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**INTERNATIONAL COMMISSION  
for the  
CONSERVATION of ATLANTIC TUNAS**

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

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MADRID, SPAIN

1989

# INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

## *Contracting Parties (as of December 31, 1988)*

Angola, Benin, Brazil, Canada, Cape Verde, Cuba, Equatorial Guinea, France, Gabon, Ghana, Côte d'Ivoire, Japan, Korea, Morocco, Portugal, Senegal, Sao Tomé & Príncipe, 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. M. MORIMOTO, Japan  
(from November 23, 1987)

## *Panel Membership (as of December 31, 1988)*

<b>Panel</b>	<b>Contracting Parties</b>	<b>Chairman</b>
1	Angola, Brazil, Cape Verde, Cuba, France, Gabon, Ghana, Côte d'Ivoire, Japan, Korea, Morocco, Portugal, Sao Tomé & Príncipe, Senegal, 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, Cuba, 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:**

Committee on Finance and Administration (STACFAD)

### **Chairman**

Ms. P. GARCÍA DOÑORO, Spain  
(from November 18, 1985)

Committee on Research and Statistics (SCRS)

Mr. A. GONZÁLEZ GARCÉS, Spain  
(from November 11, 1986)

## *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 I (1988)**", which describes the activities of the Commission during the first half of said biennial period.

This volume contains the reports of the Sixth Special Meeting of the Commission, held in Madrid in November, 1988, 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.

*S. Makiadi J. Lopes*  
*Commission Chairman*

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# CHAPTER I

## Secretariat Reports

### ADMINISTRATIVE REPORT 1988 COM/88/8 (Amended)\*

#### 1. Member countries of the Commission

There have been no changes in Commission membership since the November, 1987, meeting. The Commission is currently comprised of twenty-three (23) member countries: Angola, Benin, Brazil, Canada, Cape Verde, Côte d'Ivoire, Cuba, Equatorial Guinea, France, Gabon, Ghana, Japan, Korea, Morocco, Portugal, São Tomé & Príncipe, Senegal, South Africa, Spain, Uruguay, U.S.A., U.S.S.R., and Venezuela.

#### 2. Ratification of the Protocol to the Convention

As of December 31, 1988, the Food and Agriculture Organization of the United Nations (FAO), depository of the ICCAT Convention, had 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
São Tomé and Príncipe	November 1, 1984
Korea	December 7, 1984
South Africa	March 28, 1985
Uruguay	May 10, 1985
Japan	June 13, 1985
Senegal	June 14, 1985
Cape Verde	March 13, 1986
U.S.S.R.	June 9, 1986
U.S.A.	November 10, 1986
Spain	November 21, 1986
Equatorial Guinea	November 7, 1987
Portugal	April 7, 1988
Brazil	October 5, 1988
Ghana	December 12, 1988

\*The Administrative Report presented at the Commission Meeting was amended.

### 3. Meetings organized by ICCAT

#### 3.1 Data Preparatory Meeting for the Yellowfin Year Program

The Data Preparatory Meeting was held in Dakar from July 4 to 8, 1988, at the invitation of the "Centre de Recherches Océanographiques de Dakar-Tiaroye" (CRODT), Senegal. Scientists from Côte d'Ivoire, Cape Verde, Ghana, Spain, France, Portugal, São Tomé & Príncipe, Senegal and the U.S.A., as well as the SCRS Chairman, A. González-Garcés, were present. The Secretariat was represented by P. Kebe, Systems Analyst, whose trip expenses were funded by the Yellowfin Year Program. The report of the meeting was presented to the SCRS meeting and is contained in the "Collective Volume of Scientific Papers, Vol. XXIX".

#### 3.2 Swordfish Workshop

The Second ICCAT Swordfish Workshop was held at the Secretariat Headquarters in Madrid on September 6-13, 1988, which, although later than originally scheduled, allowed time for data up to and including 1987 to become available for the major fisheries. The Workshop was convened by Mr. S. Kume (Japan). Scientists from Equatorial Guinea, Japan, Portugal, Spain, the U.S.A., and Venezuela attended the meeting. The report was adopted and is contained in the "Collective Volume of Scientific Papers, Vol. XXIX".

### 4. Meetings at which ICCAT was represented

The Secretariat staff did not attend any meetings in 1988, except where outside funding was made available and when the meeting was of direct interest of the Commission.

#### 4.1 Report of the Tenth Session of the Committee on Management of Indian Ocean Tuna

Ms. C. Soto, Spanish Deputy Director General of International Fishery Relations, Northern Zone, head of the Spanish delegation at the Tenth Session of the Committee on Management of Indian Ocean Tuna, held in Mari-tius from June 28 to July 2, 1988, represented ICCAT at this meeting. Ms. Soto's report on the meeting was presented to the Commission as COM/88/20.

#### 4.2 International Marking Symposium

The Assistant Executive Secretary presented a paper on the history of ICCAT's tagging of tunas and tuna-like species (SCRS/88/8) at the International Marking Symposium held by the American Fisheries Society, on June 27-July 1, 1988, Seattle, Washington (U.S.A.). All his trip expenses were covered by the American Fisheries Society.

#### 4.3 Second International Billfish Symposium

The Assistant Executive Secretary presented a paper on the stock assessment of Atlantic swordfish at the Second International Billfish Symposium, held at Kona, Hawaii, on August 1-5, 1988. The paper was co-authored with Mr. J. C. Rey. His meeting report was presented as SCRS/88/15. Trip expenses for the Assistant Executive Secretary were completely covered by the host organizations.

### 5. Collaboration with other organizations

#### 5.1 Collaboration with FAO

Mutual collaboration between FAO and ICCAT in collecting statistics and other information continued as in other years. The project to eliminate discrepancies in Atlantic tuna statistics between the data bases of the two organizations was successfully continued and the FAO and ICCAT publications now have fewer discrepancies for Atlantic tunas.

#### 5.2 General Fisheries Council for the Mediterranean (GFCM)

Mr. M. Savini, Secretary of the General Fisheries Council for the Mediterranean (GFCM) of FAO, visited the Commission's Headquarters on September 16, 1988. The purpose of his visit was to discuss the follow-up to a proposal made by ICCAT at the last GFCM meeting (October, 1986), for mutual collaboration in improving tuna and tuna-like statistics for the Mediterranean so that ICCAT could complete its stock assessments of these species in the Mediterranean, which the GFCM members also need. Evidently, at a later GFCM working session on highly migratory species, the problem of the lack of assessments in the Mediterranean (particularly in the eastern part) was once again brought up and collaboration with ICCAT was again recommended to improve statistics.

Greece invited GFCM and ICCAT to hold a stock analysis meeting (probably in early 1990). The GFCM plans to study the availability of data for Mediterranean tuna and tuna-like fisheries and analyze the way to improve data collection and sampling before the stock evaluation meeting. Mr. Savini requested ICCAT to collaborate in this program. The Secretariat offered to submit a paper at the Livorno GFCM Meeting describing the data available in the ICCAT data base for the Mediterranean fisheries.

#### 5.3 Inter-Agency meeting of the Coordinating Working Party on Atlantic Fishery Statistics

The Inter-Agency meeting of the Coordinating Working Party on Atlantic Fishery Statistics was held at Bergen, Norway, in early October, 1988. The report of this meeting was presented as SCRS/88/65. ICCAT was not represented at the meeting. Since this was a meeting of the CWP members' Secretariats, it was not proper to ask any country to represent ICCAT. The next full CWP meeting is scheduled for 1990.



#### 5.4 Other organizations

The Commission also maintained contact with various international organizations other than those mentioned in the previous paragraphs, such as:

International Commission for the Southeast Atlantic Fisheries (ICSEAF)  
Northwest Atlantic Fisheries Organization (NAFO)  
International Council for the Exploration of the Sea (ICES)  
Commission for the Conservation of Antarctic Marine  
Living Resources (CCAMLR)

#### 6. Coordination of Research

The coordination of research carried out by the Secretariat during 1988 is summarized in the "Secretariat Report on Statistics and Coordination of Research".

##### 6.1 Purchase of portable computer

Following a recommendation made at the 1987 Commission Meeting, a PC (COMPAQ 386 portable) was purchased for use as an intelligent terminal. It is IBM compatible and has a 32-bit processor, 2 MB RAM, 40 MB hard disk, and a math co-processor. It arrived at the time of the SGRS Meeting and was available for use by the scientists.

##### 6.2 Program of Enhanced Research for Billfish

The Program continued as planned during 1988. Details of the funds received and disbursed, as well as progress made are presented in the Financial Report (COM/88/9) and Appendix 4 to the Annex 10.

#### 7. Publications

The following publications were published in 1988:

- Report for Biennial Period, 1986-87, Part II (1987).  
Commission's official report for 1987, including the Proceedings of 1987 Commission Meeting. Published in the three official languages of the Commission in June, 1988.
- Statistical Bulletin, Vol. 17 (Final).  
Includes statistics from 1976 through 1986. Published in May, 1988.
- Statistical Bulletin, Historical Series 3 - 1970-1979.  
Updated statistics for 1970-1979. Published in October, 1988.

- Collective Volume of Scientific Papers, Vol. XXVII.  
1987 Swordfish Workshop Report and SCRS scientific papers concerning swordfish. Distribution limited to scientists and libraries directly involved in tuna research. Published in March, 1988.
- Collective Volume of Scientific Papers, Vol. XXVIII.  
1987 SCRS scientific papers, except those on swordfish. Distribution limited to the scientists and libraries directly involved in tuna research. Published in March, 1988.
- Data Record, Vol. 28.  
Distribution limited to scientists and libraries directly involved in tuna research. Published in February, 1988.
- Statistical Bulletin, Vol. 18 (Preliminary).  
Includes 1987 preliminary statistics. Distribution limited to 1988 SCRS participants. Published in October, 1988.
- Data Record, Vol. 29.  
Distribution limited to scientists and libraries directly involved in tuna research. Published in December, 1988.

In order to reduce costs, all of these publications were done at the Secretariat except for the covers and binding. The Statistical Bulletin is now printed on both sides of the page, which reduces weight of the volume. The Biennial Report, which used to be page set by laser printer through contract, was printed at the Headquarters and the size was changed to economize on time and printing.

Also, in order to save money, almost all the ICCAT publications were shipped by surface mail, except for a few occasions when urgent distribution was essential.

As suggested by the Commission, the Secretariat requested all the member country embassies located in Madrid to assist in the distribution of publications. The embassies of the following countries are helping ICCAT by allowing publications to be sent via embassies:

Angola, Brazil, Canada, Cuba, Portugal, Venezuela.

## 8. Secretariat and Administration

There were no changes in the Secretariat staff in 1988. The Secretariat staff (as of October 15, 1988) consisted 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 1988  
COM/88/9 (Amended)\*

I. REGULAR BUDGET

A. FISCAL YEAR 1987

1. Auditor's Report

The Auditor has examined the books and accounts of the Commission up to December 31, 1987. 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 mailed a copy of the Auditor's Report to all the member country governments in May, 1988. An extract of this Report is included in the "Report for Biennial Period, 1986-87, Part II".

2. Financial status at the end of the second half of the 1987  
Biennial Budget

Statement I shows the status of Cash and Bank at the end of Fiscal Year 1987. There was a cash balance of \$141,028.46 at the end of the Fiscal Year, including \$23,180.00 in advance contributions, and the reallocation of \$68,438.17 from the Yellowfin Year Program to the Working Capital Fund.

Accumulated country contributions pending payment at the end of Fiscal Year 1987 totaled \$519,421.20.

B. FISCAL YEAR 1988

1. Regular Budget 1988-1989

The Regular Budget approved by the Commission at its Tenth Regular Meeting (Azores Islands, Portugal, November 1987) amounted to \$735,000 for 1988 and \$750,000 for 1989 (see Report for Biennial Period, 1986-87, Part II, Appendix 2 to Annex 8).

\*Updated to the end of Fiscal Year 1988. Modifications agreed upon by the Commission have been included.

The total Budget has remained practically the same since 1981:

<u>Year</u>	<u>Total Budget (\$)</u>
1981	750,000
1982	750,000
1983	825,000
1984	700,000
1985	750,000
1986	750,000
1987	690,000
1988	735,000
1989	750,000

At the STACFAD meeting at which the Budget was approved, it was noted that ICCAT's financial health was affected by some factors beyond the Commission's control, such as fluctuations in currency exchange, which in turn determines whether there is a positive or negative balance for some budget chapters. However, a much more serious factor affecting the Commission's finances is some countries have outstanding debts as regards the payment of contributions. For these reasons, the Commission is faced with serious financial difficulties.

## 2. General comments on the 1988 Budget

- a) Due to the financial crisis of the Commission, austerity measures were enforced for all the budget chapters during Fiscal Year 1988.
- b) With regards to the salaries chapters (1 and 8-a), the Executive Secretary had noted a major discrepancy between the "Special Rules of Procedure" approved by the Commission in 1987 (Biennial Report, 1986-87, Part II, Appendix 3 to Annex 8) referring to salaries, and maintaining the total expenditure at the 1987 level. If the salaries were frozen at the November 1, 1987, level for 1988, then the budget allotment for salaries would surpass by about 10% the amount which had been spent in 1987.

This discrepancy was brought to the attention of the STACFAD Chairman, who after some consideration, presented the following response whereby, "...During 1988 staff will receive the same amount in dollars as they had received in 1987. Therefore, the annual total for each person will be divided into 12 payments to arrive at the salary to be received in dollars, without any monthly modifications..."

The above was applied to staff in the Professional (D/P) and General Services (GS) categories, so that the total salaries in dollars for staff in these two categories were exactly the same as in 1987.

However, staff contracted at the local level received a 6% increase, in accordance with Spanish legislation. Therefore, the increase in the amount spent on salaries for 1988 corresponds exclusively to locally-contracted staff.

The Commission Chairman and the First Vice-Chairman demonstrated their conformity to maintain salaries at the 1987 level (in dollars), with the above modification concerning locally-contracted staff.

- c) The Executive Secretary, after prior consultation with the STACFAD Chairman, invited the boat owners and industries of some ICCAT member and non-member countries (e.g., Spain, the U.S., France, Japan, Korea, and Taiwan) involved in commercial tuna fishing to make voluntary contributions to the Commission.

There were diverse responses to this request. We received some checks as well as some correspondence encouraging the Commission to continue its fight to overcome its current financial difficulties. Of course, these voluntary contributions are not meant to solve the Commission's financial problems, since that corresponds to the member country governments.

- d) The matter of contributions from observers was postponed until the Commission adopts specific guidelines at its Sixth Special Meeting in 1988.
- e) As regards the sale of Commission publications, the Executive Secretary conducted a study on the publication costs, (including paper, copying-offset reproduction and operator's time, covers, binding, etc.) and arrived at an average cost of 1,500 Pesetas (\$12.00) per publication, excluding mailing costs.

Up to now, the Commission decided to charge for two Commission publications, the "Field Manual" (\$5.00) and the "Skipjack Conference Proceedings" (\$15.00 + mailing).

### 3. Financial status of the first half of the biennial budget - 1988

Statement 2 shows the status of the member country contributions at the end of Fiscal Year 1988.

Fourteen countries paid their 1988 contributions: twelve paid during 1988 and two countries paid their 1988 contributions in advance of the fiscal year. A total of \$571,582.00 was received (77.7% of the total budget). In addition, nine countries paid past-due contributions totaling \$193,904.35.

At the end of the fiscal year there were 1988 contributions and/or past-due contributions pending payment from Benin, Cape Verde, Cuba, Equatorial Guinea, Gabon, Ghana, Ivory Coast, Senegal and Venezuela, for a total of \$488,932.85 in accumulated pending contributions.

The Budget and Expenditures to the end of Fiscal Year 1988 are shown in Statement 3.

Total expenses in 1988 amounted to ..... \$681,065.96

Funds available in fiscal year 1988 were as follows:

i) Contributions to the 1988 Budget	\$549,909.00	
ii) 1988 contribution from Angola (paid in advance in 1986)	16,324.00	
iii) 1988 contribution from Uruguay (paid in advance in 1986 & 1987)	5,349.00	
iv) From the Working Capital Fund to cover 1988 unpaid contributions	<u>109,483.96</u>	\$681,065.96

A brief explanation, by budget chapter, is as follows:

Chapter 1 - Salaries. This chapter includes 12 staff members: the Executive Secretary (D), the Assistant Executive Secretary (P), six multi-lingual secretaries (GS), one administrative aide (GS) three other auxiliary staff contracted at the local level: a telephone operator/receptionist, a photocopy machine operator and a messenger. The four auxiliary staff members are covered by Spanish Social Security.

The difference between the amount spent on salaries for this chapter (\$391,055.79) and the amount budgeted (\$386,000.00 -although \$386,890.85 were actually spent-) corresponds to the salary increase applied for locally-contracted staff and to the currency fluctuation affecting these staff who are paid in Pesetas, but whose salaries are accounted for in dollars.

In 1988, staff in the Professional (D/P) and General Services (GS) categories received an overall 8.28% less in total salaries in U.S. dollars than they should have received if the U.N. scheme had been maintained without change.

Chapter 2 - Travel. There was no budget for travel in 1988. Consequently, there was no expenditure during this fiscal year.

Chapter 3 - Annual Commission Meeting. For the first time, expenses for the annual meeting were separated into two budget chapters: Chapter 3 for the annual Commission and Chapter 8-g for scientific meetings, including the SCRS.

Expenditures for the 1988 Commission meeting amounted to \$17,388.64, including hotel conference rooms, interpreters' fees, rental of translation equipment, reproduction of documents, and office material.

Chapter 4 - Publications. The Commission publications listed in the Administrative Report (COM/88/8) (5,000 copies and almost one million pages) were printed by the Secretariat staff. Only the covers and binding were done by outside contract. Publication expenses totaled \$17,027.89 in 1988.

Chapter 5 - Office Equipment. In the fourth quarter some essential office equipment (FAX, photocopy machine, plate-maker for the offset and a chair) totaling \$5,393.03 was purchased. Also, \$3,500 of the extrabudgetary contributions were used towards the purchase of office equipment, as indicated in the lower panel of Statement 4.

Chapter 6 - Operating Expenses. This chapter includes office material, document reproduction, mailing (of correspondence, documents and publications), telephone, cable, telex, equipment maintenance contracts (excluding the Micro-VAX computer), auditor's fee, electricity and office cleaning service.

Statement 3 shows the breakdown of these expenses, which totaled \$60,600.94.

Chapter 7 - Miscellaneous. Included in this chapter are minor expenses, such as repairs, office insurance (fire, theft and liability) and generally other miscellaneous expenses which are not applicable to other budget chapters. These expenses amounted to \$5,338.01 in 1988.

Chapter 8 - Coordination of Research.

8-a) Salaries. This sub-chapter includes four staff members: a systems analyst (P), a programmer (GS), a statistical secretary (GS) and a locally-contracted data entry clerk. The explanations given for Chapter 1 also apply to Chapter 8-a. In 1988, for the first time, the salaries of Secretariat staff in this chapter and port samplers' contract fees were separated into two sub-chapters.

In 1987, the total amount budgeted for salaries was: \$135,000.00

The amount actually spent was:

1) Secretariat staff	\$109,132.44	
ii) Port samplers	<u>12,107.30</u>	<u>121,239.74</u>

The difference was: \$ 13,760.26

However, in 1988 the sub-chapter budget allotments were as follows:

i) \$100,000 (considerably less than the 1987 expenditure of \$109,132.44) for Secretariat staff salaries (Sub-chapter 8-a).

ii) \$27,000 (considerably more than the 1987 expenditure of \$12,107.30) for port sampling (new Sub-chapter 8-c).

This error is reflected in the expenditures of these two sub-chapters. Sub-chapter 8-a shows a negative balance of \$11,123.91, whereas sub-chapter 8-c shows a positive balance of \$20,999.87

8-b) Travel to improve statistics. A policy of absolute travel restriction was also applied to this sub-chapter. The only amount charged was the trip expenses (\$1,549.59) of the Assistant Executive Secretary to Livorno, Italy, to attend the GFCM meetings as recommended by the Commission.

8-c) Port sampling. Expenses for port sampling at the Canary Islands, St. Maarten, Abidjan and Montevideo (\$6,000.13) were charged to this sub-chapter. Expenses for port sampling at Cape Town were paid by the Commission up to May, 1988, and after that by the "Sea Fisheries Research Institute" of South Africa.

8-d) Biostatistical work. Most of the biostatistical work was carried out by the current Secretariat staff in 1988. Charged to this sub-chapter were the expenses of the Assistant Executive Secretary (\$674.00) for his visit to Palermo, Sicily, to meet with Italian scientists who collaborate with ICCAT. This visit was combined with his trip to the GFCM meetings.

8-e) Electronic equipment. This year a power stabilizer with a built-in battery was purchased for the Micro-VAX. A portable computer (IBM compatible) and a terminal were also purchased. The total expenditure was \$11,306.43.

8-f) Data processing. As anticipated, the major component of data processing expenditures corresponds to Micro-VAX maintenance contracts (\$19,437.51). The cost of computer materials amounted to \$6,463.71.

8-g) Scientific meetings (including SCRS).

The Second ICCAT Swordfish Workshop, held in September at the Secretariat, was charged to this sub-chapter. The 1988 SCRS meetings (species groups meetings held at the Secretariat and the plenary sessions held at the Hotel Pintor) were also be charged to sub-chapter 8-g. The combined total costs for these meetings amounted to \$27,706.38, and includes the hotel costs, interpreters' fees, rental of translation equipment, photocopy machine rental, reproduction of documents and materials.

8-h) Miscellaneous. No expenses were charged to chapter 8-h, as was explained earlier in this Report.

4. Income and Disbursements of the Regular Budget

Statement 4 shows the income and disbursements of Fiscal Year 1988. Income included the contributions received towards the 1988 budget (\$549,909.00), past-due contributions received in Fiscal Year 1988 (\$193,904.35), interest earned and income derived from the sale of books and other sources (\$25,586.97), and voluntary contributions (\$25,666.67).

We would like to thank especially those member countries which made an extreme effort to pay all or part of their outstanding debts to the Commission. We would also like to point out the voluntary contributions donated by the private sector, which demonstrates their willingness to collaborate with ICCAT. (See Statement 4 for details.)

However, even though many past-due contributions were paid in 1988, the financial difficulties of the Commission have not been totally resolved, since the pending 1988 contributions amount to \$163,416.00 and past-due contributions from other years amount to \$325,516.85. Therefore, the accumulated pending contributions at the end of 1988 totaled \$488,932.85.



Statement 4 also shows the expenses incurred in Fiscal Year 1988 (\$681,065.96), as well as the balance in Cash and Bank (\$255,029.49).

Also included in this statement are the special funds received: \$1,500 from Mr. F. R. Castelazo and \$2,000 from the Billfish Program (charged to the 1989 Billfish Program Budget), as well as the application of these funds.

#### 5. Status of the Working Capital Fund

Statement 5 shows a cash balance of \$117,848.46 in the Working Capital Fund at the end of 1987. Past-due contributions paid in 1988, bank interest earned, income from the sale of books, a reimbursement from South Africa, a reimbursement from the Spanish National Employment Institute, and voluntary contributions received were deposited to this Fund. The total deposits to the Fund amounted to \$245,157.99, which, added to the \$117,848.46, show a total of \$363,006.45.

Of this amount, \$109,483.96 were applied to cover the unpaid 1988 contributions, so as to meet the expenses of the fiscal year.

Consequently, at the end of fiscal year 1988 there was a total cash balance of \$255,029.49 (i.e., \$253,522.49 in the Working Capital Fund and \$1,507 paid in advance by Angola).

This statement shows the exact amounts corresponding to each of the deposits mentioned above. We would like to emphasize the importance and usefulness of this Fund.

#### 6. Status of Cash and Bank at the end of fiscal year 1988

Statement 6 shows a balance of \$255,029.49 in Cash and Bank and accumulated pending contributions amounting to \$488,932.85.

## II. YELLOWFIN YEAR PROGRAM

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

At the end of 1987, there was a positive balance of \$93,438.17 available for the Program. At its Tenth Regular Meeting in November, 1987, the Commission estimated the expenditures for the rest of the Program at \$25,000 and decided to return \$68,438.17 to the Working Capital Fund. The Commission approved the following breakdown of expenses to the end of the Program:

1) Expenses of the 1988 technical meeting in Dakar.....	\$ 3,000.00
2) Expenses of final meeting in Madrid	2,000.00
3) Lottery Prizes.....	1,000.00
4) Analysis of otoliths/vertebrae....	8,000.00
5) Travel.....	2,000.00
6) Publication of results.....	5,000.00
7) Miscellaneous expenses.....	<u>4,000.00</u>
Total.....	\$25,000.00

In Fiscal Year 1988, Program activities continued and expenditures totaled \$5,152.11 (including bank charges):

1) Trip expenses for Systems Analyst to Dakar for Data Preparatory Meeting.....	\$614.16
2) Per diem for Systems Analyst in Dakar.....	1,608.00
3) Meeting expenses, Dakar.....	2,432.64
4) Tagging Lottery Prize.....	<u>497.31</u>
Total.....	\$5,152.11

Consequently:

Balance at the end of FY 1987.....	\$93,438.17
Relocation of funds to WCF.....	<u>-68,438.17</u>
Balance at beginning of FY 1988.....	25,000.00
Expenditures in 1988 .....	<u>-5,152.11</u>
Balance at end of FY 1988 .....	\$19,847.89

### III. PROGRAM OF ENHANCED RESEARCH FOR BILLFISH (TRUST FUND)

During Fiscal Year 1987, a special account was opened in the "Banco Exterior de España", in the Commission's name, to deposit funds from private sources towards the Program of Enhanced Research for Billfish. In 1988, 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.

In 1987, \$25,500.00 were received from diverse sources and \$17,550.00 were received in 1988. Expenses in 1987 amounted to \$7,428.74 and \$17,302.05 in 1988. Therefore, as of the end of Fiscal Year 1988 the balance in the Billfish Trust Fund was \$18,319.21. Details of income and expenses of the Billfish Program are given in Statement 7.

IV. GENERAL BALANCE SHEET AT THE END OF FISCAL YEAR 1988

Statement 8 shows the general balance sheet at the end of Fiscal Year 1988.

O. Rodríguez Martín  
Executive Secretary

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 Status of Cash and Bank - Regular Budget (at end of Fiscal Year 1987) (US\$)
 

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SUMMARY		BREAKDOWN	
Cash and Bank .....	141,028.46	Available in Working Capital Fund .....	49,410.29
		Reallocation from YYP to WCF .....	68,438.17
		Advance on 1988 Budget (Angola) .....	17,831.00
		Advance on 1988 Budget (Uruguay) .....	<u>5,349.00</u>
			141,028.46
Accumulated pending contributions ...	519,421.20	Contributions pending payment:	
		i) from 1982 and before .....	31,165.27
		ii) from 1983 .....	53,469.99
		iii) from 1984 .....	44,223.00
		iv) from 1985 .....	50,405.00
		v) from 1986 .....	120,457.24
		vi) from 1987 .....	209,856.00
		vii) Extrabudgetary contribution (Equatorial Guinea) .....	2,000.00
		viii) Special Skipjack Budget (Ghana) ..	4,800.00
		ix) Special Skipjack Budget (Benin) ..	<u>3,044.70</u>
			519,421.20

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Status of Member Country Contributions - Regular Commission Budget (at end of Fiscal Year 1988) (US\$)

Country	Past-due Contributions as of 12/31/87	1988 Contributions Approved by the Commission	1988 Contributions Paid	Past-Due Contributions Paid****	Balance due as of 12/31/88
Angola.....	0.00	16,324.00	16,324.00 ***	0.00	0.00
Benin.....	35,164.70 *	5,038.00	0.00	0.00	40,202.70 *
Brazil.....	26,403.00	40,122.00	40,122.00	26,403.00	0.00
Canada.....	0.00	17,239.00	17,239.00	0.00	0.00
Cape Verde.....	9,381.00	12,831.00	0.00	9,381.00	12,831.00
Côte d'Ivoire.....	19,359.00	11,397.00	0.00	0.00	30,756.00
Cuba.....	34,885.24	21,370.00	0.00	17,172.24	39,083.00
Equatorial Guinea.....	2,000.00	4,750.00	0.00	2,000.00	4,750.00
France.....	0.00	54,760.00	54,760.00	0.00	0.00
Gabon.....	38,714.11	9,500.00	0.00	16,666.11	31,548.00
Ghana.....	176,872.27 *	43,215.00	0.00	0.00	220,087.27 *
Japan.....	0.00	63,439.00	63,439.00	0.00	0.00
Korea.....	0.00	31,988.00	31,988.00	0.00	0.00
Morocco.....	29,802.00	15,842.00	15,842.00	29,802.00	0.00
Portugal.....	22,439.00	29,225.00	29,225.00	22,439.00	0.00
São Tomé and Príncipe.....	8,035.00	4,908.00	4,908.00	8,035.00	0.00
Senegal.....	54,359.88	21,501.00	0.00	0.00	75,860.88
South Africa.....	0.00	13,863.00	13,863.00	0.00	0.00
Spain.....	0.00	177,663.00	177,663.00	0.00	0.00
Uruguay.....	0.00	7,985.00	7,985.00 ***	0.00	0.00
U.S.A.....	0.00	72,011.00	72,011.00	0.00	0.00
U.S.S.R.....	0.00	26,213.00	26,213.00	0.00	0.00
Venezuela.....	<u>62,006.00</u>	<u>33,814.00</u>	<u>0.00</u>	<u>62,006.00</u>	<u>33,814.00</u>
Total.....	519,421.20	734,998.00	549,909.00	193,904.35	488,932.85
		<u>2.00 **</u>	<u>+21,673.00 ***</u>		
		735,000.00	571,582.00		

\*Includes pending contributions from Skipjack Budget (Benin, \$3,044.70; Ghana,\$4,800.00).

\*\*Rounding.

\*\*\*Includes \$16,324 from Angola and \$5,349 from Uruguay (Total \$21,673) which were deposited and accounted for in Fiscal Years 1986 and 1987.

\*\*\*\*Deposited to the Working Capital Fund.

## Regular Budget and Expenditures (at end of Fiscal Year 1988) (US\$)

	AMOUNT BUDGETED	AMOUNT SPENT (BY CHAPTER)	
Chap. 1 Salaries	386,000		
Prof. & Gen. Services		314,832.00	
Locally contracted pers.		21,986.97	
Spanish Social Security		12,040.02	
Pension		42,108.00	
Bank charges		<u>88.80</u>	391,055.79
Chap. 2 Travel	0		0.00
Chap. 3 Annual Meeting	15,000		17,388.64
Chap. 4 Publications	16,000		17,027.89
Chap. 5 Office Equipment	6,000		5,393.03
Chap. 6 Operating Expenses	65,000		
i) Office material		6,945.35	
ii) Reproduction of docs.		6,106.98	
iii) Mailing		8,412.22	
iv) Telephone		4,733.24	
v) Telex, telegrams		5,944.93	
vi) Maintenance contracts		13,297.75	
vii) Honorariums-Auditor		2,933.63	
viii) Electricity		3,057.72	
ix) Office cleaning		4,122.54	
x) Miscellaneous		<u>5,046.58</u>	60,600.94
Chap. 7 Miscellaneous	<u>5,000</u>		<u>5,338.01</u>
Subtotal Chapters 1-7	493,000		496,804.30
Chap. 8 Coordination of Research:			
Chap. 8A Salaries:	100,000		
Prof. & Gen. Services		88,270.22	
Locally contracted pers.		9,681.69	
Spanish Social Security		2,000.00	
Pension		<u>11,172.00</u>	111,123.91
Chap. 8B Travel	8,000	1,549.59	
Chap. 8C Port sampling	27,000	6,000.13	
Chap. 8D Biostatistical work	10,000	674.00	
Chap. 8E Electronic equipment	10,000	11,306.43	
Chap. 8F Data processing	27,000	25,901.22	
Chap. 8G Scientific meetings	25,000	27,706.38	
Chap. 8H Miscellaneous	35,000	<u>0.00</u>	<u>73,137.75</u>
Subtotal Chapters 8 (A-H)	<u>242,000</u>		<u>184,261.66</u>
Total for Chapters 1-8	735,000		681,065.96

## Income and Disbursements - Regular Budget (at end of Fiscal Year 1988) (US\$)

I N C O M E		D I S B U R S E M E N T S	
Cash and Bank (at start of FY 1988) .....	141,028.46	Expenditures .....	681,065.96
Contributions received towards 1988 Budget.....	549,909.00	Available in Cash and Bank ...	255,029.49
Past-due contributions received.....	<u>193,904.35*</u>		
	743,813.35		
Extrabudgetary income received:			
Bank interest .....	20,732.16		
Sale of books and others.....	303.08		
Reimbursement from South Africa...	551.73		
Reimbursement from INEM.....	<u>4,000.00</u>		
	25,586.97*		
Voluntary contributions received:			
Dong Won Fishing Co. Ltd. (Korea). 1,500.00			
Grupo Armadores "OPAGAC" (Spain).. 4,166.67			
Taiwanese Deep Sea Boatowners .... 10,000.00			
Fed. of Japan Tuna Fisheries.....	<u>10,000.00</u>		
	25,666.67*		
	51,253.64		
TOTAL.....	936,095.45	TOTAL.....	936,095.45
Special funds received:		Special funds applied:	
-From Mr. F. Rangel Castelazo, Billfish Foundation, Mexico, personal donation towards purchase of Fax	1,500.00	-To cover part of the pur- chase price of the Fax	2,500.00
-Reimbursement from Billfish Research Program (1989 Budget) towards purchase of Fax and photocopier	<u>2,000.00</u>	-To cover part of the pur- chase price of photocopier	<u>1,000.00</u>
Total.....	3,500.00		3,500.00

\*Deposited to the Working Capital Fund.

Available in Working Capital Fund - Regular Budget (at end of Fiscal Year 1988) (US\$)

Balance at end of Fiscal Year 1987 .....		49,410.29
Reallocation from Yellowfin Year Program .....		<u>68,438.17</u>
		117,848.46
Deposits:		
Past-due contributions received .....		193,904.35
Extrabudgetary income received:		
Bank Interest .....	20,732.16	
Sale of books and others .....	303.08	
Reimbursement from South Africa .....	551.73	
Reimbursement from INEM .....	<u>4,000.00</u>	25,586.97
Voluntary contributions received:		
Dong Won Fishing Co. Ltd. (Korea) .....	1,500.00	
Grupo Armadores "OPAGAC" (Spain) .....	4,166.67	
Taiwanese Deep Sea Boatowners .....	10,000.00	
Federation of Japan Tuna Fisheries .....	<u>10,000.00</u>	<u>25,666.67</u>
Total deposited to Working Capital Fund .....		<u>245,157.99</u>
Total of balance, reallocation and deposits .....		363,006.45
Less: Amount to cover unpaid 1988 contributions (Difference between contributions paid towards 1988 Budget (571,582.00) and total expenditures for 1988 (681,065.96) .....		<u>109,483.96</u>
Available in Working Capital Fund at end of Fiscal Year 1988 .....		<u>253,522.49</u>



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

SUMMARY		BREAKDOWN	
Cash and Bank .....	255,029.49	Available in Working Capital Fund .....	253,522.49
		Advance on 1988 Budget (Angola) .....	<u>1,507.00</u> 255,029.49
Accumulated pending contributions ...	488,932.85	Contributions pending payment:	
		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 .....	<u>163,416.00</u> 488,932.85

## PROGRAM OF ENHANCED RESEARCH ON BILLFISH

## SUMMARY OF TRUST FUND (US\$)

TOTAL INCOME*	TOTAL EXPENDITURES**	BALANCE as of
1987-1988	1987-1988	December 31, 1988
43,050.00	24,730.79	18,319.21
*In 1987, from: U.S. Billfish Foundation		5,000.00
South Florida Fishing Classic, Inc.		10,000.00
Key West Marlin Tournament		5,000.00
Florida Conservation Assoc., Tallahassee		5,000.00
Florida Conservation Assoc., Palm Beach		500.00
		25,500.00
In 1988, from: Pierre Closterman		500.00
South Florida Fishing Classic, Inc.		10,000.00
Florida Conservation Association		5,000.00
The Billfish Foundation		2,000.00
Pete Leonard Plumbing & Heating		50.00
		17,550.00
		43,050.00

\*\*Includes bank charges.

## BUDGET, EXPENDITURES, BALANCE FOR EACH BUDGET CHAPTER (US\$)

ITEMS	AMOUNT BUDGETED 1987-1988	AMOUNT SPENT IN 1987*	AMOUNT SPENT IN 1988*	BALANCE
SHORE-BASED (Port) SAMPLING				
Sampling at Cumaná	1,000	603.00	205.00	192.00
Secretariat port sampling:				
St. Maarten	1,500	0	184.00	1,316.00
West African ports (Dakar)	1,500	0	1,505.00	-5.00
Caribbean	6,500	0	5,791.56	708.44
Others (Abidjan)	1,000	0	1,005.00	-5.00
AT-SEA OBSERVER PROGRAM				
Small longliners (6 trips)	5,000	2,409.00	2,591.00	0.00
Large longliners - Species ID/Conversion factors	3,000	0	2,005.00	995.00
AGE AND GROWTH				
Purchase of hard parts	2,000	0	0	2,000.00
TAGGING				
Tags/applicators	2,000	1,581.00	0	419.00
Tag rewards	500	0	0	500.00
Lottery rewards	1,000	0	505.00	495.00
Hard parts rewards	500	0	0	500.00
Posters	1,000	0	0	1,000.00
COORDINATION				
Trips	6,500	2,835.74	3,510.49	153.77
Shipping	1,000	0	0	1,000.00
Data processing	1,000	0	0	1,000.00
<b>TOTAL BUDGET AND EXPENDITURES</b>	<b>35,000</b>	<b>7,428.74</b>	<b>17,302.05</b>	<b>10,269.21</b>

\*Includes bank charges.

General Balance Sheet at end of Fiscal Year 1988 (US\$)

A S S E T S

L I A B I L I T I E S

Available: (Banco Exterior de España):		
Acct. 84-31279-Z (time deposit)	203,194.25	
Acct. 82-31279-Q (US\$)	40,179.39	
Acct. 30-17672-A (Ptas.)	3,726,462	
Acct. 30-17329-F (Convert. Ptas.)	3,206	
Cash on hand (Ptas.)	19,254	
(1US\$ = 114 Ptas.)	<u>3,748,922</u>	<u>32,885.28</u>
		<u>276,258.92</u>
Difference in exchange rate		<u>-1,381.54</u>
		<u>274,877.38</u>

Available in Billfish Trust Fund:		
Acct. 82-31555-N	18,319.21	

Receivables:		
Benin	40,202.70	
Cape Verde	12,831.00	
Côte d'Ivoire	30,756.00	
Cuba	39,083.00	
Equatorial Guinea	4,750.00	
Gabon	31,548.00	
Ghana	220,087.27	
Senegal	75,860.88	
Venezuela	<u>33,814.00</u>	488,932.85

Fixed Assets:		
Acquired before 1988, in use	268,244.98	
Ajustment	700.00	
Acquired during 1988, in use	<u>26,837.46</u>	
	<u>295,782.44</u>	
Accumulated amortization	(130,237.28)	165,545.16

Guaranty deposit		<u>815.64</u>
TOTAL ASSETS		<u>948,490.24</u>

Acquired holdings (gross)	295,782.44
Less: AmcORIZATION of Fixed Assets	(130,237.28)
Acquired holdings (net)	<u>165,545.16</u>

Guaranty deposit	815.64
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Available in the Working Capital Fund	253,522.49
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Advance from Angola	1,507.00
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Yellowfin Year Program	19,847.89
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Available in Billfish Trust Fund:	
Received:	43,050.00
Spent:	<u>24,730.79</u>
	18,319.21

Contributions pending payment	488,932.85
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TOTAL LIABILITIES	<u>948,490.24</u>
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Furniture ceded by Undersecretariat of Merchant Marine of Spain	\$3,365.38
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Furniture ceded by Undersecretariat of Merchant Marine of Spain	\$3,365.38
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The Executive Secretary: O. Rodríguez Martín

Certified by the Auditor: B. Tahoces Acebo

**SECRETARIAT REPORT ON STATISTICS  
AND COORDINATION OF RESEARCH  
SCRS/88/11 (Amended)\***

**I. DATA COLLECTION AND SAMPLING**

**1. Collection of 1987 statistics through national offices**

Table 1 of Appendix 9 to Annex 10 (Report of the Sub-Committee on Statistics) shows the progress made by the national offices and by the Secretariat in the collection of 1987 statistics. As of October 20, 1988, data from the following countries had not yet been received by the Secretariat:

**Task I data (total nominal catches):**

Argentina, Cape Verde, Cuba, Ghana, Greece, Italy, Japan (longline), Libya, Mexico, Norway, Senegal, Tunisia and Venezuela.

**Task II catch and effort data:**

Canada, Cape Verde, Cuba, France (temperate species), Italy, Ghana, Morocco, Portugal (Azores), Venezuela, and Japan (longline).

**Task II size data:**

Canada, Cape Verde, Cuba, France (temperate species), Italy, Ghana (except Abidjan sampling), Morocco, Portugal (Azores), U.S.S.R. and Japan (longline, except swordfish).

**2. Improvements and remaining difficulties**

**a) Delay in submission of Task I data**

As many statistics for the major fisheries were not received until early or mid-October, it was very difficult for the Secretariat to compile 1987 statistics before the 1988 SCRS meeting.

**b) Mediterranean statistics**

Collection of Mediterranean statistics, particularly Italian catch and size data) continues to be a problem. Several telexes and letters have been

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

sent out requesting these data. In the past, most of the Italian data were secured through personal visits to the concerned scientists by the Secretariat staff.

On the other hand, statistics for the Turkish fishery have been improving. Correspondence with Turkey continued and catch statistics as well as some biological sampling results on bluefin and black skipjack have been made available by that government.

As reported in the Administrative Report (COM/88/8) in the section on relations with other organizations, there is a possibility for collaboration with the General Fisheries Council for the Mediterranean (GFCM) of FAO, to improve tuna and billfish (including swordfish) statistics for the Mediterranean. Since most of the Mediterranean fishing countries are not members of ICCAT, collaboration with these countries through mutual agreements would be most effective.

### c) Venezuelan statistics

Total 1986 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. Those logbook copies as well as 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.

It is hoped that Venezuelan Task I and catch and effort data for 1987 will be received in the near future so that this procedure can be repeated.

According to an SCRS recommendation, new sampling instructions for West Atlantic ports were sent to Venezuela. These instructions abolish the system of species composition sampling combined with stratified minimum sampling. Instead, the new sampling system takes a random sample proportional to the catch, regardless of the species.

For the first time, as a favor to ICCAT, the Inter-American Tropical Tuna Commission (IATTC) provided us with Atlantic size data (1985 through 1987) which have been collected by their sampler stationed at Cumaná.

## 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. Sampling of billfish according to the Program of Enhanced Research for Billfish is now included in the port sampling scheme. The sampler at Las Palmas resigned recently and an appropriate replacement has not yet been found. On the other hand, Montevideo sampling, which had been discontinued through 1987, has been resumed and a new sampler has been contracted.

## 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 has been extended into 1988 since the major part of the Ghanaian fleet is still unloading there. As of the time of writing this report, the Secretariat has received size data for the Ghanaian fleet up to 1987. The data file requires data verification to exclude some errors. Catch and effort data have been received up to 1986.

## II. SECRETARIAT DATA PROCESSING

1. Facilities

A power stabilizer with a built-in back-up battery was purchased for the support and protection of the Micro-Vax computer. The Commission has also bought a COMPAQ 386 portable (Model 40) which can also be connected to the VAX as an intelligent terminal. This model is IBM compatible, with a 32-bit processor, 2 MB RAM, 40 MB hard disk, and a math co-processor. The operating system is MS-DOS and graphics, Microsoft FORTRAN and communication software were also obtained.

As regards the "shopping list" discussed at the 1987 SCRS meeting, expanded disk memory for the VAX (which requires a new controller) has not yet been purchased. Since the COMPAQ was purchased in the U.S. and brought to Madrid by Mr. R. Conser, considerable savings was made on this purchase. Also, at the end of the year a console terminal was purchased.

2. Data processing

## a) Reorganization of the data base

The entire catch and effort data base has been reorganized, as were the size data for yellowfin, albacore, bigeye, billfishes, swordfish, and skipjack. The Secretariat is currently working on the bluefin tuna size data file.

The size data for small tunas still have to be reorganized. The tagging file also has to be reorganized once the size base is complete.

## b) Copies of data files for scientists

All the requests made by national scientists for catch and effort data as well as size data of the above-mentioned species have now been met. There have been several requests for various tagging data by scientists, but up to now, the Secretariat has only provided hard copies of release and recovery data of fish which have been recaptured.

