5 Domestic Longline Observer Project

The SEFC, Miami Laboratory, continued operation of a limited domestic longline observer project through contract with the Louisiana State University. The contractor placed observers aboard voluntary domestic longline vessels. The vessels fished in the Gulf of Mexico and primarily were targeting yellowfin tuna. The observers collected catch, effort, size frequency, and environmental data.

3.6 Foreign Longline Fishery Observer Project

The NMFS, Northeast Fisheries Center (NERO) has coordinated a program to place observers on 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 did not fish in the EEZ during the first eight moths of 1989.

3.7 Special working groups

3.7.1 Final Meeting of the Yellowfin Year Program

The NMFS participated in the final meeting of the Yellowfin Year Program during the first week of June, 1989, in Madrid. The results of two scientific studies were presented documenting the recent evolution of the U.S. longline fishery for yellowfin in the western Atlantic and various aspects of that fishery. An NMFS scientist attended the meeting and acted as rapporteur for two sessions.

3.7.2. NMFS Swordfish Workshop

A swordfish stock assessment workshop was held by the NMFS, SEFC, in March, 1989. The report from this workshop was reviewed by a committee appointed by the South Atlantic Fishery Management Council (SAFMC) at a meeting in April. The results indicate that the fishing mortality rates on both young and fully recruited ages have increased markedly between 1978 and 1987. Spawning stock biomass has declined continuously since 1979 and is currently about 40 percent of the 1978 level. The current rate of fishing mortality will cause a continued decline in spawning stock, placing the stock in increased jeopardy of recruitment failure. Although questions remain regarding the precision of the recruitment estimates from 1985 to 1987, the current estimates indicate that recruitment increased from 1981 through 1985 and has since leveled off. The review committee expressed concern that the assessment, which incorporated data through 1987, would be overly optimistic in estimating the current condition (late 1989). Projections were reviewed that estimated the population response to various management alternatives, including scenarios ranging from no action to a complete moratorium on swordfish harvests. Projection analyses indicate that if U.S. harvests were completely eliminated and foreign catches remained at current levels (unrestricted), the swordfish stock would be exploited at fishing mortalities greater than $F_{0.1}$, and the stock would probably not rebuild.

3.8 Mackerels

King and Spanish mackerel research continued through the collection of catch data, catch-per-unit-effort information, size frequencies, growth and stock identification data. These data were integrated into separate stock assessments of king and Spanish mackerel taken by U.S. fishermen in the Gulf of Mexico and the Atlantic. Additionally, considerable effort was expended to review the historical (1979-1986) catch and size frequency data base such that stock trends could be assessed. The assessment information indicates that Gulf of Mexico king mackerel have undergone considerable reductions in stock size; but with the advent of fisheries regulations (quotas and bag limits), the stock is now beginning to recover. Atlantic king mackerel catches have remained relatively stable in recent years due to regulations designed to keep yields at full exploitation levels. Both Gulf of Mexico and Atlantic Spanish mackerel stocks have been regulated in order to rebuild stocks and thus, to increase yields. This strategy has been moderately successful.

3.9 Sharks

In 1988, shark data from the U.S. east coast were compiled and updated. In 1989, a draft Shark Fisheries Management Plan for the U.S. east coast and gulf of Mexico EEZ has been developed. Commercial shark landings for the U.S. east coast have been doubling every year since 1986. The Shark Fishery Management plan aims at preventing overfishing by regulating landings of about 38 species of sharks that are subject to commercial and recreational fisheries. U.S. scientists have also worked with university and other researchers in developing shark biological parameters.