### III. BIOSTATISTICAL WORK CARRIED OUT BY THE SECRETARIAT

#### 1. Data updating and processing for the bluefin species group (SCRS/88/64)

Prior to the 1988 SCRS meeting, the Secretariat reviewed the bluefin catch-by-size data base. This year, a special critical review was made of the data base for earlier years and several discrepancies have been pointed out to the bluefin group. Because of the delay this year in the submission of some data for the major fisheries (i.e., Japanese longline and Italian Mediterranean purse seine data), not all the processing assignments could be completed before the SCRS meeting.

#### 2. Updating of the swordfish data base

Since the Swordfish Workshop was held in September, 1988, the Secretariat has updated the data base (1978-1985) agreed upon at the 1987 Workshop up to and including 1987 data. The collaboration of many national scientists made this work much easier than before. Some errors found in the original data base have been corrected.

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

The Secretariat prepared several tropical tuna data bases for the Data Preparatory Meeting of the Yellowfin Year Program, held in July, 1988, at the CRODT in Dakar, Senegal.

#### 4. Tuna data comparison between ICCAT and FAO bases

The comparative study between the ICCAT data base and the FAO data base started in 1985, has continued in 1988. ICCAT provided FAO with a new comparison computer run. Most of the significant discrepancies which existed previously between the two bases have been rectified, except those for FIS and U.S. data. A document prepared by FAO discusses the boundary between the Atlantic and the Indian Oceans (SCRS/88/66).

#### 5. 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 Appendix 4 to Annex 10.

#### 6. Summarizing the ICCAT tagging program

As noted in section II.2.a, once the ICCAT size data has been totally reorganized, the next task is to compile a tagging file out of all the fragmental tagging data. At present, only 1978-1987 recovered tags (with

release information) have been entered in the computer files. The rest of the information are scattered in bits and pieces or are missing.

In anticipation of creating a single tagging data base for the Atlantic, the tag release and recovery information has been gathered and summarized for the first time. The results are reported in SCRS/88/8. It was found that unless the tags are recovered, many release data are not reported to the Commission (e.g., most of the releases made during the Skipjack Year Program). It is important that the Commission implement an SCRS rule to the effect that all tags released during the year must be reported, regardless of whether or not the tags have been recovered.

#### 7. The 1988 tuna tagging lottery (for tag recoveries reported in 1987)

The Tuna Tagging Lottery was held at the ICCAT Headquarters on Friday, June 10, 1988. All the Atlantic tuna tag recoveries reported during 1987 were eligible for the lottery. This year, four \$500 rewards were given: one for yellowfin recoveries (a special drawing for the Yellowfin Year Program), one for billfishes (a special drawing for the Enhanced Billfish Research Program), one for tropical tunas other than yellowfin (skipjack, bigeye and small tunas), and one for temperate tunas (bluefin, albacore and swordfish).

For the first time, the U.S.S.R., Grenada and Italy won lottery prizes and curiously there was only one tag recovered by each of these countries. The fourth prize was won by a Senegalese.

#### 8. Venezuelan catch and effort and size data

See Section I.2.c.

#### 9. Analysis of port sampling

At the past several SCRS meetings, it was recommended that the results of ICCAT port sampling be compared with the sampling data from the national offices to decide if port sampling should be continued or not. The Secretariat made some preliminary biostatistical analyses and the results are reported in SCRS/88/9.

#### 10. Field Manual

As recommended by the SCRS, a revision of the "Field Manual for Statistics and Sampling" has been started. The West Atlantic sampling instructions agreed upon at the 1987 meeting were printed separately and distributed to the pertinent scientists early in the year. Also, tentative sampling and tagging instructions for the Billfish Program were developed in collaboration with the Billfish Program Coordinators. They were submitted as SCRS/88/28 and will be incorporated in the revised Manual, as well as the West Atlantic instructions.



**11. Development of new species tables**

This year's catch summary tables (so-called species tables) have been reorganized in accordance with a 1987 SCRS recommendation. All the tables now include data for the past 30 years and many countries, whose data used to be reported together, are now reported separately. The tables on small tunas are also now as detailed as the major species' tables.

Although many major fishery statistics were lacking, the summary tables were distributed to the scientists in mid-October.

**12. Statistical Bulletin - Historical Series 3 (1970-1979)**

As was recommended by the SCRS, the "Statistical Bulletin - Historical Series 3 (1970-1979)" was processed, prepared and published. A considerable amount of work went into data verification, cross-checking and updating prior to publication.

**IV. MEETINGS AND COLLABORATION WITH OTHER INTERNATIONAL ORGANIZATIONS**

For details on meetings and collaboration with other international organization, please refer to the Administrative Report (COM/88/8) and to SCRS/88/65.

**V. PUBLICATIONS**

For details on Commission publications issued in 1988, please refer to the Administrative Report (COM/88/8).

# CHAPTER II

## Records of Meetings

### PROCEEDINGS OF THE SIXTH SPECIAL MEETING OF THE COMMISSION

Madrid, Spain, November 14-16, 1988

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- Annex 10 - Report of the Standing Committee on Research and Statistics (SCRS)

#### OPENING PLENARY SESSION November 14, 1988

##### Item 1. OPENING OF THE MEETING

1.1 The Sixth Special Meeting of the Commission was held in Madrid, Spain, at the Hotel Pintor, under the chairmanship of Mr. S. Makiadi J. Lopes (Angola). He introduced Mr. J. Loira Rua, General Secretary of Maritime Fisheries of Spain, and the Commission officers. Mr. Loira welcomed the participants to this meeting. Mr. Loira's opening address is attached as Annex 4. The meeting was formally opened by Mr. Makiadi who reviewed the progress made by the Commission in the last few years as well as the problems facing it now. His address is attached as Annex 5.

##### 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, 5, 7, and 9 to 20 would be referred to the Standing Committee on Finance and Administration (STACFAD). Items 26, 27 and 31 were referred to the Infractions Committee and Item 29 was referred to the Panels. No subsidiary bodies were appointed. The List of Documents presented to the Commission is attached as Annex 3.

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

### 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 Commission Participants).

### Item 6. RATIFICATION OF THE PROTOCOL TO THE CONVENTION

6.1 The Executive Secretary reported that 14 member countries have ratified the Protocol for admission of the European Community (EC) to the Convention. A list of these countries can be found in the Administrative Report (COM/88/8).

6.2 The Delegate of Spain, while urging the member countries which have not yet done so to ratify the Protocol as soon as possible, requested that special attention be given to the EC's participation at the meeting since three member countries of ICCAT have transferred their competences in fishery matters to the EC.

6.3 Angola, Gabon and Canada reported that procedures for ratification had begun in their respective countries and should be completed in the near future.

6.4 The EC representative thanked the countries which had ratified the Protocol as well as those which had just provided information on the status of their domestic procedures. She reported that the EC, while being considered a privileged observer, regrets the slowness of the ratification process which does not allow it to contribute actively in all levels of ICCAT's work. She noted that this situation constituted a lack of coherence between the responsibilities entrusted to the Community by the transfer of competences in fishery matters by its member countries and which has led it to participate as a full member in many fishery organizations, and its situation in ICCAT. The EC urges prompt ratification of the Protocol to the Convention and asked the Commission Chairman to insist once more with the ICCAT member countries which have not yet completed their procedures for approval of a text already accepted at the Paris conference held in July, 1984.

SECOND PLENARY SESSION  
November 14, 1988

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

21.1 Mr. González Garcés, Chairman of the SCRS, presented his Committee's Report to the Second Plenary Session of the Commission and summarized the scientific findings.

21.2 The Chairman reported that this year a Swordfish Workshop was held to assess the total Atlantic swordfish stock (SCRS/88/12). He noted the stock assessments had advanced substantially but were not finished, pending further research. He referred to the Data Preparatory Meeting for the Yellowfin Year Program and to the schedule for immediate future work (SCRS/88/7 and Appendix 6 to the SCRS Report). He also noted that through the Program for Enhanced Research on Billfish, statistics and stock evaluation of billfish had been improved (Appendix 4 to the SCRS Report). He presented the Billfish Program Plan for 1989, along with the estimated budget (Appendix 5 to the SCRS Report).

21.3 Mr. González-Garcés reported on the SCRS conclusions regarding changes in fishing patterns, stock structure, stock assessments, and evaluations on the effects of current regulations. These subjects are reported in detail under Agenda Item 9 of the SCRS Report. This Agenda item also includes various Committee recommendations to the Commission regarding statistics, research and management.

21.4 The SCRS Chairman called the attention of the Commission to the Report of the Sub-Committee on Statistics (Appendix 9 to the SCRS Report), which includes its evaluation of statistical achievements and various recommendations regarding the improvement of statistics, including a list of priorities. The Report also includes a study on the need to improve the Commission's computer facilities.

21.5 The Committee recommended holding its 1989 meeting, prior to the Commission meeting, for a period of nine days, five of which require simultaneous interpretation services. The bluefin species group proposed meeting two days before the start of the other species meetings and the swordfish group one day prior. Three inter-sessional meetings were proposed: the final meeting of the Yellowfin Year Program, a data preparatory meeting on the albacore longline fishery, and an albacore stock evaluation workshop.

21.6 Mr. Makiadi thanked the Chairman of SCRS for the work carried out by his Committee and commended the excellent progress made in the scientific field by the members of the SCRS.

21.7 The Delegate of France proposed that the Commission endorse the French proposal made during the SCRS to establish a Sub-Committee on Environment. The SCRS Chairman noted that at the 1989 SCRS meeting, a half-day session will be devoted to a review of the relationship between fishing and environmental conditions, and at that time the French proposal will be studied.

21.8 The Spanish Delegate congratulated the SCRS Chairman for his excellent work and for his re-election. In addition, she asked why the Field Manual had not been completed by this time. The Assistant Executive Secretary commented that the draft on sampling is well advanced but was not finalized because the billfish sampling procedures had not been approved by the Committee until this meeting. Since the Committee authorized the preparation of the manual without any significant changes in species identification and keys, the draft of the new Field Manual will be circulated soon. After receiving comments from the scientists, the Manual will be published before the next SCRS session.

21.9 The Commission adopted the SCRS Report and endorsed all the recommendations by the SCRS. The Report is attached as Annex 10.

THIRD PLENARY SESSION  
November 16, 1988

Item 23. REPORTS OF PANELS 1 - 4

23.1 Dr. L. Koffi (Côte d'Ivoire) presented his report to the Commission for Panel 1, Mr. J. Plouchart (France) for Panel 2, Mr. C. J. Blondin (U.S.A.) for Panel 3 and Mr. V. Tsoukalov (U.S.S.R.) for Panel 4 and each highlighted the recommendations contained therein. The Commission adopted the reports of Panels 1 through 4 together with all the recommendations. They are attached as Annex 6.

23.2 There were no changes proposed by Panel 1 for the current size regulation in effort for yellowfin and bigeye tunas. Panel 2 proposed that the current management measures for bluefin tuna in effect for 1988 be maintained in 1989 for the west Atlantic stocks and that the regulations for the east Atlantic be unchanged. The Commission noted that Panels 3 and 4 did not suggest any conservation measures for 1989.

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 7.

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

25.1 There were no subsidiary bodies appointed during this Commission meeting.

- Item 26. REVIEW OF THE IMPLEMENTATION OF REGULATIONS RECOMMENDED BY  
THE COMMISSION REGARDING YELLOWFIN, BIGEYE, AND BLUEFIN TUNAS,  
Item 27. STATUS OF REGULATORY MEASURES IN THE MEDITERRANEAN and  
Item 31. PORT INSPECTION

26.1 These three Agenda Items were discussed together. The Commission noted that these Agenda Items (26, 27 and 31) were referred to the Infractions Committee and were dealt with by that Committee. The Commission endorsed all the recommendations concerning these Items.

Item 28. FISHING OPERATIONS BY VESSELS OF NON-MEMBER COUNTRIES

28.1 The Delegate of Japan showed several slides of longliners fishing in the Mediterranean Sea during the bluefin spawning season. These slides were taken by Japanese patrol boats sent to the Mediterranean Sea to implement their national regulations in effect for Japanese tuna boats. Most of these boats were flying flags of convenience of non-ICCAT member countries. The Delegate of Japan presented a statement, attached as Annex 8, on these fishing operations by vessels of non-member countries.

28.2 The Chairman congratulated Japan for its investigation and clear presentation which documented the situation and focused attention on the problem. The Executive Secretary informed the Commission that the longliners fishing bluefin during the spawning season in the Mediterranean Sea had been observed by the coastal fishermen and protests had been received on several occasions which the Secretariat forwarded to various longline fishing countries. He also reminded the Commission that there is no ICCAT regulation for bluefin tuna in the Mediterranean, except to prohibit catching fish less than 6.4 kg and not to surpass the 1975 fishing mortality level. It was also pointed out that non-member countries are not obliged to follow these regulations.

28.3 The Delegate of Spain also congratulated Japan for clarifying the origin of these boats. She noted that the effect of these vessels fishing in Spanish waters has been important, and recognized that Spanish fishermen and news media could have misidentified the nationality of these boats since they seemed very similar to Japanese boats and the crews are Orientals. The Spanish Delegate proposed that the Commission contact the countries where these vessels are registered to draw their attention to the Commission's recommendations for regulations and invite them to join the Commission.

28.4 The Delegate of Cuba, who is the Chairman of the Infractions Committee, recognized Japan's efforts to clarify this situation and supported the suggestion by Spain to invite these countries to join the Commission to guarantee that they fulfill the Commission's recommendations. He requested that such invitations be made not only to the countries in question but also to a larger number of countries that operate tuna boats in the Atlantic in order to try to reduce such activities in this area.

28.5 The Delegate of the U.S.S.R. also suggested that such investigations be made throughout the Atlantic and the Commission should be in-

formed if any vessels without identification or flags are observed fishing tunas.

28.6 The Spanish proposal was approved without any objections. The Chairman suggested that the Commission draw up a recommendation along these lines to be presented and acted upon at the Commission meeting in 1989.

#### Item 29. OTHER POSSIBLE REGULATORY MEASURES TO BE CONSIDERED

29.1 No other regulatory measures were considered.

#### Item 20. PROPOSAL OF COTE D'IVOIRE ON THE BASES FOR CALCULATING THE CONTRIBUTIONS OF THE MEMBER COUNTRIES

20.1 In the temporary absence of the Chairman of the Standing Committee on Finance and Administration, in which the formation of a working group to study this matter had been discussed, Dr. Koffi summed up the proposal made by Côte d'Ivoire on the bases for calculating member country contributions and the discussions that had taken place during the STACFAD meeting. While expressing his concern over the financial difficulties of the Commission, and recognizing that there is no realistic, easy solution to collect contributions from member countries in arrears, he stated that the Commission's income, i.e., the member country contributions, should be stabilized in order for it to carry out its activities effectively. For many developing countries, however, their national economy does not permit payment of their contributions. He noted that ICCAT's existence is justified by allowing all countries interested in tunas to participate. With this in mind, Côte d'Ivoire made its proposal, which is open to any other ideas on this matter, for the formation of a working group to review the alternatives for calculating member country contributions. This may take a relatively long time but the group should be able to find a formula which would satisfy everyone.

20.2 The Commission Chairman noted that a number of countries expressed their views in STACFAD, and that the setting up of a working group had been recommended to study this question in depth.

20.3 The Delegate of the U.S.A. supported the formation of a working group, and noted that many delegations are under instructions from their respective governments not to accept any further financial obligations. He stated that the Commission members could explore, without commitment, other formulas, which go beyond the economic figures in the fishery field to including other factors such as gross national product, per capita income, ratio of national debt in relation to GNP. He further suggested that the working group be open to any member country wishing to participate and that it should start working in about six months.

20.4 São Tome and Principe, Japan, Korea, France, Cuba, Portugal, South Africa, Angola, Spain and Venezuela reiterated their positions expressed during the STACFAD meeting and supported creating a working group, with appropriate terms of reference and expressed their willingness to join the group. Brazil also agreed to a working group and proposed that countries

which are not members of this group be informed regularly of the deliberations. The representative of the EC also supported these ideas.

20.5 The Delegates of the U.S.S.R. supported the proposal and stated that this problem should be solved as soon as possible as it concerns the ICCAT Convention. The Law of the Sea in effect since 1982, which defines tunas as highly migratory species, should also be taken into account.

20.6 The Chairman asked that terms of reference to be given to the working group. France inquired whether an intersessional meeting of the working group would be necessary, since this has some financial repercussion on the Commission's budget as well as on national budgets. He also observed that such a meeting would require the participation of financial experts as well as administrators, and that if an amendment to the Convention is involved, a meeting of Plenipotentiaries would have to be convened.

20.7 While bearing in mind the Commission's financial situation, the Chairman suggested that the group start its work through correspondence. France agreed with this procedure and suggested that member countries send their proposals for alternatives for calculating the contributions to the Secretariat for circulation to other member countries.

20.8 The Delegate of Spain suggested that the Secretariat ask other international fisheries organizations for information regarding the basis for calculating their member country contributions. With this information, a document showing the schemes adopted by similar fisheries organizations should be prepared for study at the next meeting. This item could be included on the Commission or STACFAD agenda, and then the terms of reference could be drawn up to continue this work. This proposal was supported by the U.S.S.R.

20.9 The Delegate of Côte d'Ivoire proposed that the terms of reference for the group be to adopt a realistic base for the calculation of country contributions to put an end to the chronic financial crisis of the Commission. He agreed with the Spanish proposal regarding the working plan and further proposed devoting a full day to this matter, either before, during or after the next Commission meeting.

20.10 The Executive Secretary noted that the first step of requesting and compiling the calculation schemes of other international fisheries organizations would be done by the Secretariat and this information would then be distributed among the members. After this is done, each country should express any opinions or present other alternatives to be included in the document to be presented at the next Commission meeting. He felt that if the Commission meets for only four days in 1989, not more than a half day could be devoted to discussions by the working group.

20.11 The terms of reference as well as the working plan were approved by the Commission. It was reaffirmed that the working group is open to all member countries and observers.



FINAL PLENARY SESSION  
November 16, 1988

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

22.1 The Chairman of the Standing Committee on Finance and Administration presented the Committee's report and emphasized the more important points. This report was adopted by the Commission and is attached herewith as Annex 9.

22.2 In adopting the STACFAD Report, the Commission noted that under Agenda item 4 (Commission and Panel membership), besides the changes in Panel membership discussed during the STACFAD meeting, Venezuela had requested admission to Panels 1 and 4 during the respective Panel sessions.

22.3 It was also noted that the following Agenda items referred to the Committee had been dealt with and completed by STACFAD and that the Commission endorsed all the recommendations concerning these items:

- Item 4. Commission and panel membership
- Item 5. Criteria for admission of observers
- Item 7. Coordination of research
- Item 9. Commission publications
- Item 10. Meetings during the year
- Item 11. Other administrative matters
- Item 12. Auditor's Report - 1987
- Item 13. Financial status of the first half of the biennial budget (1988)
- Item 14. Pending contributions of the member countries
- Item 15. Working Capital Fund
- Item 16. Financial status of the Yellowfin Year Program
- Item 17. Trust Fund for the Program of Enhanced Research for Billfish
- Item 18. Review of the second half of the biennial budget (1989)
- Item 19. Member country contributions for 1989 budget

Item 8. RELATIONS WITH OTHER ORGANIZATIONS

Detailed information on this Item was provided in the Administrative Report (COM/88/8).

Item 30. RECOMMENDATIONS FOR RESEARCH AND STATISTICS

The Commission felt that this item was discussed sufficiently at the STACFAD and Panel meetings.

Item 32. DATE AND PLACE OF THE NEXT REGULAR MEETING OF THE COMMISSION

32.1 The Delegate of Portugal expressed his country's intention to invite the Commission to hold its next meeting in Madeira, Portugal. He noted that soon after the meeting, a formal invitation would be sent to the

Secretariat and the terms of the invitation would be negotiated. He emphasized that the Commission's expenditures would not exceed the amount budgeted for the meeting.

32.2 The SCRS Chairman asked that the SCRS meeting be held in Madrid in order to utilize the Commission's computer facilities and data base located at the Secretariat. It was then clarified that the invitation would be, in effect, for the Commission meeting.

32.3 The Commission welcomed Portugal's intention to invite the Commission and decided to leave the matter to the Executive Secretary who will be in contact with the Delegate of Portugal and then he will inform the member countries as soon as possible as to the results of the negotiations.

32.4 The Commission decided that the 1989 Standing Committee on Research and Statistics would hold its plenary sessions in Madrid October 30 to November 3 (with interpreters), i.e., one day more than in 1988. The species groups will meet during the preceding week of October 23 to 27 also in Madrid.

32.5 As regards the 1989 Commission meeting, if held in Madrid, the Commission will meet for four days, November 6 to 9. However, if the Commission meets in Madeira, it will meet for five days, i.e., November 13 to 17, 1989.

#### Item 33. OTHER MATTERS

33.1 There were no other matters discussed.

#### Item 34. ADOPTION OF REPORT

34.1 The Commission adopted the Proceedings of the First and Second Plenary sessions, together with all the Annexes.

34.2 The Executive Secretary proposed that the Proceedings of the Third and Final Plenary sessions, which were held on the last day of the meeting, be adopted by mail as soon as practical after the meeting.

#### Item 35. ADJOURNMENT

35.1 The Commission Chairman thanked the Chairmen of all the Committees and Panels for their excellent leadership and all the meeting participants for their collaboration. He also thanked the Secretariat staff and the interpreters for their efficient work.

35.2 The participants congratulated the Commission Chairman for the efficient manner in which he handled the meeting.

35.3 The 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. Criteria for admission of observers
6. Ratification of the Protocol to the Convention
7. Coordination of research
8. Relations with other organizations
9. Commission publications
10. Meetings during the year
11. Other administrative matters

### Finance

12. Auditor's Report - 1987
13. Financial status of the first half of the biennial budget (1988)
14. Pending contributions of the member countries
15. Working Capital Fund
16. Financial status of the Yellowfin Year Program
17. Trust Fund for the Program of Enhanced Research for Billfish
18. Review of the second half of the biennial budget (1989)
19. Member country contributions for 1989 budget
20. Proposal of Côte d'Ivoire on the base for calculating the contributions of the member countries

### Reports to 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 - 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. Status of regulatory measures in the Mediterranean
28. Fishing operations by vessels of non-member countries
29. Other possible regulatory measures to be considered
30. Recommendations for research and statistics
31. Port inspection

Other matters

32. Date and place of the next regular meeting of the Commission
33. Other matters
34. Adoption of Report

Adjournment

35. Adjournment

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2 1988 Annotated Tentative Commission Agenda  
3 Tentative Program of ICCAT Meetings  
4 Tentative Agenda of the Standing Committee on Finance  
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5 Tentative Panel Agenda  
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11 Secretariat Report on Statistics and Coordination of  
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12 Report of the Second Swordfish Workshop - Madrid,  
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13 Program Plan for the ICCAT Enhanced Billfish Research  
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15 Status of the proposals adopted by the Commission for  
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16 Port Inspection  
17 Proposal by Côte d'Ivoire on the basis for calculating  
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18 Proposal for admission of observers to Commission  
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19 (Number not used)  
20 Report of the Tenth Session of the Committee on Manage-  
ment of Indian Ocean Tuna - C. Soto  
21 Proposal by Japan for the Tentative Agenda of the Sixth  
Special Meeting of ICCAT

**OPENING ADDRESS BY MR. J. LOIRA RUA,  
GENERAL SECRETARY OF MARITIME FISHERIES OF SPAIN**

It is a great pleasure to join you at this opening session of the Sixth Special Meeting of the International Commission for the Conservation of Atlantic Tunas.

On behalf of the Spanish Government, I would like to extend a warm welcome to the delegates of the member countries as well as their advisers in the research and commercial fields. I would also like to welcome the representative of the FAO, an organization which has always been closely related to ICCAT's work; the observers from the European Community, who I hope will soon be able to participate as a member of this Commission; the International Commission for Southeast Atlantic Fisheries (ICSEAF); the International Whaling Commission (IWC), as well as the observers from the different countries that have honored us with their presence.

I am truly and pleasantly impressed to see the representatives of fishery administrations of so many member countries, from five continents. Likewise, the presence of several international fisheries organizations as well as the attendance by many non-member countries, show the prestige of this Commission and the expectations that they have placed in its activities to take better advantage of Atlantic tuna resources.

Given the highly migratory nature of these species, which makes their study very difficult, it would have been practically impossible to progress in this research alone, without the authentic and efficient collaboration of the countries interested in this fishery, who are integrated in this Commission, and without the effective contributions from non-member countries and international organizations.

The Commission has advanced considerably in the difficult task of fishery research. This has been possible, thanks to the efforts of a select group of scientists who make up the Standing Committee on Research and Statistics (SCRS), who during the year work either on-board commercial or research vessels or in laboratories using the most advanced means to collaborate in joint programs, coordinated by the Secretariat. At the annual meetings of the Committee, the scientists have the opportunity to exchange personal experiences and to reach joint results, which serve as a basis for Commission recommendations to the member countries. Each year the cycle is repeated, in order to follow the changing state of the stocks and to perfect even more our basic knowledge on tunas.

As the person directly responsible for the Spanish Fishery Administration, I can express the confidence that the Spanish Government has deposited in this Commission. Consequently, up to now my country has accepted, without reservation, all the recommendations for regulations, which

are have been implemented on our tuna fleets. At the same time, Spain is aware of its responsibilities regarding port inspection, which is why it ratified this scheme. It is desirable that these recommendations for regulations be accepted and implemented by all the member countries, and even by other countries which, although they do not belong to the Commission, closely follow its activities, as is the case of those attending in an observer capacity.

I believe that to be interested in a subject, you have to know it well. This year I had the opportunity to visit the headquarters of the Commission and personally witness its excellent organization and activity. My country reiterates once again its great satisfaction that the headquarters of this prestigious Commission is in Madrid, which although it is not a port city, always has available fresh fish and seafood of the highest quality.

Finally, I would like all the people meeting here today to make an effort to support and improve this Commission, whose objective is the rational exploitation of a very valuable resource for human consumption as a fresh commodity and also as high quality material for canning. Thanks to industrial freezers, these resources have a world-wide market with no geographical or seasonal barriers.

I only meant to say a few words of welcome and I see that I am carrying on too long. I am going to end now as I am aware that there are many subjects - some of great importance - on your agenda for review and that the time you have available is very short. You will have to work very hard and I regret that there will be very little time left to see much of this wonderful city of Madrid, which the majority of you already know.

Thank you.



**OPENING ADDRESS BY MR. S. MAKIADI J. LOPES  
CHAIRMAN OF THE COMMISSION**

First of all, I want to extend a warm welcome to all of you present.

In 1976, my country joined the International Commission for the Conservation of Atlantic Tunas. Angola came with the enthusiasm of a young country which has important tuna resources off its coasts and it joined the organization that had been created for the purpose of achieving a rational exploitation of these resources.

Since 1982, I have participated in all the annual meetings of this Commission as head of the Angolan delegation, and upon occasion I have been asked to direct the discussions of some Panels, in the absence of their chairmen.

This is, however, the first time that I have the honor of presiding over the Commission. On behalf of my government, my country and myself, I want to recognize the unanimous support of the delegates of all the member countries in granting me this position.

Before going on, I also want to mention and underscore the merits of the person that preceded me in this position. I refer, as you all know, to Carmen Blondin, who during four years was Chairman of the Commission and who, before that, was the Chairman of the STACFAD for several years. Carmen Blondin, who is pleasant, cordial and charismatic, knows perhaps better than anyone the meaning and the development of this Commission since its beginning. For that, I think that we all will be interested in listening with special attention to his opinions and suggestions during our discussions.

The Commission has had a brilliant past and has gone from 7 to 23 member countries. At present, the governments of other countries are considering the possibility of joining ICCAT. Likewise, the European Community is waiting for the ratifications which are still lacking to the Protocol in order to become a member of this Commission.

The Standing Committee on Research and Statistics, which is comprised of an excellent group of scientists who are experts in the difficult work of marine research directed towards improved knowledge of different tuna species. This Committee has achieved outstanding results.

In particular, I want to point out the Skipjack Year Program, which culminated with a very high-level publication in which the results of this program are gathered. Another program, the Yellowfin Year Program, is coming to a close. Yellowfin tuna, along skipjack tuna, possibly represent the basic tuna resources in the Gulf of Guinea with migrations to the north

and south of this area, along the African coasts. Special attention is being given to research on bluefin tuna and swordfish. Recently, a program of intensive research on billfish has begun, with extrabudgetary financing.

However, I have become Chairman in a time of difficulty provoked by a serious financial crisis that could darken the horizon of the Commission which up to now has been bright and clear. This alarming financial crisis is basically due to the delays in payment of contributions -- in some cases permanent -- by some of the member countries.

We have two distinct recollections of the Tenth Regular Meeting of the Commission: first we remember the beauty of the island of São Miguel, Azores, and the wonderful attention and courtesy of the authorities of that island. But we also remember the difficult STACFAD meetings in which we tried to analyze the causes that had led the Commission to the serious crisis which it is now suffering, and, above all, we tried to find solutions to the problem. There were many discussions on the main subjects, and some decisions were made that I am not very sure were the most appropriate and sufficient to reach the solutions that we all want.

Please let me tell you a thought that I had during the STACFAD discussions. It seems, I thought, that the delegates have forgotten the objective of the Commission, which is the conservation of Atlantic tunas. In its place, it seems that we now have a new objective, which is "reduce the budget."

I would like my first address as Chairman of the Commission not to be limited to simple words of courtesy, welcome and good wishes. There are some very specific subjects that, in my opinion, the delegates must face, and, of course, accept the responsibilities derived they entail. I would like to submit some ideas for consideration:

The activities of the SCRS must be promoted, with the necessary aid, including financial aid, in order for it to continue offering conservation recommendations on the different species.

It is necessary that the recommendations, once agreed upon by the Commission, be made into law by the member countries. The governments should then pay very close attention to the strict enforcement of these laws.

Perhaps more importance should be placed on the Infractions Committee, which has been active, but whose activity is very limited.

National statistical services should check the reliability of their statistics.

The delegates should be conscious of the fact that an international organization of this type needs to have the necessary funds available to carry out its work. Consequently, it is imperative that the budget be realistic. An emergency situation cannot continue longer than absolutely essential because it then becomes chronic.

The contributions also should be realistic. Year after year we are repeating the utopia of approving contributions to cover the budgets, although we know that some will not be paid. If we continue in this negative position, it will be impossible for the Commission to continue, and I would not like the Commission to disappear while I am Chairman; nor afterwards either, of course.

The Commission should consider and discuss the proposal for a new formula to calculate the contributions.

We should not forget that the Commission has approved a Port Inspection Scheme -- which is in effect -- and another scheme for international inspection which is "on hold", but which could be put into effect at any time.

Ladies and Gentlemen, I have mentioned a series of subjects which I think are of considerable interest, although perhaps you can suggest other topics that are even more important or of higher priority for discussion. It should not be difficult to come to an agreement.

I cannot forget the work the Secretariat has done in the preparation of the meeting, as well as during the meeting and throughout the entire year, all carried out with maximum efficiency.

I am going to end now, but first I ask that we begin our discussions this year with optimism and high morale and that we take advantage of every minute of the short time that we have this year. May the agreements and decisions that we adopt contribute towards improving the prospects of the Commission in the future. Much work has already been done for the conservation of the tuna stocks in the Atlantic, but there is still a lot of work to do.

Thank you.

## REPORT OF THE MEETINGS OF PANELS 1-4\*

### REPORT OF THE MEETING OF PANEL 1

#### 1. OPENING

The meeting was opened by the Panel Chairman, Dr. L. Koffi (Côte d'Ivoire).

#### 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 sixteen members: Angola, Brazil, Cape Verde, Côte d'Ivoire, Cuba, France, Gabon, Ghana, Japan, Korea, Morocco, Portugal, Senegal, Spain, U.S.A., and the U.S.S.R.

Two countries, Ghana and Senegal, were not represented at the meeting.

São Tomé and Príncipe and Venezuela expressed their desire to join this Panel. The Chairman welcomed these two new members.

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

The SCRS Chairman, Mr. A. González Garcés (Spain), summarized the conclusions of the Committee regarding yellowfin and skipjack.

##### 5.a) Yellowfin

Mr. González-Garcés recalled that the SCRS normally works under the hypothesis of two yellowfin stocks in the east and west Atlantic. Fishing

\*Panel Membership is shown in Appendix 2 to Annex 6.

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 show a slight decrease. There is still no evaluation by the SCRS on the state of the stock. Recent improvements in statistics in this area, however, will lead to preliminary analyses being carried out very soon within the framework of the Yellowfin Year Program.

In the east Atlantic, purse seine fishing effort has remained low since 1984, and the catch rates are high and stable since 1985. Fishing effort since 1984 on this stock is at a slightly lower level than that corresponding to the maximum sustainable yield. The analyses presented to the SCRS in 1988 show 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 in the adult stock. This explains how the catch rates have very rapidly reached high levels. All these elements will be analyzed in detail in the Yellowfin Year Program which will come to a close at a meeting of an ad hoc working group in 1989 in Madrid.

#### 5.b) Skipjack

The skipjack purse seine catch in the east Atlantic remains slightly reduced since 1984 due to the departure of a part of the FIS and Spanish purse seine fleets to the Indian Ocean. The skipjack catch did not decrease as much as the yellowfin catch because of the significant increase in purse seine catch rates on this species. In the west Atlantic, recent catches have decreased somewhat, mainly because of the decreased fishing effort of purse seiners operating in this area. 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 under-exploited during the 1980-1982 period of the International Skipjack Year Program, during which there was high fishing effort, is even more 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

Chairman Koffi reviewed the ICCAT regulations prohibiting the landing of yellowfin less than 3.2 kg. The SCRS Chairman noted that, on the one hand, the proportion of undersized yellowfin in the purse seine catches remains high but has been less since 1985, and on the other hand, the potential gains from the regulation would be less with the present lower exploitation level.

Following this information, the U.S. delegate asked the SCRS Chairman if the regulation limiting size to 3.2 kg is still useful for yellowfin. The SCRS Chairman replied that fishing mortality on juveniles is still significant. This fishing mortality could reduce dangerously the yield per recruit of the stock, if the purse seiners presently operating in the Indian Ocean return to the Atlantic. Therefore, Panel 1 recommended continuing the present regulation.

## 7. RESEARCH NEEDED TO BE CARRIED OUT

The research recommendations for yellowfin tuna are directed towards detailed analysis of yellowfin stock dynamics during the recent period as a result of the important variations in fishing effort which have been observed recently. All this research is being finalized within the framework of the Yellowfin Year Program which will hold its final meeting in Madrid in 1989.

Research on skipjack centers on improving our knowledge of the biology and state of the stocks, particularly as regards the analysis of the changes in target species and the effects of environmental variations on this stock.

The Panel recommends that all the research proposed be carried out.

## 8. DATE AND PLACE OF NEXT MEETING

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

## 9. OTHER MATTERS

No other matters were discussed.

## 10. ADOPTION OF REPORT

The Report was adopted.

## 11. ADJOURNMENT

The meeting of Panel 1 was adjourned.

## REPORT OF THE MEETING OF PANEL 2

### 1. OPENING

The meeting was called to order by the Chairman, Mr. J. Plouchart (France).

### 2. ADOPTION OF THE AGENDA

The agenda was adopted without amendment (Appendix 1).

### 3. ELECTION OF RAPPORTEUR

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

### 4. REVIEW OF PANEL MEMBERSHIP

Canada, France, Japan, Korea, Morocco, Portugal, Spain, and the United States, which are members of the Panel, were represented. No new requests for membership were made.

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

Mr. A. González Garcés, 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, one in the west Atlantic and one in the east Atlantic and Mediterranean Sea. For the first time, the SCRS was able to present an assessment of the east Atlantic stock. The overall trend in abundance for this stock is down, showing declines of 70 and 80 percent for ages 10 to 20 years and 6 to 9 years, respectively. The SCRS cautions that there is a great degree of uncertainty in the analysis of this stock due to late and non-reporting of catch statistics.

In the west Atlantic, VPA results indicate that some recovery has occurred since 1981. This finding is similar to those of 1985, 1986 and 1987, and is attributed to decreases in fishing mortality on the juvenile population. Recruitment has improved generally and limited improvement was noted for medium-sized fish (ages 6 to 9). The spawning stock continues to decline sharply as a result of high fishing mortality, as noted in previous SCRS reports.

#### 5.b) Albacore - North

The trend in catches of North Atlantic albacore has been generally downward since the late 1970's. Two surface gear fisheries, troll and baitboat, provide indices of abundance of young fish. After a sharp decline in 1985, CPUE for the troll fishery has stabilized in 1986 and 1987. The CPUE derived from the 1987 baitboat fishery is the highest recorded.

The longline fishery catches both juveniles and adults. However, the preponderance of landings by longlines is comprised of adults and therefore, provides an index of abundance of the adult population. Longline CPUE has shown a declining trend for the past five years.

The SCRS was hampered in its ability to provide advice on the status of the stock by uncertainties surrounding the analysis of production model

functions and the basic statistics. Before such advice can be provided, discrepancies in the data bases must be reconciled and additional information on catch and size provided.

## 6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

### 6.a) Bluefin

The SCRS recommended no changes to the management measures in effect for the east Atlantic bluefin stock. The Chairman of the SCRS reiterated the Committee's grave concern that important data on the catch of young fish are not available. The Committee urges initiation of a long-term data collection program for the Mediterranean area in cooperation with the General Fisheries Council for the Mediterranean (GFCM).

The Delegate from Spain expressed concern that the lack of information on which to base recommendations contributes to the vulnerability of the stock to overexploitation. The delegate supports the SCRS recommendation to improve the collection of statistics, especially by ICCAT member nations, and urged the Commission to restate the need for member nations to comply with existing Commission recommendations. Her statement is attached as Appendix 3.

The Delegate from France concurred with the SCRS and the delegate from Spain that important catch statistics are lacking and should be collected.

The Delegate representing the European Community also expressed concern for the lack of these statistics, particularly from the Mediterranean area. Her statement is attached as Appendix 4.

For the west Atlantic stock, the results of the analysis are compatible with advice given in 1984 indicating that present catch levels are likely to stop the decline of the stock and allow increases over a 30-year period. Increases in allowable catch are not advised and, due to uncertainties associated with some of the estimates, monitoring levels should not be changed. In addition, the Committee recommended that future changes be based on an evaluation of the impacts of current measures.

The Delegate from Canada presented a statement (Appendix 5) recommending that a cautious approach be maintained, despite some optimism expressed by the SCRS, and recommended the continuation of the current management measures.

The Delegate from Japan expressed his country's view that the current management regime in the western Atlantic should be continued for one more year.

The Delegate from the United States urged members to realize that all the information necessary to ensure that the western Atlantic stock is improving is not available. Therefore, management of the stock should be tempered by caution. The U.S. delegation supports continuation of the current stock monitoring levels.



## 6.b) Albacore - North

The Committee did not present recommendations for management measures for northern albacore due to the uncertainty surrounding the status of the stock. The Committee instead strongly advises that a special analytical workshop be held to resolve some of the uncertainties.

The Delegate of Spain urged that an evaluation be made of the impact of the newly introduced gear types on the fishery. The delegate was strongly against any increases in fishing effort on this stock (Appendix 6).

The Delegate of France expressed his country's belief that the stock in question is presently in no danger of being overfished and that research on this stock should be developed as soon as possible (Appendix 7).

The representative of the EC informed the Panel that the EC reiterated, as it has done many times in the scientific meetings, its conviction of the necessity to have more detailed studies on North Atlantic albacore. The EC reaffirmed its willingness to develop, in close collaboration with ICCAT, a program for this species, and to contribute to putting it into effect.

## 7. RESEARCH NEEDED TO BE CARRIED OUT

The SCRS Chairman summarized the research recommendations of the Committee which included, for bluefin, a re-examination of assessment methodology, presentation of data in non-aggregate form to improve the quality of abundance indices, review of the U.S. larval survey, and evaluation of impacts of the current management measures. In addition, for east Atlantic bluefin, the effect that the use of spotter aircraft may have on abundance indices should be investigated. The Panel reiterated all these recommendations.

The Panel stressed the need for further research and basic statistics for the albacore fishery. Two meetings, a workshop and a data preparatory meeting, to be held before the next ICCAT SCRS meeting were strongly recommended.

The Panel requested the SCRS to draw up a new, comprehensive research project on albacore and present it at the 1989 Commission meeting.

## 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. OTHER MATTERS

No other matters were discussed.

## 10. ADOPTION OF REPORT

The report was adopted.

## 11. ADJOURNMENT

The meeting of Panel 2 was adjourned.

## REPORT OF THE MEETING OF PANEL 3

### 1. OPENING

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

### 2. ADOPTION OF THE AGENDA

The Agenda was adopted without changes (Appendix 1).

### 3. ELECTION OF RAPPORTEUR

Ms. M. G. Dion (France) was appointed rapporteur.

### 4. REVIEW OF PANEL MEMBERSHIP

Brazil, Japan, South Africa and U.S.A., which are the members of this Panel, were present.

Spain requested becoming a member of this Panel and was welcomed by the current members.

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

Mr. A. González-Garcés, Chairman of the SCRS, reviewed and summarized the conclusions of the SCRS concerning southern bluefin tuna and albacore in the south Atlantic.

#### 5.a) Southern bluefin tuna

The Chairman of the SCRS noted that southern bluefin tuna are distributed exclusively in oceans of the southern hemisphere. A spawning area is presently known at a mean latitude in the eastern Indian Ocean. It should be noted that as they grow, tuna make a circumpolar migration in the Pacific, Indian, and Atlantic Oceans.

The stock is exploited exclusively by Japan, Australia and New Zealand, whose catches in 1987 amounted to 15,000, 10,800 and 50 MT, respectively. Atlantic catches, taken by longline mainly along the southern coasts of Africa, fluctuated between 400 and 6,200 MT in the last ten years, which reflect the movement of Japanese longliners between the Indian and Atlantic Oceans.

At the seventh tripartite meeting (August, 1988), Japan, Australia and the New Zealand carried out a re-evaluation on the state of the stock. They confirmed a sharp decrease in the spawning stock and foresaw an additional decrease for the coming years. The opinion of the scientists is that these immediate reductions could represent half the present catches.

In 1988, following the recommendation made at the scientific meeting, the tripartite administrative meeting decided to limit catches for the coming year to 8,800 MT for Japan, 6,250 MT for Australia and 450 MT for New Zealand.

#### 5.b) Albacore - South

Mr. González Garcés pointed out that the total catch in the south Atlantic decreased by 4,100 MT in 1987. Catches of small-sized albacore by the southeastern Atlantic surface fisheries increased to 6,100 MT, which is an increase of 22 percent, while the longline catches went from 22,800 MT in 1986 to 17,500 MT in 1987.

For the 1967-1987 period, the CPUE of the longline fishery fluctuated with a decreasing trend. At the same time, the total longline catch showed the same but steadier trend.

A production model was made from the analysis of different catch and effort data collected since 1967. The Committee concluded that the MSY could be estimated at 28,500 MT, which tended to show that the 1985 and 1986 catches, 28,400 MT and 28,100 MT, respectively, are near the MSY level presently estimated by the new production model.

### 6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

#### 6.a) Southern bluefin tuna

The Committee did not recommend any management measures for southern bluefin tuna in the Atlantic Ocean, since exploitation in the Atlantic is a part of the entire stock, which is monitored very closely by other international regimes.

The Delegate of the U.S., after expressing his satisfaction for the measures taken by Japan, Australia and New Zealand in August, 1988, drew the attention of the SCRS Chairman to the fact that, although the stock of southern bluefin tuna is monitored by different international regimes, this did not exclude the Commission from taking measures since this species is also a responsibility of ICCAT.

The Chairman of the SCRS explained that the stocks of all the tuna species which are of concern to the Commission are closely monitored by the SCRS.

6.b) Albacore - South

The Committee made no particular recommendations for management of southern albacore.

7. RESEARCH NEEDED TO BE CARRIED OUT

7.a) Southern bluefin tuna

No particular research recommendations were made.

7.b) Albacore - South

Recommendations were made on the following points:

1. The comparison of size between ICCAT and Taiwanese sampling revealed significant differences between the two samples. It was suggested that the ICCAT Secretariat along with the Taiwanese scientists define the causes for these differences.
2. The collection of catch, effort and size data from baitboats that fish off South Africa should be intensified and the data should be transmitted to the ICCAT Secretariat.
3. The albacore workshop should compile an adequate data base on long-line catch, effort and size statistics for south Atlantic albacore before the next SCRS Meeting.
4. The possible relationships between the albacore stocks exploited in the Indian and south Atlantic Oceans should be analyzed.

8. DATE AND PLACE OF NEXT PANEL MEETING

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

9. OTHER MATTERS

No other matters were discussed.

10. ADOPTION OF REPORT

The report was adopted.