Table 1. Catches and landings (MT) of Atlantic tunas and tuna-like fishes by United States fishermen, 1967-1987[1]

Year	BFT	YFT[2,3]	ALB	BET[2]	LTA	SKJ[2]	BON	SWO[4]	SSM[5]	KGM[5]	Other	TOTAL
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	1,142	5,775	162	747	103	1,004	83	4,906	5,957	5,682	337	25,898
1987	1,351	6,993	270	1,008	118	650	130	4,887	5,071	5,628	386	26,492
1988	1,290	9,447	115	702	204	36	88	5,891	5,005	6,412	283	29,473

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 catches of purse seiners flying the flags of Bermuda, Netherlands Antilles, Nicaragua and Panama.
3. Includes small quantities of bigeye tuna prior to 1975. Landings revised for 1986 and 1987.
4. Swordfish landings revised for 1967-77 and 1979.
5. Does not include recreationally caught Spanish (1967-83) and king (1967-78) mackerel. Landings revised for Spanish (1984-87) and king (1979-87) mackerel.

Table 2. Summary of catches of bluefin larvae in the Gulf of Mexico with estimates of larval productions, spawning stock abundance and biomass for 1977, 1978, 1981-1984, 1986-1988[1]

Year	1977	1978	1981	1982	1983	1983[2]	1984	1986	1987	1988
Catch	34	292	51	79	71	71	27	20	26	63
Samples	48	147	65	121	67	92	96	69	157	84
Positive	15	53	13	27	19	19	12	8	17	12
Mean of Ln (positives)	2.434	2.853	2.824	2.621	2.762	2.762	2.245	2.585	2.301	2.934
Variance Ln (positives)	0.456	1.126	0.639	1.060	1.767	1.767	0.350	0.593	0.195	0.874
Mean catch per $10m^2$	4.397	10.802	4.498	5.066	10.038	7.310	1.383	1.979	1.184	3.961
Variance	1.524	4.931	2.306	2.039	16.095	8.718	0.196	0.706	0.090	2.333
S. E.	1.234	2.221	1.519	1.428	4.012	2.953	0.443	0.841	0.300	1.527
S.E./Mean	0.281	0.206	0.338	0.282	0.400	0.404	0.320	0.425	0.253	0.386
Survey Area $\times 10^{11} m^2$	7.327	7.383	8.78	3.94	2.209	3.681	4.624	4.624	3.970	4.433
Larvae $\times 10^{12}$ (mean x area)	3.222	7.975	3.949	1.996	2.217	2.691	0.640	0.915	0.470	1.756
Larvae*e**(.1AGE)	7.80	16.07	9.15	4.10	3.93	4.77	1.22	2.54	1.27	2.71
Season (days)	60	60	60	60	39	56	60	60	60	60
Age, mean (days)	8.842	7.007	8.402	7.191	5.723	5.723	6.457	10.200	9.943	4.34
Mean Length (mm)	4.6	4.1	4.48	4.15	3.75	3.75	3.95	4.97	4.9	3.37

1. Gulf of Mexico survey cruise not conducted in 1979, 1980 and 1985.
2. Survey in 1983 was incomplete. Low estimate is based on the observed spawning. The high estimate assumes the normal 60-day spawning duration.

NATIONAL REPORT OF THE U.S.S.R.

by

V. V. Ovchinnikov, M. E. Grudtsev, V. Z. Gaikov

1. The fisheries

In 1988, the total catch of tunas and related species amounted to 22,869 MT. The proportions were: 3,207 MT of yellowfin tuna, 1,822 MT of skipjack, 1,077 MT of bigeye tuna, 1,707 MT of black skipjack, 5,638 MT of frigate tuna, 357 MT of bullet tuna, 32 MT of marlins, 4 MT of sailfish, 8,882 MT of Atlantic bonito and 143 MT of king mackerel.

The total catch distributed by fishing gear was as follows: longline yields from the eastern tropical Atlantic constituted 2,158 MT, among which 1,045 MT were yellowfin tuna, 1,077 MT bigeye tuna, 32 MT marlins and 4 MT sailfish; 5,187 MT were taken with purse seine, among which 2,162 MT were yellowfin tuna, 1,822 MT skipjack, 89 MT frigate tuna, 757 MT black skipjack and 357 MT bullet tuna; the trawl fishery yielded 8,882 MT of Atlantic bonito, 5,549 MT frigate tuna, 950 MT black skipjack and 143 MT of king mackerel.