## 11. ADJOURNMENT

The meeting of Panel 3 was adjourned.

## REPORT OF THE MEETING OF PANEL 4

### 1. OPENING

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

### 2. ADOPTION OF AGENDA

The agenda was adopted without changes (Appendix 1).

### 3. ELECTION OF RAPPORTEUR

Ms. M. Huard (Canada) was appointed rapporteur.

### 4. REVIEW OF PANEL MEMBERSHIP

All nine Panel members were present. Venezuela proposed joining this Panel and was welcomed.

### 5. REVIEW OF THE REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS,

### 6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS and 7. RESEARCH NEEDED TO BE CARRIED OUT

Agenda Items 5, 6, and 7 were discussed together by species. Agenda Items 6.b) Atlantic bonito, and 6.d) Other species were discussed together after billfishes and swordfish and thus form section 5.d) in this report.

Mr. A. González Garcés, SCRS Chairman, summarized the conclusions of the Committee regarding bigeye, billfishes, swordfish, Atlantic bonito and other small tunas.

For each species or group of species, Mr. González Garcés summarized the conclusions of the Committee concerning the state of the stocks and its recommendations for statistics, research and management measures.

#### 5.a) Bigeye

Bigeye is a single stock, widely distributed in the Atlantic Ocean, and is fished primarily by longline. Catches are believed to be near the MSY level. An increase in yield would be possible, by increasing the fishing mortality on larger rather than smaller fish.

The Committee recommended that efforts to gather data continue and that the 1974 high longline CPUE figures be investigated. No new management measures were presented. Panel members made no comments concerning the SCRS Chairman's remarks.

#### 5.b) Billfishes

Generally speaking, although the statistical and biological information on billfish is sparse, it will improve over time as a result of the Enhanced Research Program for Billfish initiated in 1987.

In assessing the state of both blue and white marlin stocks, the Committee continues to be concerned about the lack of data.

With respect to sailfish, Mr. González Garcés addressed the western and eastern stocks separately. Indications are that the western stock may be only moderately exploited and that the eastern stock may perhaps be under-exploited.

Mr. González Garcés summarized the recommendations for billfishes by saying that collecting and providing specific statistics to ICCAT should be encouraged. No management recommendations were made although the need to monitor especially blue and white marlin fisheries was stressed.

In response to the Panel Chairman's request for comments, the U.S. delegation presented a statement (attached as Appendix 8), and urged Panel members to participate in, and support, the Enhanced Research Program for Billfish.

The Panel Chairman thanked the U.S. Delegate for his remarks and agreed that scientific research in this area was important.

The floor was then given to Spain who asked the SCRS Chairman for an estimate of the percentage weight that billfishes represented of all Atlantic tuna species. Mr. González Garcés responded that billfish were approximately 1 percent.

As no other comments were made, the Panel Chairman asked Mr. González Garcés to proceed with the other species.

#### 5.c) Swordfish

The SCRS Chairman addressed each of the three swordfish stocks individually. The Mediterranean stock could not be analyzed due to a lack of data. With respect to the North Atlantic stock, the SCRS was particularly concerned about divergent trends between catch-at-age estimates and some abundance indices. These trends cast doubts over the results of the VPA analyses. Despite these difficulties, stock estimates were made for each of two sets of assumptions. Depending upon the assumption chosen, the size of the spawner stock has decreased by 30 percent or 6 percent in the period observed. Short-term research is required to improve the reliability of the assessments. An assessment was also done on the south Atlantic stock showing the stability of this stock.

In summarizing the Committee's recommendations, Mr. González Garcés highlighted the need for progress in developing growth studies and the need for other short-term research referred to above.

The Panel Chairman thanked Mr. González Garcés and opened the floor to comments. The U.S. delegation expressed its concern about the status of the swordfish stock and urged ICCAT members to support the completion of the assessment. The text of the statement is attached as Appendix 9.

The Spanish delegation indicated its support of the U.S. statement and referred to their comments last year supporting a swordfish research program. Spain suggested that the Panel ask the SCRS to prepare such a research program and present it at the next ICCAT meeting.

The Chairman then gave the floor to the EC who indicated that it had sent to the Secretariat a report concerning the fisheries of swordfish and other tunas off the coast of Greece. Mr. González Garcés responded that the referenced document was furnished to, and used, by the SCRS. However, as 90 percent of the swordfish catch in the Mediterranean is made by Italy, a non-ICCAT member, it was very important to obtain the data on this catch.

The Delegate of Cuba supported the suggestion that a swordfish research program be established with the proviso that financial contributions not be increased.

The Chairman thanked the Cuban Delegate and asked Mr. González Garcés to continue his discussion.

#### 5.d) Atlantic bonito and other small tunas

Mr. González Garcés briefly described the artisanal nature of the fishery and indicated that it is perhaps an easier fishery to manage on a local basis. Although there were insufficient data to assess the status of these stocks, there were indications that some species may be underexploited.

The recommendations stressed the need for statistical information and the inclusion of "discards" in those data. More information was required to complete studies on the biological structure of the stocks and methods of estimating fishing effort. No management measures were recommended.

#### 8. DATE AND PLACE OF NEXT PANEL MEETING

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

#### 9. OTHER MATTERS

No other matters were discussed.

## 10. ADOPTION OF REPORT

The report was adopted.

## 11. ADJOURNMENT

The meeting of Panel 4 was adjourned.

*Appendix 1 to Annex 6*

**Agendas 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. Panel membership
5. Report of the Standing Committee on Research and Statistics (SCRS)
6. Measures for the conservation of stocks:

<u>Panel 1</u>	<u>Panel 2</u>	<u>Panel 3</u>	<u>Panel 4</u>
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
8. Date and place of next Panel meeting
9. Other matters
10. Adoption of Report
11. Adjournment



## PANEL MEMBERSHIP

Country	P A N E L				TOTAL
	1	2	3	4	
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	-	-	X	2
Equatorial Guinea	-	-	-	-	0
France	X	X*	-	-	2
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 & Príncipe	X	-	-	-	1
Senegal	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
	18	8	5	10	41

\*Panel Chairman.

**STATEMENT BY SPAIN ON EAST ATLANTIC BLUEFIN TUNA**

(Appended to Report of Panel 2)

The Spanish delegation expresses its concern on the bluefin tuna stock in the eastern Atlantic, specifically in the Mediterranean.

In the first place, the Spanish delegation supports the recommendations of the scientific committee to improve the statistics and also considers ICCAT/GFCM cooperation to be very positive. It has been noted that there is a lack of data and, in some cases, the data available are not very reliable. Consequently, the analyses carried out up to now do not provide results that allow us to reach definitive conclusions on this stock. However, based on the available data, estimated stock size seems to have been reduced by more than 60 percent, due to a decrease in the spawning stock.

Secondly, the increase in fishing effort in the Mediterranean during the current year, not only by vessels flying flags of convenience and by non-ICCAT member countries, but also by ICCAT member countries, hinders the recommendations in effect on this stock.

Therefore, the Spanish delegation, which is concerned about the current situation, asks the scientific committee to go ahead, once the data are collected, with a detailed analysis of the state of this species.

Likewise, the delegation asks the Panel to remind again the member countries of the necessity of complying with the existing recommendations, especially if there were no objections presented within the time allowed by the Convention.

*Appendix 4 to Annex 6*

**STATEMENT BY THE EUROPEAN COMMUNITY (EC) ON BLUEFIN TUNA**

(Appended to Report of Panel 2)

The EC shares the concern expressed at ICCAT about the lack of statistics on bluefin tuna in the Mediterranean and about the problems of reliability of these data, which make scientific work on this species difficult.

In connection with the fishing activities for bluefin tuna in the Mediterranean by some EC member states which are not members of ICCAT, the EC emphasizes the slight disadvantage for all members due to the fact that the EC is not a member of ICCAT. In fact, the ICCAT recommendations were not applicable to all its member states. Under these circumstances, it was difficult for the EC to present statistics as it does in other fisheries

organizations; that is, it does not have a base for control with respect to ICCAT recommendations. Now, there seems to be some problems of catching juveniles.

The EC has expressed its appreciation for the quality of ICCAT's scientific work, as well as its willingness to cooperate in it.

The EC has also expressed its concern about the fishing activities of non-ICCAT member countries and non-coastal countries of the Mediterranean which could have negative repercussions on the artisanal fisheries, which are particularly important in that area.

*Appendix 5 to Annex 6*

### STATEMENT BY CANADA ON BLUEFIN TUNA

(Appended to Report of Panel 2)

Canada has carefully assessed the advice provided by SCRS to the Commission. Although cautiously optimistic, the findings presented still indicate the rate of recovery is slow. The stock size estimates of spawners are still declining, supporting the view of Canadian industry that the stock upon which our traditional fishery is based is not recovering at the rate expected. Thus, in our view, a cautious approach must be maintained.

Canada has noted that the number of bluefin of ages 6 to 9 appears to be either stable or slightly increasing. We understand the broad band of confidence that must be applied around this data. However, the data do support the observation of increased landings of young-adult fish in Canada during 1988. These smaller fish will comprise the future bluefin spawning population of the west Atlantic Ocean and they must not be subjected to any increase in fishing mortality at this time. To address the changing pattern of our fishery, we will base our domestic management approach on the fishing year rather than the calendar year. Of course, our data reporting to ICCAT will continue on a calendar year basis.

Realizing that current catch levels are required to permit scientific monitoring and in line with our wish to increase the rate of recovery of the west Atlantic stock, Canada proposes the continuation of current management measures for 1989.

**STATEMENT BY SPAIN ON ALBACORE**  
(Appended to Report of Panel 2)

At the Tenth Regular Meeting of the Commission, the Spanish delegation expressed its concern about the introduction of new fishing gears in the Bay of Biscay, namely gillnet and pelagic trawls.

For many years, in its report on the albacore stock in the North Atlantic, the scientific committee has noted the fluctuating nature of this species, due to the variability in recruitment. The committee has always emphasized the uncertainty of state of its stock. This conclusion is also reflected in this year's SCRS report.

During 1988, an increase can be observed in fishing effort by the new gears on the north stock of albacore in the Bay of Biscay, effort which went from an experimental stage (2 gillnet vessels in 1986, and 3 gillnet vessels and 5 pairs of pelagic trawls in 1987) to 20 gillnet vessels and 27 pairs of pelagic trawls in 1988. This increase in effort, in principle due to a larger number of vessels with greater fishing power, as with the pelagic trawl, implies twice the effort if the day/night activity of these vessels are taken into account.

Besides, this fishery directed at albacore implies an increase in fishing effort on bluefin due to the by-catch. Even assuming that the incidental catches make up 6 percent in weight of the catch of this fishery, effort on bluefin tuna is considered higher than this percentage, especially at present, taking into account searching time, because there is an increase in the number of vessels. When the two species, albacore and bluefin, are found together well inside the Bay of Biscay, the bluefin by-catch increases, even by highly selective, traditional gears. Therefore, the impact on this stock could worsen the situation, and we cannot forget the Commission regulation currently in effect regarding no increase in fishing effort on bluefin tuna.

All the committees which deal with tuna are concerned about the interaction of new gears with traditional gears. It is, therefore, necessary to study the effects in detail and to monitor these fisheries.

The concern of the Spanish delegation as regards the albacore fishery is based on the fact that any additional element, such as new gears, could disrupt the stable equilibrium of the rational exploitation of this species by very selective traditional gears. Therefore, because of the vulnerability of this species, the consequences would be unpredictable.

For all of these reasons, the Spanish delegation wholeheartedly supports the scientific committee's recommendations on statistics and research. It considers it essential that at the next meeting of this Com-

mission, the SCRS present a research program on this stock which includes all the elements necessary for better knowledge on the stock situation and gear interaction. Meanwhile, because of the uncertainty reflected in reports of the SCRS on this stock, fishing effort should not be increased in any way on this species.

*Appendix 7 to Annex 6*

### STATEMENT BY FRANCE ON ALBACORE

(Appended to Report of Panel 2)

Unfortunately, this year the SCRS was not able to present a consistent analysis on the state of the North Atlantic albacore stock. In spite of these uncertainties, it seems clear that at present this stock is not under any threat of overfishing to justify fishery restrictions.

If the conclusions of previous SCRS reports and recent information on the fisheries are considered, it appears in fact that fishing effort for both surface and longline is much lower than that previously exerted. It can therefore be affirmed, even in the absence of detailed analyses, without risk of being mistaken, that this stock is by no means in danger of overexploitation, even with the changes in fishing effort observed in 1987 and 1988 for the French fleet.

As regards yield per recruit of the new French fisheries, it can be noted from the detailed results presented at the SCRS by France that the average size of albacore caught by this fishery is slightly larger than that of the traditional surface fleet, in particular, trolling. These sizes that are very close to the biological optimum for the species should improve the productivity of the stock.

In conclusion, it is clear that nothing suggests at present that the North Atlantic albacore stock is in danger. The introduction of new, more effective fishing gears poses, however, for our community a certain number of questions which unfortunately are without answers.

Because of this, France strongly supports the SCRS recommendations to carry out as soon as possible multiple research on albacore that should include:

1. A comprehensive review of longline statistics, as the poor quality presently impairs any consistent analysis.
2. A complete evaluation of the present state of the stock by production and analytical models for the entire history of the fishery. The potential of the fisheries could be calculated from this long historical series, which fortunately is well known thanks to detailed statistics.

3. Studies on the effects of environmental variability on the distribution of albacore and the catch rates by the different gears.
4. Studies on albacore behavior as regards the traditional and new fishing gears operating in the Bay of Biscay.
5. Studies on competition and potential interaction among these different gears.

These research projects should be carried out through active cooperation among Spanish, Taiwanese and French scientists, just as in the past.

*Appendix 8 to Annex 6*

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

The U.S. delegation acknowledges that the SCRS has, based upon available data, reaffirmed its concern with regard to the status of billfish stocks. We recognize the progress accomplished in the Enhanced Billfish Research Program as evidenced by the quarterly and annual reports. We strongly support continued efforts of this program to accomplish the three expressed objectives:

1. Provide more detailed catch and effort statistics;
2. Expand the ICCAT tagging program to include billfish; and
3. Assist in collecting data for age and growth studies.

As in the past, the continued funding of the program will be accomplished through private fishing interests of many countries.

Since the last annual ICCAT meeting the U.S. and Venezuela have implemented fishery management plans for Atlantic billfish. An integral part of the U.S. plan is the collection of scientific data, which will be made available to the ICCAT program.

We encourage other member nations to participate in, and support, the Enhanced Research Program for Billfishes, and welcome data contributed. We are pleased to see that this Program is garnering the support and participation of so many member countries. We would urge that this cooperation continue to grow. Progress is being made by U.S. and participating scientists in developing the necessary technology for assessing the billfish stocks, but this work requires the contributions of all concerned.

We concur that the Program Plan targets the appropriate objectives so that significant progress can be made. The U.S. Domestic Fishery Management Councils have developed a plan which will enhance the billfish data base. We recognize that to accomplish the goals of the Program, the various types of data needed to conduct a rigorous stock assessment are not yet adequate. We are gratified that SCRS is directing its efforts towards the end of obtaining the data base required for assessments and urge that this important work be continued.

In light of the findings, accomplishments, the ongoing commitments received, and the SCRS Program Plan, we now urge your support to ratify this Program for a five-year period, to compile a statistically reliable data base.

*Appendix 9 to Annex 6*

**STATEMENT BY THE UNITED STATES ON SWORDFISH**  
(Appended to Report of Panel 4)

The U.S. remains very concerned about the status of swordfish in the North Atlantic as there are indications that suggest that the resource is in decline. While the results of the recent stock assessment were not conclusive, it currently appears that fishing mortality rates are very high and that the adult spawning stock has been markedly reduced. Therefore, the U.S. wishes to stress the importance of continued monitoring and assessment of the stock by ICCAT in cooperation with appropriate member states. In addition, the U.S. is concerned that international management action may be necessary but, because of uncertainties in the results of the assessment, may be delayed.

The U.S. delegation expresses regret that the stock assessment has not been completed, and strongly urges that ICCAT place the highest priority on conclusion of this task.

## 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 AND ORGANIZATION OF THE MEETING

The Tentative Agenda (COM/88/6), circulated prior to the meeting, was adopted without modification (Appendix 1).

### 3. ELECTION OF RAPPORTEUR

The Chairman proposed that the Spanish delegation serve as rapporteur, and Mr. J. L. Cort was designated.

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

The Chairman referred the members of the Committee to Document COM/88/15 which presents the Commission's recommendations for conservation of these species.

After a brief summary of the different recommendations, the Chairman asked the member countries to update, if necessary, the tables attached herewith as Appendix 2. He also asked about the internal regulations in effect by the countries for the application of the ICCAT recommendations. No additional information was presented.

### 5. STATUS OF REGULATORY MEASURES IN THE MEDITERRANEAN

Since this item was included in the Agenda at the request of Japan (see Document COM/88/21), the Chairman asked for comments from the Japanese delegation.

Japan stated that the regulatory measures should be observed by all the member countries and mentioned that catches are increasing in the Mediterranean and in the eastern Atlantic, particularly those of undersized fish (less than 6.4 kg) (see Table 18 of the SCRS Report). (The average 1970-74 catch was 6,986 MT, and the average 1975-86 catch was 12,624 MT.) Since 1975, Japan has implemented the following regulatory measures directed at



protecting the spawning stock: a closure of the fishing between May 21 and June 30 (to limit fishing mortality in the eastern Atlantic to recent levels, as recommended by ICCAT); a limit on the number of longliners to 35 vessels (since 1985); and the presence of patrol vessels to assure that these measures are enforced (since 1976).

The Delegate of Korea mentioned that since last year its fishing effort, mainly directed at bigeye, decreased from 27 to 24 vessels in the Atlantic. He noted that Korea has not fished bluefin tuna in the Atlantic since 1986. The Korean Delegate also noted that although his country does not fish bluefin tuna in the Mediterranean, his government makes every effort to conserve marine resources.

The Delegate of Spain commended the measures taken by Japan, which seemed very positive, but insisted that there be no increase in effort on bluefin tuna in the Mediterranean, in view of the increase in effort reported by several countries in this area in 1988, and the uncertainties on the state of this stock.

In response to a question raised by the Spanish delegation concerning the number of Japanese longliners operating in the eastern Atlantic and the Mediterranean, the Delegate of Japan informed the Committee that 29 vessels operated in 1986 and 19 in 1987. These vessels fish from April (or the beginning of May) until August, except during the period of inactivity as mentioned earlier.

As there were no other comments, the Committee Chairman recommended that the Secretariat contact, through correspondence, the member and non-member countries to remind them about the current state of bluefin tuna and that fishery in the Mediterranean. This situation is, in effect, contradictory to ICCAT's recommendations on this species, since the catch of undersized fish now exceeds the established tolerance level, according to the information given to the Commission by the SCRS.

The Delegates of Spain and São Tomé and Príncipe supported this recommendation, which was adopted by the Committee.

## 6. PORT INSPECTION

The Chairman referred to document COM/88/16 which gives a list of the countries which have accepted the inspection scheme, as well as the forms used for inspections.

### 6.1 Review of the reports of inspections carried out

The Chairman mentioned that South Africa had presented its inspection reports and noted that no infractions had been made.

The Delegate of Spain noted that because of its obligations in other fisheries, it could not carry out inspections as in other years, within the ICCAT scheme.

The U.S. Delegate reiterated that according to the inspection scheme, formal reports of inspections are only necessary in the case of foreign vessels and that the U.S. had not inspected any foreign vessels in 1987. However, inspections of domestic vessels are regularly carried out to determine compliance with regulations based on ICCAT recommendations and the U.S. will submit a report for the record.

#### 6.2 Updating of lists of authorized and national correspondents

The Chairman asked that the list of inspectors and correspondents be updated. The Delegate of São Tomé and Príncipe informed the Committee that his country would transmit the name of its inspectors as soon as possible by correspondence, and noted the interest his country has in this work.

The Chairman recommended that the Secretariat ask the Contracting Parties for information on the current status of the ICCAT Port Inspection Scheme in their countries, so that national administrations which have not yet officially accepted the scheme be made aware of the importance of the inspection program.

The Delegates of South Africa and Spain supported this recommendations, which was adopted by the Committee.

### 7. FUTURE WORK OF THE COMMITTEE AND PLANS FOR IMPROVEMENT

The new situation seems to indicate that the regulations are not being totally enforced. A future task could be an annual review of the status of the ICCAT inspection scheme by the different countries, and emphasis on the necessity of carrying out inspections at tuna landing or transshipment ports, in order to evaluate the level of observance of ICCAT regulations.

As regards bluefin tuna, the Committee will discuss again next year the matter of the application of regulations, particularly as concerns this species and the fishery in the Mediterranean, where various kinds of infractions have been observed.

### 8. DATE AND PLACE OF THE NEXT COMMITTEE MEETING

The Infractions Committee will meet at the same time and place as the next meeting of the Commission.

### 9. OTHER MATTERS

No other matters were discussed.

### 10. ADOPTION OF REPORT

The report was adopted.

### 11. ADJOURNMENT

After expressing his hope that the ICCAT Port Inspection Scheme will become more important during the coming year, the Chairman adjourned the meeting.

## AGENDA OF THE INFRACTIONS COMMITTEE

1. Opening of the meeting
2. Adoption of Agenda and organization of the meeting
3. Election of Rapporteur
4. Review of the implementation of regulations recommended by the Commission regarding yellowfin, bigeye, and bluefin tunas
5. Status of regulatory measures in the Mediterranean
6. Port Inspection
  - 6.1 Review of the reports of inspections carried out
  - 6.2 Updating of lists of authorized and national correspondents
7. Future work of the Committee and plans for improvement
8. Date and place of the next Committee meeting
9. Other matters
10. Adoption of Report
11. Adjournment

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-88)

Species	YELLOWFIN	BIGEYE	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	
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			
COTE D'IVOIRE .....	March 2, 1970	March 2, 1970		
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 .....				
SENEGAL .....	July 2, 1976	July 2, 1976	July 2, 1976	
SOUTH AFRICA .....	May 1973	Dec. 5, 1980	Dec. 5, 1980	June 27, 1975
SPAIN .....	May 29, 1974		Aug. 14, 1987	March 3, 1975
URUGUAY .....				
UNITED STATES .....	Nov. 5, 1975	March 30, 1981	April 9, 1986	Aug. 13, 1975
USSR .....	Sept. 28, 1978	Sept. 28, 1978		Sept. 28, 1978
VENEZUELA .....				

NOTE: For more details, please request information from the national administrations.

Table 2 - Status of adoption of regulatory measures on BLUEFIN TUNA fishing mortality by the member countries (as of 31-XII-88)

Commission recommendation	Limiting fishing mortality to recent levels				
		1st	2nd	Extensions 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 .....					
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 .....					
COTE D'IVOIRE .....					
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 ...					
SENEGAL .....					
SOUTH AFRICA .....	June 27, 1975	Oct. 19, 1976	Feb. 9, 1979	Jan. 11, 1980	March 11, 1982
SPAIN .....	Feb. 19, 1976	Feb. 19, 1976	Feb. 19, 1976	Jan. 24, 1980	
URUGUAY .....					
UNITED STATES .....	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, please request information from the national administrations.

Table 3 - Status of adoption of regulatory measures on west Atlantic BLUEFIN TUNA catches by the member countries (as of 31-XII-88)\*

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 .....	.....Developing fishery not subject to limitation.....				
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 .....	.....Developing fishery not subject to limitation.....				
CUBA .....	.....Developing fishery not subject to limitation.....				
EQUATORIAL GUINEA .....	.....Developing fishery not subject to limitation.....				
FRANCE .....	.....Developing fishery not subject to limitation.....				
GABON .....	.....No fishing or landings.....				
GHANA .....	.....Developing fishery not subject to limitation.....				
COTE D'IVOIRE .....	.....Developing fishery not subject to limitation.....				
JAPAN .....	March 3, 1982	March 7, 1983	March 7, 1983	March 7, 1983	March 7, 1983
KOREA .....	.....Developing fishery not subject to limitation.....				
MOROCCO .....	.....Developing fishery not subject to limitation.....				
PORTUGAL .....	.....No fishing.....				
SAO TOME & PRINCIPE ...	.....Developing fishery not subject to limitation.....				
SENEGAL .....	.....Developing fishery not subject to limitation.....				
SOUTH AFRICA .....	.....No fishing or landings.....				
SPAIN .....	.....Developing fishery not subject to limitation.....				
URUGUAY .....	.....Developing fishery not subject to limitation.....				
UNITED STATES .....	June 11, 1982	June 17, 1983	July 24, 1984	Nov. 25, 1985	Nov. 25, 1985
USSR .....	.....Developing fishery not subject to limitation.....				
VENEZUELA .....	.....Developing fishery not subject to limitation.....				

\* 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 was extended annually, and is now valid until the end of 1989.

NOTE: For more details, please request information from the national administrations.

STATEMENT BY JAPAN REGARDING FISHING OPERATIONS  
BY VESSELS OF NON-MEMBER COUNTRIES

(Agenda Item 28)

Japan had requested that this subject be added to this year's agenda. This request was based on the fact that on June 15, 1988, Spanish national television reported that no less than eight fishing vessels, believed to be Japanese, were violating ICCAT regulations in the Mediterranean Sea. This caused Japan to begin a lengthy, detailed investigation into these reports.

Initially a Japanese patrol vessel in the Mediterranean Sea observed six vessels, some of which were those mentioned in the Spanish press. Our investigation showed that these vessels fly flags of non-ICCAT member countries. Our investigation further led to the identification of thirteen unidentified vessels. Since 1976, our Japanese patrol boat has observed vessels in the Mediterranean Sea that are registered to countries like Panama, Honduras, Turkey and Sierra Leone. It appears from our investigation that these vessels are very clever and often register, for purposes of convenience, in non-ICCAT member countries, and they conceal and change their names and registrations. We have varying degrees of detailed information on each of these vessels which we would be happy to make available to those of you who are interested. Also, we have some slides, taken by our patrol boat, which we would like to show you of these vessels.

Through our investigation we concluded that those vessels identified on Spanish television were not Japanese. We can only assume that they were identified as Japanese because the story was first reported by Greenpeace, an environmental organization that is quite keen on attacking Japan.

Japan would like to urge ICCAT to use every available tool to encourage non-ICCAT nations fishing for tuna to become contracting parties of the Commission.

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

### 1. OPENING OF THE MEETING

1.1 The 1988 meeting of the Standing Committee on Finance and Administration (STACFAD) was opened by Mrs. P. García Doñoro (Spain), the Committee Chairman. All the countries attending the Sixth Special Meeting of the Commission were present. (See Annex 2 to the Commission Proceedings.)

### 2. ADOPTION OF AGENDA

2.1 After reviewing the Tentative Agenda, the Committee noted that "Ratification of the Protocol to the Convention" and "Relations with other organizations" were discussed at the Commission meeting. After some modifications were made to the Tentative Agenda, it was adopted and is attached as Appendix 1.

### 3. ELECTION OF RAPPORTEUR

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

### 4. COMMISSION AND PANEL MEMBERSHIP

4.1 The Executive Secretary presented document COM/88/7 referring to Panel membership, which outlines the terms of reference of the panels. He noted that some of the new member countries were not represented on any of the panels.

4.2 The Delegate from Sao Tomé and Príncipe requested membership to Panel 1, since that Panel deals with the tuna species which are important to his country. The Delegate from Spain requested membership to Panel 3, Temperate Tunas-South, the only Panel to which Spain did not belong.

### 5. CRITERIA FOR ADMISSION OF OBSERVERS

5.1 The Chairman explained that this Agenda Item was discussed at the 1987 Meeting and that the Executive Secretary was instructed to study this



matter in detail and present a report to the Committee. The Executive Secretary presented COM/88/18, circulated prior to the meeting, which gives information on the background and current procedures for the admission of observers, as well as the Executive Secretary's recommendations in this aspect.

5.2 After presentation of document COM/88/18 there were several comments and inquiries concerning the recommendations contained in this document.

5.3 The Delegate from Japan stated that the Commission has sufficient guidelines and procedures for the admission of observers from non-member countries and international organizations, but that criteria has to be decided regarding the admission of observers from non-governmental organizations. He added that the Commission should only accept observers from non-governmental organizations that are ready to contribute to the basic objectives of the ICCAT Convention, but not those whose main objectives are not in compliance with the Convention.

5.4 The U.S. Delegate asked Japan to clarify whether there have been any problems in the past with the admission of observers.

5.5 The Delegate from Spain commended the Secretariat for its work in preparing document COM/88/18 and added that it would be advisable to establish concrete criteria for the admission of observers and that the Secretariat should follow these guidelines when sending the meeting invitations. The Delegate from Spain recommended that a small working group be set up to study this matter further.

5.6 In response to the U.S. question, Japan recommended that concise criteria be formulated in order to avoid any difficulties in the future.

5.7 A question was raised by the Delegate from France concerning the terminology used in the Secretariat's recommendations, specifically "international organizations" and "intergovernmental organizations". He suggested that the term used should be "international organizations". The U.S. Delegate agreed with France's suggestion.

5.8 The observer from the EEC noted that, as an intergovernmental economic integration organization, the European Community is a special case and asked ICCAT to clarify this point when the question is considered.

5.9 The Delegate from Côte d'Ivoire supported the proposal made by France and the suggestion of Spain that a small working group be set up comprised of Japan, France, the U.S., Spain and the EEC as observer to revise the text of the Secretariat's recommendations on the admission of observers. He added that this group should then report to STACFAD's second session. The Group's report should include proposals on invitations, admission and contributions by observers.

5.10 The Delegate from Spain referred to the section on observer contributions in document COM/88/18 and agreed that \$1,000 could be fixed as the minimum contribution for registration to participate in ICCAT meetings.

5.11 The Delegate from Korea reiterated his country's view that any imposition should be voluntary rather than compulsory. He also asked that this point be clarified in the small working group's recommendations.

5.12 Following the Delegate from Angola's suggestion that the Secretariat also participate in the small working group, the Committee Chairman noted that the group would be comprised of the following: France, Japan, Korea, Spain, the U.S., the EC and the Secretariat.

5.13 At a later session, the small group presented recommendations on criteria for the invitation of observers. After some minor modifications, these recommendations were adopted by the Committee and are attached as Appendix 2.

## 6. COORDINATION OF RESEARCH

6.1 The Committee was referred to the Administrative Report (COM/88/-8), the Financial Report (COM/88/9), the Secretariat Report on Statistics and Coordination of Research (COM/88/11) and Appendix 4 to the SCRS Report regarding the various aspects of the Secretariat's coordination of research.

6.2 The Assistant Executive Secretary informed the Committee of the acquisition of a power stabilizer and an IBM PC compatible which can also be used as a terminal. He noted that the expansion of disk space with a controller was not yet purchased nor was the 2 MB expansion of RAM.

6.3 The Assistant Executive Secretary noted that much of the Secretariat's time in 1988 was spent in the collection of statistics and entry of these data to the ICCAT data base. He referred to some deficiencies in the collection of statistics and to the delays in the submission of data by the national offices. He made special emphasis on the deficiencies in the Mediterranean statistics, but added that the collaboration with the GFCM started, which may help to solve some of these problems.

6.4 The Assistant Executive Secretary noted the extensive review and some revision of the bluefin, swordfish and yellowfin data bases done by the Secretariat. He also noted that compilation of a tagging file was initiated and that a comparative study of the ICCAT port sampling and national sampling schemes was carried out. The results of this comparative study were evaluated by the SCRS.

6.5 The SCRS Chairman made some general comments and reiterated the Secretariat's problems in the collection of data and stressed the importance of timeliness in the submission of data by the national offices. He also noted that Mediterranean statistics are a particular problem, especially since those data are becoming more important as catches are increasing. He added that the SCRS is pleased with the recent additions to the computer facilities. He noted that expansion of 2 MB real memory and disk storage capacity were also requested in 1987 and recommended that these purchase be made in 1989.

6.6 The Delegate from Spain noted that coordination of research should be the main job of the Commission. She expressed her country's concern that the Commission's critical financial situation has not made it possible to carry out any research project in the last two years and reserved more detailed comments for when the agenda item on the budget was discussed.

## 7. COMMISSION PUBLICATIONS

7.1 The Executive Secretary referred to the importance of the ICCAT publications, which reflect the Commission's activities. He outlined the Commission publications issued in 1988, including a new volume of the "Historical Statistical Bulletin".

7.2 The Executive Secretary asked that the Committee decide on guidelines for the sale of publications in order to help deter requests for excessive copies of these books. A list of the Commission's publications is given in the Administrative Report (COM/88/8). He also stated that for the first time all the publications were done entirely at the Secretariat, which represents a substantial savings in publications costs.

7.3 Further to an inquiry from the Delegate of Spain, the Executive Secretary gave the Committee specific details on Commission publications, such as distribution, number of copies of each publication (by language), to whom copies are sent, etc. and he circulated detailed information to the Committee to this effect.

7.4 The Delegate of Sao Tomé and Príncipe was concerned that his country had not received any publications in 1988 and asked the Secretariat to investigate this matter.

7.5 The Executive Secretary referred to the cost of publications and noted that mailing expenses often exceed the cost of the publication itself. Based on his study, the Executive Secretary recommended a price of US\$12.00 per publication, excluding mailing costs.

## 8. MEETINGS DURING THE YEAR

8.1 The Assistant Executive Secretary introduced this agenda item and referred the Committee to the Administrative Report (COM/88/8) and the Secretariat Report on Statistics and Coordination of Research (SCRS/88/11). He noted that two intersessional meetings were organized by ICCAT in 1988: (1) the Data Preparatory Meeting of the Yellowfin Year Program and (2) the Second Swordfish Workshop.

8.2 The meetings at which ICCAT was represented are also outlined in the Administrative Report. The Assistant Executive Secretary informed the Committee that Mrs. C. Soto represented the Commission at the Tenth Session of the Committee on Management of Indian Ocean Tuna. Her report is contained in COM/88/20. He noted that he had participated in two meetings, the International Marking Symposium (SCRS/88/8), and the Second International Billfish Symposium (COM/88/14) and had presented papers at both meetings. He also noted that his expenses for both trips were incurred by the sponsors.

## 9. OTHER ADMINISTRATIVE MATTERS

9.1 No other administrative matters were discussed.

## 10. AUDITOR'S REPORT - 1987

10.1 The Executive Secretary presented the Financial Report (COM/88/9) and an Information Document on the Commission's finances. In presenting these documents he reiterated the critical financial situation of the Commission, which has conditioned Commission activities.

10.2 The Executive Secretary referred to the Auditor's Report on ICCAT finances for Fiscal Year 1987 and noted that this report had been distributed in May, 1988, to all the member countries.

## 11. FINANCIAL STATUS OF THE FIRST HALF OF THE BIENNIAL BUDGET - 1988

11.1 The Executive Secretary noted that during the current Fiscal Year, due to the economic crisis of the Commission, extreme austerity was exercised in all the budget chapters.

11.2 The Executive Secretary again referred the Committee to the Financial Report and explained in detail the financial statements attached to the report. He also provided the Committee with valuable information on the status of the Commission finances during the first half of the biennial period (Statements 3 and 4 of the Financial Report).

11.3 The Executive Secretary noted that this year the delegates were kept well informed on the Commission's financial matters and he referred specifically to Circulars 1988/1, 8, 10 and 11 which had been distributed during 1988. He made special note of Circular 1988/1 in which he had indicated the difficulties encountered in putting into effect the agreements reached by the Commission at its Tenth Regular Meeting and which, in his opinion, contained discrepancies. In consultation with the STACFAD Chairman, a solution was reached so that the total expenditure of the salaries chapters in 1988 would be maintained at the same level as in 1987. This solution was to divide the 1987 total salary in dollars by 12 months for staff in the Professional and General Services categories to arrive at the monthly salary in dollars to be received in 1988. The difference between the total spent on salaries between 1987 and 1988 corresponds to locally-contracted staff, who are governed by Spanish legislation and who are paid in local currency.

11.4 The Executive Secretary, in referring to member country contributions, commented that many countries had paid their 1988 contributions early in the year and that several countries had paid past-due contributions. He also informed the Committee that some voluntary contributions had been received in 1988.

11.5 The Delegate of Spain commended the Executive Secretary for his efforts during 1988 to economize and to solicit arrearages as well as voluntary contributions. She added that all the member countries should be

congratulated for their efforts in paying their 1988 and pending contributions. She noted that the drastic measures implemented in 1988 had positive results, especially in the replenishment of the Working Capital Fund.

11.6 The Delegate of Spain noted that many SCRS recommendations for coordination of research had not been carried out even though budgetary appropriations had been made.

11.7 The Executive Secretary clarified that some research work was not carried out because even though allocations were made, the cash was not actually available in the early part of 1988. Since the financial situation has improved in recent months, the Executive Secretary has agreed to consult the SCRS Chairman as regards his committee's recommendations in order to establish priorities to utilize the funds now available.

## 12. PENDING CONTRIBUTIONS OF THE MEMBER COUNTRIES

12.1 The Executive Secretary again referred the Committee to the Financial Report (COM/88/9) and the pertinent financial statement concerning the status of the member country contributions. He noted that there were still outstanding contributions totaling \$524,076.96 at the time of the meeting.

## 13. WORKING CAPITAL FUND

13.1 The Executive Secretary referred to Statement 6 of the Financial Report (COM/88/9) which gives information on the cash available in the Working Capital Fund.

13.2 In referring to the funds available from the Regular Budget, The Executive Secretary noted that the balance in Cash and Bank up to September 30, 1988, was \$369,541.57. However, he pointed out to the Committee that since Portugal had just recently paid its 1988 (\$29,225) and Cape Verde had paid back contributions (\$9,381), the balance in Cash and Bank would be changed. He further noted that in addition to a \$1,500 voluntary contribution from the Dong Won Fishing Co. Ltd. of Korea, and a \$4,167 voluntary contribution from the "Grupo Armadores OPAGAC" of Spain, a \$10,000 voluntary contribution was received from Taiwan and Gabon had announced that it will be paying back contributions totaling 16,661. Also, he added that Japan had announced a voluntary contribution of \$10,000.

13.3 The Executive Secretary suggested that a special fund be set up to deposit the voluntary contributions received. This fund would be kept as a second reserve fund to be used in case of lack of cash in the regular budget.

13.4 The Executive Secretary made special note of Portugal's generosity in inviting the 1987 meeting, which resulted in a positive balance of \$3,400 in the Meetings chapter of the budget.

#### 14. FINANCIAL STATUS OF THE YELLOWFIN YEAR PROGRAM

14.1 The Executive Secretary again referred to the Financial Report (COM/88/9) and noted that the balance in Yellowfin Year Program amounted to \$19,847.89 as of September 30, 1988.

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

15.1 The Committee was informed by the Executive Secretary that Billfish Program funds showed a balance of \$20,910.21 as of September 30, 1988. More details on Billfish funds are given in the Financial Report (COM/88/9)

15.2 The observer from the Billfish Foundation expressed his organization's gratitude to the United States for its support in order to continue the research work on billfish, which is enabling this program to continue providing valuable knowledge on these species. He also noted that the Billfish Foundation appreciates ICCAT's collaboration in carrying out this Program. In this sense, he pointed out the Foundation's commitment to finance the Program, through ICCAT, with \$25,000 annually for five years, provided that this Program is implemented according to plan.

#### 16. REVIEW OF SECOND HALF OF BIENNIAL BUDGET - 1989

16.1 The second half of the biennial budget was reviewed by the Executive Secretary and he pointed out that the Commission had approved a 1989 budget of \$750,000 at its 1987 meeting. He noted that in his proposed 1989 budget some re-distribution of funds is suggested, in line with expenditures in 1988.

16.2 The Executive Secretary pointed out that staff in the Professional and General Services categories will continue to receive the same total salary in dollars as they received in 1987 and 1988, which means that the downward fluctuations in the U.S. dollar will again adversely affect their income in local currency.

16.3 The Executive Secretary emphasized that detailed information on all matters concerning finances and administration under study by STACFAD can be found in the Administrative Report (COM/88/8) and in the 1988 Financial Report (COM/88/9).

16.4 The Executive Secretary, in response to a question raised by the SCRS Chairman, informed the Committee that since the Financial Report was prepared before the 1988 SCRS meeting, the committee's recommendations that have financial repercussions were not taken into account in the distribution of funds by budget chapter. However, the Executive Secretary suggested that the SCRS Chairman prepare a list of priorities and added that he would consult the SCRS Chairman concerning those recommendations which have financial implications, e.g., the additional day required for the 1989 SCRS meeting.

16.5 The Delegate from Brazil declared that his country attaches much importance to ICCAT and believed that the Commission's research and stock

conservation work is very important, which is why Brazil continues to participate in the Commission. He reminded the Committee that Brazil had hosted the Meeting of Plenipotentiaries in 1966. In spite of his country's serious financial difficulties, Brazil has made a great effort to meet its obligations to the Commission.

16.6 The Delegate of Brazil further stated that his country could not accept an increase in their contribution. He also stated that the Commission had not exhausted all the possibilities to cut expenditures, and at the same time maintain efficiency and assure the continuity of ICCAT.

16.7 The STACFAD Chairman commended Brazil's efforts to meet its financial obligations to the Commission and took due note of the comments made by the Delegate of Brazil.

16.8 The Delegate from Sao Tomé and Príncipe inquired whether their recent membership to Panel 1 would affect the 1989 total budget. The Executive Secretary clarified that the budget is approved for a two-year period, and he suggested that the total budget figure, as well as the country contributions, not be altered for 1989, since any change might delay payment of the member country contributions.

16.9 The U.S. Delegate agreed with the suggestion that the current total budget should not be altered. He stated that the U.S. also has budgetary constraints and that the U.S. cannot assume new financial obligations.

16.10 The U.S. recognized and appreciated that the Executive Secretary is doing his best with a minimum staff to assure that all the tasks assigned to the Secretariat are accomplished.

16.11 The Executive Secretary mentioned that in spite of the reduction in their salaries, the Secretariat staff had expressed their willingness to work, with or without extra compensation, any overtime hours necessary during the 1988 meeting, in order to collaborate in the work of the Commission.

16.12 The U.S. Delegate felt that there were potential dangers to taking any drastic measures, such as staff cuts, to reduce expenses since such measures could cause further problems. He added that ICCAT is a model international organization and that the most important issue is to assure the survival of the Commission. The Executive Secretary referred to the comments made by the Delegate from the U.S. and added that he hoped that the freeze on salaries was a temporary situation.

16.13 The Delegate from Portugal supported the U.S. intervention and stressed the importance of the Commission's work and the need to continue. He added that the financial difficulties were discussed at length last year and a solution could not be found to the problem that some countries do not meet their financial obligations and others cannot accept an increase in contributions. He added that the Commission's financial difficulties cannot be solved by minimal cuts. He also noted that if countries cannot pay or increase contributions, and if we maintain the same structure, then we cannot solve our problems and we will have the matter on the Agenda year

after year. He proposed that the Committee approve the proposed budget for 1989 and then try to seek new, realistic solutions for the future.

16.14 The Delegate of France also expressed his support of the Secretariat and recognized the sacrifices which had been made. He agreed with the concerns expressed by the U.S. Delegate and the SCRS Chairman concerning clarification of programs which could be carried out. He reaffirmed that the views expressed by the U.S. and Portuguese delegations were the essence of the Commission's problems.

16.15 The Delegate of Spain agreed with the total budget, but expressed some reservation about the modifications introduced by the Secretariat, especially those referring to the coordination of research. She asked the SCRS Chairman to inform the Committee about the recommendations having financial implications to see if the appropriations outlined in the proposed budget are sufficient to carry them out.

16.16 The SCRS Chairman cited the recommendations of the scientific committee regarding research and statistics, particularly those with financial repercussions, and noted that some require more funding than others, such as:

- The final Yellowfin Year Program meeting to be held in Madrid in 1989. (This item has its own budget so there would be no repercussion on the regular budget.)
- The albacore data preparatory meeting on the longline fishery hosted by the National Taiwan University. (The Assistant Executive Secretary can attend this meeting while on home leave in Japan.)
- The albacore workshop to be held at the Secretariat, which may have some slight repercussion on the budget.
- The extra day for the 1989 SCRS meeting.
- The purchase of data processing equipment using the \$36,000 allocated in the 1989 budget for this purpose.
- An improvement in the quality of port sampling in Las Palmas and Tenerife which requires a visit by the Secretariat to these ports.
- An improvement in sampling at the ports of St. Maarten and Montevideo.
- An improvement in Mediterranean statistics, including the Secretariat's participation in the GFCM meeting.
- The Secretariat's participation in the FAO meeting on large Mediterranean migratory fish to be held in Greece.
- The continuation of the contract with the CRO-Abijdan to sample fleets landing there.



- The processing of data received from IATTC on the Venezuelan fleets.

16.17 The SCRS Chairman also referred to the suggestion by the panels that research program plans on albacore and swordfish be prepared during the 1989 SCRS Plenary sessions. He added that if these plans are to be prepared before the SCRS meeting, they may have some financial repercussions.

16.18 In response to the Delegate of Spain's inquiry, the Executive Secretary informed the Committee that the 1989 Budget, slightly modified by the Secretariat as regards the distribution of funds by budget chapter, could adequately cover the financial implications of the above SCRS recommendations.

16.19 Following this clarification, the Delegate of Portugal reiterated his proposal of adoption of the 1989 Budget, as modified by the Secretariat.

16.20 This proposal was unanimously agreed upon by the member country delegations. The Proposed 1989 Budget is attached as Appendix 3.

#### 17. MEMBER COUNTRY CONTRIBUTIONS FOR 1989 BUDGET

17.1 The Committee Chairman noted that this matter had been discussed under Agenda Item 16. The table showing the 1989 member country contributions is attached as Appendix 4.

#### 18. PROPOSAL OF COTE D'IVOIRE ON THE BASES FOR CALCULATING THE CONTRIBUTIONS OF THE MEMBER COUNTRIES

18.1 The Delegate from Côte d'Ivoire referred the Committee to document COM/88/17 which gives detailed background information on this subject as well as the complete text of his country's proposal. He reiterated that the purpose of the proposal was to make a distinction between the industrialized countries and the developing countries of the Contracting Parties and to adopt a system for calculating the contributions which would substantially reduce the proportion of the developing countries.

18.2 The Delegate of Côte d'Ivoire recognized that such a proposal might involve an amendment to the ICCAT Convention, which could be a long process. He also reiterated the suggestion that a working group be formed to study the proposal and report to the Committee. He noted that his country is prepared to contribute to a solution to this matter.

18.3 The Delegate of Korea noted that as there were no changes in the Côte d'Ivoire proposal, he was obligated to reiterate the main points of his country's position of last year. He added that he was not authorized by his government to vote for any change in the current ICCAT Convention. Korea noted that it was fair and rational to calculate the contributions of each member country according to the catch statistics as adopted by ICCAT and other important, international fisheries organizations.

18.4 The Delegate of Korea expressed his country's wish to participate in a working group to study this matter, provided the formation of such a group is approved by the majority of the delegations and does not imply that the Convention will be amended.

18.5 The Korean Delegate further noted that ICCAT has successfully survived the test of time over the past two decades and emphasized that the observance of financial obligations as outlined in the Convention is of the utmost importance and an essential prerequisite before we can deliberate on the introduction of a device.

18.6 The Delegate of France reiterated his agreement with the proposal by Côte d'Ivoire, but expressed some reservation, since his government cannot accept any increase in contributions without modifying the budget. He also noted that he required prior consultation with his government regarding this matter.

18.7 The Delegate from Japan recognized the difficult situation of some of the member countries and he added that his country is prepared to participate in the consideration of this issue. He pointed out, however, that Japan cannot accept proposals which would lead to an amendment of the Convention in order to solve the financial difficulties of the Commission. The Japanese Delegate expressed that if the majority of the Committee members accepted the formation of a working group to study the Côte d'Ivoire proposal, his country wished to participate, but with the reservation that it cannot agree with any modification to the Convention.

18.8 The Observer from the European Community noted that in view of its future membership in ICCAT and to assure the continuation of ICCAT's work, which is of great importance, the Commission should take into account that the main purpose of the Côte d'Ivoire proposal is to establish a distinction between the level of development of the different countries. She added that such a distinction is followed in some international organizations, such as the NEAFC, which have introduced procedures of this kind to calculate their budgets taking into account the diverse situations of their member countries (i.e., low population, etc.)

18.9 The EC Observer also stated that since ICCAT is a fisheries organization, the importance of tuna activities of the Contracting Parties regarding catch and canning should be reflected in the financial contributions. She also expressed that this was in compliance with the principles outlined in the Law of the Sea Convention concerning highly migratory species. The EC expressed its willingness to participate actively in further discussions concerning the distinction of the levels of development as well as other aspects of this matter.

18.10 The Delegate from Angola noted that this issue is a delicate one from an economic point of view. He noted that his country shared similar economic problems. He added that this matter must be carefully studied from all standpoints. The Committee should bear in mind that a legal solution would involve convening a meeting of Plenipotentiaries to draw up a Protocol to the Convention, which is a long procedure. He also referred to the suggestion to form a working group, and added that such a group should study the technical, political, economical, and juridical aspects of this matter.

and submit a report to a regular meeting of the Commission. He noted that this procedure has been followed in other international fisheries organizations.

18.11 The Delegate of Spain also sympathized with the difficulties of some of the member countries in paying their contributions. She noted that the proposal was not in line with the Law of the Sea Convention and added that we cannot accept a distinction of categories of countries. The Spanish Delegate noted that perhaps other factors might be considered in calculating contributions, such as GNP or GEP, bearing in mind that since ICCAT is a fisheries organization, we must take into account catch and canning as outlined in the Convention. She stated that if the matter is studied in a working group, Spain would like to participate in the group.

18.12 The Delegate of Cuba also expressed a wish to participate in the working group and added that this group should study other possibilities of calculating the contributions.

18.13 The U.S. also shares the concerns expressed by the different delegations. He agreed with the opinion expressed by Angola and added that perhaps the working group could formulate some suggestions which might be acceptable to the Committee. The U.S. Delegate would also like to participate in the working group.

18.14 The Delegate of Côte d'Ivoire reiterated that this problem could not be resolved at this time and agreed with forming a working group. He asked that the terms of reference be given to the working group by the Commission.

18.15 The STACFAD Chairman noted that the discussions of this item were both interesting and complex. She also noted that there seemed to be a consensus for the creation of a working group and referral of this matter to the Plenary. Therefore, the Committee recommended the formation of the working group, as well as the group's mandate, to the Commission.

## 19. RECOMMENDATIONS FOR RESEARCH AND STATISTICS

19.1 The SCRS Chairman noted that this matter had been discussed under Agenda Item 16. He referred the Committee specifically to points 16.15, 16.16, 16.17 and 16.18. He also asked the financial committee to approve all the research programs recommended by the SCRS, i.e., those that require funding as well as those which do not.

## 20. DATE AND PLACE OF NEXT REGULAR MEETING OF THE COMMISSION

20.1 This Agenda Item was referred to the Commission.

## 21. OTHER MATTERS

21.1 The Chairman of STACFAD noted that she had maintained close contact with the Executive Secretary and the Secretariat staff during the past

year. She noted that she had held working meetings with the staff in order to explain the reasons why the Commission had to adopt such drastic economic measures as regards staff salaries for 1988.

## 22. ADOPTION OF REPORT

22.2 The Report was adopted.

## 23. ADJOURNMENT

23.1 The Chairman thanked the Committee and expressed her appreciation to the rapporteurs, the Secretariat and the interpreters. The meeting was adjourned.

*Appendix 1 to Annex 9*

## STACFAD AGENDA

1. Opening of the meeting
2. Adoption of Agenda
3. Election of Rapporteur
4. Commission and Panel membership
5. Criteria for admission of observers
6. Coordination of research
7. Commission publications
8. Meetings during the year
9. Other administrative matters
10. Auditor's Report - 1987
11. Financial status of the first half of the biennial budget - 1988
12. Pending contributions of the member countries
13. Working Capital Fund
14. Financial status of the Yellowfin Year Program
15. Trust Fund for the Program of Enhanced Research for Billfish
16. Review of the second half of the biennial budget - 1989
17. Member country contributions for 1989 budget
18. Proposal of Côte d'Ivoire on the bases for calculating the contributions of the member countries
19. Recommendations for research and statistics
20. Date and place of the next regular meeting of the Commission
21. Other matters
22. Adoption of Report
23. Adjournment

## RECOMMENDATIONS ON CRITERIA FOR INVITATION OF OBSERVERS

In exercising its responsibilities in respect to invitations to observers to ICCAT meetings as provided for in Article XI of the Convention, Article 2 of the FAO/ICCAT Agreement and Rule 5 of the Rules of Procedure, the Executive Secretary, acting on behalf of the Commission, shall invite:

- FAO
- Intergovernmental economic integration organization constituted by States that have transferred to it competence over the matters governed by this Convention, including the competence to enter into treaties in respect of those matters.

and may invite:

- All the non-member countries with coastlines bordering the "Convention area" which is defined in Article I of the Convention.
- International organizations which have regular contact with ICCAT or whose work is of interest to ICCAT, and vice versa.

Any invitations not mentioned above are subject to prior Commission approval, unless such invitations have been made previously on a regular basis. Requests to the Executive Secretary for invitations shall be submitted to ICCAT members for consideration at least 120 days prior to a subject meeting. The Executive Secretary may issue such invitations 60 days prior to the meeting provided no objection has been made by any ICCAT member.

Observers to ICCAT Commission/SCRS meetings will be advised that a registration fee is payable on a voluntary basis amounting to a minimum of \$1,000 per delegation comprised of not more than 2 persons. If the delegation exceeds 2 persons, then the registration fee will be increased by \$1,000 for each additional person. The fee is payable at the moment of registration (at the beginning of the meeting). This amount could be paid in cash or by bank check in the name of the Commission. International organizations which also invite ICCAT to attend their meetings free of charge should be exempted from this rule. The country or organization which has made a voluntary contribution exceeding the participation fee should also be exempted.

## 1989 BUDGET (US \$)

CHAPTER	750,000
1. Salaries .....	395,000
2. Travel .....	12,000
3. Annual Commission Meeting .....	22,000
4. Publications .....	16,000
5. Office Equipment .....	4,000
6. Operating Expenses .....	62,000
7. Miscellaneous .....	5,000
Subtotal .....	516,000
8. Coordination of Research	
a) Salaries .....	113,000
b) Travel for improvement of statistics....	6,000
c) Port sampling .....	12,000
d) Biostatistical work .....	7,000
e) Electronic equipment .....	36,000
f) Data processing .....	27,000
g) Scientific Meetings (including SCRS)....	30,000
h) Miscellaneous .....	3,000
i) Billfish Program .....	0*
Subtotal .....	234,000
TOTAL .....	750,000

\*Funded by the Trust Fund for Billfish Research.

## Member country contributions to the Regular Commission Budget - 1989 (US\$)

COUNTRY	TOTAL BUDGET = \$750,000.00					CONTRIBUTION (K) = \$750,000.00					
	A #	B %	C (MT)	D (MT)	E (MT)	F %	G \$	H \$	I \$	J \$	K \$
Angola	2	5.00	2,124	703	2,827	0.46	1,000	2,000	11,500	2,120	16,620
Benin	0	1.67	392	0	392	0.06	1,000	0	3,833	294	5,127
Brazil	2	5.00	32,954	2,312	35,266	5.75	1,000	2,000	11,500	26,447	40,947
Canada	2	5.00	741	3,333	4,074	0.66	1,000	2,000	11,500	3,055	17,555
Cape Verde	1	3.33	4,335	206	4,541	0.74	1,000	1,000	7,667	3,405	13,072
Cuba	2	5.00	8,846	859	9,705	1.58	1,000	2,000	11,500	7,278	21,778
Equatorial Guinea	0	1.67	0	0	0	0.00	1,000	0	3,833	0	4,833
France	2	5.00	30,219	25,000	55,219	9.00	1,000	2,000	11,500	41,411	55,910
Gabon	1	3.33	0	0	0	0.00	1,000	1,000	7,667	0	9,667
Ghana	1	3.33	44,158	1,798	45,956	7.49	1,000	1,000	7,667	34,464	44,131
Ivory Coast	1	3.33	1,386	1,200	2,586	0.42	1,000	1,000	7,667	1,939	11,606
Japan	4	8.33	54,099	0	54,099	8.82	1,000	4,000	19,167	40,571	64,738
Korea	3	6.67	17,704	0	17,704	2.89	1,000	3,000	15,333	13,277	32,610
Morocco	2	5.00	1,928	242	2,170	0.35	1,000	2,000	11,500	1,627	16,127
Portugal	3	6.67	9,655	4,282	13,937	2.27	1,000	3,000	15,333	10,452	29,785
S Tome & Principe	0	1.67	215	0	215	0.04	1,000	0	3,833	161	4,995
Senegal	1	3.33	12,076	4,282	16,358	2.67	1,000	1,000	7,667	12,268	21,934
South Africa	1	3.33	5,856	91	5,947	0.97	1,000	1,000	7,667	4,460	14,127
Spain	3	6.67	156,281	59,990	216,271	35.26	1,000	3,000	15,333	162,190	181,522
U.S.A.	4	8.33	18,306	47,477	65,783	10.72	1,000	4,000	19,167	49,333	73,500
U.S.S.R.	2	5.00	15,496	810	16,306	2.66	1,000	2,000	11,500	12,229	26,729
Uruguay	0	1.67	4,410	0	4,410	0.72	1,000	0	3,833	3,307	8,141
Venezuela	0	1.67	22,733	16,884	39,617	6.46	1,000	0	3,833	29,710	34,544
<b>TOTAL</b>	<b>37</b>	<b>100</b>	<b>443,914</b>	<b>169,469</b>	<b>613,383</b>	<b>100.00</b>	<b>23,000</b>	<b>37,000</b>	<b>230,000</b>	<b>460,000</b>	<b>750,000</b>

A - Panel membership.

B - Percentage of payments for annual membership and panel membership (G+H).

C - Catch (live weight) - 1985

D - Canned production (net product weight) -- 1985

E - Total (C+D).

F - Percentage distribution of E.

G - Payment of \$1,000 annual membership contribution.

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)

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

Madrid, November 2-10, 1988

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Appendix 9 - Report of the Sub-Committee on Statistics

**Item 1. OPENING OF THE MEETING**

The species groups met at the ICCAT Secretariat in Madrid, Spain, on November 1-4, 1988, and the Plenary Sessions of the Standing Committee on Research and Statistics (SCRS) met at the Hotel Pintor in Madrid from November 7-10, 1988, under the chairmanship of Mr. A. González-Garcés (Spain).

The SCRS Chairman opened the Nineteenth Regular Meeting of the Committee and welcomed all the scientific delegations. Mr. González-Garcés explained and evaluated the repercussions which the recent financial problems of the Commission have had on its scientific work. He reviewed the special activities of the SCRS during 1988, and referred to the intersessional meetings, the Program for Enhanced Billfish Research, and some improvements in computer facilities.

**Item 2. ADOPTION OF AGENDA AND ARRANGEMENTS FOR THE MEETING**

The Tentative Agenda was adopted and is attached as Appendix 1. The scientists nominated as rapporteurs of the Report are as follows:



For Agenda Item 9:

Tropical Tunas	A. Fonteneau (General), F. X. Bard (YFT), J. Pereira (BET), P. Pallarés (SKJ)
ALB - Albacore	W. Nelson
BFT - Bluefin tuna	D. Clay (assisted by J. Cort and B. Liorzou)
BIL - Billfish	E. Prince
SWO - Swordfish	S. Kume
SBF - Southern bluefin	S. Kume
SMT - Small tunas	T. Diouf
MLT - Multi-Species	A. Fonteneau
All Agenda items, except 9:	P. M. Miyake

Item 3. INTRODUCTION OF DELEGATIONS

Each member country introduced its scientific delegation. The List of SCRS Participants is attached as Appendix 2 to Annex 10.

Item 4. ADMISSION OF OBSERVERS

The observers, as shown in the List of Participants, were introduced, admitted and welcomed to the 1988 SCRS Meeting.

Item 5. ADMISSION OF SCIENTIFIC PAPERS

The Committee was informed that some documents had been delivered with an insufficient number of copies. Since there were enough copies available for review by the rapporteurs' groups, these documents were accepted, with the condition that this procedure would not set a precedent. The List of SCRS Documents is attached as Appendix 3 to this Report.

Item 6. REVIEW OF NATIONAL FISHERIES AND RESEARCH PAPERS

6.1 ANGOLA

No report was presented.

6.2 BENIN

No report was presented.

6.3 BRAZIL

No report was presented.

6.4 CANADA

Canadian nominal catch of Atlantic bluefin tuna in 1987 totaled 476 fish weighing 83.8 MT. Three hundred and thirty-two of these fish were

caught by offshore Japanese longline vessels under charter to two Canadian firms. These latter fish were considerably smaller (averaging only 93 kg.) than the fish landed by the traditional Canadian inshore fishery.

The nominal landings of swordfish for Canada in 1987 totaled 955 MT, taken mainly by longline, with minor catches (78 MT) by the harpoon fishery.

Little biological sampling was conducted on the traditional inshore bluefin tuna rod and reel and tended line fisheries. However, there was extensive sampling carried out on both the offshore Japanese and Canadian longline fisheries while the vessels were within the Canadian EEZ. Software development was completed to permit access to the Canadian observer data base for large pelagics.

No new studies were initiated and no tagging was carried out during 1987 on swordfish.

Tuna fishery regulations are enacted under the Federal Fisheries Act. Management regulations followed in 1987 were similar to those of 1986 and reflected the aim to restrict the bluefin fisheries within Canadian control to ICCAT quotas.

Over 700 small (less than 13 m) vessels were licensed to fish bluefin tuna. Swordfish longline licenses were issued to 70 vessels in 1987. Harpoon licenses were again issued to about 500 vessels (some also have longline licenses).

On the Scotian shelf, where the majority of the swordfish fishery occurs, there were 46 active longline licenses out of approximately 60.

The landings as of October 19, 1988, were approximately 1,521 fish, weighing 404 MT. This increase is largely due to the substantial catch (204 MT) of small adults (8-10 years old) from southwest Nova Scotia (between Browns Bank and the northeast peak of George's Bank) and the Virgin Rocks area (central Grand Banks of Newfoundland). Although these are offshore fisheries, the vessels used are similar to those used in the Gulf of St. Lawrence inshore fishery (less than 13 m).

Two companies have again chartered Japanese longline vessels to participate in the offshore, large pelagic fishery. As of October 19, 1988, 41 MT of bluefin by-catch have been landed in this fishery. The two companies engaged in this fishery are in the process of making the transition from Japanese charter vessels to independent Canadian vessels and crews.

The quota for swordfish in 1988 is 3,500 MT with 70 longline licenses issued. Thirty-four vessels of the Nova Scotia longline fleet have been active so far this season.

In an effort to address concerns about the depressed swordfish stock, efforts are under way to resurrect the dormant Canadian swordfish research program. To this end, staffing is in progress for a research scientist to work on swordfish at the St. Andrews Biological Station of the Department of Fisheries and Oceans.

## 6.5 CAPE VERDE

Tuna fishing in Cape Verde is carried out by small vessels, baitboats and beach seines.

Total catches in 1987 amounted to 5,414 MT, of which 2,997 MT were taken by baitboat. The 1987 catches were slightly higher than those of 1986.

Cape Verde tries to follow ICCAT's instructions for statistics. For the ICCAT Yellowfin Year Program intensive size sampling has been carried out for two years.

Gonad sampling has also been conducted and a report showing the results has been submitted to ICCAT.

## 6.6 COTE D'IVOIRE

There was no Atlantic tuna fishing under the Ivorian flag in 1987, with the exception of some small canoes.

However, Abidjan is still an important landing and transshipment port for fleets catching tropical tunas in the eastern Atlantic. These fleets are comprised of purse seiners and baitboats from Spain, Ghana, France, Japan and Norway. The volume of tuna thus handled is estimated at 100,000 MT/year.

The frequent use of the Abidjan port provides much statistical work for the "Centre de Recherche Océanographique" (CRO) of Abidjan. In fact, the CRO collects almost all the logbooks from the vessels unloading or transshipping tuna and then codes and processes the data by computer. In addition, the CRO takes about 400 size samples per year of the major tunas from these tuna vessels. The cost of all this statistical work is only partially covered by contracts with certain flag countries.

Côte d'Ivoire has also participated in the Yellowfin Year Program by releasing and recovering tuna tags and taking biological samples. It should be noted that tag recoveries indicated two large yellowfin had made transatlantic migrations.

Côte d'Ivoire participates in the Billfish Program by carrying out special sampling involving the measuring of all billfish landed at Abidjan.

Finally, the CRO offers logistical support to the Fishery Research Unit (FRU) of Tema, Ghana, by monitoring its baitboat fishery. Since 1988, the CRO also helped the FRU with billfish sampling in Ghana.

## 6.7 CUBA

No report was presented.

## 6.8 EQUATORIAL GUINEA

No report was presented.

## 6.9 FRANCE

Tuna catches by the French fleet in 1987 amounted to about 42,000 MT. Of these, 35,100 MT are of tropical fish caught by French baitboats and purse seiners along the west African coast; the remainder of the catch, about 6,900 MT, is of temperate tunas from the Mediterranean and the Bay of Biscay.

Fishing effort for the tropical fleet remains low as the major part of the purse seine fleet has continued to operate in the Indian Ocean since 1984. In the Bay of Biscay, new methods for catching albacore are being developed. They are gillnets used at night by some trollers and trawlers which, using pelagic trawls pulled by a pair of boats, harvest concentrations of albacore at greater depths. The catches made by these new gears remain low, (350 MT in 1987) and are subject to detailed statistical monitoring by IFREMER scientists. A document was submitted to the SCRS describing in detail the fishing methods and the results of this new fishery.

Tropical tuna research is carried out in collaboration with Côte d'Ivoire, Senegal and Venezuela, thanks to the ORSTOM scientists stationed at the research centers of these countries. Research is also done on billfish. Particular attention is given to the analysis of the yellowfin stock conditions and the influence of environmental anomalies on the stock catchability.

## 6.10 GABON

Gabon does not have canning industries of its fishery resources, particularly of tunas, nor an appropriate local fishing fleet. It does not have catch statistics on the catches made by the foreign fleet, mostly comprised of French, Spanish and Japanese vessels, which has been fishing within Gabonese waters for more than ten years.

Gabon hopes that, with the help of ICCAT and other research organizations based in Africa, such statistics will be forthcoming.

## 6.11 GHANA

No report was presented.

## 6.12 JAPAN

Japanese tuna fisheries in the Atlantic in 1987 harvested 36,900 MT of tunas and billfishes, of which 31,700 MT (86 percent) were taken by the longline fishery. The target species of the longline fishery has recently been bigeye tuna (19,300 MT in 1987, 61 percent), and followed by yellowfin (4,000 MT, 13 percent), swordfish (2,600 MT, 8 percent) and bluefin tuna (1,900 MT, 6 percent). The number of longliners has been decreasing recently, but the seasonal and geographic operational pattern has been unchanged. The 1987 catches of skipjack and yellowfin tuna by two purse seiners in the Gulf of Guinea amounted to 5,200 MT.

In 1987 and 1988, a patrol boat was sent by the government to the northeastern Atlantic and the Mediterranean Sea during May-July to monitor the longline fleet for the purpose of complying with the ICCAT bluefin tuna regulation.

In 1988, the Far Seas Fisheries Research Laboratory made a special effort to compile size frequency data of bluefin tuna and swordfish much earlier than routinely processed with other species; the latter was submitted to the Swordfish Workshop in September, 1988.

#### 6.13 KOREA

The 1987 total catch of tuna and tuna-like fishes amounted to 7,625 MT, taken by 29 longliners, which showed a decrease of 23.5 percent compared to the 1986 catch. Bigeye tuna remained one of the major species in 1987 and comprised 58 percent (4,438 MT) of the catch. Yellowfin and albacore catches amounted to 1,457 MT and 401 MT, respectively.

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 (up to 1987) were regularly submitted to ICCAT.

Monthly changes in catch per unit effort of bigeye and yellowfin tunas were studied by latitude and longitude based on data from the longline fishery from 1984 to 1986.

#### 6.14 MOROCCO

No report was presented.

#### 6.15 PORTUGAL

Catches of tunas and tuna-like species by Portugal in 1987 rose to 14,000 MT, of which 4,470 MT were bigeye, 8,011 MT skipjack, 430 MT albacore and 1,030 MT other species. The 1987 skipjack catch was the highest for this species during the last few years. This increase in catch is due to the development of the tuna fishery in Azores whose catches increased from 7,600 MT in 1985 to 12,661 MT in 1987.

Preliminary estimates of catches made during the first three quarters of 1988 indicate a catch of 1,800 MT in Madeira and 14,000 MT in Azores.

As regards changes in the fleet, fifteen new freezer baitboats started operating in the Azores since 1986. More new boats will enter the fishery in 1989.

Some new surface longline fisheries targeting swordfish have recently developed off continental Portugal, in the Azores and also off the coasts of Africa.

A sport fishery targeting blue marlin has been developing in the Azores since 1984.

As regards research, sampling activities and the collection of statistics continued as in the past. An experimental fishing cruise using live bait was carried out in 1988 within the continental EEZ. Another research cruise for albacore also took place in the Azores at the end of 1988. Research activities are essentially centered on bigeye stock evaluation studies.

#### 6.16 SAO TOME & PRINCIPE

No report was presented.

#### 6.17 SENEGAL

The tuna fleet based in Dakar in 1987 was comprised of 13 French baitboats, 4 Spanish baitboats, 2 Senegalese baitboats and 3 Senegalese purse seiners. The total landings by this fleet at Dakar amounted to 10,968 MT, which was 909 MT (-7.6 percent) less than in 1986. The number of boats declined from 25 in 1986 to 22 in 1987.

The foreign fleet not based in Dakar (principally comprised of 7 French, 16 Spanish and 2 Ghanaian purse seiners) unloaded and transshipped 19,152 MT, a decrease of 6,766 MT (-26 percent). This reduction is essentially due to less activity by the Spanish purse seiners in Dakar (25 boats in 1986 compared to 16 in 1987).

The combined landings and transshipments by all the fleets at Dakar reached 30,120 MT in 1987, 20 percent less than those observed in 1986.

The total catches of sailfish by the artisanal fisheries amounted to 385 MT, which are lower than those of 1986 after adjustment. Catches by the sport fishery were about 50 MT and are similar to those of 1986.

The total catches of small tunas by all fisheries combined reached 9,052 MT in 1987, an increase of 3,390 MT (+55 percent), mainly due to an increase in the reported industrial catches of Atlantic black skipjack.

Research carried out in conjunction with French scientists based at the "Centre de Recherche Océanographique" includes sampling and collection of statistics, as well as diverse analyses on population dynamics of Atlantic tunas and the relation between tunas and the environment. Within the framework of the Enhanced Research Program for Billfish, a Senegalese scientist is in charge of coordinating research activities carried out on these species in the eastern Atlantic. Some tagging cruises carried out within this Program in collaboration with Dakar sport fishermen were also continued.

#### 6.18 SOUTH AFRICA

No report was presented.

## 6.19 SPAIN

In 1987 Spanish catches of tunas and tuna-like species reached 155,200 MT in the Atlantic Ocean and Mediterranean Sea, a 3 percent increase with relation to 1983-1984.

The majority of the catches, which came from the tropical area (yellowfin, 62,900 MT; skipjack, 37,800 MT; and bigeye, 8,300 MT), makes up 70 percent of the total catch.

Albacore catches increased with regard to the previous year and swordfish catches increased steadily to about 10,200 MT. The decline in trap catches as well as the inactivity of the baitboats from northern Spain that fish in the Mediterranean Sea resulted in a decrease in bluefin tuna catches in 1987.

Spanish research activities are centered on the major species of the temperate and tropical areas. The study of the evaluation of tuna and tuna-like species stocks within the SCRS makes up the major component of Spanish research on these species.

It should be pointed out that the Spanish fishery sector is very concerned about the extensive use of gillnet and pelagic paired trawl gears by other countries in the traditional troll and baitboat fishing areas of the Cantabrian Sea.

In 1987, purse seine cruises were carried out within the Yellowfin Year Program. Two tagging cruises were carried out in the summer of 1988 in the Bay of Biscay and a total of 1,650 tunas were tagged (1,150 bluefin and 500 albacore).

## 6.20 UNITED STATES

Total reported U.S. landings of tuna and tuna-like fishes in 1987 were 23,000 MT. This represents a decrease of 2,000 MT over 1986. The decrease results from regulations on mackerels (*Scomberomorus* spp.). Landings for king and Spanish mackerels combined accounted for 8,000 MT. Bluefin landings were up slightly to 1,351 MT. Albacore landings increased from 162 to 270 MT.

Skipjack and yellowfin tuna landings were 650 MT and 6,509 MT, respectively, about 350 MT below and 1,200 MT above their 1986 levels. An expanding U.S. longline fishery for yellowfin in the Gulf of Mexico took 3,700 MT in 1987. Swordfish landings remained stable at 4,900 MT. Many U.S. coastal swordfish longliners have converted, at least seasonally, to yellowfin fishing while the larger vessels continue to fish in waters distant from the coast.

Major research activities on large pelagics in 1987 and 1988 included increased monitoring of the landings by size for swordfish, preparation of data and analytical reports for the 1988 ICCAT Swordfish Workshop, continuation of data base development for eventual stock assessments, a continuation of port and tournament sampling for billfishes and other pelagics.

gics, time estimation procedures for partial bluefin discards, bluefin larvae surveys, evaluation of analytical methodology for use in assessing the status of bluefin stocks, and development of catch-per-unit-effort indices. The cooperative tagging program tagged and released 4,982 large pelagic fish in 1987.

#### 6.21 URUGUAY

No report was presented.

#### 6.22 U.S.S.R.

In 1987, the total catch of tunas and tuna-like species amounted to 7,840 MT, broken down as follows: 2,905 MT frigate and bullet tuna, 1,887 MT bigeye tuna, 1,275 MT yellowfin tuna, 1,083 MT bonito, 547 MT skipjack, 61 MT Atlantic black skipjack, 45 MT marlins, 28 MT king mackerel, 5 MT sailfish and 4 MT swordfish.

The total catch dropped by 1,853 MT as compared to 1986. This drop was due to a reduction in fishing effort in the purse seine fishery for skipjack tuna.

Scientific research involved studies of fishing intensity, state of stocks, size-weight and age composition of catches, parasitofauna of tunas, possible trawling of small tuna species, and the development of methods to provide the tuna fleet with hydro-meteorological information.

Two scientific research cruises were carried out and three observers-ichthyologists worked on commercial vessels.

#### 6.23 VENEZUELA

No report was presented.

#### 6.24 CHINA (TAIWAN)

The 1987 total catch of tunas and tuna-like species in the Atlantic by Taiwanese longliners was estimated to be about 23,375 MT, which was about 16,000 MT less than the 39,492 MT taken in 1986. Also the number of long-lining vessels dropped from 190 in 1986 to 140 in 1987. Of the 1987 catches in weight, 84.33 percent of the catches were albacore (about 19,712 MT); 5.63 percent bigeye tuna; 3.26 percent yellowfin tuna; 3.22 percent billfishes; 0.61 percent young tunas; 0.18 percent bluefin tuna and 2.73 percent other species.

The Institute of Oceanography of the National Taiwan University is in charge of processing catch statistics and carrying out assessment research. The Taiwan Fisheries Bureau handles logbook collection and fishing vessels registrations under a grant and through coordination with the Council of Agriculture. Catch and effort estimates and biological data on length measurements were routinely reported to the ICCAT Secretariat.



Updated production models have been done and submitted to the 1988 SCRS meeting for both north and south albacore stocks. VPA and yield-per-recruit analyses and studies on the possible interaction between fisheries have been conducted in fiscal year 1988.

#### 6.25 CIESM (Observer)

The observer from the CIESM informed the SCRS of the concern expressed by the Committee on Marine Vertebrates and Cephalopods of the CIESM regarding the presence in the Mediterranean Sea of an indeterminate number of fishing vessels flying flags which are neither of ICCAT member countries nor of coastal Mediterranean countries. These vessels fish albacore, bluefin and other tunas and their catches are not reported to ICCAT or to the Mediterranean coastal countries.

#### 6.26 CONGO (Observer)

Up to 1974, the port of Pointe-Noire was the main center of ocean fishing by the freezer baitboat and small purse seine fleets. These fleets exploited, among others, three tuna species: skipjack, yellowfin, and small tunas, commonly referred to as "false tunas". During prosperous years, of an estimated overall total Atlantic catch of 300,000 MT per year, 165,000 MT per year (about 55 percent of the total) were harvested in the Pointe-Noire sector. Since 1974, the situation has changed and there has been a sharp decline in tuna vessel activities due, among other reasons, to:

- the discontinuation of freezer baitboat and small French purse seine fleet operations as a result of the crisis of the tuna market in 1974;
- the inadequacy of the Pointe-Noire port facilities, particularly its deteriorated state and the small capacity of the freezer warehouse, as compared with that of the new tuna vessels;
- the development of a fleet of large-capacity (400 to 1,500 MT of frozen tuna), highly autonomous (45 to 60 days at sea) and powerful (13 to 15 knots) vessels;
- the high transport costs of the frozen cargo of the catches transshipped at Congo;
- the better storage facilities, supplies and repairs offered by other ports of the west coast of Africa;
- the failure of the "Société Halo-Congolaise de Pêche" (SICAPE), etc.

Since the failure of SICAPE, the People's Republic of the Congo does not have an ocean fleet. The conversion and development of fishing depends on the priorities of the Government of the Congo.

With the help of experts from FAO, a general program for research and development of the primary sectors (agriculture, animal breeding and fishing) is under way which will allow the country to face the growing food demand.

Within the framework of the development of maritime fishing, the potential of tuna fishing and that of the high value species will be studied. To

this effect, the People's Republic of the Congo envisages greater inter-regional and international cooperation as regards fishing matters. The Congo is a founding member of the Regional Fisheries Committee Project of the Gulf of Guinea countries.

#### 6.27 EUROPEAN COMMUNITY (Observer)

The EC continues awaiting the ratification of the Protocol Amendment to the Convention for the EC's adhesion to ICCAT.

The EC does not present its own report on the Community's activities on tunas since the member countries of the European Community which are also members of ICCAT present their respective detailed national reports on tuna fishing activities and research on these species.

The EC, via the SCRS Chairman, presented a final report to the ICCAT Secretariat on a study carried out in Greece on bluefin tuna, albacore and swordfish. This study, financed by the EC, gives new information on diverse aspects of the fishing and biology of the aforementioned species in waters off Greece.

The EC is very interested in tuna research within ICCAT, particularly since the Community's fishing fleets operate in a wide area of the Atlantic (tropical and temperate waters) and the Mediterranean and fish the majority of the ICCAT species.

#### 6.28 MEXICO (Observer)

The tuna fishery is one of the most important in Mexico. Therefore, research programs, aimed at improving our knowledge of these species to assure their better administration and conservation, have permanent priority.

In this sense, Mexico's participation in this international forum confirms its keen interest and its agreement, in principle, with all the countries present as regards efforts to design and apply strategies which over the long term may lead to equilibrium between the exploitation and conservation of tuna resources in the Atlantic. Therefore, Mexico is very interested in continuing the close contact it has had up to now with ICCAT.

The collection of statistical data is fundamental towards continuing this work. To this end, Mexico has made an effort to improve statistics. Hopefully, this improvement will contribute towards reaffirming and facilitating our collaboration with ICCAT, who can at any time request statistical information as it has in the past.

#### Item 7. REPORT OF THE SWORDFISH WORKSHOP

Mr. S. Kume, Convener of the Workshop, informed the Committee of the results of findings of the Workshop which was held on September 6-13, 1988, at the Secretariat. The Committee reviewed and adopted the report (SCRS/

88/12), which will be published in the Collective Volume of Scientific Papers, Vol. XXIX. The Committee noted that the report was utilized by the SCRS to draft the section on swordfish stock assessment.

Item 8. REPORT OF THE DATA PREPARATORY MEETING FOR THE  
YELLOWFIN YEAR PROGRAM

Dr. A. Fonteneau, Convener of the Data Preparatory Meeting, presented the report of the meeting (SCRS/88/7), held in July, 1988, at Dakar, Senegal. The Report was reviewed and adopted and will be published in the Collective Volume of Scientific Papers, Vol. XXIX.

Item 9. REVIEW OF CONDITIONS OF STOCKS

In order to assist readers in better understanding stock analysis, a Glossary of Technical Terms has been prepared and is attached to this Report as Appendix 7.

YFT - YELLOWFIN TUNA

YFT-1. DESCRIPTION OF FISHERIES

Yellowfin are caught throughout the entire tropical Atlantic, between around 30°N and 20°S by surface gears (purse seine and baitboat) and by longline. The surface fisheries operate in both the east and the west, sometimes extending quite far from shore. The traditional longline fisheries operate in all the mid-tropical area. However, new longline fisheries, which operate near the coast, have recently developed in the western Atlantic.

Catches

The catch figures for these gears, broken down for the eastern and western Atlantic, are presented in Table 1 and Figure 1 for 1958-1987.

For the entire Atlantic, catches have increased regularly since 1958 and reached a record high in 1983. In 1984 catches dropped drastically. Since then they have recovered to a high level.

In the eastern Atlantic, catches increased since 1974 to a peak of 134,800 MT in 1981. Catches decreased significantly in 1984 but increased substantially in 1985 and 1986 to the 1975-1980 level. This recovery is due to the good catches by purse seiners rather than by baitboats. It should be noted that some yellowfin baitboat catches before 1985 may have been underestimated.

Catches by longliners operating in the eastern Atlantic continue showing a constant decline since 1972 and presently they represent approximately five percent that area's catch.

In the western Atlantic, the surface fisheries have developed rapidly since 1982, increasing the total western Atlantic catch to 37,900 MT in 1985. In 1986 and 1987, catches declined markedly. After a period of high catches which culminated in 1982, longliners in the western Atlantic have maintained their catch levels on the order of 10,000 MT in recent years.

### Fishing effort

In the eastern Atlantic, fishing effort is mainly exerted by the surface fleets (purse seiners and baitboats). Nominal fishing effort for the eastern Atlantic surface fleets is shown in Table 2 and in Figure 2. An estimate of effective fishing effort calculated from purse seine data is also shown in Figure 2. A sharp, parallel decline in nominal effort and effective effort since 1984 can be observed. This real decline in surface fishing effort is due to the departure of the purse seiners to the Indian Ocean, where they still operate. A preliminary estimate of effective longline fishing effort on yellowfin for the 1975-1986 period shows only a slight decline which does not correspond to the stronger decrease shown in nominal effort.

An estimate of surface fishing effort in the western Atlantic for 1983-1987 shows a clear decrease in 1987 which corresponds to the departure of the Venezuelan purse seiners to the eastern Pacific Ocean. An estimate of longline fishing effort in the western Atlantic shows a slight decrease, as in the eastern Atlantic.

### Catch rates

After the strong decrease in catch rates in the eastern Atlantic in 1984, purse seine yields increased and were stable at a high level for the 1985-1987 period. This also seems to be the case for the baitboats.

In the western Atlantic, purse seine catch rates show a decreasing trend for the 1985-1987 period. Baitboat catch rates have remained stable.

## YFT-2. STATE OF THE STOCKS

As in the past, there are alternative hypotheses for the yellowfin stock structure (either two stocks separated into east and west around 30°W, or a single Atlantic stock). The separate-stock hypothesis has been considered up to now as the most reasonable. Transatlantic migrations of tagged fish have recently been recorded. This could lend more support to the single-stock hypothesis, although these migrations seem to have been very slow.

It should be noted that the majority of the catches up to 1983 were made in the eastern Atlantic, and since there are few analyses on the new western Atlantic fisheries, most of the analyses here deal with the eastern stock.

### YFT-2.1 East Atlantic Stock

An abundance index calculated from raw FISM and Spanish purse seine CPUE data for 1968-1987 is provided in Document SCRS/88/48 (Figure 3). This index indicates that general yellowfin abundance in the eastern Atlantic has risen since 1985, and stabilized in 1986-1987.

A production model based on this abundance index is presented in Figure 4. The recovery of the east stock is well described by the model and the stock reached a stable state during the last three years (1985-1987), at a level near the estimated equilibrium curve. It can be noted that the recovery was remarkably rapid. Based on adjusted 1969-1987 data, MSY estimates go from 117,000 to 123,000 MT for an F-opt of 49,000 to 58,000 standard purse seine days, according to the sets of  $m$  used and  $k$  selected ( $m = 0$  excluded). It appears, therefore, that the stock is near the MSY, with an effort slightly below F-opt.

A cohort analysis provided fishing mortality vectors for 1980-1987. This analysis is affected, moreover, by uncertainties for the years 1983-1984. In fact, it is observed that the catch rates of FIS and Spanish purse seiners are particularly low for these two years, especially for large yellowfin. This can be interpreted by two extreme hypotheses: a very low adult biomass and normal catchability, or a rather high biomass and abnormally low catchability. Figure 5 shows the changes in the adult biomass computed under each hypothesis.

Different factors seem to have reduced the catchability of adults. Abnormal oceanographic conditions, like "El Niño", were observed which lowered the thermocline in the adult fishing area (Figure 6). It also seems that a temporary change in target species towards skipjack occurred. The rapid recovery of the stock in 1985 supports the second hypothesis. Finally, the stability of the abundance indices from longliners in 1983-84 suggests a certain stability in the adult stock. All these support the hypothesis of reduced catchability in 1983 and 1984, with a rather high biomass.

According to the hypothesis used, quite different conclusions can be drawn on the stock recovery scenario (Figure 7). During the stable period (1985-1987), however, fishing mortality vectors were again rather similar and current average fishing mortality seems to be relatively moderate.

The conclusion is maintained that there are less benefits to be gained from an increase in the age at first capture if the current reduced fishing effort level is continued. This is different from the situation of high exploitation of the 1980-1983 period.

### YFT-2.2 West Atlantic Stock

The state of a possible western Atlantic stock is still difficult to evaluate due to the lack of a sufficiently reliable data series, although some progress has been made.

### YFT-2.3 Single Atlantic Stock

There is no recent analysis available. The last analysis, done in 1983, used CPUE from the eastern Atlantic; however, this is valid only if a rapid mixing of fish in the entire Atlantic is realized. This does not seem to be the case.

### YFT-3. EFFECTS OF CURRENT REGULATIONS

Yellowfin less than 3.2 kg are taken in large numbers in the eastern tropical Atlantic, frequently in mixed schools with skipjack and small bigeye. In 1973, ICCAT adopted a regulation to reduce the catches of young yellowfin, and to increase the yield per recruit of the stock. This regulation prohibits the catch of yellowfin weighing less than 3.2 kg. However, it does allow for 15 percent, in number, of the catch to be small yellowfin. This regulation has had only a minor effect on the fisheries, as noted in previous SCRS reports. In general, the regulation has been ineffective in reducing the mortality of young yellowfin.

It appears that since 1985, however, the recovery of the yellowfin stock in the eastern Atlantic has led to high yields of large fish taken by purse seiners, while the yields of juveniles are stable. Consequently, the percent in weight of small fish in the purse seine catches decreased in 1986 and 1987 as shown in Table 3.

### YFT-4. RECOMMENDATIONS

#### YFT-4.a Statistics

A number of recommendations made in 1987 have been fulfilled. In particular, the multi-species sampling method in effect in African ports was applied to Venezuelan ports, and this should be continued. Moreover, it is strongly recommended that length frequency data collected by IATTC technicians from Venezuelan purse seiners operating in the Atlantic and provided to ICCAT be processed and made available by the Secretariat as soon as possible.

In addition, at the Yellowfin Year Program Data Preparatory Meeting, held in Dakar in July, 1988, a series of statistical recommendations were made, which the Committee endorses, and some of them have already been fulfilled (see SCRS/88/7).

The United States should provide the conversion factor to change dressed weight, as reported by their longline fishery (SCRS/88/42), to round weight.

#### YFT-4.b Research

Likewise, scientists at the Dakar Meeting made research recommendations that should be carried out in 1989 and these were also endorsed by the Committee.

The success of tagging carried out on medium and large fish through cooperation of sport fishermen off the U.S. coasts was noted. The Committee recommended encouraging this tagging as well as all other tagging that could be done in the western Atlantic. There should be adequate publicity in the Caribbean area to facilitate tag reporting.

In the Canary Islands area, an increase of yellowfin catches in recent years has been noted. This phenomenon, which seems to be linked to environmental factors, should be studied.

#### YFT-4.c Management

The Committee reasserted that the scientific base on which the present management measures were established was justified. Given the intensive exploitation of yellowfin during 1982-1983, effective application of the yellowfin regulation should produce appreciable gains in yield per recruit.

However, the potential benefits from the real application of the current regulation are slight because the eastern Atlantic yellowfin stock has recovered and the exploitation rates have become stable at apparently moderate levels in 1985-1987.

### BET - BIG EYE TUNA

#### BET-1. DESCRIPTION OF FISHERIES

Bigeye tuna is widely distributed in the tropical and temperate waters of the Atlantic Ocean, between approximately 45°N and 45°S. The known spawning areas are located in the tropical area between 10°N and 10°S and juveniles are only present in one eastern tropical Atlantic nursery, in the Gulf of Guinea.

The stock is exploited in the entire area of distribution by different fleets and gears, such as longline, purse seine and baitboat.