Tuna catch statistics for 1988 by area and period, fishing gear, number of ships, effort and species composition of fishing gear, number of ships, effort and species composition of the catches are presented in Table 1. Soviet catch statistics for the main commercial tunas by species and fishing gear for the 1984-1988 period are given in Table 2, and preliminary data on the catch during the first half of 1989 are contained in Table 3.

2. Research

The analysis of the biocommercial statistics showed that reduced commercial effort in the purse seine fishery in the east Atlantic due to switching of some fleets to the Indian Ocean fishery resulted in the rehabilitation of tuna stocks and increased Soviet tuna catches. In particular, in the Sierra Leone area, the catch per effort reached the record estimate with medium-sized seienrs catching about 10 MT per fishing day in March-May, 1988. Unlike the Gulf of Guinea, this area is characterized by annual fluctuations in the catch species composition. So the yellowfin tuna catch increased in recent years (Figures 1 and 2).

2.1 Yellowfin tuna

Mean lengths of tunas in the purse seine catches taken in March-May were 84.2-132.4 cm. In the Sierra Leone area, the immature specimens oc-

Original report in English.

curred only in March and April in small numbers (2.4-7.8 percent of the studied fish). In March-May, the maturing and adult fish predominated. The mean index of stomach filling for the same period was 1.2-1.5. In August-September, 1988, the purse seine fishery in the area of São Tomé and Principe Islands yielded fish 34-176 cm in length, 74.0 cm on the average, and 0.7-47.0 kg in weight, 10.0 kg on the average. The immature yellowfin tuna catch less than 52 cm in length averaged about 6.0 percent, which is markedly below the allowable level under the ICCAT regulation measures. Large yellowfin tuna shoals with the 40-80 MT biomass made up a maximum of 5 percent of the total number of sets. All examined fish had mature or maturing gonads and did not feed intensively, which provided for increased moving activity.

The bulk of the longline catches was comprised of large yellowfin tuna specimens. In February-April, the length of tunas mainly ranged between 120 and 170 cm with a mean length of 144.4-146.6 cm. In May, the size composition of tunas extended due to smaller specimens that entered the fishery. The length of yellowfin tunas in May fluctuated between 76 and 166 cm with the mean length of 131.2 cm. The specimens at prespawning and spawning stages predominated in February-April, and maturing specimens were prevalent in May. Mean sizes of tunas in longline catches were found to increase compared with the similar periods in the previous years.

2.2 Skipjack

In March-May, 1988, the purse seine catches from the Sierra Leone area yielded fish 41-60 cm in length, with a mean length of 50.0 cm. Immature specimens were absent, the running males were recorded in April. The mean index of stomach filling was 1.5 in March and 0.6 in May. In the area of São Tomé and Principe Islands, skipjack length ranged from 35.0 to 64.0 cm, 44.6 cm on the average, and the weight ranged from 0.9 to 5.2 kg, 1.7 kg on the average. Mobile shoals represented by the fish with maturing and mature gonads predominated, the feeding was not intensive.

2.3 Bigeye tuna

In February-May, the length of tunas in the longline catches fluctuated between 60 and 207 cm. Mean lengths were: 129.7 cm in February, 118.0 cm in March, 120.5 cm in April and 123.1 cm in May. In February-April, the fishery was carried out in the equatorial waters south of the equator, and in May north of the equator. Prespawning and spawning specimens predominated in February-April, and the maturing fish were prevalent in May. Mean sizes of tunas in the catches were found to decrease compared with the similar period in previous years.

A increasing trend in the total catch at reduced catch per unit effort was observed. The calculated parameters of the Butterwort's equation for the North Atlantic stock were: $r = 0.3284$, $K = 338.8$ thousand tons, $q = 0.875 \times 10^{-6}$, the TAC was 27.9 thousand tons with the fishing effort of 188.0 million hooks; for the south Atlantic stock, the respective parameters were 0.1398, 792.2, 0.337×10^{-6}, the TAC value of 28.0 thousand tons with the fishing effort of 207.3 million hooks.