The main bigeye fishery is the longline, which operates throughout the year. It includes the entire distribution area and catches are essentially made in the eastern Atlantic. Since 1980, Japanese and Korean longliners have targeted bigeye using deep longline and effort is concentrated in the time-area strata where the density of bigeye tuna is great. This is a fishery which directly targets large fish. Bigeye tuna is also an important species for some local longline fisheries and is seasonally targeted by the new U.S. longline fishery which operates in the northeastern coastal area of the U.S.

Among the surface fisheries, various local baitboat fleets seasonally target bigeye in the area of the Azores, Madeira, Canary Islands and off Senegal and Mauritania. These fisheries of the northeastern Atlantic islands exploit mainly pre-adult or adult bigeye tuna.

In the eastern tropical Atlantic, the purse seine and baitboat fleets catch juvenile bigeye tuna which form mixed schools with young yellowfin and skipjack. The fisheries are not directed at bigeye, but the catches of juvenile bigeye are especially important in terms of number.

Changes in annual catches of bigeye, by gear and country, in the period 1958-1986 and preliminary estimates for 1987 are shown in Table 4 and in Figure 8. The areas of operation, size ranges, characteristics of each gear, and the changes in annual catches during 1975-1987 are shown in Figure 9.

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 in 1986 and again in 1987, mainly due to a decline in the longline catch.

The fluctuations between years in the catches are basically due to the longline operations, as their catches make up more than 60 percent of the total since the beginning of the fishery. In the most recent years, the longline catches have fluctuated between 33,300 MT in 1983 and 51,700 MT in 1982. A sharp decrease in longline catches was observed in 1986 and 1987, reflecting the departure of part of the Japanese and Korean fleets from the Atlantic.

As regards surface gears, baitboat catches have increased in recent years up to 1985 (17,600 MT) and decreased slightly in 1986 and 1987. Since 1980 there has been a sharp decline in baitboat catches of Madeira which is probably related to variations in local hydrological conditions, rather than to stock abundance. Purse seine catches declined after 1984, following the departure of part of the fleet to the Indian Ocean.

## 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 only valid abundance indices for the bigeye stock are calculated from longline fishery catch rates. Since the surface fisheries only catch bigeye incidentally or on a seasonal basis, their CPUE indices are not representative of the total stock abundance.

The CPUE of the seasonal fisheries of the northeastern Atlantic islands reflects the local abundance of a fraction of the stock, and is subject to variations caused by regional hydrological conditions. The yields, though seasonal, of the FIS baitboat fishery seem to be less influenced by environmental changes and can provide a measure of recruitment.

Adult stock abundance, calculated from the Japanese longline CPUE after adjusting for the use of deep longlines, shows relative stability in recent years, with a slightly increasing trend, compared to the period before the introduction of deep longline. Bigeye (adult stock) abundance indices, calculated from longline CPUE, are 71 percent of the CPUE at the beginning of the fishery (1961-1965) (Figure 10).



The age-specific mean fishing mortality rates, estimated by cohort analysis for 1980-1986, 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 11).

An updated production model analysis, including the adjusted 1986 CPUE, indicates MSY values slightly below those estimated in the past. These estimates give a range of MSY of 67,000 to 138,000 MT, depending on the value of  $m$  used (Figure 12). This analysis suggests that present catches are at a level close to or below the MSY.

Another production model analysis, using another estimate of CPUE, gives higher values for the MSY, about 71,700 ( $m = 2$ ) to 165,000 MT ( $m = 0$ ). This analysis also indicates that the present catch is below the estimated values of MSY.

Production model analyses also indicate that current 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 by increasing fishing mortality. 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 13.)

The multi-gear, yield-per-recruit analysis suggests that significant gains could be expected if the increase in fishing mortality on large bigeye is accompanied by a simultaneous decrease in the mortality on juveniles (Figure 14).

### BET-3. EFFECTS OF CURRENT REGULATIONS

The bigeye minimum size regulation of 3.2 kg has been in effect since 1980, while the same size regulation has also been in effect on yellowfin tuna. It has been reported in recent years that landings of a fairly large number of juvenile bigeye tuna have been continuing by the tropical surface fleets.

### BET-4. RECOMMENDATIONS

The Committee recommends:

#### BET-4.a Statistics

- 1) That improvements in extrapolation procedures and strata substitutions adopted for yellowfin statistics also be applied to bigeye tuna data. All the size frequencies (1980-1987) obtained from purse seiners should be reprocessed according to the new criteria.

The new file should replace the former one in the ICCAT data base.

- ii) That ongoing multi-species sampling of the surface catch in the eastern tropical Atlantic be continued to resolve the species complex problem in the reported catch which mixes juvenile bigeye and yellow-fin tunas and skipjack. The same sampling scheme started in the west Atlantic should be continued.
- iii) That species and size sampling of catches transshipped to Puerto Rico 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.
- iv) That all countries which fish bigeye tuna with longlines send to ICCAT in five-degree per month strata the proportion of deep longlines in operation.

#### BET-4.b Research

- i) That an index of abundance that incorporates information from the bigeye surface tuna fisheries be developed.
- ii) That age-structured stock analysis, such as cohort and yield-per-recruit analyses, be updated using recently improved catch data. An analysis on evaluation of the effect of taking small bigeye tuna must be emphasized.
- iii) That a relationship between gilled/gutted/headed weight and round weight and between fork length and round weight for bigeye tuna caught by the U.S. longline fishery be developed, in order to take advantage of the available weight frequency data.
- iv) That calibration of gear efficiency between regular and deep longline operations be continued to obtain a common measure of effective effort.
- v) That a detailed analysis of real bigeye abundance for the period 1973-1975 be made in order to adjust the 1974 CPUE, which seems too high.
- vi) That the possible causes of the observed decline in bigeye baitboat catches of Madeira be clarified in relation to changes in environmental conditions.

#### BET-4.c Management

At present, the Committee has no new findings to change the management recommendations given to the Commission in 1984.

SKJ - SKIPJACK TUNA

SKJ-1. DESCRIPTION OF THE FISHERIES

Skipjack are caught almost exclusively by surface gears both in the eastern and western Atlantic. Purse seine and baitboat gears are used in the industrial and semi-industrial fisheries, whereas some artisanal fisheries (Cuba, Martinique) use hand line and trolling.

The total eastern Atlantic catch in 1987 (Table 5 and Figure 15) maintained the 1986 increasing trend, due to an increase in baitboat catches, which reached the average level of the 1977-1983 period after 3 years of low catches. As regards purse seine catches, a slight decline is noted (52,900 MT in 1987 vs. 57,700 MT in 1986), due to a decline in nominal effort, measured by vessels carrying capacity of the Spanish fleet.

As regards the western Atlantic, the total catch in 1987 (19,000 MT) confirmed the declining trend started in 1986, after the record 1985 catch of 40,000 MT. This decline is noted both in the purse seine and the baitboat catches, which decreased by 16.4 percent and 33 percent, respectively. This marked trend is due to the drop in catches of the two principal fisheries of the western Atlantic, the Venezuela purse seine fishery and the Brazilian baitboat fishery. The decline in Venezuelan catches is due to the shift of part of the fleet to the Pacific Ocean. Data which would explain the drop in Brazilian catches are not available.

Estimates of effective fishing effort on skipjack are not available. Therefore, as in previous years, vessel carrying capacity is used to measure nominal effort. Table 2 and Figure 16 show total carrying capacity of the eastern Atlantic fleets from 1968 to 1987. The declining trend in purse seine carrying capacity continued, due to the continued shift in effort of the Spanish purse seine fleet to the Indian Ocean. Baitboat effort, which showed a slight decrease in 1987, is within the stable levels which this fishery has maintained since 1974.

As concerns total effort (purse seine + baitboat carrying capacity) and total standardized effort (purse seine + baitboat carrying capacity standardized to purse seine), we observe that their trends are parallel to purse seine effort, as expected, due to the stability of the effort. Because of the bias in existing data for the western Atlantic, estimates of nominal effort could not be made.

SKJ-2. STATE OF THE STOCKS

The last evaluation of the skipjack stock in the eastern Atlantic was carried out in 1984 by the Working Group on Juvenile Tropical Tunas. For the analysis the Group used mainly data and parameters obtained fundamentally during the International Skipjack Year Program. The results of this evaluation show that the stock is under-exploited, as had been assumed by the Working Group and later by the SCRS.

In observing total nominal effort it is noted that at the time of the evaluation, the fishery sustained the highest effort levels of the histori-

cal series, with an average carrying capacity of 71,100 MT in the 1978-83 period. Since then, nominal effort has continually decreased until 1987, with an average of 48,900 MT for the 1985-87 period. This significant reduction in nominal effort (31 percent) in recent years, with respect to the time when the evaluation was carried out, presumably has been accompanied by a reduction of similar magnitude in effective effort.

Therefore, even though no new stock evaluations have been done, it seems reasonable to believe that the analysis carried out in 1984 and repeated at the present time would show more conclusive results as regards the status of under-exploitation of the stock.

A similar view of the development of the fishery can be observed from Figure 17 which clearly indicates the two periods of effort and their relation to catches.

Regarding parameters such as CPUE, the Committee does not advise interpreting trends as an indicator of the state of the skipjack stock. The clear increasing trend (Figure 18) observed in the CPUE of the purse seine fleets, should not be interpreted as an indicator of abundance, because of the low yellowfin abundance from 1978 to 1984 and/or because of variations in the catchability of skipjack. The availability of skipjack to purse seines could have increased as competition between boats decreased due to the reduction in the number of vessels in the fleet.

Data for the western Atlantic are insufficient to carry out an analysis of the state of that skipjack stock.

### SKJ-3. EFFECTS OF CURRENT REGULATIONS

There are no regulations in effect for skipjack. The minimum size regulations in effect on yellowfin and bigeye stocks since 1980 have had a negative effect on skipjack catch statistics, which have been overestimated including yellowfin and bigeye below the minimum size. This has resulted in significant problems of bias in the data bases, although these problems have been resolved by the establishment of multi-species sampling and the development by the Working Group on Juvenile Tropical Tunas of methods to correct species composition.

### SKJ-4. RECOMMENDATIONS

The Committee recommends:

#### SKJ-4.a Statistics

- i) That the collection of catch and effort statistics of the purse seine and baitboat fleets which operate in the western Atlantic be improved.
- ii) That the sampling scheme for Venezuelan landings be maintained.
- iii) That possible biases in port sampling, based on information from observers be studied.

- iv) That the Secretariat revise and improve the current tables on purse seine and baitboat carrying capacity in the western Atlantic.

#### SKJ-4.b Research

- i) That supplementary research on maturity, fecundity and spawning of the skipjack stock in the western Atlantic be carried out.
- ii) That the study of the time-area interactions between fleets and skipjack concentrations be continued.
- iii) That research on the effect of environmental factors on abundance, recruitment and availability of skipjack be continued.

#### SKJ-4.c Management

As in other years, there are no apparent reasons to consider management measures for Atlantic skipjack. The Committee observed that the eastern Atlantic stock was under-exploited and that could support an increase in catches.

### ALB - A L B A C O R E

#### ALB-1. DESCRIPTION OF FISHERIES

Albacore in the Atlantic is considered to be comprised of two stocks separated, by convention, at 5°N. However, the possibility of the existence of a Mediterranean stock and that the south Atlantic stock may be related to the Indian Ocean stock should not be discarded.

Table 6 presents a historical catch series by gear and by country for 1958-1987. In 1987, albacore catches in the North Atlantic were estimated at 35,500 MT, a reduction of 7,100 MT from the previous year. Although not all landings are reported, this reduction in catch was related to a decline in longline effort and in catch per unit of effort of the longline fishery. This fishery landed only 4,700 MT in 1987, as compared to 16,400 MT in 1986. The longline fishery catches both juveniles and adults, but most of the tonnage is mainly comprised of adult individuals.

The surface fisheries in the North Atlantic, which catch mostly younger fish, took an estimated 30,800 MT in 1987, an increase of 4,600 MT from 1986. Baitboat catches increased by 3,600 MT in 1987 to 18,800 MT. Troll catches in the North Atlantic increased slightly in 1987 to 11,500 MT.

New gears, such as drift gillnets were used in experimental fishing in the eastern North Atlantic in 1986 and 1987, and effort was expanded in 1988. Pelagic paired (two-boat) trawls were used experimentally in 1987,

and expanded to commercial fishing in 1988. Gillnet and paired trawl catches in 1988 were 500 and 1,100 MT, respectively. The area fished by these two gears is the same as for the surface fisheries in the eastern North Atlantic. Size ranges of fish taken by these gears are similar to those of the surface fisheries, with fish taken by pelagic trawls having a larger average size than those taken by gillnets in 1988.

The total South Atlantic catch in 1987 was 24,000 MT (4,100 MT less than in 1986). Surface catches in the South Atlantic increased slightly in 1987 to 6,100 MT, while longline catches decreased from 22,800 MT in 1986 to 17,500 MT in 1987.

Catch data from the important albacore fishery in the Mediterranean have not been available, and it is assumed that the 1987 catch is similar to the 1986 estimated catch of 4,400 MT.

## ALB-2. STATE OF THE STOCK

### ALB-2.1 North stock

The total catch of North Atlantic albacore has generally decreased since the late 1970's, as a result of long-term declines in catch and effort of the troll fishery and a widely fluctuating longline catch (Figure 19). Baitboat catches increased substantially from 1984 to 1987.

Catch per unit of effort (in weight) for the surface gears (troll and baitboat) can be considered as an index of abundance of young individuals. CPUE of the troll fishery showed a relatively constant trend, with considerable fluctuation, from 1957 until the early 1970's. After that, CPUE of the troll fishery increased somewhat, before dropping sharply in 1985. It remained stable in 1986 and 1987. The CPUE of the baitboat fishery has generally trended upward since the mid-1970's, although there has been considerable fluctuation. Baitboat CPUE reached an all-time high in 1987, up sharply from the previous three years (Figure 19).

Longline CPUE has been considered as an index of abundance of the adult stock. Estimates of effort used to calculate CPUE was based on the Taiwanese longline gear targeted for albacore. Catch per unit effort fluctuated somewhat during the 1972-1987 time series, with a declining trend for the past five years (Figure 19).

Information has been developed during the past year for North Atlantic albacore on stock size and annual fishing mortality rates by gear, on yield per recruit, and on spawning stock biomass. Production models have been developed based on a standardization of baitboat and troll fishing effort to the Taiwanese longline fleet. Since technical aspects of the analyses or specific knowledge of parameters included in the models were found to be questionable or uncertain, the results are not included in this report. Because of these uncertainties, it is not possible to provide advice on the current status of the North Atlantic albacore stock. In addition to questions about the development of models and estimation of biological parameters, there is also concern about size sampling for albacore taken by the longline fishery. Before advice can be provided on the status of stocks, it

will be necessary to reconcile discrepancies in the data bases and to conduct a special analytical workshop (see Research section).

#### ALB-2.2 South stock

CPUE of the longline fishery which operated in the South Atlantic can be used as an index of abundance for the adult stock. Longline CPUE trends have fluctuated somewhat from 1967 to 1987, but have generally trended downward throughout the time series (Figure 20). The overall longline catch also trended downward during this period, but at a lesser rate than CPUE.

There are no abundance indices for the juvenile stock. In recent years an increase in the catch of juvenile albacore was noted in the surface fishery, to about 6,000 MT in 1987, a 22.4 percent increase over 1986.

A production model was updated using standardized catch and effort data from 1967 to 1986. Two effort measurements were analyzed: Case (1) using effective effort in number of effective hooks, and Case (2) using fishing intensity in number of hooks by  $5^{\circ} \times 5^{\circ}$  squares. Both cases gave similar estimates of MSY. Therefore, only Case (1) was considered (Figure 21).

The MSY obtained by the production model (Case 1) was estimated at 28,500 MT, corresponding to an optimal effective effort of  $80 \times 10^6$  effective hooks. Catches in 1985 (28,400 MT) and in 1986 (28,100 MT) were approaching the MSY values from the production model, and effort in 1985 and 1986 was slightly above the level corresponding to MSY.

#### ALB-3. EFFECTS OF CURRENT REGULATIONS

There are no regulations currently in effect for albacore in the Atlantic.

#### ALB-4. RECOMMENDATIONS

##### ALB-4.a Statistics

- i) The ICCAT Secretariat conducted a comparison of size sampling between the ICCAT port sampling scheme and the Taiwanese on-board size sampling program. The results show an important difference in sizes sampled from 1984 to 1986 between the two programs. The ICCAT Secretariat is requested to work with scientists from Taiwan to determine the basis for this difference.

The Committee recommends:

- ii) That a data preparatory meeting of longline fishing countries and the Secretariat be held prior to an albacore analytical workshop to develop a longline catch-at-size data base.
- iii) That basic data be collected from countries that fish albacore in the Mediterranean and which presently do not submit data to ICCAT on a regular basis.

- iv) That efforts be made to increase the collection of catch, effort, and size data from baitboats operating off South Africa, and that these data be transmitted to the ICCAT Secretariat.
- v) That catch, effort, and size data continue to be collected from the new fisheries which utilize gillnets and paired (two-vessel) pelagic trawls in the northeastern Atlantic.

#### ALB-4.b Research

- i) It is recommended that a workshop for albacore be held before, and separate from, the 1989 SCRS meeting. The workshop should be held only after the completion of the recommendations on statistics (i and ii, above) to compile adequate data bases on catch, effort, and size. The purposes of the analytical workshop are:
  - a) To evaluate data bases on catch, effort, and size from the different national fisheries.
  - b) To standardize effort among the various baitboat, troll and longline fleets for production analyses, and by fishery and size category for cohort analysis.
  - c) To review and evaluate available biological parameters.
  - d) To carry out analyses to determine the status of the North Atlantic albacore stock as a first priority, and the South Atlantic stock as a second priority. It is anticipated that VPA analysis, production models, and estimates of recruitment will be developed at the workshop, as well as evaluations of the potential impact of the expansion of newly developed fisheries in the northeastern Atlantic on the albacore stock.
- ii) Catch, effort and size data should be compiled for the different fleets by adequate strata, if possible by 5°x5° and month, in order to study effort standardization between gears.
- iii) Research should be carried out (or continued) on the relationship between albacore in the Atlantic and the Mediterranean to determine if there are two separate stocks.
- iv) Geographic and density information from the Taiwanese longline fleet and the South African fishery in the Atlantic and Indian Oceans should be analyzed together. This study would contribute to clarifying the interchange of stock(s) of albacore between the South Atlantic and Indian Oceans.
- v) Tagging programs should be started (or intensified) in the North Atlantic and Mediterranean as well as in the South Atlantic to provide information on movement, growth, and stock structure.
- vi) Studies should be initiated (or continued) on the growth of albacore in the North Atlantic and Mediterranean, South Atlantic, and Indian Oceans. These studies should include growth rate by sex.



- vii) The interactions between newly developed fisheries and existing surface fisheries for albacore in the northeastern Atlantic should be studied.

#### ALB-4.c Management

At present, the Committee does not have any recommendations for management of the north stock, because of the uncertainty of the status of this stock. Increased research effort is advised to resolve some of this uncertainty, and a special analytical workshop is identified in the Research section.

The South Atlantic stock appears to be exploited at approximately the MSY level, with the current exploitation scheme, and the Committee recommends careful monitoring of this fishery. Additional information that may be used to develop management recommendations is anticipated from the results of the proposed workshop.

#### 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 eastern and western Atlantic Ocean and in the Mediterranean Sea. Many different gears are used and the size of fish caught varies depending on the gear. For many years, Atlantic bluefin tuna have been managed under a two-stock hypothesis, one stock occurring in the western and the other in the eastern Atlantic and Mediterranean Sea (Figure 22).

Table 7 and Figure 23 show the landings in weight separated into western Atlantic, eastern Atlantic and Mediterranean Sea. The provisional estimate made for the 1987 bluefin tuna landings in the eastern Atlantic and Mediterranean Sea is incomplete due to late reporting. However, if we assume the same landings as in 1986 for the non-reported Mediterranean catch (50 percent) and non-reported eastern Atlantic catch (25 percent), the estimated 1987 catches by areas are: 2,600 MT in the western Atlantic, 5,700 MT in the eastern Atlantic, and 13,500 MT in the Mediterranean Sea. The total landings for 1987 would then be almost 22,000 MT, slightly higher than in 1986.

##### BFT-1.a Eastern Atlantic

In the eastern Atlantic, trap catches increased from 1976 (500 MT) to 1982 (2,300 MT), remained stable until 1984 (2,300 MT), and dropped to 800 MT in 1986 increasing in 1987 to 1,400 MT. Longline catches were relatively stable between 1978 and 1981 (500 to 900 MT), increased in 1982 and 1983 to about 2,700 MT, then decreased to the 1978-1981 level in 1985 (540 MT) and 1986 (780 MT). Baitboat landings in recent years are made almost exclu-

sively by Spain. During the last ten years, baitboat catches fluctuated between 1,000 and 4,000 MT, the maximum being in 1978 and the minimum in 1982. Recent data show similar catches in 1983 and 1984 (3,000 MT), and slightly lower catches of 2,300 MT for 1985 to 1987. Purse seine catches in the eastern Atlantic are low and exceeded 1,000 MT only in 1977. A second peak of about 700 MT was observed in 1982. The lowest annual purse seine harvest occurred in 1985 (90 MT) while 1986 catches increased to 280 MT. No purse seine data are available for 1987. Spanish hand lines and French trollers comprise most of the nominal catch of unclassified gears for recent years, and these gears landed just over 100 MT in 1987.

#### BFT-1.b Mediterranean Sea

In the Mediterranean, the collection of statistical data is difficult due to the large number of countries that fish for bluefin with many different gears. The 1986 catch was approximately 13,000 MT. In 1987 approximately 50 percent of the landings were not reported. If countries not reporting in 1987 maintain the same landings as in the last reported year the landings would be 13,500 MT. Estimates of total landings are poor for 1986, since much of the data has been estimated from the corresponding landings of 1985. This trend is continuing with 1987 landings being estimated from those of 1985 and earlier. Such lack of data significantly inhibits the Committee's ability to provide reliable advice. Purse seine catches continue to represent the majority of reported landings. The only available purse seine data, for France, indicate a rise of nearly 1,000 MT to 4,300 MT. Estimated landings for other gears increased continuously from 1979 to 1985 when they reached 5,800 MT.

#### BFT-1.c Western Atlantic

Western Atlantic catches of bluefin tuna were restricted by quotas of 1,160 MT in 1982 and 2,660 MT between 1983-1987. The level of 2,660 MT represents about 40 percent of the largest catch in the 1973 to 1981 period. Longline landings increased by 50 percent from 1983 (800 MT) to 1985 (1,230 MT), dropped to 750 MT in 1986 and rose to 1,100 MT in 1987. Landings by purse seiners remained stable. Rod-and-reel landings declined in 1986 from 1985 and increased in 1987 to 539 MT. Landings by other gears (558 MT) increased in 1987 by 25 percent.

#### BFT-2. STATE OF THE STOCK

The Committee conducted its investigations using the two-stock hypothesis (western Atlantic and eastern Atlantic/Mediterranean). The growth and natural mortality rate parameters for each stock were the same as those used by the 1987 SCRS. Details of assessment parameters used and the derivation of catch tables are presented in Appendix 8 to this Report. Many of the more technical terms used in this text are explained in Appendix 7.

**BFT-2.a Eastern Atlantic and Mediterranean**

Six indices of abundance were available for examination by the working group (Table 8). One of these, the Japanese longline within the Portuguese EEZ, had no additional data over that presented last year. The others had data for 1986 added and in some cases had improvements in the analysis incorporated into the series. It was noted that the two Spanish baitboat indices, on ages 2 and 3, did not agree. The age-2 index was felt superior by the group and the age-3 index was put aside pending further study. Three of the four series with data for 1986 show declines in the last year (Figure 24). Three of the five tested indices met the selection criteria, i.e., the fully recruited  $F$  lay between 0.01 and 0.99 and no trend in the residuals. Indices meeting these criteria were the French purse seiner age 2 and age 3 and Spanish baitboat age 2 (Table 9).

The 1986 SCRS Report noted the quality of the data in the catch at age had improved since 1975. This year concern expressed on the composition of the catch at age of the younger ages (0 through 3) puts some doubt on last year's confidence. Catch at age (Table 10), including 1986, 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. Reviewing the age composition (Table 11) of the catch at age, it was noted that ages 21 to 30 made up less than one-tenth of one percent for most years, thus it was agreed to truncate the catch at age at 20 (ages 21 to 30 dropped).

Separable virtual population analyses (SVPA) were used to estimate partial recruitment (PR). The input for this calculation was catch at age from 1982 to 1986 for ages 1 to 18, a reference age of 1, an  $M = 0.18$ , an  $F = 0.2$  and the selectivity on the oldest age (18) set to 2.0. The PR on the youngest age groups is very important in the assessment as the age-specific abundance indices used for calibration are based on ages 2 and 3 only. These ages are the very ones for which difficulty exists in the catch-at-age table.

Calibration of the virtual population analysis (VPA) with the three selected abundance indices provides a first estimate of terminal  $F$ . It must be stressed that the concern expressed elsewhere in this report places unknown, but very wide, confidence limits about this estimate. It can be said, however, that there has been a shift in the catch over the last 15 years to generally younger fish.

The calibration of this stock is based largely on young fish. The great uncertainty in the catch at age of these age groups places uncertainty on the entire assessment. An independent analysis in 1987 using different input parameters and calibrated to different indices produced quite different results.

The results of VPA indicate that between 1970 and 1986 the stock size of older fish (ages 10 to 20) and medium fish (ages 6 to 9) declined by 70 and 80 percent, respectively (Table 12 and Figure 25). We have no confidence in the stock size of ages 0 and 1. This results in difficulty in the interpretation of estimates of ages 2 to 4 stock size other than to say no trend over time is apparent.

**BFT-2.b Western Atlantic**

Following the recommendations made by the SCRS in 1986, seven abundance indices were analyzed in greater detail and improved indices presented (Table 13). Two of these indices were not able to present data to estimate the 1987 point (Canadian rod and reel as very few fish were caught and U.S. rod and reel due to sampling problems). Three of the indices, two for large fish and one for medium fish, indicated a decline in abundance while two medium fish indices indicated a rise in abundance (Figure 26).

Catch at age including 1987 (Table 14) was available for analysis. The catch composition (Table 15) was used to determine the relative importance of the various age groups.

The Committee selected the partial recruitment pattern using SVPA. The input for this calculation was catch-at-age data from 1983 to 1987, representing age 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 75 percent of the selectivity of the reference age. The final PR was similar in shape to that used by the 1987 SCRS (i.e., dome-shaped); however, this year no smoothing was used.

Three of the seven indices were selected for calibration of the VPA. Selection criteria required the fully recruited  $F$  to be within the range 0.01 to 0.99, and that there was no trend in the residuals. Indices that met these criteria were the Japanese longline indices (ages 3 to 5 and ages 6 to 8) and the Gulf of Mexico larval bluefin index (ages 10 to 30) (Figure 26, Table 16).

Similar VPA calibration procedures have been used since 1985 and this year the estimated terminal  $F$  applied to the catch-at-age table (Table 14) indicates that 1987 adult stock size (ages 10-30) is approximately 30 percent of the 1970 level; ages 6-9 approximately 40 percent; and ages 1-5 for 1985 (the last year with useful estimates) approximately 31 percent of the 1970 level (Table 17 and Figure 27).

The results of this year's VPA are generally similar to those generated by the Working Group on Bluefin Tuna in 1985 and the SCRS in 1986 and 1987. The 1988 analysis indicates that since 1981 some recovery has occurred. This is as a result of the decline in fishing mortality on the juveniles (ages 1 to 5) since 1981 (Figure 27). Although no large, new year-classes have appeared, there has been a general improvement in recruitment accompanied by the higher survival of these fish in their early years. Limited improvement has been observed for medium-sized fish (ages 6 to 9). However, fishing mortality has increased on those age groups. The spawning stock (ages 10 to 30) has declined sharply since 1970 (Figure 27); their decline still continues due to high fishing mortality.

The working group noted that the estimates of population for ages 1 and 2 in 1987 are based solely on those  $F$  values input by the working group. The only abundance index representing the youngest ages covers fish 3- to 5-years-old, thus little confidence can be placed in estimates of recruitment (age 1) in the last two years of the analysis (Table 15).

## 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 total Atlantic and Mediterranean catches declined from 26,100 MT in 1975 to 18,400 MT in 1979, averaged about 25,500 MT in 1982-1985 and decreased to 19,000 MT in 1986. Data are not yet available for 1987, but the landings appear to have decreased to some value over 13,500 MT. In the western Atlantic, catches averaged approximately 6,100 MT from 1976 to 1981 and generally have been below or slightly above the level set for scientific monitoring.

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. Since that time, the catch has averaged 4,500 MT. In the Mediterranean, catches increased from 11,000 MT in 1975 to 17,000 MT in 1976, declined to 7,300 MT in 1979, increased thereafter to 15,100 MT in 1982, decreased in 1983 to 12,900 MT and increased to 18,500 MT in 1985 and declined in 1986 to 13,000 MT.

A regulation prohibiting the catching and landing of bluefin tuna less than 6.4 kg for the entire Atlantic stock went into effect in August, 1975; an exemption allowed incidental catches of 15 percent (by number). After the regulation went into effect, the percentage of individuals less than 6.4 kg 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 18). The percentage declined to low levels (2 to 5 percent) since. In contrast, the percentage of undersized fish is still high in the eastern Atlantic and Mediterranean Sea with a 1976-1986 average of 50 percent and 30 percent, respectively.

Using research data from 1985 (see Appendix 8 to Annex 10, Section I.ii.a) the estimate of undersized fish in the Mediterranean would increase from 59.8 (Table 18) to 89 percent. These minimum estimates of undersized fish indicate that the countries fishing in the eastern Atlantic and Mediterranean are not complying with these regulations.

An additional regulation limited catches in the western Atlantic in 1982 to 1,160 MT and 2,660 MT each year during 1983 to 1987, and prohibited fishing directed at the spawning stock in the Gulf of Mexico. As a result catches declined (Figure 23).

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 that size (Table 18). The percentage was about 13 percent in 1987.

## BFT-4. RECOMMENDATIONS

### BFT-4.1 Statistics

Some interchange between the bluefin stocks in the eastern and western Atlantic is known to occur. This makes the interpretation of assessments of one stock affect the interpretation of assessments of the other. This is the first year for which the working group has completed an analytical assessment in the eastern Atlantic and Mediterranean Sea. Without adequate data meaningful assessment is impossible. However, even with better data than presently available, more scientists with knowledge of the fisheries of the eastern stock will be required. They must be capable of conducting independent analysis. The Committee therefore recommends that for the eastern and western stocks, common meetings be held to review new data, separate meetings be held to develop stock independent parameters and common meetings again held to discuss stock status and assessment results.

Concern over the possible scale of the error caused by incorrect substitutions in the catch-at-age table has led the working group to recommend that the Secretariat prepare software 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 Eastern Atlantic and Mediterranean

The Committee has repeatedly expressed grave concern that basic information on catch and size composition is not available. Without such information the Committee may not be able to provide advice to the Commission, especially for the youngest ages, which account for the majority of the catch. The Committee urges in the strongest possible manner that a long-term data collection program be initiated, especially for the Mediterranean area, to improve information from bordering countries, especially those countries not normally submitting data.

The Committee recommends cooperation with the General Fisheries Council for the Mediterranean (GFCM) and participation by the Secretariat and scientists from member nations in the 1990 analyses proposed by the GFCM on bluefin in the Mediterranean.

#### BFT-4.1.b Western Atlantic

Concern was expressed that little is known on the size or exact species composition of the reported bluefin catch from the Dominican Republic. This could represent a significant portion of the nominal catch in number if these are smaller fish than previously believed. The Secretariat should endeavor to acquire the necessary data to determine the size composition of the bluefin catch.

### BFT-4.2 Research

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.

The working group recommends continued examination of assessment methodology; including weighting procedures, partial recruitment patterns and sensitivity to the variability found in the indices.

To permit evaluation of the quality of abundance indices the data should, as a general rule, be presented at the lowest level of aggregation. Work should continue to develop additional age-specific indices, particularly on adult fish.

#### 4.2.a Eastern Atlantic and Mediterranean

An investigation should be carried out to study the effect of the use of spotter aircraft in the French purse seine fisheries and the resulting abundance indices.

#### 4.2.b Western Atlantic

A review should be conducted on the U.S. larval bluefin index, specifically regarding the development of the index from the basic survey data.

An evaluation of the impact of current regulations should be made. Sensitivity analysis would be an important part of this work.

### BFT-4.3 Management

#### 4.3.a Eastern Atlantic and Mediterranean

Due to the uncertainty surrounding this first analytical assessment of eastern bluefin tuna, the Committee advises no changes in the existing management measures.

#### 4.3.b Western Atlantic

This year's analysis is generally compatible with recent assessments. In 1984, it was advised that present catch levels were "likely to stop the decline of the stock as well as allow stock increases in the long-term (30 years)." This year's analysis results are compatible with that advice. 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).

Our analysis continues to indicate that increases in allowable catch are not advisable at this time. There does appear to be a continuing improvement in the abundance of the youngest age groups since the inception of the management program in 1982. However, the abundance of medium-sized fish (6 to 9 ages), which will form a major part of the adult group in the

next four years, has remained relatively constant. Therefore, catches of adult fish, at the present level of fishing mortality, will cause the decline of this group to continue at least for the near-term.

Because of uncertainties associated with the estimates, levels of monitoring should not be changed at present, and future changes should depend on an evaluation of the impact of current regulations.

## 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, Caribbean Sea, and tropical Atlantic for tuna and swordfish have been reported by various nations. Because these areas are known to have significant concentrations of billfishes, increased incidental catches of these species can be expected.

### BIL-2. STATE OF THE STOCKS

A new 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, except for eastern Atlantic sailfish, 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 19) increased rapidly from 1960, reaching a peak of more than 9,000 MT by 1963. Landings general-



ly 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.

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. An updated analysis of Japanese CPUE data was presented to the SCRS in 1988 but was limited to the years 1977-1986 because the fishing gear and fleet deployment pattern was significantly different in earlier years. Catch-per-unit-effort has stabilized since 1977 but at a low level compared to earlier years. However, until CPUE's are standardized for such factors as fishing pattern, target species, and gear selectivity (particularly depth of fishing), the significance of the decrease in these data will remain uncertain. The same series of the CPUE (1977-1986) by North and South Atlantic indicated higher values in the North Atlantic (Figure 28-A).

A new 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.

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 increase or stabilization in standardized recreational CPUEs over the past decade (U.S. and Venezuela). However, continued low levels of Japanese longline CPUE (not fully standardized) and the recent expansion of longline fisheries by numerous countries (principally U.S. and Mexico), as well as recreational fisheries, in areas of blue marlin abundance (Gulf of Mexico and Caribbean Sea) reinforce some of 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 20) increased rapidly from 1960 to almost 5,000 MT by 1965. Landings generally declined since then, fluctuating between 900 and 1,600 MT in the last 10 years.

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). An update of the Japanese longline CPUE indices (not fully

standardized) indicated low, but relatively stable, CPUE levels during the period 1977-1986. 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 28-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 continuing low level of Japanese longline CPUE (not fully standardized), 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 21) 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 3,700 MT by 1986. Preliminary estimates for 1987 were around 3,600 MT. However, information presented during the 1988 SCRS strongly suggests that Task I data are underestimating landings for several important long-line fleets. In addition, the majority of the catch is reported separately by eastern and western Atlantic.

#### BIL-2.3.a Western Atlantic

Catch-per-unit-effort data from the Venezuelan recreational fisheries were presented 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 Eastern 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 29). Standardized recreational CPUE from Senegal was stable from 1970-1980, then declined gradually through 1986 (Figure 29). 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 30) 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.

### BIL-4. RECOMMENDATIONS

#### BIL-4.a Statistics

The Committee recommends:

- i) That accurate estimates of total landings (Task I data) be made for Atlantic marlin and sailfish. In addition, billfish landings from non-ICCAT reporting nations 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 interim 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 in Ghana, other West African countries, and Caribbean countries be obtained.
- v) That sailfish/merlin discards for historical longline and more recently developed fisheries, such as tropical purse seine and Spanish longline fleets, be evaluated.

#### BIL-4.b Research

The 1989 Program Plan (Appendix 5 to Annex 10) describes recommended research. In addition, general recommendations of the Committee are:

- i) That age and growth studies of marlins and sailfish be continued.
- ii) That commercial and recreational fisheries data for billfishes be further analyzed to determine indices of abundance which account for changes in the effectiveness of fishing effort.

- iii) That the establishment of the ICCAT billfish tagging program be urged (SCRS/88/28). Research evaluating the survival of released billfish should be initiated.
- iv) That research be conducted to standardize effort for all high seas longline fisheries so that changes in CPUE can be evaluated. Gear type and gear deployment for fisheries catching billfish should be described.

#### 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. In the North Atlantic, swordfish concentrations have been commercially exploited on both sides of the Atlantic for a long period of time. Recently, U.S. and Spanish swordfish longline fisheries have expanded to the east and west, respectively, overlapping in the central North Atlantic. Catch and effort information from those fisheries indicates a continuous distribution from east to west in the high latitudes of the North Atlantic. In tropical waters swordfish are caught by tuna longline fisheries from west to east almost continuously. Swordfish are believed to spawn in tropical waters although there is also a spawning area in the Mediterranean Sea. In the South Atlantic, swordfish harvests by longline fisheries indicate concentrations off Brazil and in 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 has increased since the mercury content control was eased in 1978, reaching a peak catch of 17,700 metric tons (MT) in 1987 (Table 22 and Figure 31). Longline gear deployed at night is the principle fishing method. Spanish and U.S. swordfish longline fisheries dominated landings in 1987, with 9,100 MT (53 percent) and 4,830 (28 percent), respectively (Table 22). These landings combined with Canadian (880 MT) and Japanese (730 MT) catches, account for more than 90 percent of the total North Atlantic swordfish catch. In the South Atlantic, the annual catch showed an increasing trend from 1980 to 1985 (8,800 MT) decreasing somewhat in 1986 (5,900 MT) and 1987 (6,100 MT). More than 94 percent of the catch was taken by the longline fisheries of several countries, with the highest catch by Japan (3,080 MT), followed by Brazil (920 MT), Cuba (740 MT), and Uruguay (700 MT). Swordfish catches in the Mediterranean Sea increased sharply in 1984-1986, mainly due to the increase in the Italian catch. The 1986 total Mediterranean catch exceeded 10,000 MT

with a repetition of 1985 preliminary estimates of the Italian catch. In the Mediterranean, 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 developed at the 1987 Workshop was reviewed. Catch at size was updated with 1986 and 1987 data, and raising procedures for the data substituted by Japanese size data were revised using new Japanese Task I estimates. These revisions were more significant for the South Atlantic than for the North Atlantic. These corrections resulted in catch-at-size tables which were different from the 1987 Workshop.

The growth equation was refit to mark-recapture data using 19 additional observations, most from recent recaptures. The revised curve indicates slower growth earlier in life and a subsequent higher asymptotic weight. A re-estimation of catch-at-age data was made using the revised fisheries data and the newly-developed growth curve for the designated swordfish areas (see 1988 Workshop Report). Catch-at-age tables which were used for virtual population analyses are given in Table 23 for the North Atlantic and in Table 24 for the South Atlantic.

A review was made of the information supporting the single-stock or multi-stock hypotheses for the North Atlantic. At the 1988 Workshop, fifteen additional recoveries of tagged fish were reviewed and these continued to show the same movement patterns as in previous tagging studies (i.e., extensive north-south movement in the western North Atlantic and only limited east-west movement (see third recommendation of the Workshop, below). The 1988 Workshop concluded that although the available data do not permit a clear choice between the one- or two-stock hypotheses, it is reasonable to consider all North Atlantic swordfish as a single group for assessment, as the 1987 Workshop recommended. The Committee proceeded with assessments on the North and South Atlantic. An assessment for the Mediterranean was not possible because updated Mediterranean landings and size samples were not available.

The Workshop examined 17 standardized CPUE indices for tuning VPA's. The indices were developed from Japanese catch and effort data in the North and South Atlantic, from U.S. data in the western North Atlantic, and from Spanish and U.S. data in the western and eastern North Atlantic. Analytical assessments were conducted using accepted virtual population analysis techniques (See Section 8 of the 1988 Workshop Report, contained in Col. Vol. XXIX).

Trends in stock size, number of spawners (age 4+), and fishing mortality rates were developed from the VPA analyses. However, the Workshop was concerned about the regular increases in the entire Atlantic and particularly noticeable in the North Atlantic, over the 10-year period, in the estimated population sizes for ages 1, 2 and 3 and age 0. Although biologically possible, these increases seem unrealistic and cast doubt on the validity of the VPA results. Concern was also expressed over the divergent trends between the catch-at-age estimates and the indices of abundance

derived from the directed swordfish fisheries (U.S. and Spain). The unrealistically high levels of fishing mortality needed to reconcile these trends cast additional doubt on the validity of the VPA results. These problems were discussed at length but a lack of time prevented further detailed investigations of possible biases in the data and/or analyses.

Despite these concerns, the Committee felt that useful information was obtained from the Workshop on levels, trends and fishing mortality of small fish (ages 1-3) and spawners (age 4+) from estimates of VPA. The results are summarized as follows:

#### North Atlantic

Under the assumption that the Japanese CPUE index represented ages 4-10 for the North Atlantic, fishing mortality rates of both the fully recruited and the younger fish are shown to have increased markedly over the 1978-1987 period. Population size of the fully recruited ages (5+) declined approximately 50 percent over this period. Sharper declines are apparent in the older age groups, as expected under heavy exploitation. At age 4, all males and approximately 50 percent of females are mature. Thus, the age 4+ group may be considered as the major portion of the spawning stock. This age group declined by 32 percent over the period. Recruitment (age 1) has increased steadily, especially in recent years (Figure 32).

Under the assumption that the Japanese CPUE index represented ages 5-10 for the North Atlantic, fishing mortality rates have also increased for nearly all ages but the increases are much more modest than those associated with the ages 4-10 assumption. Population size of the fully recruited ages (5+) declined by approximately 28 percent over the 1978-87 period. The number of fish in the spawning stock has declined by some 6 percent. Sharp increases in recruitment are indicated over the entire period (Figure 33).

#### South Atlantic

For the South Atlantic stock fishing mortality rates have also increased for all ages during the 1978-1986 period, particularly in 1984-1986. The population size of fully recruited fish (6+) was stabilized during 1978-1985, but declined in 1986 to about the 60-percent level. On the contrary, young recruitment showed an increase in 1986 (Figure 34).

#### SCRS Evaluation of 1988 Swordfish Workshop

The SCRS recognized that the Workshop successfully revised, corrected and updated the Atlantic catch-at-size data base through 1987, revised the mark-recapture growth equation, reviewed CPUE indices, and conducted the first VPA analysis of North and South Atlantic data bases. Unfortunately, the Workshop could not conduct a VPA analysis for the Mediterranean because of incomplete catch and size data for the major fishing nations. The Workshop also could not develop yield-per-recruit or surplus production analyses due to uncertainties in the VPA results and to the lack of time. The concerns expressed by the Workshop participants relating to the reliability of the VPA results (mentioned in the previous section) suggest that short-

term and longer-term research projects are needed to improve the reliability of analytical assessments of Atlantic swordfish. Longer-term research projects are listed in Section 4. The SCRS recommends the following short-term research projects:

- 1) Investigate the accuracy of the catch-at-size data base revised in 1988 by comparing the analytical procedures used by major swordfish fishing nations to estimate catch at size. Evaluate the accuracy of the different procedures to establish unbiased standardized methods.
- ii) Develop age-specific CPUE indices to compare against catch-at-age trends. This will require detailed size composition and fishing effort information which will allow seasonal growth to be accounted for. The use of standard statistical procedures, such as generalized linear modeling, is strongly suggested.
- iii) Evaluate tag-recapture data with respect to seasonal-geographical distribution patterns of fishing effort and catch.

#### SWO-3. EFFECTS OF CURRENT REGULATIONS

There are no ICCAT regulations in effect for this species.

#### SWO-4. RECOMMENDATIONS

##### SWO-4.a Statistics

- 1) 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 adequate levels 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. If catch at size cannot be submitted, landings and size composition data by gear, month, and ICCAT swordfish area should be submitted. Size measurements should be kept in the smallest increments possible.
- iv) Mediterranean fishing nations are encouraged to submit data to correct the under-reporting of landings and inadequate size samples that have prevented analysis of Mediterranean harvests. In this respect, the SCRS welcomed the offer made by GFCM to collaborate in improving Mediterranean statistics and carrying out sampling on highly migratory species and assured that ICCAT would be involved in the stock assessment meeting proposed by GFCM.

##### SWO-4.b Research

- 1) Emphasis should be placed on developing validated growth models. Estimated growth rates based on hard parts, modal analysis and mark-recapture should be updated and compared.

## ii) 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 determine 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 and 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 must be evaluated.

iii) 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 investigated for patterns in distributions which might provide information on mixing rates.

iv) Scientific tagging should be intensified to refine the growth model and to help resolve the question of stock structure. Tagging by commercial fishermen should be encouraged.

## SWO-4.c Management

No management recommendations were presented. However, the Committee was somewhat concerned about the preliminary estimates of high fishing mortality, despite the uncertainty resulting from the analysis. The Committee also expressed the need to complete the work of analytical assessment, but accomplishment of the short-term research recommendations is required.

SBF - S O U T H E R N B L U E F I N

## SBF-1. DESCRIPTION OF FISHERIES

Southern bluefin tuna 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. As the fish 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 30 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 indicated an interest in harvesting this species by handline gear in its coastal waters, although the catch amount has been very small. In 1987, catches were 15,000, 10,800 and 50 MT for Japan, Australia and New Zealand, respectively. As far as the Atlantic Ocean is concerned, southern bluefin tuna are caught by the Japanese 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 25), reflecting the shifts of the Japanese longline fishery between the Atlantic and Indian Oceans.

#### SBF-2. STATE OF THE STOCK

At the Seventh Tripartite Meeting of Japan, Australia and New Zealand held in Wellington, New Zealand, in August, 1988, the status of the stock was re-evaluated on the basis of updated catch at age, fishing effort and tag release and recaptures. The severe decline in parental biomass from its pre-exploitation level, which had been evident during the previous meetings, was re-confirmed. A further decline of parental biomass was predicted over the next few years, largely due to the high Australian catches of young fish during the early 1980's. It was also estimated that in most of the computer simulations, parental biomass and recruitment would decline further, if current catches are continued. Based on these analyses, the scientific meeting recommended that global southern bluefin catch limits be immediately reduced substantially below current catch levels. The unanimous feeling of the scientists was that the immediate reductions should be at least to the half of the current catches.

#### SBF-3. EFFECTS OF CURRENT REGULATIONS

Since 1971, as a first stock management action, Japanese longline fishermen 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 (from the 1986 season) and 19,500 MT (from the 1987 fishing season), respectively. In 1988, in accordance with the recommendation made at the scientific meeting, the tripartite administrative meeting decided to reduce their catch limits in 1989: 8,800 MT for Japan, 6,250 MT for Australia, and 450 MT for New Zealand.

#### SBF-4. RECOMMENDATIONS

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 other international arrangements.

## SMT - S M A L L T U N A S

### SMT-1. DESCRIPTION OF FISHERIES

Small tunas are mainly exploited by coastal artisanal fisheries. Around ten species make up this category, but only four of them represent more than 85 percent of the total weight; they are Atlantic bonito, Atlantic black skipjack, frigate tuna and spotted Spanish mackerel (including Serra Spanish mackerel). 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 (Figure 26). The catches of other species remained stable during the period. Since 1984, the total catches have once again been stable at around 90,000 MT (Table 26). The 1987 catch data are incomplete as statistics have not been available for 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 composition of reported catches. Some new fisheries have developed, principally artisanal fisheries in the Antilles.

### SMT-2. STATE OF THE STOCKS

The stocks of small tunas are generally coastal and management of stocks at the local level is easier than managing stocks of large, deep-water tunas. However, current available information does not allow us to draw any conclusions on the state of these stocks. It is probable, however, that some stocks are under-exploited.

Stock evaluations of Scomberomorus spp. were carried out in 1987 for the United States Exclusive Economic Zone and the results have led to production quotas being put into effect for this species.

### 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" was approved and is in effect in the U.S. EEZ. It provides for a total allowable catch (TAC) for Scomberomorus spp. These TACs are divided by area and between the commercial and sport fisheries. The TACs and the allocations are adjusted each year. Due to the regulations, fishing mortalities are estimated in relation to the stock size, but these studies were not available to the SCRS.

### 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 continue to be estimated.
- iii) That efforts be made by member countries to report catch statistics by species and gear.

#### SMT-4.b Research

The Committee recommends:

- i) That studies be made to provide or to complete biological data (area and time of reproduction, growth, etc.) of the main small tunas species, especially in areas where important fisheries exist.
- ii) That studies be carried out aimed at defining the size and structure of the stocks, as well as the migratory schemes of the species. Tagging cruises would be interesting for this type of study.
- iii) That studies be continued on the ecology of small tunas in general and their association with juvenile tunas in the schools.
- iv) That a method for estimating fishing effort be studied, in order to measure the effective fishing intensity applied to these species, often caught at the same time as the target species.
- v) That studies related to stock evaluation of small tunas be carried out as far as possible and the results be communicated to the SCRS.

#### SMT-4.c Management

The Committee has no recommendation for management of the small tuna stocks.

### MLT - MULTI - SPECIES INTERACTIONS

This year no document was presented to the Committee which dealt explicitly with this subject. Multi-species interactions is still, however, a very important problem in interpreting abundance indices from the fishery data, and in evaluating the state of stocks of several species.

The longline fisheries have operated for the last thirty years with many changes in fishing strategies, resulting in time-area concentrations of quite variable fishing effort, and in modifications in the depth of the lines related to the changes in target species.

This generalized use of deep longlines was observed for different fleets, particularly those of Japan and Korea, and it makes the interpretation of the CPUE difficult. For example, the CPUE of sailfish would be very low with a deep longline, as this species inhabits an area limited to the surface layer. A similar problem exists in interpreting sailfish catch rates as they differ depending on whether the longlining is done by day (high CPUE) or by night (low CPUE). These biases can in some cases be partially corrected, but serious doubts remain on the validity of the corrections made, in particular because the rate of using deep longline is not well known for many longline fleets.

As the surface fisheries are also of a multi-species nature, there are analytical problems in interpreting surface fleet CPUE data. This problem is posed, for example, in interpreting the yellowfin CPUE data for the eastern Atlantic. The current analyses clearly indicate that, in 1984 and perhaps in 1986-1987, intertropical purse seine fishing effort was transferred to skipjack. This change in fishing strategy resulted in changes in yellowfin and skipjack catch rates which are not related to fluctuations in the stock biomass. This problem is being analyzed within the framework of the research for the Yellowfin Year Program.

#### Item 10. REVIEW OF THE PROGRESS MADE BY THE YELLOWFIN YEAR PROGRAM

The Committee reviewed the work schedule given in the Report of the Data Preparatory Meeting (see Col. Vol. XXIX). The Activity Team Leaders met during this session to review the progress made since that meeting and to modify the schedule, if necessary. The Report of the Team Leaders was later presented and approved by the Committee and is attached as Appendix 6 to this Report.

#### Item 11. REVIEW OF THE PROGRESS MADE BY THE ENHANCED BILLFISH RESEARCH PROGRAM

The Program's Coordinator, Dr. B. Brown, summarized the substantial progress made by the Commission on the Program during 1988 (SCRS/88/10). The Committee reviewed and adopted the report (Appendix 4 to Annex 10). Dr. Brown also presented the draft Program Plan for 1989, including the estimated budget to carry out the plan. The eastern Atlantic coordinator, Mr. T. Diouf, emphasized the importance of the eastern Atlantic for the Billfish Program, as regards billfish abundance and the fishery.

A small group of scientists directly involved in the Program was formed. The Group reviewed the draft Program Plan for 1988 and revised version was presented at a later SCRS Session. The Committee endorsed the plan and recommended that the Commission approve it and make the necessary funding arrangements. The Program Plan for 1989 is attached as Appendix 5 to Annex 10.

#### Item 12. 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. The Committee expressed its appreciation for the

work achieved by the Convener and the Sub-Committee members. The Committee adopted the report and concurred with all the recommendations contained therein, as well as the priorities set forth in Addendum 2 to the report. The Report of the Sub-Committee is attached as Appendix 9 to Annex 10.

### Item 13. REVIEW OF EDITORIAL AND PUBLICATION POLICY

The Committee noted that a review had been made by the Sub-Committee on Statistics concerning statistical and scientific publications. It concurred with and endorsed all the recommendations made by the Sub-Committee regarding publications.

### Item 14. REVIEW OF FUTURE SCRS RESEARCH PROGRAMS AND CONSIDERATION OF SCRS MEETING PROCEDURES

The Committee discussed the SCRS meeting organization and intersessional meetings.

Intersessional meetings. Three proposed intersessional meetings were identified for 1989: (1) The final meeting of Yellowfin Year Program in Madrid in May, 1989; (2) a data preparatory meeting for the albacore long-line fishery; and (3) an albacore workshop. After some review, the Committee recommended that the Commission endorse these intersessional meetings. The albacore data preparatory meeting is tentatively scheduled for July, 1989, at the National Taiwan University, and the albacore workshop is tentatively scheduled for September, 1989, at the ICCAT Headquarters.

The observer from the European Community expressed his concern that too few stock assessments have been carried out on albacore and noted the possibility of the EC's developing a program to study albacore in collaboration with ICCAT.

Swordfish assessment. The Committee Chairman recognized that the 1988 Swordfish Workshop could not complete all stock assessment work, pending further studies. The Commission decided that the countries involved should work together during the year through correspondence to achieve the short-term research items recommended at this time. One extra day would be required to make some stock analyses during the 1989 species rapporteurs meeting (4 days in total).

Bluefin assessment. The Committee noted the extensive work load and tension under which scientists have to work on the stock assessment of the bluefin tuna. Some concerns were also expressed over the lack of communication between the SCRS Plenary and the bluefin group before the report is finalized.

The separation of analysis of east and west bluefin was discussed, but the matter was left to the bluefin group to decide.

A suggestion was made to hold an informal meeting (prior to the SCRS species groups meeting) of bluefin scientists to carry out some preliminary

analyses needed before the final stock assessment for west bluefin tuna is done.

The Committee was informed that by mid-September the bluefin catch-at-size data base for the western Atlantic could be completed. As financing travel costs would be difficult for the governments involved, the Committee recommended that when the data base for the western Atlantic is completed by the Secretariat, it be circulated to the laboratories. The national scientists could individually develop some preliminary analyses through frequent communication among themselves. The bluefin rapporteurs can then bring all the computer outputs on the western Atlantic to the meeting to be held two days before the general species group meetings (five days in total).

The use of the telefax and satellite data communication was also discussed as a possibility to expedite such activities. The Committee recommended that the possibility of satellite data communication be studied further by the Secretariat.

1989 SCRS meeting. The SCRS Chairman proposed that the 1989 SCRS sessions be held for eight days (five days with simultaneous interpretation) with the understanding that the bluefin group will start its meeting two days earlier than the general species groups, and the swordfish group will start one day earlier. The Chairman noted the importance of the scientific committee discussing a different, specific topic each year, in addition to the subjects generally reviewed. For example, in 1989, a half-day session could be devoted to a special topic, such as the environment/tuna relationship. It has become more and more apparent to the SCRS that variations in oceanic environment can have significant effects on the species and serious effects on stock evaluations. This problem, which potentially concerns all the species, has already been the subject of several pertinent studies within the SCRS and it would be convenient to coordinate and develop the research.

The Chairman's suggestion to hold a half-day session on the relationship between the environment and tuna stocks was supported by various scientists. The possibility of establishing a Sub-Committee on Environment was also suggested by France. The Committee decided to hold a half-day session in which various alternatives could be discussed for future consideration by the Committee to improve environmental studies.

It was agreed that the general species group meet from Wednesday to Friday, and that the SCRS Plenary Sessions be held from Monday to Friday of the following week, in Madrid, hopefully in November, prior to the Commission meeting.

#### Item 15. COOPERATION WITH OTHER ORGANIZATIONS

The Committee noted that the Sub-Committee on Statistics reviewed this aspect for 1988 as well as for the future (Appendix 9 to Annex 10) and concurred with all the recommendations made by the Sub-Committee.

#### Item 16. RECOMMENDATIONS

The Committee wishes to draw the attention of the Commission as well as the Panels to various recommendations concerning statistics, research and management of tuna species which can be found in Section 4 of each of the respective species sections of Agenda Item 9 of this Report and in the Report of the Sub-Committee on Statistics (Appendix 9 to Annex 10).

The Committee also wishes to draw the attention of the Commission to the recommendation to hold various Inter-Sessional meetings, as well as to the Billfish Program Plan for 1989, request for the expansion of computer facilities, various plans to improve statistics, publications, and collaboration with other organizations.

#### Item 17. OTHER MATTERS

No other matters were discussed.

#### Item 18. ELECTION OF CHAIRMAN

Mr. J. B. Amon-Kothias (Cote d'Ivoire) was asked to chair the election of the SCRS Chairman. He first praised the excellent work of the present Chairman, Mr. A. González-Garcés. He opened the floor for nominations for Chairman for the next period, in accordance with the procedures established for elections. The U.S. delegate nominated the current Chairman for re-election. This proposal was seconded by France and by all the countries present. Mr. González-Garcés was unanimously re-elected.

The re-elected Chairman expressed his appreciation for the support of the Committee and promised to put forth his best efforts to assure further scientific advancement of the SCRS.

#### Item 19. ADOPTION OF REPORT

After introducing some minor modifications, the SCRS Report was adopted.

#### Item 20. ADJOURNMENT

In his closing remarks, the SCRS Chairman expressed his appreciation to the Secretariat staff, especially for the efficient translations, reception, and document reproduction. He also thanked the interpreters for their efficient work. Mr. González-Garcés expressed his thanks to the scientific committee for its hard work and noted that the SCRS scientists all work towards a common goal, which is to improve our knowledge on tunas and tuna-like species.

The SCRS Chairman then closed the Nineteenth Session of the Standing Committee on Research and Statistics.

Table 1. Atlantic yellowfin catches (1,000 MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>TOTAL</b>	<b>40.4</b>	<b>37.0</b>	<b>40.9</b>	<b>59.1</b>	<b>58.1</b>	<b>64.9</b>	<b>69.3</b>	<b>60.1</b>	<b>36.8</b>	<b>60.2</b>	<b>83.0</b>	<b>92.7</b>	<b>73.4</b>	<b>75.2</b>	<b>83.5</b>
<b>EAST ATLANTIC</b>	<b>24.3</b>	<b>38.6</b>	<b>52.0</b>	<b>51.0</b>	<b>38.3</b>	<b>42.3</b>	<b>47.3</b>	<b>54.4</b>	<b>43.3</b>	<b>52.6</b>	<b>73.7</b>	<b>80.6</b>	<b>59.2</b>	<b>57.5</b>	<b>70.2</b>
—SURFACE	10.3	5.9	11.4	10.0	10.6	19.1	28.4	16.0	30.7	33.3	51.9	59.8	43.1	42.0	60.1
<b>SAITBOAT</b>	<b>10.3</b>	<b>5.8</b>	<b>11.2</b>	<b>8.8</b>	<b>10.6</b>	<b>17.8</b>	<b>21.1</b>	<b>18.5</b>	<b>15.1</b>	<b>16.8</b>	<b>22.1</b>	<b>19.6</b>	<b>9.6</b>	<b>10.6</b>	<b>13.1</b>
Angola	2.0	1.3	2.3	2.0	1.8	2.1	3.6	1.9	1.3	0.9	1.1	0.4	0.3	0.3	0.6
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
FIS.	8.3	4.5	5.9	7.8	6.1	12.3	13.2	12.7	13.1	14.4	18.6	14.0	7.4	7.4	7.4
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	++
Japan	0.0	0.0	0.0	0.0	1.7	0.9	2.1	1.3	0.3	1.3	1.2	1.0	0.8	1.0	3.5
Morocco	0.0	0.0	0.0	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	0.4
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
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	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
<b>FURSE SEINE</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.3</b>	<b>7.2</b>	<b>8.3</b>	<b>15.7</b>	<b>18.7</b>	<b>29.7</b>	<b>44.3</b>	<b>33.4</b>	<b>32.2</b>	<b>46.9</b>
Canada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.6	0.7	0.7	0.9	0.2	++	0.0
Cayman Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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	0.4	0.0
FIS.	0.0	0.0	0.0	0.0	0.0	0.8	3.8	6.5	8.9	9.0	12.7	14.4	16.6	18.6	23.8
Ghana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	0.0	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	2.3
Morocco	0.0	0.0	0.0	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	0.0
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
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Spain	0.0	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	5.6
U.S.A.	0.0	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
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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
<b>OTHER SURFACE GEAR</b>	<b>++</b>	<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>0.1</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>++</b>	<b>0.0</b>	<b>++</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>
Angola	++	0.1	0.1	0.2	0.3	0.1	++	++	++	++	0.0	++	0.1	0.1	0.1
Bentin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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
Sao Tome	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St. Helena	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>TOTAL</b>	<b>94.7</b>	<b>106.8</b>	<b>134.6</b>	<b>123.1</b>	<b>128.7</b>	<b>130.5</b>	<b>124.8</b>	<b>125.4</b>	<b>151.2</b>	<b>159.8</b>	<b>180.4</b>	<b>111.5</b>	<b>149.8</b>	<b>131.9</b>	<b>124.2</b>
<b>EAST ATLANTIC</b>	<b>79.8</b>	<b>92.2</b>	<b>108.1</b>	<b>109.3</b>	<b>115.3</b>	<b>115.7</b>	<b>111.7</b>	<b>112.4</b>	<b>134.8</b>	<b>134.3</b>	<b>123.4</b>	<b>75.4</b>	<b>112.6</b>	<b>106.7</b>	<b>101.3</b>
—SURFACE	39.3	72.0	92.7	96.6	99.7	104.5	105.0	99.9	126.9	124.4	117.3	66.6	105.0	101.2	97.9
<b>SAITBOAT</b>	<b>14.7</b>	<b>19.7</b>	<b>9.6</b>	<b>12.0</b>	<b>10.9</b>	<b>9.0</b>	<b>13.7</b>	<b>7.6</b>	<b>9.8</b>	<b>13.2</b>	<b>11.5</b>	<b>13.7</b>	<b>16.1</b>	<b>15.1</b>	<b>16.5</b>
Angola	0.6	0.0	0.1	1.0	1.9	2.0	0.8	0.3	0.7	1.4	0.7	0.2	0.3	0.1	0.1
Cape Verde	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
FIS.	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
Ghana	0.1	0.3	0.7	0.8	0.6	0.3	1.2	1.7	2.5	3.6	5.0	5.5	8.9	8.2	8.9 <sup>pm</sup>
Japan	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
Morocco	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
Norway	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
Portugal	0.0	0.0	++	++	0.0	0.0	0.0	++	0.0	++	++	0.2	++	++	++
South Africa	0.0	++	++	0.0	0.0	0.0	3.0	0.3	0.3	++	0.3	0.7	0.3	++	++
Spain	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
<b>FURSE SEINE</b>	<b>44.5</b>	<b>53.1</b>	<b>83.0</b>	<b>83.6</b>	<b>88.3</b>	<b>94.6</b>	<b>89.9</b>	<b>21.8</b>	<b>111.7</b>	<b>107.9</b>	<b>101.9</b>	<b>50.5</b>	<b>87.4</b>	<b>83.8</b>	<b>78.3</b>
Canada	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
Cayman Islands	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
Congo	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
Cuba	0.4	0.4	0.3	0.6	0.1	0.4	0.6	0.2	0.4	0.1	0.3	0.3	0.4	0.6	0.0
FIS.	26.2	31.9	43.0	46.3	48.3	48.0	43.2	47.0	46.9	39.5	36.1	4.4	9.5	13.1	13.5
Ghana	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.2	3.0	4.2	2.7	2.5	3.7	3.6	1.0
Japan	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
Morocco	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	4.0
Norway	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.0
Portugal	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.2	0.9	1.3	0.3	0.0	++	0.0
South Africa	++	++	++	0.1	0.1	0.1	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	13.3	14.0	13.7	23.2	33.3	33.4	33.9	38.7	51.3	53.8	51.2	37.5	64.0	59.5	60.2 <sup>m</sup>
U.S.A.	3.0	5.6	14.0	1.7	6.4	9.1	2.9	1.6	1.5	0.8	0.0	0.0	0.0	0.0	0.0
U.S.S.R.	0.0	0.0	0.0	0.1	0.0	0.1	6.1	++	0.1	0.9	1.2	1.8	3.4	1.4	0.7
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
MEXICO	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	0.0
<b>OTHER SURFACE GEAR</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.4</b>	<b>0.9</b>	<b>1.4</b>	<b>0.6</b>	<b>5.3</b>	<b>3.2</b>	<b>3.9</b>	<b>2.4</b>	<b>1.5</b>	<b>3.3</b>	<b>2.8</b>
Angola	++	++	3.0</												





Table 1. (Cont.)

	1950	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
--LONGLINE - Cont.															
Cuba . . . . .	0.0	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
Japan . . . . .	13.2	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
Korea . . . . .	0.0	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
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
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
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
U.S.A. . . . .	0.0	0.1	0.0	0.0	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.5	1.9
--UNCL. GEARS . . . . .	1.3	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
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barbados . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bermuda . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grenada . . . . .	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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
Neth. Antilles . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2
St. Lucia . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++
Trinidad . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	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
Venezuela . . . . .	1.0	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
UNCL. REGION . . . . .	0.0	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
--SURFACE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--LONGLINE . . . . .	0.0	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
China-Taiwan . . . . .	0.0	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
--UNCL. GEARS . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
--LONGLINE - Cont.															
Cuba . . . . .	0.0	0.4	0.6	1.2	0.9	0.7	0.2	0.7	2.0	1.5	0.0	2.5	1.9	0.5	0.0
Japan . . . . .	2.5	2.0	2.4	3.1	1.4	1.6	1.7	1.1	3.0	3.3	1.2	1.0	2.2	2.1	2.5
Korea . . . . .	4.5	3.4	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
Mexico . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.6	0.0	0.6	0.5	++
Panama . . . . .	2.0	1.1	1.2	1.3	0.6	0.7	0.0	0.0	0.3	0.7	0.1	0.2	0.0	0.3	++
Uruguay . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.4	0.4	0.3	0.1
U.S.A. . . . .	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
Venezuela . . . . .	1.9	1.2	0.6	0.6	0.0	1.3	1.0	1.0	1.0	0.5	1.2	1.7	1.6	0.9	0.6
--UNCL. GEARS . . . . .	0.3	0.4	0.4	0.7	0.6	0.5	0.4	0.7	0.5	0.6	0.4	0.5	0.5	0.9	++
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	++	++	++
Barbados . . . . .	0.0	++	0.1	0.1	0.1	0.1	0.1	++	++	++	0.1	0.1	0.1	++	0.0
Bermuda . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	0.0
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grenada . . . . .	0.1	0.1	0.1	0.1	0.4	0.2	0.1	0.5	0.1	0.1	0.2	0.1	0.2	0.5	0.0
Mexico . . . . .	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
Neth. Antilles . . . . .	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
St. Lucia . . . . .	0.1	0.1	0.1	0.1	0.1	0.1	++	++	++	++	++	0.1	0.1	0.1	0.0
Trinidad . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.1	++	++	++	0.0	0.0	0.2	0.0	0.0	++	++	0.0
Venezuela . . . . .	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNCL. REGION . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--SURFACE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--LONGLINE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China-Taiwan . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--UNCL. GEARS . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

\* Provisional data.  
 \*\* Species composition of the catch was done from sampling of landings at the port of Abidjan assuming that the proportions of species are the same for the local market.  
 \*\*\* 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.  
 ++ Catches: < 50 MT and >= 1 MT

Table 2. Carrying capacity ( $10^3$  MT) of yellowfin and skipjack surface fisheries in the east Atlantic

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987*
--BB																
FISM	2.7	2.1	2.0	1.8	1.5	1.3	1.3	1.4	1.3	1.3	1.3	1.2	1.2	1.1	1.0	.5
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
Spain (Can.)	.6	1.0	1.9	1.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
Angola	.3					.5	.5	.5	.4	.5	.4	.4	.4	.4	.4	.3
Cape Verde									.2	.2	1.0	1.0	1.0	1.2	1.2	1.2
Portugal	.5	.5	.4	.6	.3	.3	.3	.6	.6	.5	.3	.3	.3	.4	1.0	1.2
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	10.7	10.3	10.8	8.6
--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
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
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.	.
Japan	1.9	1.9	.6	.2							.4	.4	.4	.8	.8	.8
U.S.S.R.	.1	.1	.1	.1	.1	.1	.2	1.0	3.0	3.9	4.9	4.9	4.9	5.4	5.4	5.4
Others**	.9	.2	.2	.4	.2	.2	.2	.7	2.9	4.9	10.8	10.2	6.4	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
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
Effort ( $10^3$ searching hours)***	15.3	23.8	24.4	32.1	32.6	24.7	37.1	40.3	56.3	57.4	69.3	73.0	44.4	40.5	37.2	39.5

\*Preliminary

\*\*Ghana (1982-87), Mexico (1983), Congo (1980-81), Gran Cayman (1982-83), Portugal (1979-81), Venezuela (1983).

\*\*\*SCRS/88/48.

Table 3. Percentage in weight of yellowfin less than 3.2 kg in the FIS and Spanish purse seine catches.

Year	FIS PS	Spanish PS
1980	5	8
1981	5	12
1982	9	6
1983	6	8
1984	24	13
1985	7	4
1986	3	6
1987	4	6

Table 4. Atlantic bigeye catches (1,000 MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>TOTAL</b>	<b>4.3</b>	<b>7.7</b>	<b>9.1</b>	<b>17.0</b>	<b>23.1</b>	<b>26.0</b>	<b>23.5</b>	<b>39.2</b>	<b>25.0</b>	<b>24.7</b>	<b>23.0</b>	<b>35.7</b>	<b>41.3</b>	<b>55.0</b>	<b>46.4</b>
<b>--SURFACE</b>	<b>3.8</b>	<b>6.3</b>	<b>8.1</b>	<b>5.8</b>	<b>7.1</b>	<b>10.9</b>	<b>5.7</b>	<b>9.8</b>	<b>5.3</b>	<b>11.5</b>	<b>4.2</b>	<b>12.7</b>	<b>13.9</b>	<b>15.9</b>	<b>13.9</b>
BAITBOAT	3.8	6.3	8.1	5.8	7.1	10.9	5.7	9.8	5.3	11.4	3.8	9.7	10.5	11.6	9.3
Brazil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde	0.0	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
FIS	0.0	0.0	0.0	0.0	0.4	2.4	0.8	+	+	1.7	0.2	2.3	1.4	1.3	1.1
Ghana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	0.0	0.0	0.0	0.0	+	+	0.1	+	+	0.4	0.6	0.3	0.2	0.5	0.9
Korea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Morocco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Panama	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Portugal	3.8	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
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	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
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PURSE SEINE	0.0	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
Brazil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	0.0	0.0	0.0	0.0	0.0	0.0	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
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
FIS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	+	+	1.3	2.4	2.6	2.8
Ghana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.7
Morocco	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.4	0.9
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	0.1	0.2	0.5	0.2
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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
OTHER SURFACE GEARS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
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
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St. Helena	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>TOTAL</b>	<b>56.4</b>	<b>63.6</b>	<b>60.7</b>	<b>44.6</b>	<b>54.1</b>	<b>51.7</b>	<b>45.1</b>	<b>62.7</b>	<b>67.1</b>	<b>72.9</b>	<b>58.4</b>	<b>68.8</b>	<b>74.3</b>	<b>58.6</b>	<b>47.4</b>
<b>--SURFACE</b>	<b>18.5</b>	<b>24.5</b>	<b>19.9</b>	<b>17.2</b>	<b>25.0</b>	<b>23.4</b>	<b>17.9</b>	<b>21.4</b>	<b>25.7</b>	<b>21.2</b>	<b>25.1</b>	<b>27.3</b>	<b>25.7</b>	<b>25.1</b>	<b>18.2</b>
BAITBOAT	17.6	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
Brazil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	0.0	+	+	+	0.0
Cape Verde	0.1	0.1	0.1	0.1	+	0.5	+	+	+	0.1	0.3	0.2	+	+	+
FIS	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
Ghana	+	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*
Japan	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
Korea	0.2	0.5	0.3	0.2	0.5	0.5	0.7	1.3	0.5	0.2	0.0	+	+	0.0	0.0
Morocco	0.0	0.0	+	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	+	0.3	0.1	0.2	0.3	0.1	+	+	+	0.2	0.0	0.0	0.0	0.0	0.0
Portugal	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
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	+	0.1	0.3	0.1	0.1	+	0.1	0.1	0.2
Spain	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
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	0.0
PURSE SEINE	4.9	6.6	5.3	6.9	11.5	8.6	0.0	8.7	15.2	14.0	15.2	16.0	7.9	9.8	5.4
Brazil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	0.0	0.0	0.0	0.0
Canada	0.0	0.0	0.0	+	0.0	0.0	0.0	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
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
FIS	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
Ghana	0.0	0.0	0.0	+	0.0	0.0	0.0	+	0.3	0.4	0.2	0.8	0.5	0.3	+
Japan	0.3	0.2	+	0.0	0.0	0.0	0.0	0.0	0.0	+	+	0.5	0.5	0.3	0.4
Morocco	0.0	0.0	0.0	0.2	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.1	+	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	0.3	0.4	0.1	0.1	0.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	+	0.0	0.0	0.0	0.0
Spain	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
U.S.A.	0.1	0.9	0.1	+	0.3	0.2	0.2	0.2	0.1	0.3	0.0	+	0.0	0.0	0.0
U.S.S.R.	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
Venezuela	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	0.3	1.1	0.2	0.0	0.0	0.0
OTHER SURFACE GEARS	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
Benin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	+	0.0	0.0	0.0	+	+
Brazil	0.0	0.0	0.0	0.4	0.7	0.1	0.1	0.1	0.1	+	+	0.0	0.0	0.0	0.0
Cape Verde	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
Ghana	0.0	0.0	0.0	0.0	0.0	+	0.1	0.1	+	0.0	+	+	0.0		

Table 4. (Cont.)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
---LONGLINE . . . . .	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	29.1
Argentina . . . . .	++	++	0.1	0.2	0.1	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil . . . . .	0.1	0.2	0.1	0.2	0.5	0.6	0.6	0.6	0.5	0.6	0.5	0.7	0.4	0.0	0.7
Canada-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	0.1
Cape Verde . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0
China-Taiwan . . . . .	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
Cuba . . . . .	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	0.0
Japan . . . . .	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	19.3
Korea . . . . .	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
Panama . . . . .	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	0.2
Poland . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	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
South Africa . . . . .	++	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	++	0.1	++	++	0.1	0.0
Spain . . . . .	0.0	0.0	1.5	1.5	1.4	0.0	0.0	0.0	++	0.3	0.1	++	++	++	0.0
Uruguay . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.6	0.7	0.5	0.2	0.2
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.1	0.4	0.3	0.5	0.8
U.S.S.R. . . . .	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
Venezuela . . . . .	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
---UNCL. GEARS . . . . .	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
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	++	0.1
Togo . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	++	++	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.0

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
---LONGLINE . . . . .	0.5	1.5	1.0	11.2	16.0	15.1	17.8	29.4	19.6	13.2	18.8	23.0	27.4	39.1	32.5
Argentina . . . . .	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.4	0.2	0.1	0.3	0.2	0.1	++	0.0
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada-Japan . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China-Taiwan . . . . .	0.0	0.0	0.0	0.0	++	++	++	0.0	0.6	2.2	5.3	7.5	7.6	5.5	5.0
Cuba . . . . .	0.0	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	1.0
Japan . . . . .	0.5	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	16.1
Korea . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	1.9	4.1	2.4	5.7
Panama . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Poland . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portugal . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa . . . . .	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uruguay . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	1.8	1.7	2.2	2.6	2.7	1.6
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
---UNCL. GEARS . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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.

The species composition of the catch was made from samples of landings in the port of Abidjan, supposing that the proportions of species are the same for the local market.

Catches: < 50 MT and > = 1 MT







Table 5. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
UNCL. GEARS - ALL ATL. - Cont.															
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
Neth. Antilles . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Russia . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St. Lucia . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trinidad . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
UNCL. GEARS - ALL ATL. - Cont.															
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
Neth. Antilles . . . . .	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++	++	++
Russia . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St. Lucia . . . . .	0.1	0.1	0.1	0.1	0.1	0.1	++	++	++	++	++	0.1	0.1	0.1	0.0
Trinidad . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	++	0.0	++	0.1	0.3	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
U.S.S.R. . . . .	0.3	0.4	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

\* Provisional data.

\*\* Species composition of the catches was done from sampling of the landings carried out at the port of Abidjan and assumes that the proportions of the species are the same for the local market.

\*\* 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.

+ Catches: < 50 MT and > = 1 MT

Table 6. Atlantic albacore catches (1,000 MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>TOTAL</b>	<b>53.5</b>	<b>54.6</b>	<b>63.0</b>	<b>53.3</b>	<b>77.2</b>	<b>77.5</b>	<b>90.4</b>	<b>90.7</b>	<b>75.0</b>	<b>75.0</b>	<b>71.9</b>	<b>76.3</b>	<b>70.3</b>	<b>83.1</b>	<b>83.4</b>
<b>NORTH ATLANTIC</b> . . . . .	<b>52.4</b>	<b>49.9</b>	<b>52.5</b>	<b>42.5</b>	<b>58.3</b>	<b>60.1</b>	<b>64.4</b>	<b>60.4</b>	<b>47.2</b>	<b>50.8</b>	<b>45.7</b>	<b>47.3</b>	<b>46.2</b>	<b>57.6</b>	<b>65.3</b>
--SURFACE	51.5	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
BAITBOAT	17.6	18.5	18.1	21.1	21.5	20.7	20.4	20.1	16.8	18.3	13.9	14.6	14.4	11.7	8.2
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
France	8.6	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	5.2
Portugal	0.3	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
Spain	8.6	7.3	8.1	12.6	13.1	13.3	13.2	15.1	13.0	13.7	11.6	12.4	12.9	13.9	7.3
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TROLLING	33.9	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	26.3
France	8.6	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	1.7
Spain	25.3	22.6	22.9	11.7	18.4	14.8	15.3	14.2	12.8	19.0	13.0	10.2	11.2	16.3	17.4
OTHER SURFACE GEARS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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
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
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--LONGLINE	0.9	0.6	1.3	0.5	5.8	14.7	15.9	14.7	7.7	5.5	7.7	14.2	18.1	17.5	24.0
Canada-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	1.0	0.0
China-Taiwan	0.0	0.0	0.0	0.0	+	+	0.1	0.1	0.2	0.8	1.9	2.4	4.7	2.5	4.4
Cuba	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.3	0.1	0.0	0.6	+
Japan	0.9	0.6	1.1	0.4	5.7	14.6	15.7	14.3	5.9	4.8	3.3	4.7	5.6	6.2	2.5
Korea	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.5	3.9	1.6	6.8	5.6	7.7	7.5
Pauzans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.6	0.6	0.5	0.2	0.2
--UNCL. + TRAWL GEARS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+
Trinidad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>TOTAL</b>	<b>75.7</b>	<b>72.5</b>	<b>59.4</b>	<b>77.2</b>	<b>75.1</b>	<b>72.2</b>	<b>73.6</b>	<b>61.2</b>	<b>59.2</b>	<b>74.0</b>	<b>67.6</b>	<b>57.6</b>	<b>74.6</b>	<b>70.1</b>	<b>68.6</b>
<b>NORTH ATLANTIC</b> . . . . .	<b>47.0</b>	<b>52.3</b>	<b>61.4</b>	<b>57.3</b>	<b>52.9</b>	<b>46.3</b>	<b>50.3</b>	<b>38.2</b>	<b>34.1</b>	<b>42.1</b>	<b>50.5</b>	<b>28.1</b>	<b>60.4</b>	<b>65.0</b>	<b>25.1</b>
--SURFACE	28.8	37.6	28.7	34.3	32.0	34.3	38.1	28.8	24.3	28.9	34.3	19.6	23.3	20.8	30.1
BAITBOAT	10.1	16.7	19.2	20.4	15.6	11.7	15.9	16.2	11.4	15.9	21.4	8.2	22.8	25.1	10.1
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	+	0.0	0.1	0.1
France	1.1	0.6	0.7	1.1	0.6	0.4	0.2	0.4	0.4	0.2	0.2	+	0.1	0.0	0.0
Portugal	0.9	1.2	0.9	0.6	0.1	0.1	0.1	0.1	0.4	0.3	1.0	0.1	0.0	0.1	0.0
Spain	8.2	14.9	17.6	18.7	14.9	11.3	15.6	15.7	12.6	13.3	19.0	7.4	18.6	14.6	18.2
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	+	+	0.0
TROLLING	18.7	21.0	9.5	13.9	16.5	22.6	22.1	12.6	10.8	13.8	13.6	17.0	10.7	10.1	11.5
France	5.8	7.9	5.0	5.7	6.2	9.4	7.8	3.1	2.5	2.7	2.2	2.8	1.4	2.5	2.6
Spain	12.9	13.1	4.5	8.2	10.3	14.1	14.2	9.5	8.3	10.1	10.6	8.2	8.3	9.2	10.0
OTHER SURFACE GEARS	0.0	0.0	0.0	0.0	+	0.0	0.1	+	0.1	0.2	0.4	0.6	0.2	0.2	0.0
France	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	+	+	+	+	+	+	+	+	+
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	+	0.0	0.0	+	0.1	0.1	+	+	+	0.1	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.1	+	0.0
--LONGLINE	18.1	14.6	12.7	23.0	20.9	14.2	12.2	9.4	9.8	13.2	16.6	19.3	17.1	10.4	4.2
Canada-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	+
China-Taiwan	9.5	9.5	8.1	14.8	13.7	9.3	7.0	7.1	6.6	10.5	14.3	14.9	14.0	24.4	5.5
Cuba	0.0	0.0	0.1	0.1	0.1	0.1	0.0	+	+	0.1	+	0.1	+	+	0.1
Japan	1.3	2.1	1.3	1.3	0.8	0.5	1.2	1.0	1.7	0.8	1.2	0.5	0.5	0.3	0.6
Korea	4.8	2.8	2.8	5.4	5.6	3.0	3.0	0.8	0.9	1.3	0.5	1.4	0.4	0.4	+
Pauzans	2.4	0.2	0.2	1.2	0.6	0.8	0.4	0.2	0.2	0.5	0.4	2.2	0.8	0.3	+
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	+	+	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	0.0	+	+	+	+	0.0
Venezuela	0.0	0.0	0.1	0.1	0.1	0.4	0.6	0.3	0.1	+	0.3	0.4	0.3	0.1	+
--UNCL. + TRAWL GEARS	0.0	+	0.0	0.0	0.0	+	0.0	+	0.0	+	+	0.6	0.0	0.1	0.0
Trinidad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+	2.0	0.6	0.1	0.0
U.S.A.	0.0	+	0.0	0.0	0.0	+	0.0	+	0.0	+	0.0	0.0	0.6	0.0	0.0



Table 6. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
UNCL. REGION . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--SURFACE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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
--LONGLINE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--UNCL. + TRAWL GEARS. .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
UNCL. REGION . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0
--SURFACE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0
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
--LONGLINE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--UNCL. + TRAWL GEARS. .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

++ Catches: < 50 MT and > = 1 MT

Table 7. Atlantic bluefin catch (MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TOTAL	33194	25493	24701	27984	33823	29318	35213	31002	22706	25207	15738	17385	18019	17493	14492
WEST ATLANTIC . . . . .	1207	1570	1032	1620	5799	13838	18679	14171	8090	5940	3176	3012	5466	6591	3940
-PURSE SEINE . . . . .	138	781	277	903	3768	5770	5158	3331	1006	2082	687	1118	4288	3769	2011
Canada . . . . .	0	0	0	0	0	323	579	461	0	0	0	0	1181	935	260
Norway . . . . .	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
U.S.A. . . . .	138	781	277	903	3768	5447	4571	2870	1006	2082	687	1118	3127	2834	1751
-ROD & REEL + SPORT . . . . .	18	30	29	101	380	1162	601	1052	3726	343	619	1008	987	1049	1084
Canada . . . . .	0	14	5	41	40	90	99	94	111	56	180	170	151	88	188
U.S.A. . . . .	18	16	24	60	340	1072	502	958	3615	287	439	838	436	961	896
-LONGLINE . . . . .	72	283	300	373	1351	6558	12410	9469	3085	3126	1665	593	268	1380	339
Argentina . . . . .	0	0	0	0	106	271	204	100	100	60	21	0	0	2	0
Brazil . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
China-Taiwan . . . . .	0	0	0	0	0	0	0	0	0	0	12	7	2	13	7
Cuba . . . . .	0	0	0	0	0	0	0	139	465	2352	1351	468	200	0	0
Japan . . . . .	32	200	339	373	1219	6191	12044	9147	2471	694	272	116	66	1375	321
Korea . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Norway . . . . .	0	0	0	0	0	0	63	4	10	0	0	0	0	0	0
Panama . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A. . . . .	40	83	1	0	26	96	99	79	39	20	9	2	0	++	0
-OTHER & UNCL. GEARS . . . . .	979	476	386	243	300	348	510	309	273	389	205	293	323	383	514
Argentina . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Canada . . . . .	38	79	32	79	137	229	318	81	87	174	101	193	130	59	29
Dominican Republic . . . . .	0	0	0	0	0	0	0	0	0	++	++	++	++	++	++
Mexico . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
Poland . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Lucia . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	**	**	**
U.S.A. . . . .	941	397	354	164	163	119	192	228	186	215	164	180	193	324	462

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
TOTAL	14632	23651	26167	28197	25473	20449	18456	18907	19142	23212	21672	26949	26003	19201	13465
WEST ATLANTIC . . . . .	3971	5510	5078	5913	6710	5824	6364	5922	5912	1546	1709	2499	2759	1917	2602
-PURSE SEINE . . . . .	1856	960	2320	1582	1502	1230	1381	758	910	232	384	401	377	360	367
Canada . . . . .	635	103	291	332	298	241	0	0	105	0	0	0	0	0	0
Norway . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A. . . . .	1021	857	2029	1250	1204	989	1381	758	805	232	384	401	377	360	367
-ROD & REEL + SPORT . . . . .	519	2913	328	590	630	475	499	535	523	300	476	401	466	328	539
Canada . . . . .	239	409	208	342	302	208	214	259	279	0	71	1	1	2	1
U.S.A. . . . .	280	2504	122	248	328	267	285	276	244	308	405	400	465	326	538
-LONGLINE . . . . .	1127	946	1522	3056	3752	3217	3691	3972	3879	349	828	835	1238	764	1138
Argentina . . . . .	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil . . . . .	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	32	33
China-Taiwan . . . . .	2	20	1	0	1	1	49	15	7	11	2	3	3	3	0
Cuba . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Japan . . . . .	1097	905	1513	2902	3658	3144	3621	3936	3771	292	711	696	1092	584	960
Korea . . . . .	23	20	8	7	1	0	1	0	0	0	0	0	0	0	0
Norway . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panama . . . . .	2	0	0	157	92	58	10	9	14	12	0	0	0	0	0
Uruguay . . . . .	0	0	0	0	0	0	0	0	1	3	0	9	10	6	4
U.S.A. . . . .	1	1	0	0	0	0	0	10	83	30	114	127	132	139	139
-OTHER & UNCL. GEARS . . . . .	669	691	908	675	826	902	793	657	600	657	1021	867	678	465	558
Argentina . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	6	0	2
Canada . . . . .	144	256	144	172	372	221	31	65	41	291	352	263	141	39	49
Dominican Republic . . . . .	100	117	46	30	16	61	109	121	141	115	158	207	81	109	199
Mexico . . . . .	29	39	24	37	14	28	22	10	20	14	0	0	0	0	0
Poland . . . . .	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
St. Lucia . . . . .	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
U.S.A. . . . .	396	276	694	433	424	592	631	461	398	237	491	392	450	317	388