2.4 Small tunas

In the spring of 1988, the length of black skipjack in purse seine catches taken in the Sierra Leone area ranged from 39.0 to 55.0 cm, 47.4 on the average; and the length of bullet tuna was 35-47 cm (40.2 cm), The frigate tuna length in the trawl fishery conducted in the West Sahara area fluctuated between 27 and 38 cm, 31.1-33.4 on the average, with the weight ranging from 0.5 to 0.6 kg. July-December is the most favorable period for the trawl fishery. Usually fish aggregations are formed in the upper homothermal water layer (0-70 m) at the water temperatures of 20-23°C. Favorable thermal conditions are set as a result of interaction of the northeastern trade wind and cold Canary Current and lowered activity of the coastal upwelling in the summer-fall period. Such conditions promote formation of feeding frigate tuna aggregations on the shelf and continental slope in the West Sahara area. The euphausiids and young squids are main food organisms there.

3. Research cruises

The scientific research expedition for studying the longline tuna fishery in the central tropical Atlantic and the expedition for studying hydrological conditions in the area of purse seiner operation were executed in 1988. Four observers worked on board commercial ships, among them, two on purse seiners, one on longliners and one on trawlers. The amount of collected materials is presented in Tables 4 and 5.

4. References

Bagautdinov, I. I., B. I. Kozhemyakin, V. V. Ovchinnikov. Use of means for artificial fish concentration in order to increase purse seine tuna catches. In Coll.: Accessibility of marine commercial organisms to fishing gears and technical means or observations. Kaliningrad, 1988, p. 4-8.

Ovchinnikov, V. V. On Soviet fishery and studies of tunas in the Atlantic Ocean. FAO Indo-Pacific Tuna Development and Management Programme. Col. Vol. Work. Doc. 1988, Vol. 3, p. 382-384.

Ovchinnikov, V. V., V. Z. Gaikov, Yu. P. Fedoseev, V. G. Shcheglov. Main results of realization of the Soviet Program of tuna tagging in the Atlantic Ocean. FAO Indo-Pacific Tuna Development and Management Programme. Col. Vol. Work. Doc. 1988, Vol. 3, p. 224-236.

Sigaev, A. K., V. Z. Gaikov. Peculiarities of Bigeye tuna, Thunnus obesus (Lowe), distribution in relation to seasonal cyclic pattern of water circulation in the Central Tropical Atlantic. ICCAT Col. Vol. Sci. Pap., 1988, Vol. XVIII, p. 31-39.

Table 1. Tuna fishery in Sierra Leone (1), Gulf of Guinea (2), West Sahara (3) and open sea of the central tropical Atlantic (4), fishing gears, fishing period, number of boats, effort and catch (MT) by species, 1988

Area	Gear	No. of boats	Period	Effort in days at sea	CATCHES (MT)						
					YFT	SKJ	BET	LTA	FRI	BLT	TOTAL
1	Purse seine	5	February-June	429	1,406	844	--	745	80	330	3,405
2	Purse seine	7	June-December	583	753	978	--	12	--	27	1,780
3	Trawl	-	July-December	---	--	--	--	950	5,383	--	6,333
4	Longline	3	January-December	485	1,045	--	1,077	--	--	--	2,122
Other	Purse seine	-	-	---	--	--	--	--	9	--	9
		-	-	---	--	--	--	--	169	--	169

Table 2. Soviet tuna catches (1,000 MT) by species and fishing gear in the eastern Atlantic Ocean in 1980-1988

	Purse seine					Longline		Trawl		
Year	YFT	BET	SKJ	LTA	FRI	YFT	BET	SKJ	LTA	FRI
1984	1.8	0.0	1.0	0.4	3.1	0.3	1.2	0.0	0.3	2.8
1985	3.4	0.0	1.4	0.9	1.6	0.3	0.9	0.0	0.1	4.4
1986	1.4	0.0	1.7	0.3	0.1	0.4	1.1	0.0	0.0	3.3
1987	0.7	0.0	0.5	0.1	0.2	0.6	1.9	0.0	0.0	2.7
1988	2.2	0.0	1.8	1.7	0.4	1.0	1.1	0.0	0.9	5.5