Table 7. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
EAST ATLANTIC . . . . .	25592	18469	18854	20750	23230	9020	10239	30834	9290	10523	4629	5683	5764	4675	4732
-DAITBOAT . . . . .	2829	3052	1198	1453	1537	1178	1079	1820	3347	1805	1474	1826	3037	3055	3032
Cape Verde . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France . . . . .	1303	2031	553	907	965	543	400	621	1624	860	390	534	732	680	740
Japan . . . . .	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Portugal . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	1526	1021	645	548	572	635	676	1199	1723	945	1084	1292	2285	2375	2292
-PURSE SEINE . . . . .	5539	2500	6222	10962	9781	1575	3458	3378	2737	4022	1149	1435	669	598	961
Morocco . . . . .	2539	0	2286	2994	1678	1419	2059	906	1778	2048	453	678	406	30	531
Norway . . . . .	3000	2500	3936	7968	8153	156	1390	2472	959	1974	696	757	263	568	430
Portugal . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa . . . . .	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-TRAP . . . . .	16622	11061	10430	7576	9014	4472	5059	5172	3123	4540	1790	2220	1786	663	372
Morocco . . . . .	7961	5378	3714	1377	3648	2318	2256	1882	1601	1331	635	59	286	63	122
Portugal . . . . .	661	883	1016	1499	666	354	303	90	122	209	55	263	0	0	0
Spain . . . . .	8600	4600	5700	4700	4700	1800	2500	3200	1400	3000	1100	1900	1500	600	250
-LONGLINE . . . . .	2	56	481	223	2484	1618	582	434	81	141	208	201	274	254	261
China-Taiwan . . . . .	0	0	0	0	0	0	0	0	0	0	138	116	46	12	2
Japan . . . . .	2	56	481	204	2484	1618	582	404	50	100	13	2	21	157	240
Korea . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
Norway . . . . .	0	0	0	19	0	0	0	30	31	41	57	85	207	85	0
Panama . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-OTHER & UNCL. GEARS .	600	1800	523	536	414	177	61	30	2	15	8	1	18	105	106
Denmark . . . . .	200	800	47	192	202	4	61	30	2	15	8	1	14	1	6
France . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany, F.R. . . . .	400	1000	434	331	212	44	44	44	44	44	44	44	14	1	6
Greece . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Morocco . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands . . . . .	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
Poland . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
Portugal . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	173	0	0	0	0	0	0	0	0	0
Sweden . . . . .	44	44	42	13	44	44	0	44	44	44	44	0	4	3	0

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	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
EAST ATLANTIC . . . . .	4685	6067	9376	5212	6977	5800	4767	4064	3331	6669	8010	7386	4754	4193	4536
-DAITBOAT . . . . .	3142	2348	2951	1803	2881	3904	2128	1874	1553	957	3032	2948	2366	2253	2128
Cape Verde . . . . .	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0
France . . . . .	540	522	692	267	592	723	275	260	153	150	400	566	380	272	533
Japan . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal . . . . .	0	191	303	24	14	56	10	17	16	30	53	15	3	28	58
Spain . . . . .	2602	1635	1996	1512	2275	3125	1843	1597	1384	777	2569	2366	1983	1953	1537
-PURSE SEINE . . . . .	932	1455	3512	860	1422	257	266	437	266	655	262	414	86	281	0
Morocco . . . . .	512	590	2624	331	662	36	206	155	105	600	187	127	86	122	0
Norway . . . . .	420	865	988	529	764	221	60	282	161	50	1	243	0	24	0
Portugal . . . . .	0	0	0	0	0	0	0	0	0	0	74	3	0	123	0
South Africa . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	41	0	12	0
U.S.A. . . . .	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
-TRAP . . . . .	505	20	448	490	561	450	600	706	859	2309	1956	2271	1630	799	1399
Morocco . . . . .	1	7	0	0	222	0	0	6	72	393	94	0	0	0	460
Portugal . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	504	13	448	490	339	450	600	700	787	1916	1862	2271	1630	799	939
-LONGLINE . . . . .	91	2243	2223	2048	1806	733	748	1002	575	2705	2626	1538	535	741	904
China-Taiwan . . . . .	1	12	5	3	2	0	3	5	5	16	2	0	0	0	0
Japan . . . . .	44	2195	2900	1972	1594	577	620	880	515	2573	2609	1514	420	710	900
Korea . . . . .	43	36	15	3	2	0	1	0	0	0	3	0	77	0	0
Norway . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panama . . . . .	3	0	0	69	208	156	14	117	48	12	0	17	22	11	4
Spain . . . . .	0	0	3	0	0	0	100	0	6	104	12	7	16	20	0
-OTHER & UNCL. GEARS .	15	1	2	11	303	456	1025	45	78	43	134	215	137	119	105
Denmark . . . . .	2	1	44	3	1	1	1	0	4	44	44	0	0	1	0
France . . . . .	11	0	0	0	0	0	0	0	0	0	0	36	110	76	0
Germany, F.R. . . . .	2	0	0	0	0	1	1	0	2	0	0	0	0	0	0
Greece . . . . .	0	0	0	0	0	0	0	44	5	0	0	0	0	0	0
Morocco . . . . .	0	0	0	0	0	0	0	0	0	0	84	44	0	0	0
Netherlands . . . . .	0	0	0	0	0	0	0	0	0	44	44	44	44	44	0
Norway . . . . .	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0
Poland . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal . . . . .	0	0	0	0	0	0	25	7	1	11	47	16	26	42	105
Spain . . . . .	0	0	0	0	360	450	998	38	70	27	2	119	1	0	0
Sweden . . . . .	0	0	2	8	2	2	44	44	44	44	1	44	0	0	0

Table 7. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
MEDITERRANEAN. . . . .	6395	5454	4815	5614	4794	6460	6295	5997	5326	8744	7933	8698	4789	6227	5812
-PURSE SEINE. . . . .	605	388	225	472	419	1533	1261	435	1876	2919	3341	3629	2393	3904	4084
France . . . . .	0	0	0	0	0	0	0	0	1000	1500	2500	1500	1100	2200	1100
Italy . . . . .	217	164	116	349	332	1256	990	301	630	1088	691	1828	1203	1336	2783
Morocco . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	42	1
Spain . . . . .	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
Yugoslavia . . . . .	188	224	109	123	87	277	271	134	246	331	150	301	90	328	200
-TRAP . . . . .	4296	3382	2890	3043	2861	2058	3081	3872	2250	1137	3082	3768	1489	1372	1023
Algeria . . . . .	78	++	++	++	**	++	++	++	150	150	150	150	0	0	0
Italy . . . . .	2736	1823	1229	1423	1280	1227	1652	1264	945	1949	1739	1324	961	1044	835
Libya . . . . .	1200	1100	1100	1000	800	100	400	600	700	800	1000	2000	0	0	0
Morocco . . . . .	0	0	0	0	0	0	0	172	11	27	5	0	0	37	36
Spain . . . . .	202	374	561	620	377	472	653	1235	151	104	4	217	280	53	88
Tunisia . . . . .	0	85	0	0	404	260	376	601	293	307	184	77	248	238	64
-LONGLINE . . . . .	0	0	0	0	0	800	300	400	500	300	600	400	69	129	236
Italy . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Japan . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	112
Panama . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	800	300	400	500	300	600	400	69	129	124
-OTHER & UNCL. GEARS. . . . .	1494	1684	1700	2099	1514	2068	1653	1290	700	2188	910	893	638	622	469
Algeria . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	100	100	1
France . . . . .	294	184	400	599	214	668	953	390	0	0	0	0	0	0	0
Greece . . . . .	700	700	900	1100	1000	1200	600	700	500	600	500	500	0	0	0
Italy . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100
Libya . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	500	600	300
Malta . . . . .	100	100	100	100	100	100	100	100	100	100	100	++	++	++	++
Morocco . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey . . . . .	400	500	300	300	200	100	0	100	100	1488	310	393	138	22	68
UNCL. REGION . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
MEDITERRANEAN. . . . .	5976	12074	11113	17072	11786	8825	7325	8921	9899	14987	12953	17064	18490	13091	6327
-PURSE SEINE. . . . .	4324	8119	8065	13970	9552	7278	5990	7394	7430	11023	9370	9856	10988	9052	5269
France . . . . .	1400	1800	1600	3800	3182	1566	1527	1701	2300	4818	3600	3570	5400	3480	4300
Italy . . . . .	2700	6000	6270	9607	5431	4663	3705	5120	4704	5442	4552	5382	4522	3289	0
Morocco . . . . .	0	2	40	1	7	0	2	++	2	++	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	59	277	0	79	56	22	0
Turkey . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	1524	328
Yugoslavia . . . . .	224	317	155	562	932	1049	756	573	374	486	1216	825	1010	757	641
-TRAP . . . . .	566	880	817	718	820	331	326	611	565	451	401	1028	677	547	219
Algeria . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy . . . . .	367	739	713	650	698	210	195	152	209	155	284	327	295	295	0
Libya . . . . .	0	0	0	0	0	0	0	339	255	130	0	0	0	0	0
Morocco . . . . .	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	146	11	3	3	2	1	0	0	3	66	37	621	302	168	219
Tunisia . . . . .	52	123	101	65	120	120	131	120	98	100	80	80	80	84	0
-LONGLINE . . . . .	520	2387	1363	1218	592	153	199	219	300	1499	939	1146	1064	600	396
Italy . . . . .	0	0	0	0	0	0	0	0	0	0	29	41	62	62	0
Japan . . . . .	246	2195	1260	968	520	61	99	119	100	961	677	1036	873	421	280
Panama . . . . .	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	274	192	103	258	68	92	100	100	200	538	233	69	129	117	116
-OTHER & UNCL. GEARS. . . . .	566	688	868	1166	822	1063	810	697	1604	2024	2243	5034	5761	2892	443
Algeria . . . . .	++	33	66	49	40	20	150	190	220	230	252	254	260	280	0
France . . . . .	0	0	0	0	0	31	51	0	50	60	60	30	30	30	30
Greece . . . . .	0	0	0	0	0	0	0	0	516	500	500	500	500	500	0
Italy . . . . .	100	100	100	112	134	110	120	0	104	61	0	1082	1424	1474	0
Libya . . . . .	400	500	634	799	336	677	424	59	16	180	300	300	300	300	0
Malta . . . . .	++	21	37	25	47	26	23	24	32	40	31	21	21	41	36
Morocco . . . . .	0	0	0	0	0	0	0	0	0	0	1	4	12	18	0
Spain . . . . .	0	0	14	0	88	72	15	35	101	108	542	1974	984	249	377
Turkey . . . . .	66	34	17	181	177	127	27	391	565	825	557	669	2236	0	0
UNCL. REGION . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

++ Catch: < 0.5 MT  
\*\* Catch: Unknown

Table 8. Abundance indices considered for the calibration of stock size estimates of east Atlantic and Mediterranean bluefin tuna

GEAR COUNTRY	LL JAPAN	TRAP SPAIN	PSM FRANCE	PSM FRANCE	BB SPAIN	
AREA	EEZ PORTUGAL ATLANTIC	GIBRALTAR ATLANTIC	MEDITERRANEAN	MEDITERRANEAN	BAY OF BISCAY ATLANTIC	
AGE RANGE	7~20+	7~20+	2	3	2	
YEAR	1970	---	---	5.1	11.5	18.0
	1971	---	11.0	17.5	46.0	13.7
	1972	---	3.5	115.5	12.1	13.3
	1973	---	18.2	14.5	51.3	25.6
	1974	---	---	88.8	32.9	29.2
	1975	0.50	15.5	91.5	11.5	42.2
	1976	1.26	13.7	113.5	89.1	37.6
	1977	1.14	10.1	306.6	107.6	43.9
	1978	0.85	16.2	63.3	86.1	24.8
	1979	---	16.8	86.1	137.3	7.8
	1980	0.53	33.7	20.0	49.2	17.0
	1981	0.32	33.0	135.8	14.1	25.5
	1982	1.37	71.3	122.7	96.2	23.6
	1983	0.37	41.3	87.7	54.7	33.2
	1984	0.38	43.4	256.6	16.0	105.0
	1985	---	37.8	150.9	173.5	51.1
	1986	---	11.5	85.7	113.9	36.5
	1987	---	---	---	---	82.0
Interpretation (Table 9):	rejected	rejected	used	used	used	

-- Signifies no data available.



Table 9. Test criteria for the abundance indices considered in calibration of east Atlantic and Mediterranean bluefin tuna

Index	Years	F Full	r	Prob (r>0)
Japan LL (7+)	75-84	1.60	0.05	0.55
Spain TRAP (7+)	70-86	0.00	0.46	0.96
France PS (2)	70-86	1.08	0.68	0.99
France PS (2)	78-86	0.93	0.88	0.99
France PS (3)	70-86	0.50	0.74	0.99
France PS (3)	78-86	0.57	0.82	0.99
Spain BB (2)	70-86	0.61	0.90	0.99

The two French indices (PSM2 and PSM3) for the period 1978 to 1986 and the Spanish baitboat index were chosen for calibration.

Table 10. Catch at age for bluefin tuna from the eastern Atlantic and Mediterranean from 1970 to 1986

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
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	83398	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	1305	1828	4700	7257	4079	3827	2018	2321
12	2549	1553	1928	1862	6115	10354	5326	4500	3012	2129
13	804	1121	2959	2677	7133	10250	7951	5131	3598	3637
14	2745	1864	1492	3231	6859	8198	6740	6240	5935	3246
15	2253	3913	1688	1044	4242	5120	4870	4992	3563	2206
16	1407	3515	2824	1167	1329	3523	3154	3299	1577	2406
17	535	1728	1262	1712	977	985	1757	1949	836	1454
18	118	754	528	767	1475	829	640	1242	823	836
19	20	243	139	184	604	797	426	163	502	164
20	3	40	25	58	107	240	364	245	24	56

Table 10. (Cont.)

AGE	1980	1981	1982	1983	1984	1985	1986
1	110511	148702	686475	689247	228294	572333	664539
2	152516	319670	195261	156855	590218	305695	313545
3	99926	94453	188618	114841	41959	296477	152180
4	27918	12747	23223	28790	32486	32613	73871
5	8620	12428	5229	10547	21553	13663	6706
6	5399	7120	3693	3666	10375	7590	4424
7	3186	4235	6299	9440	6729	3835	2149
8	2217	4896	8647	5937	7500	3028	1715
9	2541	3852	5714	5778	11439	3284	2009
10	3885	3731	6204	14061	11541	5783	3099
11	3997	4628	7276	5917	8743	5766	4424
12	3984	3777	8275	6318	9749	5866	5192
13	3911	2202	10381	6232	4666	4142	3569
14	3347	1502	3009	4305	2798	2249	1606
15	2699	1081	1410	1062	1439	1284	839
16	1537	693	1086	445	943	663	421
17	566	429	881	242	552	323	170
18	192	330	424	115	206	137	98
19	48	116	160	81	116	65	49
20	5	67	73	4	67	40	13

Table 11. Percent composition by age of the bluefin catch in numbers for the east Atlantic Ocean and Mediterranean Sea

YEAR :	70	71	72	73	74	75	76	77
AGE :								
1 :	.4251	.0471	.2940	.4045	.3625	.6199	.1385	.3228
2 :	.2483	.4009	.3774	.1959	.2595	.2615	.2782	.4329
3 :	.0857	.2372	.1862	.2443	.1125	.0308	.4137	.0649
4 :	.0545	.0684	.0587	.0188	.1261	.0178	.0604	.0998
5 :	.0311	.0553	.0190	.0093	.0149	.0061	.0301	.0034
6 :	.0290	.0188	.0204	.0105	.0102	.0043	.0080	.0081
7 :	.0150	.0206	.0109	.0200	.0061	.0030	.0050	.0064
8 :	.0121	.0555	.0062	.0300	.0107	.0031	.0030	.0037
9 :	.0208	.0144	.0083	.0192	.0213	.0052	.0059	.0041
10 :	.0279	.0066	.0030	.0047	.0092	.0052	.0045	.0054
11 :	.0165	.0065	.0033	.0054	.0094	.0066	.0060	.0058
12 :	.0083	.0070	.0049	.0055	.0122	.0094	.0079	.0068
13 :	.0026	.0051	.0075	.0078	.0142	.0093	.0118	.0077
14 :	.0089	.0084	.0038	.0095	.0137	.0074	.0100	.0094
15 :	.0073	.0177	.0043	.0031	.0065	.0046	.0072	.0075
16 :	.0046	.0159	.0072	.0034	.0027	.0032	.0047	.0050
17 :	.0017	.0078	.0032	.0050	.0019	.0009	.0026	.0029
18 :	.0004	.0034	.0013	.0022	.0029	.0007	.0009	.0019
19 :	.0001	.0011	.0004	.0005	.0012	.0007	.0008	.0002
20 :	.0000	.0002	.0001	.0002	.0002	.0002	.0005	.0004
21 :	.0000	.0000	.0000	.0000	.0000	.0001	.0002	.0003
22 :	.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0002
23 :	.0000	.0000	.0000	.0000	.0000	.0001	.0002	.0002
24 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
25 :	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0001
26 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001
27 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
28 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
29 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
30 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2+ :	.5749	.9529	.7060	.5955	.6375	.3801	.8615	.6772
3+ :	.3267	.5519	.3286	.3895	.3780	.1187	.5633	.2443
4+ :	.2409	.3147	.1424	.1552	.2655	.0878	.1696	.1794
5+ :	.1865	.2463	.1037	.1364	.1394	.0701	.1092	.0796
6+ :	.1553	.1910	.0847	.1271	.1245	.0640	.0791	.0762

Table 11. (Cont.)

YEAR :	78	79	80	81	82	83	84	85	86
AGE :									
1 :	.2638	.2417	.2529	.2373	.5906	.6479	.2303	.4525	.5356
2 :	.3484	.1312	.3490	.5101	.1680	.1474	.5953	.2417	.2527
3 :	.2676	.3316	.2287	.1507	.1623	.1079	.0423	.2344	.1227
4 :	.0517	.1587	.0639	.0203	.0200	.0271	.0328	.0258	.0595
5 :	.0088	.0227	.0197	.0198	.0045	.0099	.0217	.0108	.0054
6 :	.0032	.0086	.0124	.0114	.0032	.0034	.0105	.0060	.0036
7 :	.0047	.0085	.0073	.0068	.0054	.0089	.0068	.0030	.0017
8 :	.0032	.0123	.0051	.0078	.0074	.0056	.0076	.0024	.0014
9 :	.0024	.0129	.0058	.0061	.0049	.0054	.0115	.0026	.0018
10 :	.0062	.0114	.0089	.0060	.0053	.0132	.0116	.0046	.0025
11 :	.0036	.0076	.0091	.0074	.0063	.0056	.0088	.0046	.0036
12 :	.0054	.0069	.0091	.0060	.0071	.0059	.0098	.0046	.0042
13 :	.0064	.0119	.0089	.0035	.0089	.0059	.0047	.0033	.0029
14 :	.0106	.0106	.0077	.0024	.0026	.0040	.0028	.0018	.0013
15 :	.0064	.0072	.0062	.0017	.0012	.0010	.0015	.0010	.0007
16 :	.0028	.0078	.0035	.0011	.0009	.0004	.0010	.0005	.0003
17 :	.0015	.0047	.0013	.0007	.0008	.0002	.0006	.0003	.0001
18 :	.0015	.0027	.0004	.0005	.0004	.0001	.0002	.0001	.0001
19 :	.0009	.0005	.0001	.0002	.0001	.0001	.0001	.0001	.0000
20 :	.0000	.0002	.0000	.0001	.0001	.0000	.0001	.0000	.0000
21 :	.0001	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000
22 :	.0005	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
23 :	.0000	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000
24 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
25 :	.0003	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
26 :	.0002	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
27 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
28 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
29 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
30 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2+ :	.7362	.7563	.7471	.7627	.4094	.3521	.7697	.5475	.4644
3+ :	.3878	.6271	.3981	.2526	.2414	.2047	.1744	.3058	.2116
4+ :	.1202	.2955	.1695	.1019	.0792	.0968	.1321	.0715	.0890
5+ :	.0685	.1368	.1056	.0815	.0592	.0697	.0993	.0457	.0294
6+ :	.0598	.1141	.0858	.0617	.0547	.0598	.0775	.0349	.0240

Table 12. Population numbers estimated by VPA for eastern Atlantic and Mediterranean bluefin tuna. Little confidence can be placed on the estimates of ages 1 and 2, due to sampling problems

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
2	352196	463182	622894	429205	470594	1041429	551679	805977	537551	295054
3	197501	224782	306258	385293	297628	274961	607275	290316	413134	272136
4	192963	140967	140107	189213	246012	197285	198622	254556	203303	209210
5	181103	145915	103962	103148	152175	148054	146893	128800	152542	143431
6	157608	142543	110738	80030	83252	120295	117530	104192	105527	122939
7	153942	123505	115280	85188	63564	64871	96162	93266	82108	86524
8	113683	124370	98998	92360	64937	50319	51154	77247	74059	66163
9	91519	91567	92694	80450	67804	49338	38892	40904	62263	60246
10	70360	70606	73588	74461	61219	46930	35965	28873	31700	50802
11	50437	50952	57237	60406	60737	46941	33968	27253	20856	23303
12	17029	37498	41252	46618	48787	46448	32603	24658	19279	15582
13	16157	11904	29905	32699	37240	35182	29386	22385	16502	13362
14	24292	12762	8921	22282	24872	24618	20084	17326	14035	10513
15	13548	17790	8963	6094	15670	14548	13130	10665	8818	6355
16	5813	9266	11303	5951	4140	9237	7512	6556	4400	4141
17	2476	3577	4557	6876	3910	2253	4526	3422	2500	2246
18	654	1582	1428	2660	4188	2378	991	2190	1104	1330
19	220	439	641	714	1526	2161	1235	254	711	188
20	24	166	148	409	430	728	1083	645	66	145

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1-4	1439518	1586057	1709153	1717491	2459221	2915219	2424640	2227242	1667890	1364021
5-9	697855	627899	521672	441177	431731	432875	450631	444409	476498	479303
10-20	201010	216542	237942	259170	262719	231424	180484	144227	119971	127968

Table 12. (Cont.)

AGE	1980	1981	1982	1983	1984	1985	1986	1987
2	423363	736213	530925	370049	1605106	900461	855906	1103389
3	209831	215445	325912	266597	167230	806073	475026	430891
4	135263	85035	94567	102525	118839	101568	404738	258763
5	130530	87596	59424	57892	59502	69768	55261	270867
6	113471	101169	61852	44870	38761	30175	45849	40050
7	100272	89855	78013	48296	34137	22955	18310	34265
8	69906	80848	71191	59420	31754	22394	15684	13336
9	51832	56368	63066	51588	44223	19709	15948	11538
10	46717	40976	43571	47470	37827	26549	13473	11491
11	39242	35481	30826	30745	26891	21125	16919	8438
12	17350	29136	25422	19137	20299	14533	12410	10114
13	11076	10871	20897	13730	10256	8153	6831	5670
14	7859	5708	7078	8087	5837	4351	3074	2488
15	5837	3537	3404	3191	2875	2349	1606	1120
16	3309	2437	1974	1567	1702	1103	806	585
17	1295	1376	1407	671	905	573	325	293
18	572	570	760	384	341	260	188	119
19	361	304	179	253	216	100	94	68
20	12	257	149	9	138	76	25	34
AGE	1980	1981	1982	1983	1984	1985	1986	1987
1-4	1770390	1834270	2133807	3410274	3217915	3453795	3778103	0
5-9	466011	415837	333546	262066	208377	165000	151051	370056
10-20	133629	130653	135665	125244	107288	79172	55751	40419

Table 13. Abundance indices considered for calibration of stock size estimates of west Atlantic bluefin tuna

GEAR COUNTRY	Larval bluefin U.S.A.	Rod & reel CANADA	Tended line CANADA	Longline JAPAN	Longline JAPAN	Longline U.S.OBSERVER	Rod & reel U.S.A.
AREA	Gulf of Mexico	NW Atlantic	NW Atlantic	NW Atlantic	NW Atlantic	U.S. EEZ	U.S. Coast
AGE RANGE	10-30	16-30	16-30	3-5	6-8	3-7	10-30
YEAR	1970	--	--	--	--	--	--
	1971	--	--	--	--	--	--
	1972	--	--	--	--	--	--
	1973	--	--	--	--	--	--
	1974	--	--	--	--	--	--
	1975	--	0.09	--	--	--	--
	1976	--	0.13	--	0.3328	0.0669	--
	1977	6.11	0.09	--	1.7440	0.3976	--
	1978	10.80	0.09	--	0.8824	0.4155	--
	1979	--	0.07	--	0.2140	0.3790	--
	1980	--	0.07	--	0.5407	0.4100	--
	1981	5.98	--	0.21	0.5127	0.3641	--
	1982	4.10	0.06	0.19	0.2526	0.2022	--
	1983	3.93	0.08	0.13	0.0762	0.0674	1.28
	1984	1.22	0.03	0.09	0.2728	0.2222	3.91
	1985	--	0.02	0.05	0.4907	0.3889	4.06
	1986	2.29	0.02	0.05	0.1717	0.1853	3.00
	1987	0.92	--	0.04	0.3825	0.3246	2.74
Interpretation Table 16.	used	rejected	rejected	used	used	rejected	rejected

-- signifies no data available.



Table 14. Catch at age for bluefin tuna from the western Atlantic from 1970 to 1986

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
0	117	0	0	3	28	61	54	46	65	20
1	71408	64903	45772	5460	55914	44489	5427	1342	5725	3007
2	124014	151510	97975	73811	19080	146899	19629	22493	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	4481	4489	2167	2886	15250	7758	11596
6	1802	819	2163	2395	1983	814	1653	3008	7527	1541
7	607	1375	91	622	592	370	252	3016	2522	2832
8	109	1370	432	562	899	235	142	889	445	2322
9	90	1291	416	1317	476	390	644	353	459	766
10	257	928	344	1085	787	698	691	568	320	425
11	431	877	175	349	901	1327	473	890	194	389
12	433	770	388	487	521	950	753	950	362	448
13	590	1007	727	682	681	841	1318	803	417	665
14	737	1061	961	744	1890	1392	2074	1002	647	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	1169	1860	1966	1595
19	160	223	333	311	774	530	786	1014	1305	934
20	116	81	142	159	700	394	709	855	1031	926
21	30	48	144	68	616	237	439	614	725	646
22	29	36	60	51	338	116	211	352	526	461
23	28	7	20	20	42	112	163	273	360	381
24	16	4	12	10	15	36	73	96	262	192
25	16	2	4	6	7	31	32	74	167	152
26	16	0	1	0	8	22	19	41	104	111
27	11	1	3	0	6	17	15	40	86	97
28	0	3	1	0	2	5	16	24	68	30
29	0	3	0	0	0	1	3	7	33	16
30	0	1	0	0	0	1	0	4	33	18
TOTAL	328220	313682	192371	128962	124424	225566	119943	90365	70691	68081

Table 14. (Cont.)

AGE	1980	1981	1982	1983	1984	1985	1986	1987
0	249	26	24	0	30	10	40	90
1	3539	6269	3702	4114	917	563	583	1511
2	18464	10209	3651	2583	7164	5689	5548	13018
3	7850	15481	1536	3040	2001	11854	7018	7506
4	6895	4858	477	889	1684	2460	2833	4884
5	4778	5188	235	669	2021	3883	1876	3997
6	1534	3634	404	739	1600	3855	1325	4445
7	1993	2570	511	620	746	1769	1333	1155
8	4098	2044	417	994	455	670	975	1432
9	4267	2095	302	966	506	419	515	965
10	1291	2603	487	851	629	434	580	929
11	839	1728	754	707	768	455	471	505
12	635	1296	702	649	689	499	393	511
13	567	935	671	806	867	706	574	472
14	688	749	320	922	703	851	595	464
15	1099	671	178	663	917	959	835	591
16	1712	985	119	391	531	898	677	624
17	1515	799	176	408	281	585	420	419
18	1661	686	149	562	266	351	351	333
19	1505	715	175	391	219	213	198	226
20	941	778	226	393	182	139	139	177
21	798	777	162	205	98	91	27	62
22	421	649	176	228	116	78	106	72
23	318	557	133	220	166	98	32	48
24	220	282	73	115	56	57	41	32
25	164	314	45	82	82	44	42	17
26	109	227	28	77	45	42	31	20
27	118	192	41	40	26	30	19	19
28	41	96	24	22	33	18	19	3
29	25	79	42	15	27	15	16	2
30	13	88	7	5	9	5	1	0
TOTAL	68347	67583	15946	22366	23833	37740	27613	44530

Table 15. Percent composition by age of bluefin catch in numbers for the west Atlantic Ocean

YEAR :	70	71	72	73	74	75	76	77	78
AGE :									
1 :	.2176	.2069	.2379	.0423	.4495	.1973	.0453	.0149	.0811
2 :	.3780	.4830	.5093	.5723	.1534	.6514	.1637	.2490	.1444
3 :	.3086	.1212	.1732	.2226	.1787	.0185	.5889	.0819	.2526
4 :	.0477	.1439	.0141	.0425	.0240	.0635	.0281	.2402	.0787
5 :	.0267	.0047	.0177	.0347	.0361	.0096	.0241	.1689	.1098
6 :	.0055	.0026	.0112	.0186	.0159	.0036	.0138	.0333	.1066
7 :	.0019	.0044	.0005	.0048	.0048	.0016	.0021	.0334	.0357
8 :	.0003	.0044	.0022	.0044	.0072	.0010	.0012	.0098	.0063
9 :	.0003	.0041	.0022	.0102	.0038	.0017	.0054	.0039	.0085
10 :	.0008	.0030	.0018	.0054	.0063	.0031	.0058	.0063	.0045
11 :	.0013	.0028	.0009	.0027	.0072	.0059	.0039	.0099	.0027
12 :	.0013	.0025	.0020	.0038	.0042	.0042	.0063	.0105	.0051
13 :	.0018	.0032	.0038	.0053	.0055	.0037	.0110	.0089	.0059
14 :	.0022	.0034	.0050	.0058	.0152	.0062	.0173	.0111	.0092
15 :	.0018	.0029	.0050	.0042	.0130	.0066	.0219	.0178	.0161
16 :	.0013	.0031	.0039	.0048	.0124	.0070	.0190	.0215	.0173
17 :	.0010	.0016	.0030	.0039	.0123	.0040	.0120	.0206	.0231
18 :	.0005	.0011	.0024	.0038	.0203	.0043	.0098	.0206	.0278
19 :	.0005	.0007	.0017	.0024	.0062	.0024	.0066	.0112	.0185
20 :	.0004	.0003	.0007	.0012	.0056	.0017	.0059	.0095	.0146
21 :	.0001	.0002	.0007	.0005	.0050	.0011	.0037	.0068	.0103
22 :	.0001	.0001	.0003	.0004	.0027	.0005	.0018	.0039	.0074
23 :	.0001	.0000	.0001	.0002	.0003	.0005	.0014	.0030	.0051
24 :	.0000	.0000	.0001	.0001	.0001	.0002	.0006	.0011	.0037
25 :	.0000	.0000	.0000	.0000	.0001	.0001	.0003	.0008	.0024
26 :	.0000	.0000	.0000	.0000	.0001	.0001	.0002	.0005	.0015
27 :	.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0004	.0012
28 :	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0003	.0010
29 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0005
30 :	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0005
2+ :	.7824	.7931	.7621	.9577	.5505	.6027	.9547	.9651	.9189
3+ :	.4044	.3101	.2528	.3853	.3971	.1513	.7910	.7361	.7748
4+ :	.0958	.1889	.0795	.1627	.2184	.1328	.2021	.6542	.5220
5+ :	.0481	.0450	.0654	.1202	.1845	.0694	.1740	.4140	.4433
6+ :	.0214	.0403	.0477	.0855	.1484	.0596	.1499	.2452	.3335

Table 15. (Cont.)

YEAR :	79	80	81	82	83	84	85	86	87
.....									
AGE :									
1 :	.0442	.0520	.0928	.2325	.1839	.0385	.0149	.0211	.0340
2 :	.1548	.2711	.1511	.2293	.1155	.3010	.1508	.2012	.2929
3 :	.2093	.1153	.2292	.0985	.1359	.0841	.3142	.2545	.1688
4 :	.1152	.1013	.0719	.0300	.0397	.0707	.0652	.1027	.1099
5 :	.1704	.0702	.0768	.0148	.0299	.0849	.1029	.0680	.0899
6 :	.0226	.0225	.0538	.0254	.0330	.0672	.1022	.0481	.1000
7 :	.0416	.0293	.0380	.0321	.0277	.0313	.0469	.0483	.0260
8 :	.0341	.0602	.0303	.0262	.0444	.0191	.0178	.0354	.0322
9 :	.0113	.0627	.0310	.0190	.0432	.0213	.0111	.0187	.0217
10 :	.0062	.0190	.0385	.0306	.0380	.0264	.0115	.0210	.0209
11 :	.0057	.0123	.0256	.0474	.0316	.0323	.0121	.0171	.0114
12 :	.0066	.0093	.0192	.0441	.0290	.0289	.0132	.0143	.0115
13 :	.0098	.0083	.0138	.0421	.0360	.0364	.0167	.0208	.0106
14 :	.0165	.0101	.0111	.0201	.0412	.0295	.0226	.0216	.0104
15 :	.0230	.0161	.0099	.0112	.0296	.0385	.0254	.0303	.0133
16 :	.0249	.0251	.0146	.0075	.0175	.0223	.0238	.0246	.0140
17 :	.0220	.0222	.0118	.0111	.0182	.0118	.0155	.0152	.0094
18 :	.0234	.0244	.0102	.0094	.0251	.0112	.0093	.0127	.0075
19 :	.0137	.0221	.0106	.0110	.0175	.0092	.0056	.0072	.0051
20 :	.0136	.0138	.0115	.0142	.0176	.0076	.0037	.0050	.0040
21 :	.0095	.0117	.0115	.0102	.0092	.0041	.0024	.0010	.0014
22 :	.0068	.0062	.0096	.0111	.0102	.0049	.0021	.0038	.0016
23 :	.0056	.0047	.0082	.0084	.0098	.0070	.0026	.0012	.0011
24 :	.0028	.0032	.0042	.0046	.0051	.0024	.0015	.0015	.0007
25 :	.0022	.0024	.0046	.0028	.0037	.0034	.0012	.0015	.0004
26 :	.0016	.0016	.0034	.0018	.0034	.0019	.0011	.0011	.0005
27 :	.0014	.0017	.0028	.0026	.0018	.0011	.0008	.0007	.0004
28 :	.0004	.0006	.0014	.0015	.0010	.0014	.0005	.0007	.0001
29 :	.0002	.0004	.0012	.0028	.0007	.0011	.0004	.0006	.0000
30 :	.0003	.0002	.0013	.0004	.0002	.0004	.0001	.0000	.0000
-----									
2+ :	.9558	.9480	.9072	.7675	.8161	.9615	.9851	.9769	.9660
3+ :	.8010	.6789	.7561	.5382	.7006	.6605	.8343	.7776	.6731
4+ :	.5917	.5816	.5269	.4418	.5847	.5765	.5201	.5231	.5042
5+ :	.4784	.4604	.4550	.4118	.5249	.5057	.4549	.4204	.3943
6+ :	.3061	.3902	.3782	.3870	.4950	.4208	.3520	.3523	.3043

Table 16. Test criteria for the abundance indices considered in calibration of west Atlantic bluefin tuna

Index	Years	F Full	r	Prob (r>0)
Larval bluefin	77-87	0.39	.82	.99
Canada R&R	75-80	2.1>	.62	.91
Canada R&R	82-86	2.1>	.86	.97
Canada Tended Line	81-87	2.1>	.90	.99
Japan LL (3-5)	76-87	0.37	.19	.73
Japan LL (6-8)	76-87	0.12	.68	.99
U.S. Obs. LL	83-87	0.18	.87	.97
U.S. R&R	82-86	0.0	-.97	.00

The two Japanese loneline indices (ages 3 to 5 and ages 6 to 8) and the U.S. larval bluefin index were chosen for calibration.

Table 17. Population numbers estimated by VPA for west Atlantic bluefin tuna. Estimates of the youngest ages in the most recent years are most affected by the input values of the working group

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1	347451	275531	250786	119861	393299	130581	99277	65536	57948	72490
2	213008	246625	187742	183475	103265	302778	76008	84672	58024	46995
3	187189	75720	80292	77320	96150	75328	135100	50159	55285	42823
4	40731	73755	32583	41110	42779	65913	64203	55541	38365	33120
5	33145	22052	24184	26907	31988	34696	46062	54892	29717	29437
6	31023	21673	18558	18647	20092	24681	29335	38936	35210	19532
7	29731	26358	18832	14738	14598	16297	21559	24972	32372	24717
8	29225	26324	22543	16953	12744	12646	14394	19268	19731	26895
9	32681	26340	22517	19987	14806	10677	11219	12889	16589	17431
10	31430	29485	22606	19979	16834	12944	9290	9540	11327	14574
11	26665	28195	25797	20128	17047	14484	11049	7750	8092	9945
12	20088	23718	24678	23176	17881	14568	11845	9548	6167	7138
13	17162	17765	20729	21961	20508	15684	12279	10002	7737	5236
14	15341	14968	15117	18065	19222	17909	13392	9859	8287	6604
15	9649	13180	12536	12765	15639	15598	14882	10149	7969	6884
16	6860	8155	11062	10428	11033	12617	12701	10976	7660	6128
17	4607	5795	6442	9289	8848	8513	9914	9331	8084	5769
18	2870	3861	4757	5283	7930	6556	6838	7607	6679	5770
19	1996	2425	3174	3859	4319	4778	5003	5078	5119	4180
20	779	1654	1983	2556	3197	3173	3820	3781	3632	3394
21	491	595	1420	1659	2162	2228	2497	2783	2610	2309
22	493	416	493	1148	1437	1372	1791	1843	1936	1674
23	104	418	342	389	990	979	1131	1420	1333	1253
24	38	68	372	291	333	856	780	869	1026	865
25	35	19	57	325	254	287	740	636	695	680
26	33	16	15	48	288	223	230	639	505	470
27	50	15	15	13	44	253	181	190	540	359
28	38	34	12	11	12	34	213	149	134	407
29	13	34	28	10	10	9	26	178	112	57
30	0	11	28	26	9	9	7	20	154	70

AGE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1-5	821524	693683	575587	448672	667481	609295	420649	310799	239338	224865
6-9	122659	100695	82451	70325	62240	64301	76507	96065	103902	88575
10-30	138741	150830	151664	151409	147993	133073	118609	102347	89798	83765

Table 17. (Cont.)

AGE	1980	1981	1982	1983	1984	1985	1986	1987	1978
1	51373	38123	53287	75920	92759	73193	131075	91975	0
2	62734	43121	28544	44698	64785	83060	65692	118047	81786
3	32524	39261	29333	22360	37990	51815	69750	54170	94448
4	25251	21982	20870	25082	17345	32473	35638	56446	41887
5	22527	16310	15281	18431	21850	14095	27045	29555	46434
6	15658	15850	9842	13604	16041	17851	9072	22689	22947
7	16209	12711	10894	8521	11607	12994	12494	6951	16312
8	19675	12774	9063	9372	7121	9793	10078	10039	5193
9	22130	13914	9617	7804	7563	6011	8225	8193	7724
10	15044	15974	10601	8415	6144	6338	5041	6953	6496
11	12783	12386	11983	9129	6806	4962	5322	4010	5409
12	8629	10769	9566	10126	7589	5429	4057	4368	3149
13	6033	7204	8514	7989	8546	6212	4438	3298	3467
14	4106	4920	5631	7066	6463	6909	4950	3471	2536
15	4908	3062	3741	4791	5518	5180	5443	3914	2700
16	4746	3398	2134	3215	3705	4122	3777	4132	2980
17	3935	2673	2141	1818	2538	2849	2878	2775	3147
18	3798	2126	1661	1770	1258	2030	2022	2205	2113
19	3709	1866	1274	1361	1069	886	1503	1497	1679
20	2896	1931	1011	986	861	760	600	1172	1140
21	2193	1728	1011	700	520	607	555	411	893
22	1477	1229	829	761	439	378	462	477	313
23	1078	937	499	583	472	288	268	318	363
24	773	674	323	325	319	270	167	212	242
25	601	491	343	223	185	236	190	113	161
26	471	388	148	267	124	90	172	132	86
27	320	323	137	107	169	69	42	126	101
28	232	178	111	85	59	128	34	20	96
29	339	171	70	78	56	22	99	13	15
30	37	283	80	24	56	25	6	74	10

AGE	1980	1981	1982	1983	1984	1985	1986	1987	1978
1-5	194409	158798	147315	186490	234730	254636	329201	350193	0
6-9	73672	55248	39416	39301	42305	46650	39869	47871	52175
10-30	78106	72712	61806	59821	52897	47788	42028	39691	37095

Table 18. 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			West Atlantic	
	East Atlantic	Mediterranean	Mediterranean	<6.4 kg % nos.	<120 cm % weight
	< 6.4 kg as % by numbers				
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	17.7	4.1
1984	16.7	17.6	17.3	4.1	5.9
1985	20.8	59.8	54.7	1.6	11.7
1986	74.6	57.5	62.4	2.9	9.5
				5.2	13.1





Table 19. (Cont.)