Table 3. Soviet catches (MT) of tuna and other species in the first half of 1989

Yellowfin tuna	3,241
Bigeye tuna	168
Skipjack	1,427
Bullet tuna	200
Frigate tuna	627
Black skipjack	690
Atlantic bonito	1,310
Marlins	4
Sailfish	1
Total	7,668

Table 4. Number of fish measured by species and fishing gear in the eastern tropical Atlantic

Fishing gear	YFT	SKJ	BET	LTA	FRI	BLT	TOTAL
Purse seine	1,445	2,716		477	386	258	5,282
Longline	2,238		404				2,642
Trawl	—	—	—	344	—	1,613	1,957
TOTAL	3,683	2,716	404	821	386	1,871	9,881

Table 5. Amount of materials on tunas collected in eastern central Atlantic by fishing method, 1988

Materials	Purse seine fishery	Longline fishery	Trawl fishery
Biological analysis	1,010	1,483	1,020
Samples for age determination	871	90	300
Samples for feeding studies	53	45	27
Samples for fecundity studies	138	--	--
Samples for parasitological studies	17	--	--
Hydrological stations	89	180	--

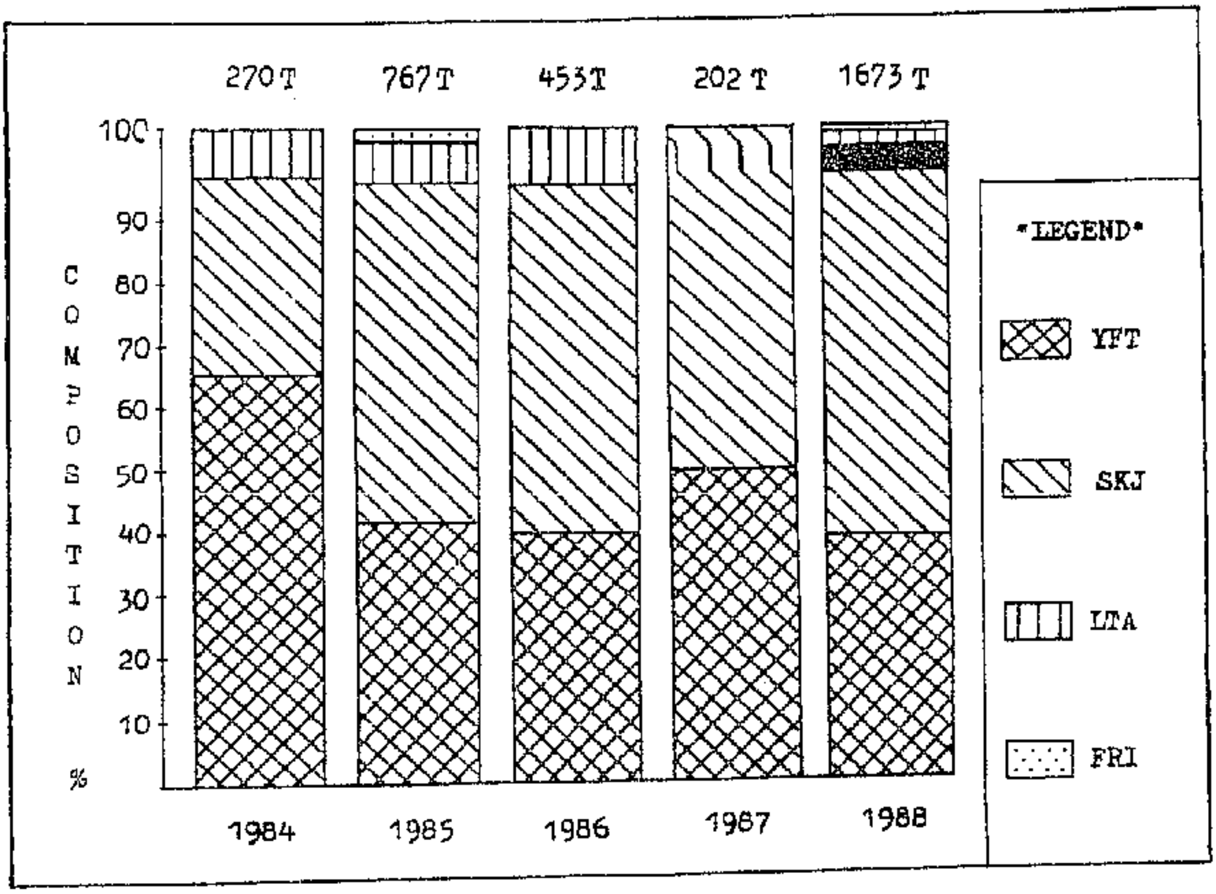


Fig. 1. Soviet tuna catch in the Gulf of Guinea, 1984-1988.

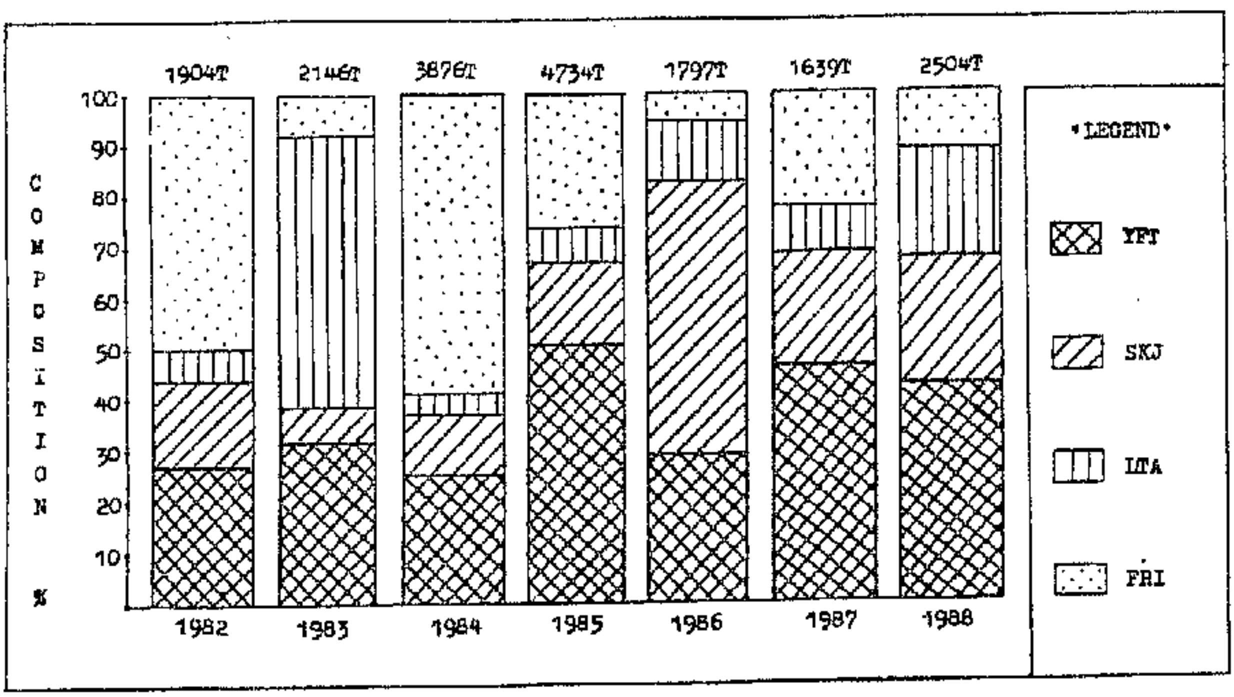


Fig. 2. Soviet tuna catches in the Sierra Leone area, 1982-1988.