	1950	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
UNCL. REGION . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--LONGLINE . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--PURSE SEINE . . . . .	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	0	0	0	0	0	0
Spain. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--OTHER & UNCL. GEARS. .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
UNCL. REGION . . . . .	0	0	0	0	0	0	0	0	213	281	145	100	100	100	145
--LONGLINE . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
U.S.S.R. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
--PURSE SEINE . . . . .	0	0	0	0	0	0	0	0	213	281	145	100	100	100	100
FIS. . . . .	0	0	0	0	0	0	0	0	150	180	100	100	100	100	100
Spain. . . . .	0	0	0	0	0	0	0	0	63	101	43	0	0	0	0
--OTHER & UNCL. GEARS. .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

++ Catch: < 0.5 MT  
 \* Estimate.  
 \*\* Catch: Unknown

Table 20. Atlantic white marlin catches (MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>TOTAL</b>	161	112	313	823	2059	2612	3731	4903	3501	1616	2036	2232	2085	2246	2331
<b>NORTH ATLANTIC</b>	62	16	85	101	376	912	1690	2126	1787	578	681	1190	1036	1535	1158
--LONGLINE	62	16	23	41	302	868	1620	2043	1711	497	594	1114	932	1340	1099
Canada-Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
China-Taiwan	0	0	0	0	1	4	3	2	32	67	58	132	97	176	266
Cuba	0	0	0	0	0	35	45	69	118	127	103	58	61	45	34
Japan	62	16	23	30	271	756	1493	1913	1417	176	273	451	419	915	339
Korea	0	0	0	0	0	0	1	1	51	44	32	204	340	319	212
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R.	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1
Venezuela	0	0	0	11	30	55	78	63	93	104	107	268	15	82	258
--ROD & REEL	0	0	60	60	74	64	70	76	76	81	87	76	104	95	99
U.S.A.	0	0	60	60	74	64	70	76	76	81	87	76	104	95	99
--OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>SOUTH ATLANTIC</b>	99	96	228	722	1683	1700	2041	2779	1714	838	1355	1042	1049	711	1133
--LONGLINE	99	96	228	722	1683	1700	2041	2779	1714	838	1355	1042	1049	711	1133
Argentina	0	0	0	0	0	0	0	0	0	3	14	0	0	20	100
Brazil	0	0	0	50	24	17	17	17	17	9	21	24	54	15	96
China-Taiwan	0	0	0	0	5	10	3	2	29	134	327	436	459	260	669
Cuba	0	0	0	0	0	9	17	32	23	67	15	7	8	4	6
Japan	99	96	228	652	1544	1464	2002	2716	1585	494	815	392	234	65	101
Korea	0	0	0	0	0	0	2	7	58	125	157	177	230	141	332
Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R.	0	0	0	0	0	0	0	2	2	6	6	6	4	6	15
--OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>UNCL. REGION</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--LONGLINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987		
<b>TOTAL</b>	1779	1747	1572	1812	977	937	1012	955	1120	1091	1672	1100	1530	1325	1348
<b>NORTH ATLANTIC</b>	990	1211	1084	1047	499	636	479	505	778	652	1377	704	891	815	601
--LONGLINE	886	1103	977	938	390	317	370	396	669	563	1236	559	749	706	509
Canada-Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
China-Taiwan	120	248	84	142	46	79	62	105	174	130	203	32	115	275	93
Cuba	112	256	294	68	67	83	68	70	189	301	723	261	296	183	183
Japan	328	381	806	560	80	17	42	99	118	66	27	52	65	56	73
Korea	106	90	71	64	71	33	16	12	48	13	23	18	120	19	2
Panama	48	14	10	17	20	8	1	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0
U.S.A.	6	0	0	0	0	0	0	0	0	0	29	39	11	103	89
U.S.S.R.	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	170	114	113	107	108	127	181	110	140	112	230	148	148	148	146
--ROD & REEL	104	108	107	109	109	109	109	109	109	109	141	143	141	31	91
U.S.A.	104	108	107	109	109	109	109	109	109	109	141	143	141	31	91
--OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>SOUTH ATLANTIC</b>	789	536	488	765	478	311	533	450	352	439	295	396	659	510	667
--LONGLINE	789	536	488	760	473	308	529	447	352	439	295	396	655	506	667
Argentina	57	++	2	2	2	0	0	0	0	0	0	0	0	0	0
Brazil	10	36	31	41	126	143	128	58	36	82	66	60	40	16	84
China-Taiwan	412	279	255	377	119	197	255	165	136	220	87	66	154	138	332
Cuba	21	48	55	38	57	127	205	212	114	45	112	152	216	234	236
Japan	27	9	16	3	26	14	15	7	25	27	17	24	81	73	97
Korea	165	139	109	220	111	5	24	25	37	60	13	39	104	25	20
Panama	75	22	16	59	31	1	2	0	0	0	0	0	0	0	0
Uruguay	0	0	0	0	0	0	0	0	1	3	0	36	0	0	0
U.S.S.R.	22	3	6	0	3	2	0	0	1	0	0	0	0	0	0
--OTHER & UNCL. GEARS.	0	0	0	25	5	2	4	3	++	++	++	++	4	6	0
Argentina	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0
Brazil	0	0	0	25	3	2	4	3	++	++	++	++	6	6	0
<b>UNCL. REGION</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--LONGLINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

++ Catch: U.S. ME  
 + Estimate  
 \* Catch: Unknown

Table 21. Atlantic sailfish catches (MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TOTAL	119	28	326	683	898	996	1479	2916	2409	1890	2585	2090	2766	2820	2451
EAST ATLANTIC	0	0	0	0	0	0	0	3	5	90	89	95	98	126	161
--LONGLINE	0	0	0	0	0	0	0	3	5	14	13	14	11	14	39
Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
China-Taiwan	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
Korea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R.	0	0	0	0	0	0	0	3	5	14	13	14	11	14	39
--ROD & REEL	0	0	0	0	0	0	0	0	0	2	5	7	13	38	46
Senegal	0	0	0	0	0	0	0	0	0	2	5	7	13	38	46
--TROLLING	0	0	0	0	0	0	0	0	0	74	71	74	74	74	74
Senegal	0	0	0	0	0	0	0	0	0	74	71	74	74	74	74
--OTHER & UNCL. GEARS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Côte d'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Korea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEST ATLANTIC	**	**	111	322	296	234	255	327	301	337	343	330	697	651	457
--LONGLINE	**	**	**	196	154	77	82	139	107	136	136	116	469	396	196
Brazil	**	**	**	159	91	46	46	46	46	23	57	27	21	70	105
China-Taiwan	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
Korea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	37	63	31	36	93	61	113	79	89	428	326	91
--ROD & REEL	**	**	111	126	142	157	173	188	194	201	207	216	220	227	233
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.A.	**	**	111	126	142	157	173	188	194	201	207	216	220	227	233
--OTHER & UNCL. GEARS	0	0	0	0	0	0	0	0	0	0	**	**	28	28	28
Aruba	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++
Brazil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
TOTAL	1633	1364	1206	1526	1912	2643	3285	2469	2071	1911	3618	3650	3506	3556	3742
EAST ATLANTIC	160	126	165	193	816	1723	2350	1519	1047	784	2768	2389	2499	2679	2260
--LONGLINE	16	9	7	1	13	5	**	0	37	171	200	128	89	57	29
Cape Verde	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
China-Taiwan	0	0	0	0	0	0	0	0	0	0	0	9	9	0	0
Cuba	0	0	0	0	0	0	0	0	0	158	200	115	19	23	23
Korea	0	0	0	0	0	0	0	0	0	0	0	0	54	3	1
Spain	0	0	0	0	0	0	0	0	0	10	0	4	7	9	0
U.S.S.R.	14	9	7	1	13	5	**	0	37	0	0	0	0	2	5
--ROD & REEL	70	33	61	76	93	79	77	62	88	69	49	41	35	43	52
Senegal	70	33	61	76	93	79	77	62	88	69	49	41	35	43	52
--TROLLING	74	74	75	91	72	65	27	266	437	448	376	80	224	438	395
Senegal	74	74	75	91	72	65	27	266	437	448	376	80	224	438	385
--OTHER & UNCL. GEARS	2	8	22	25	638	1574	2246	1191	485	96	2163	2140	2151	2161	2394
Benin	0	0	0	0	0	0	0	0	36	48	0	53	50	25	28
Côte d'Ivoire	0	0	0	0	0	0	0	0	0	0	**	**	**	**	**
Ghana	2	8	22	11	638	1574	2246	1191	449	16	2161	2087	2100	2136	2325
Korea	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0
Senegal	0	0	0	0	0	0	0	0	0	32	2	20	3	0	3
WEST ATLANTIC	391	445	436	549	697	689	642	625	566	766	646	887	885	778	637
--LONGLINE	123	159	144	178	191	203	159	148	116	305	192	372	414	279	432
Brazil	37	82	88	124	137	139	68	93	66	68	49	87	36	2	127
China-Taiwan	0	0	0	0	0	0	0	0	0	0	0	42	39	49	19
Cuba	0	0	0	0	0	0	0	0	0	181	28	169	130	82	17
Korea	0	0	0	0	0	0	0	0	0	0	0	0	135	69	52
U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	3	70
Venezuela	86	77	56	54	54	66	91	55	70	56	115	74	74	74	74
--ROD & REEL	240	248	254	261	308	308	308	308	308	308	308	345	221	230	251
Brazil	0	0	0	0	0	0	0	0	0	0	0	37	26	35	36
U.S.A.	240	248	254	261	308	308	308	308	308	308	308	308	195	195	195
--OTHER & UNCL. GEARS	28	38	38	110	198	178	175	169	142	153	146	170	250	269	174
Aruba	++	10	10	20	20	30	30	30	30	30	30	30	30	30	30
Brazil	0	0	0	62	119	90	84	67	35	53	8	4	0	0	0

Table 21. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
--OTHER & UNCL. GEARS - Cont.															
Dominican Republic . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grenada . . . . .	0	0	0	0	0	0	0	0	0	0	**	**	**	**	**
Neth. Antilles . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	28	28	28
U.S.A. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UNCL. REGION . . . . .	119	28	215	361	602	762	1224	2586	2103	1463	2153	1665	1971	2043	1833
--LONGLINE . . . . .	119	28	215	361	602	762	1224	2586	2103	1463	2153	1665	1971	2043	1833
China-Taiwan . . . . .	0	0	0	0	2	4	2	2	34	183	594	593	498	779	802
Cuba . . . . .	0	0	0	0	0	23	42	102	75	371	384	71	100	51	30
Japan . . . . .	119	28	215	361	600	735	1170	2471	1845	678	970	458	594	446	221
Korea . . . . .	0	0	0	0	0	0	3	11	149	231	275	543	779	767	745
Panama . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	**	**	35
--OTHER & UNCL. GEARS. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
--OTHER & UNCL. GEARS - Cont.															
Dominican Republic . . . . .	0	0	0	0	0	0	0	0	0	22	50	49	46	18	40
Grenada . . . . .	**	**	**	**	31	37	40	31	36	27	37	66	164	211	104
Neth. Antilles . . . . .	28	28	28	28	29	21	21	21	21	21	21	21	10	10	0
U.S.A. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**
UNCL. REGION . . . . .	1082	775	603	786	409	231	293	325	458	361	184	174	122	99	45
--LONGLINE . . . . .	1082	775	603	786	409	231	293	325	458	361	184	174	122	99	45
China-Taiwan . . . . .	598	248	66	270	64	52	37	49	86	140	108	0	0	0	0
Cuba . . . . .	100	229	262	185	156	120	191	198	213	0	0	0	0	0	0
Japan . . . . .	144	137	150	137	47	20	39	55	94	173	69	97	122	99	45
Korea . . . . .	165	139	109	151	111	32	24	23	65	48	7	77	0	0	0
Panama . . . . .	73	22	16	41	31	7	2	0	0	0	0	0	0	0	0
--OTHER & UNCL. GEARS. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

++ Catch: < 0.5 MT  
 \* Estimate.  
 \*\* Catch: Unknown

Table 22. Atlantic swordfish catch (MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>TOTAL</b>	5910	6603	4367	5591	6399	11900	13669	12554	12560	13792	14672	16897	17657	11746	12598
<b>NORTH ATLANTIC</b>	4904	6232	3828	4381	5342	10189	11238	8652	9338	9084	9137	9138	9425	5198	4727
-LONGLINE	875	1428	1042	2060	3202	9192	10633	7759	8492	8656	8950	8938	9127	5140	4430
Canada	0	0	0	0	311	6682	6888	4155	3731	4534	4342	4149	4800	0	0
China-Taiwan	0	0	0	0	0	2	1	1	37	76	115	218	234	226	129
Cuba	0	300	300	300	400	125	134	171	175	336	324	87	134	160	75
Japan	63	26	20	54	106	311	700	1025	658	280	262	130	298	914	784
Korea	0	0	0	0	0	0	1	2	27	46	24	22	60	159	155
Morocco	0	0	0	6	12	5	18	14	12	11	13	16	14	21	15
Norway	0	0	0	0	0	0	0	4+	300	300	200	600	400	200	**
Panama	0	0	0	0	0	0	0	0	0	0	0	0	**	**	7
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	812	1100	722	1700	2300	1000	1800	1433	2999	2690	3551	3502	3160	3384	3210
U.S.A.	0	0	0	0	65	1053	1279	965	534	340	180	93	0	0	0
U.S.S.R.	0	0	0	0	0	0	0	5	8	22	21	11	24	24	28
Venezuela	0	0	0	0	8	13	12	8	11	21	18	100	23	52	27
-OTHER & UNCL. GEARS	4029	4804	2786	2321	2140	997	425	893	846	428	187	200	298	58	297
Canada	3219	4014	2326	1913	1781	800	211	519	702	260	51	108	0	0	0
Cuba	**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liberia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Martinique	103	100	**	**	**	**	**	**	(	0	0	0	0	0	0
Mexico	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Morocco	++	++	++	0	0	0	100	86	49	23	30	4	3	12	28
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	9	6	15	11	12	11	6	11	21	37
Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
St. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++
U.S.A.	710	690	458	408	359	197	105	282	80	134	94	77	287	35	246
U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>SOUTH ATLANTIC</b>	92	171	459	1016	769	1417	2029	2578	1930	1539	2335	4290	5130	1945	2381
-LONGLINE	92	71	359	816	769	1417	2029	2578	1930	1539	2235	4090	5130	1843	2381
Argentina	0	0	281	111	196	400	508	400	200	79	259	500	400	63	100
Brazil	**	**	**	440	251	125	125	125	125	62	100	181	162	113	103
China-Taiwan	0	0	0	0	1	6	2	1	73	128	375	637	985	599	621
Cuba	0	0	0	0	0	83	101	184	122	539	410	170	148	74	66
Japan	92	71	76	265	321	825	1288	1845	1300	474	859	2163	2877	662	1023

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>TOTAL</b>	13247	13365	15344	13491	13933	19814	19061	23975	20649	24619	25371	32269	35906	37588	24751
<b>NORTH ATLANTIC</b>	6001	6301	8776	6587	6352	11797	11859	13527	11126	12832	14423	12761	14134	17522	17139
-LONGLINE	5446	5078	7015	9125	5401	11035	11099	12800	10507	12800	13897	12575	14019	16901	16326
Canada	0	2	21	15	113	2314	2970	1794	542	542	960	465	550	973	876
China-Taiwan	263	204	209	362	139	126	260	103	160	200	209	126	117	121	40
Cuba	248	572	280	263	398	281	128	278	227	254	410	206	162	143	173
Japan	318	1178	2462	1149	793	946	542	1167	1315	1755	537	665	921	807	727
Korea	374	152	172	335	541	634	303	284	136	198	53	257	59	16	7
Morocco	10	12	15	12	6	11	208	136	124	91	125	79	137	178	207
Norway	**	**	0	0	0	0	0	0	0	0	0	0	0	0	0
Panama	171	24	25	91	22	76	26	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	7	15	30
Spain	3833	2893	3747	2816	3309	3611	2582	3810	4013	4554	7100	6315	7431	9712	9134
U.S.A.	0	0	0	0	0	3020	3888	5015	3986	4912	6468	4416	4563	4819	4827
U.S.S.R.	26	17	32	19	15	20	10	21	0	69	0	16	13	18	0
Venezuela	23	24	52	43	15	46	182	192	24	25	35	23	51	84	0
-OTHER & UNCL. GEARS	555	1223	1761	1462	951	712	760	727	619	232	526	166	135	621	807
Canada	0	0	0	0	0	0	0	91	19	12	126	34	35	86	78
Cuba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	5	4	0	0	1	4	4	0
Ireland	0	0	3	1	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
Liberia	0	0	0	0	0	0	0	0	38	38	53	++	24	24	30
Martinique	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	4	3	0	0	0	2	0	0	0	0	0	0	0	0	0
Morocco	8	3	0	0	1	0	0	0	0	0	4	2	0	0	0
Poland	100	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Portugal	37	92	58	32	38	17	29	15	13	11	9	7	7	638	634
Rumania	0	0	0	0	0	1	0	0	0	0	0	0	0	4	1
Spain	0	0	0	0	0	11	0	0	1	0	0	0	0	0	0
St. Lucia	++	++	++	++	++	++	++	++	0	0	0	0	0	0	0
U.S.A.	406	1125	1700	1429	912	664	731	610	546	175	332	122	55	65	60
U.S.S.R.	0	0	0	0	0	3	0	0	0	0	0	0	0	0	4
<b>SOUTH ATLANTIC</b>	3799	2451	2650	2674	2704	2548	2862	5058	3819	6295	5330	8665	8828	6005	6257
-LONGLINE	2799	2451	2650	2674	2669	2531	2833	4914	3782	6192	5235	8425	8120	5072	5767
Argentina	48	10	10	111	132	4	0	++	0	0	0	0	0	0	0
Brazil	137	368	314	399	389	292	386	1476	618	978	754	463	501	727	921
China-Taiwan	849	617	719	573	519	681	994	540	406	400	201	153	215	166	260
Cuba	221	509	243	317	302	319	272	316	147	632	818	1161	1301	588	739
Japan	480	191	205	105	514	903	782	2029	2170	3287	1908	4395	4613	2913	1077

Table 22. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Korea . . . . .	0	0	0	0	0	0	1	4	54	79	77	370	382	256	249
Panama . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
South Africa . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uruguay . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R. . . . .	0	0	0	0	0	0	6	39	56	158	155	89	176	176	202
-OTHER & UNCL. GEARS.	**	100	100	200	**	**	**	**	**	**	100	200	0	2	0
Angola . . . . .	++	100	100	200	++	++	0	0	0	0	0	0	0	0	0
Argentina . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Benin . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazil . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulgaria . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Côte d'Ivoire . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ghana . . . . .	**	**	**	**	**	**	**	**	**	**	100	200	0	0	0
Japan . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Nigeria . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Togo . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U.S.S.R. . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDITERRANEAN . . . . .	914	200	100	194	288	294	262	1724	1632	3169	3200	3469	3102	4603	5490
-LONGLINE . . . . .	414	0	0	94	168	94	282	1423	1192	869	1196	1350	1114	1426	1529
Greece . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Japan . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Morocco . . . . .	0	0	0	94	158	94	262	223	192	169	196	250	214	326	229
Spain . . . . .	414	0	0	0	0	0	0	1200	1000	700	1000	1100	900	1100	1300
-OTHER & UNCL. GEARS.	500	200	100	100	100	200	100	301	500	2300	2004	2119	1988	3177	3961
Algeria . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	**	**	++
Cyprus . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	++
Greece . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Italy . . . . .	**	**	**	**	**	**	**	**	**	1900	1400	2000	1800	2900	3700
Libya . . . . .	0	0	0	0	0	0	0	200	200	300	500	**	0	0	0
Malta . . . . .	**	**	**	**	**	**	**	++	++	++	++	++	100	200	200
Morocco . . . . .	0	0	0	0	0	0	0	1	0	1	1	0	0	1	1
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	++	++	++
Turkey . . . . .	500	200	100	100	100	200	100	100	300	99	103	119	88	76	60
UNCL. REGION . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-LONGLINE . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Korea . . . . .	602	563	278	812	699	699	303	399	311	486	609	149	285	66	60
Panama . . . . .	274	90	40	212	28	83	26	0	0	0	0	0	0	0	0
South Africa . . . . .	0	0	0	0	0	0	0	0	0	0	0	5	5	3	3
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	66	0
Uruguay . . . . .	0	0	0	0	0	0	0	0	94	583	1099	1953	1140	543	699
U.S.S.R. . . . .	183	123	231	133	106	149	70	154	36	26	46	146	60	0	0
-OTHER & UNCL. GEARS.	0	0	**	++	15	17	29	144	37	103	95	240	708	933	490
Angola . . . . .	0	0	0	0	0	0	0	0	0	0	0	26	228	815	**
Argentina . . . . .	0	0	0	++	0	0	0	0	0	20	0	0	361	31	351
Benin . . . . .	0	0	0	0	0	0	0	0	18	24	0	86	90	39	13
Brazil . . . . .	0	0	0	++	12	5	1	3	1	1	0	1	0	0	0
Bulgaria . . . . .	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Côte d'Ivoire . . . . .	0	0	0	0	0	0	0	0	0	0	0	**	**	**	0
Ghana . . . . .	0	0	0	0	0	0	0	110	3	55	5	23	20	14	123
Japan . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nigeria . . . . .	0	0	0	0	0	0	0	0	**	**	83	69	0	0	0
South Africa . . . . .	0	0	0	0	0	0	28	31	9	3	7	23	3	2	2
Togo . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	32	1
U.S.S.R. . . . .	0	0	0	0	0	12	0	0	4	0	0	12	0	0	0
MEDITERRANEAN . . . . .	4447	4613	5913	6230	4877	5469	5120	5390	5704	5292	5818	10863	12924	14061	1363
-LONGLINE . . . . .	1288	893	207	3343	3784	4242	3688	4003	4123	3211	3749	9592	3673	2978	1173
Greece . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	1535	0
Italy . . . . .	0	0	0	3067	2973	3348	3085	3252	3002	2306	2375	2251	2203	0	0
Japan . . . . .	0	0	0	1	0	2	3	3	1	5	6	19	14	7	0
Morocco . . . . .	183	193	118	186	144	172	0	**	**	0	43	39	37	99	39
Spain . . . . .	1105	780	83	89	667	720	800	790	1120	900	1321	1243	1219	1337	1134
-OTHER & UNCL. GEARS.	3159	3720	3711	867	1099	1227	1232	1387	1581	2091	2079	7911	9651	11083	199
Algeria . . . . .	100	196	508	368	370	320	521	650	760	870	877	884	890	960	0
Cyprus . . . . .	++	++	5	72	118	91	308	79	88	124	13	72	80	176	0
Greece . . . . .	0	0	0	0	0	0	0	0	73	552	351	772	760	0	0
Italy . . . . .	2800	3330	3002	279	372	675	424	467	412	318	327	5387	7386	9590	0
Libya . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malta . . . . .	200	171	191	156	199	121	135	198	171	158	53	84	96	67	117
Morocco . . . . .	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia . . . . .	++	5	3	5	0	0	0	0	0	7	19	15	15	61	64
Turkey . . . . .	59	15	10	7	34	20	44	13	70	40	216	95	190	226	14
UNCL. REGION . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-LONGLINE . . . . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-OTHER & UNCL. GEARS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

++ Catch: 4 0-3 MT  
 \*\* Catch: Unknown

Table 23. Catch (no. of fish) at age for the North Atlantic (Areas 1, 2, 3, 4A, 4B). (Revised growth equation September 10, 1988)

AGE	NUMBERS CAUGHT									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
0	580	1178	3306	2953	3697	4149	5222	4989	13140	14877
1	6402	10406	25881	14761	20357	29247	28733	32602	44092	62073
2	19279	27379	46023	34832	31038	54189	51951	57783	88748	100052
3	36184	33384	49655	40423	43192	55267	55518	65338	82864	91744
4	35416	32012	39174	34777	39982	48455	44301	51359	63560	61361
5	26021	22812	25817	20987	26889	30545	25892	26827	33138	31312
6	13661	14327	14852	11283	13260	15415	12703	12735	15379	15160
7	8664	8992	9327	7282	7745	8367	6432	7156	7645	6613
8	4269	4694	4697	4143	4971	4023	3222	3525	3974	3340
9	3290	3494	3228	2428	2932	2599	2020	2234	2595	1756
10	2051	2057	1927	1557	1678	1381	1135	1159	1481	1417
11	1074	1470	1151	928	1209	873	766	668	928	880
12	820	825	707	622	619	522	416	433	613	478
13	712	851	496	511	478	367	317	285	411	316
14	507	651	399	376	315	352	296	229	301	285
15+	5228	5985	5113	4758	6193	3808	2914	2814	3696	3164
TOTAL	164158	170517	231753	182621	204555	259559	241838	270136	362565	394828



Table 24. Catch (number of fish) at age for the South Atlantic (Areas 6 and 7). (Revised growth equation September 10, 1988)

AGE	NUMBERS CAUGHT									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
0	67	83	166	122	297	52	977	816	276	334
1	485	616	1015	1306	3268	1546	5345	7584	4197	5142
2	1485	3329	3729	3156	11297	7974	16049	20184	9438	14775
3	1463	7372	8442	4370	18886	12928	24197	22605	13923	11325
4	2204	5523	12494	5894	16699	11739	21655	29350	14678	14011
5	3883	5384	9641	6533	15222	13536	17066	22559	14990	16061
6	4886	3756	11210	5564	10711	10979	10937	11499	9681	13824
7	2798	2587	7154	3818	5570	3185	6992	4770	5096	6220
8	1045	1592	2608	2328	2772	2091	3075	3197	2471	2451
9	1342	1640	1341	1685	1426	681	1742	1591	1716	1571
10	871	1235	827	1301	1127	707	1395	980	1246	987
11	506	920	349	797	536	135	812	438	540	628
12	221	139	158	252	283	62	380	200	186	372
13	305	129	257	202	198	150	220	229	141	170
14	245	95	164	164	183	122	158	213	160	137
15	2757	977	1072	3529	1473	800	2184	2709	1142	2050
TOTAL	24562	35378	60629	41021	89948	66687	113182	128923	79882	90056

Table 25. Atlantic and world southern bluefin catches (MT) by gear, area and country

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
ATLANTIC TOTAL	3168	4680	6203	2823	2569	1138	514	1636	1476	413	1152
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
Japan	3168	4651	6192	2788	2506	1135	505	1636	1468	389	1110
South Africa	0	0	0	13	6	++	0	0	0	0	0
WORLD CATCHES (all oceans)											
Longline	29595	22974	27715	33364	28056	20809	24735	23323	20393	15522	15000 *
Surface	12569	12190	10783	11325	17016	21709	17807	13497	12688	12614	10871
Total	42164	35164	38498	44689	45072	42518	42542	36820	33081	28136	25871 *

\*Preliminary

Source for "world" section: Report of the Seventh Meeting of Australian, Japanese, and New Zealand Scientists on Southern Bluefin Tuna (SBT). Wellington, New Zealand. August, 1988.

Table 26. Atlantic small tunas catches (1,000 MT)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>TOTAL</b>															
ATLANTIC + MEDITERRANEAN	67.2	50.7	74.0	84.3	52.4	65.4	49.7	71.4	66.2	91.4	76.6	115.5	86.7	97.3	87.3
MEDITERRANEAN	30.9	12.1	37.0	30.6	12.9	29.3	18.4	30.9	26.1	46.4	30.6	60.6	25.4	33.3	20.7
ATLANTIC	36.3	38.6	37.0	53.6	39.5	36.0	31.2	40.5	40.2	45.0	46.0	55.0	63.2	64.0	66.6
<b>ATLANTIC BONITO (S. SARDA)</b>															
ATLANTIC + MEDITERRANEAN	33.4	17.9	40.7	50.7	14.8	28.2	16.8	31.4	29.1	49.1	31.9	61.7	28.7	64.0	25.0
MEDITERRANEAN	28.6	11.5	34.4	45.8	7.5	22.8	13.5	27.0	27.1	41.2	26.3	55.6	20.7	26.2	16.2
--PURSE SEINE	++	++	++	0.1	++	++	++	++	0.1	0.1	++	++	++	++	++
Spain	0.0	0.0	0.0	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	0.0
Yugoslavia	++	++	++	0.1	++	++	++	++	0.1	0.1	++	++	++	++	++
--OTHER SURFACE GEARS	0.1	0.0	0.1	++	0.5	0.5	0.3	0.4	0.6	0.8	0.4	0.4	0.7	0.8	0.3
Morocco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	++	++	++	0.1	0.1
Spain	0.1	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 + TRAWL	28.5	11.5	34.2	45.7	6.9	32.3	13.2	26.5	21.3	40.3	25.9	55.2	20.0	27.3	15.9
Algeria	0.0	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	0.0	1.7	1.5	2.3	1.8	2.1	0.0	0.1	0.0
Egypt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
France	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Greece	1.3	0.9	1.4	1.9	2.0	2.2	0.9	3.2	3.3	1.8	1.7	2.0	0.9	0.6	0.6
Italy	0.0	0.0	0.0	2.0	1.1	1.0	1.0	0.9	1.0	1.4	0.8	1.0	0.9	1.1	1.0
Malta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Romania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tunisia	0.0	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	0.2
Turkey	27.2	10.6	32.2	41.8	3.8	19.1	11.2	20.6	16.1	34.5	21.3	30.1	16.1	25.2	13.9
U.S.S.R.	0.0	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
ATLANTIC	4.8	6.3	6.4	4.9	7.3	5.3	3.3	4.4	7.0	7.9	5.7	6.1	6.0	15.8	8.8
--PURSE SEINE	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
Argentina	0.0	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
Morocco	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	++	++	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--UNCL. + LL + TRAWL	5.7	7.3	5.6	5.6	7.6	8.5	12.6	13.3	28.0	30.1	34.2	13.8	17.3	6.5	6.0
Algeria	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	0.9	0.0
Bulgaria	0.0	0.0	0.0	++	++	++	++	++	0.2	++	++	++	++	0.0	0.0
Egypt	0.0	++	++	0.0	++	++	++	++	++	++	++	++	++	++	0.0
France	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0
Greece	0.5	0.5	0.7	0.5	0.6	0.6	0.7	0.8	1.3	1.6	1.4	1.7	1.6	1.6	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	0.0
Malta	0.0	++	++	++	++	++	++	++	0.0	0.0	++	0.0	0.0	0.0	0.0
Romania	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tunisia	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	0.0
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	12.8	0.0	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ATLANTIC	6.1	13.7	9.6	9.5	12.0	7.9	6.5	12.6	10.0	12.8	7.0	6.2	6.6	5.3	6.2
--PURSE SEINE	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
Argentina	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
Morocco	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	0.3	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	0.1	0.2
South Africa	++	0.0	++	0.0	0.0	++	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	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	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	++	++	0.6	++	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--UNCL. + LL + TRAWL	5.7	7.3	5.6	5.6	7.6	8.5	12.6	13.3	28.0	30.1	34.2	13.8	17.3	6.5	6.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>TOTAL</b>															
ATLANTIC + MEDITERRANEAN	66.7	90.7	78.7	74.5	90.9	83.3	83.6	113.1	111.0	128.3	126.3	97.4	93.0	87.8	64.5
MEDITERRANEAN	11.1	13.4	10.3	12.7	14.5	15.4	19.8	25.4	33.6	37.2	40.8	20.6	24.3	22.5	2.6
ATLANTIC	55.6	77.3	68.4	61.8	76.3	67.9	63.8	87.7	77.4	91.1	85.5	76.9	68.7	65.4	61.9

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>ATLANTIC BONITO (S. SARDA)</b>															
ATLANTIC + MEDITERRANEAN	12.3	21.4	15.6	16.0	20.7	17.3	20.0	31.5	39.1	44.1	62.5	21.1	25.0	22.1	7.8
MEDITERRANEAN	6.3	7.7	6.0	6.9	8.7	9.4	13.5	18.9	29.0	31.2	35.5	16.9	18.4	16.8	1.7
--PURSE SEINE	++	++	++	++	++	++	++	0.1	++	0.1	1.0	0.7	0.6	11.9	1.6
Spain	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
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	11.6	1.5
Yugoslavia	++	++	++	++	++	++	++	0.1	++	0.1	++	++	++	++	0.1
--OTHER SURFACE GEARS	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
Morocco	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
Spain	0.3	0.3	0.3	0.6	0.6	0.7	0.7	0.5	0.7	1.0	0.3	0.3	0.4	0.3	0.1
--UNCL. + LL + TRAWL	5.7	7.3	5.6	5.6	7.6	8.5	12.6	13.3	28.0	30.1	34.2	13.8	17.3	6.5	6.0
Algeria	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	0.9	0.0
Bulgaria	0.0	0.0	0.0	++	++	++	++	++	0.2	++	++	++	++	0.0	0.0
Egypt	0.0	++	++	0.0	++	++	++	++	++	++	++	++	++	++	0.0
France	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0
Greece	0.5	0.5	0.7	0.5	0.6	0.6	0.7	0.8	1.3	1.6	1.4	1.7	1.6	1.6	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	0.0



Table 26. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>ATLANTIC BLACK SKIPJACK (E. ALLETTERATUS)</b>															
ATLANTIC + MEDITERRANEAN	3.4	9.7	3.0	2.5	5.1	4.0	1.7	4.1	3.3	4.0	3.2	3.6	6.4	5.4	2.9
MEDITERRANEAN	++	++	++	++	++	++	++	++	++	++	0.2	1.0	0.7	0.5	0.7
—SURFACE GEARS.	++	++	++	++	++	++	++	++	++	++	0.2	0.9	0.6	0.4	0.6
Morocco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.6	0.4	0.6
Yugoslavia	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
—UNCL. + LL + TRAWL.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Cyprus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	0.1	0.1
Syria	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ATLANTIC	3.4	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
—BAITBOAT	++	++	++	++	++	++	++	++	0.1	0.7	0.3	0.6	1.9	1.1	0.6
Angola	++	++	++	++	++	++	++	++	0.1	0.7	0.3	0.6	1.2	0.7	0.3
Brazil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde	0.0	0.0	0.0	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	0.0	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
Morocco	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	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	0.3
—PURSE SEINE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Canada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.4	0.0
France	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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
Morocco	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>ATLANTIC BLACK SKIPJACK (E. ALLETTERATUS)</b>															
ATLANTIC + MEDITERRANEAN	2.4	5.1	0.7	9.9	7.3	16.6	13.1	17.7	16.2	15.8	25.4	17.0	12.1	9.6	16.4
MEDITERRANEAN	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	++
—SURFACE GEARS.	0.7	0.7	0.8	1.1	1.1	1.2	1.0	0.8	0.1	0.7	++	++	++	++	++
Morocco	++	++	0.1	++	++	0.0	++	0.0	0.1	++	0.0	++	0.0	0.0	0.0
Spain	0.7	0.7	0.7	1.1	1.1	1.2	1.0	0.8	0.1	0.7	0.0	++	++	++	0.0
Yugoslavia	++	++	++	++	++	++	0.0	0.0	0.0	++	++	++	++	++	++
—UNCL. + LL + TRAWL.	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	0.0
Cyprus	++	++	++	++	++	++	++	++	++	++	++	++	++	++	0.0
Israel	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.1	++	0.1	++	0.1	0.3	0.3	0.0
Syria	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	++	0.0
ATLANTIC	1.5	4.2	7.7	8.4	5.8	15.1	11.8	16.7	15.9	14.8	25.2	16.8	11.7	9.3	19.4
—BAITBOAT	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	1.6
Angola	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
Brazil	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
Cape Verde	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	++	++	++	++	++
Cuba	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	0.0
Ghana	++	0.1	0.1	0.1	0.1	0.1	0.1	++	++	++	0.0	0.3	0.7	0.5	0.3
Morocco	0.0	0.0	0.0	0.1	0.0	++	++	0.1	++	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	0.3	++	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	0.0	0.0	0.0	0.0
Spain	++	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0
—PURSE SEINE	++	0.1	0.1	0.1	++	5.5	++	0.8	1.9	3.0	2.7	1.2	2.5	1.3	2.7
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
Cuba	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
France	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
Ghana	0.0	0.0	++	++	0.0	0.0	0.0	0.0	0.4	0.6	0.0	0.3	0.2	0.1	++
Morocco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.4	0.1	0.0
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	++	0.1	++	0.0	0.0	0.0	0.0	++	++
Senegal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.7	1.0	0.5	1.0	0.6	2.6
Spain	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0
U.S.A.	++	0.1	0.1	0.0	++	0.1	++	++	++	0.0	++	++	++	++	++
U.S.S.R.	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

Table 26. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>ATLANTIC BLACK SKIPJACK (E. ALLETTERATUS) - Cont.</b>															
<b>TROLLING</b> . . . . .	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>TRAP</b> . . . . .	3.3	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
Angola . . . . .	3.3	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
Morocco . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	++	++	++	0.1	++	++	++
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	++	0.1	++	++	++	++	++	++	++	++	++	++	0.0	0.0	0.0
<b>OTHER SURFACE GEARS</b> . . . . .	0.1	0.3	++	++	0.2	0.2	0.3	1.2	0.4	0.2	0.3	0.6	3.9	2.3	0.9
Angola . . . . .	0.1	0.3	++	++	0.2	0.2	0.3	0.8	0.4	0.2	0.1	0.1	3.2	0.6	0.5
Benin . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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
Mauritania . . . . .	0.0	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
Morocco . . . . .	0.0	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
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
São Tomé . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	0.0	0.0	0.0	0.0	++	++	++	0.4	0.0	0.0	0.0	++	0.1	0.7	++
U.S.A. . . . .	0.0	++	++	0.0	0.0	++	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.2
<b>UNCL. + LL + TRAWL</b> . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.2	++	0.3
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Côte d'Ivoire . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Germany, 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
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
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
Poland . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Roumania . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.2	++	0.2

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>ATLANTIC BLACK SKIPJACK (E. ALLETTERATUS) - Cont.</b>															
<b>TROLLING</b> . . . . .	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
Senegal . . . . .	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
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	++	2.0	++	0.0	0.0	0.0	0.0
<b>TRAP</b> . . . . .	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
Angola . . . . .	0.6	0.7	0.1	++	0.2	++	0.2	0.4	0.4	0.6	0.4	0.3	0.1	++	0.1
Morocco . . . . .	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	++	0.0	++	++	++	++	++
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++	++	0.0
<b>OTHER SURFACE GEARS</b> . . . . .	0.5	1.1	6.1	7.7	4.4	9.1	10.9	13.8	8.1	3.8	13.0	11.1	4.8	5.5	7.7
Angola . . . . .	0.1	0.2	++	0.0	0.5	0.5	++	0.1	++	++	++	++	++	++	++
Benin . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	0.1	++
Brazil . . . . .	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
Cape Verde . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	0.1	++	++
Ghana . . . . .	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
Mauritania . . . . .	0.1	0.1	0.1	0.1	0.1	0.1	0.1	++	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Morocco . . . . .	++	++	0.1	++	++	++	0.3	++	++	++	0.0	++	0.0	0.0	0.1
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	++
São Tomé . . . . .	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
Senegal . . . . .	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
Spain . . . . .	++	0.0	++	++	++	++	++	0.5	++	++	0.0	++	++	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++	0.1	0.1
U.S.S.R. . . . .	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
Venezuela . . . . .	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	0.0
<b>UNCL. + LL + TRAWL</b> . . . . .	0.1	1.9	0.9	0.4	0.5	0.1	0.1	0.4	3.1	4.8	5.4	1.6	0.9	0.1	5.3
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	++	++	0.0
Bulgaria . . . . .	0.0	0.0	++	0.0	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Côte d'Ivoire . . . . .	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
Germany, D. R. . . . .	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	0.2	0.2	0.6	0.3	0.3	0.1	0.0	0.0
Italy . . . . .	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Poland . . . . .	0.0	++	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Roumania . . . . .	0.1	0.3	++	++	0.1	++	++	++	++	0.3	0.2	0.3	0.1	0.1	0.0
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	++	0.0	++	++	++	++	++	++	++	0.1	++	++	0.0	++	++



Table 26. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>FRIGATE TUNA (A. THAZARD) - Cont.</b>															
--PURSE SEINE . . . . .	0.0	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
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0	0.0
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
France . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	0.0	0.0	0.0	0.0	0.4	1.3	0.2	0.7	0.6	1.2
Morocco . . . . .	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Senegal . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--TRAP . . . . .	1.9	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
Angola . . . . .	1.3	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
Morocco . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.2	0.1	++	0.4	++	0.3
Spain . . . . .	0.6	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
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	0.0	0.0
--OTHER & UNCL. GEARS .	6.7	6.6	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
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
Benin . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Verde . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Germany, 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
Ghana . . . . .	0.0	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
Morocco . . . . .	0.0	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	++
São Tomé . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	5.5	2.8	4.2	2.6	0.7	0.4	0.4	0.8	3.4	0.4	0.3	0.2	0.1	1.8	0.2
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela . . . . .	1.2	1.7	1.3	0.8	1.0	1.0	1.4	1.8	1.6	1.1	0.4	0.4	0.7	0.5	0.6

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
<b>FRIGATE TUNA (A. THAZARD) - Cont.</b>															
--PURSE SEINE . . . . .	0.2	++	++	++	0.0	1.2	0.8	6.0	5.4	4.6	4.7	8.7	5.3	3.6	5.9
Argentina . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil . . . . .	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
France . . . . .	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
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
Japan . . . . .	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
Morocco . . . . .	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
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	++	++	++
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	1.0
Spain . . . . .	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	4.8
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0
U.S.S.R. . . . .	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
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0
NET . . . . .	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
--TRAP . . . . .	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
Angola . . . . .	0.5	0.7	0.2	++	0.1	0.1	0.1	++	0.1	0.1	0.1	0.1	++	0.0	0.0
Morocco . . . . .	0.1	0.1	0.0	0.0	++	0.0	0.0	0.1	++	0.0	++	0.0	0.0	0.0	0.0
Spain . . . . .	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
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--OTHER & UNCL. GEARS .	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	8.3
Angola . . . . .	0.2	0.6	0.3	0.0	0.1	0.1	++	++	++	++	++	++	0.0	++	++
Benin . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	0.1	++	++	0.1	++	++
Brazil . . . . .	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
Bulgaria . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.0	++	++	0.0	0.0	0.0	0.0
Cape Verde . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++
Germany, D. R. . . . .	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
Ghana . . . . .	1.6	6.3	6.0	4.3	13.3	1.0	4.3	7.6	2.0	6.1	5.6	4.5	4.5	3.3	4.7
Morocco . . . . .	1.0	0.1	++	0.3	0.7	0.6	0.7	0.7	1.3	0.1	0.7	0.2	0.4	0.0	0.5
São Tomé . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0
Spain . . . . .	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
U.S.S.R. . . . .	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
Venezuela . . . . .	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	0.0



Table 26. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>SPOTTED SPANISH MACKEREL (S. MACULATUS)***</b>															
ATLANTIC . . . . .	8.2	7.6	11.2	11.2	11.7	11.1	10.0	11.9	13.5	12.8	12.8	12.5	15.9	11.9	16.8
--LONGLINE . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil . . . . .	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0
Mexico . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
--TROLLING . . . . .	0.2	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
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
U.S.A. . . . .	0.2	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
--OTHER SURFACE GEARS . . . . .	8.0	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
Brazil . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.2	1.8
Cuba . . . . .	0.0	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
Dominican Republic . . . . .	0.0	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
U.S.A. . . . .	5.0	3.1	3.4	3.3	4.2	3.4	2.7	3.5	4.2	3.5	5.2	4.3	0.0	0.0	0.0
Venezuela . . . . .	3.0	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
--UNCL. + TRAWL . . . . .	++	++	2.0	2.9	3.0	3.6	2.2	3.5	4.3	6.9	2.7	5.2	11.4	10.0	11.3
Colombia . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.1
Grenada . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico . . . . .	0.0	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
Trinidad . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.2	1.0
U.S.A. . . . .	++	++	++	++	++	++	++	++	++	++	++	++	5.5	4.7	4.9

**KING MACKEREL (S. CAVALLA)**

ATLANTIC . . . . .	1.5	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
Argentina . . . . .	0.0	0.0	0.0	++	++	++	++	0.0	0.0	++	++	0.0	0.0	++	0.0
Brazil . . . . .	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	0.9	2.5
China-Taiwan . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grenada . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico . . . . .	0.0	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
U.S.A. . . . .	1.5	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
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.1	1.8	1.5	1.8	1.6	1.1

1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987

**SPOTTED SPANISH MACKEREL (S. MACULATUS)\*\*\***

ATLANTIC . . . . .	20.0	21.0	18.1	18.6	15.4	15.0	14.5	18.1	15.0	16.6	16.0	13.8	16.8	16.4	11.1
--LONGLINE . . . . .	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	6.0	6.5
Brazil . . . . .	0.0	0.0	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	0.6	0.5	0.4	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.1	0.1	0.0
Mexico . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	5.8	5.8	5.9	6.5
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0
--TROLLING . . . . .	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	0.0
Cuba . . . . .	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.5	0.6	0.6	0.1	0.1	++	0.1	0.0
U.S.A. . . . .	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
--OTHER SURFACE GEARS . . . . .	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	4.5
Brazil . . . . .	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	++	++
Cuba . . . . .	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	0.0
Dominican Republic . . . . .	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
U.S.A. . . . .	0.9	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
Venezuela . . . . .	2.5	2.5	2.6	2.0	2.2	2.0	2.5	2.8	2.8	1.7	2.1	1.9	2.0	1.5	0.0
--UNCL. + TRAWL . . . . .	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	0.1
Colombia . . . . .	0.2	0.3	0.4	0.2	0.3	0.2	0.2	0.2	0.6	++	++	0.1	0.1	0.1	0.0
Grenada . . . . .	0.0	0.0	0.0	0.0	++	++	0.0	++	++	++	++	++	++	++	0.0
Mexico . . . . .	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
Trinidad . . . . .	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	0.0
U.S.A. . . . .	4.4	5.0	5.3	6.4	3.5	3.3	2.9	++	++	3.7	++	++	++	++	0.1

**KING MACKEREL (S. CAVALLA)**

ATLANTIC . . . . .	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	8.8	7.7
Argentina . . . . .	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
Brazil . . . . .	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	++	++
China-Taiwan . . . . .	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grenada . . . . .	0.0	0.0	0.0	0.0	0.2	0.2	0.1	++	++	++	++	++	++	++	0.0
Mexico . . . . .	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	3.3	3.1
U.S.A. . . . .	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
U.S.S.R. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela . . . . .	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	0.0	0.0



Table 26. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
<b>SCOMBEROMORUS UNCLASSIFIED (S. SPP.)</b>															
ATLANTIC. . . . .	3.4	3.7	1.5	1.6	1.6	1.5	1.8	1.8	1.9	2.1	2.1	3.4	0.9	1.1	1.0
Barbados . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Brazil . . . . .	0.8	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
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	0.3	0.2	0.1
Grenada . . . . .	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	0.0	0.0
Guadalupe . . . . .	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Martinique . . . . .	0.2	0.3	0.4	0.2	0.2	0.1	0.2	0.3	0.4	0.4	0.3	0.2	0.2	0.5	0.5
Mexico . . . . .	2.1	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>PLAIN BONITO (O. UNICOLOR)</b>															
ATLANTIC + MEDITERRANEAN	2.7	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
MEDITERRANEAN . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++
Morocco . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++
ATLANTIC. . . . .	2.7	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
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
Mauritania . . . . .	0.0	0.0	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
Morocco . . . . .	2.7	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
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
<b>OTHERS</b>															
ATLANTIC + MEDITERRANEAN	3.8	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
MEDITERRANEAN . . . . .	0.5	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
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
Israel . . . . .	0.5	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
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
Lebanon . . . . .	0.0	0.0	0.6	0.5	0.4	0.5	0.5	0.5	0.3	0.2	0.3	0.0	0.2	0.2	0.2
Malta . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain . . . . .	++	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
Tunisia . . . . .	0.0	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
<b>1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987</b>															
<b>SCOMBEROMORUS UNCLASSIFIED (S. SPP.)</b>															
ATLANTIC. . . . .	1.2	1.0	1.3	1.0	1.0	1.0	0.9	0.8	1.0	1.1	1.0	1.5	0.8	1.9	0.0
Barbados . . . . .	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.0
Brazil . . . . .	0.0	0.0	0.0	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 . . . . .	0.2	0.3	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.1	++	0.5	++	++	0.0
Grenada . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Guadalupe . . . . .	0.3	0.3	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
Martinique . . . . .	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	0.6	0.0
Mexico . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trinidad . . . . .	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.0
Venezuela . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
<b>PLAIN BONITO (O. UNICOLOR)</b>															
ATLANTIC + MEDITERRANEAN	0.1	0.2	0.1	0.2	0.5	1.0	0.5	0.7	1.4	0.6	++	++	0.1	0.1	0.5
MEDITERRANEAN . . . . .	++	++	0.0	0.0	0.1	0.2	++	0.0	0.0	0.0	0.0	0.0	++	++	0.0
Morocco . . . . .	++	++	0.0	0.0	0.1	0.2	++	0.0	0.0	0.0	0.0	0.0	++	++	0.0
ATLANTIC. . . . .	0.1	0.1	0.1	0.2	0.3	0.8	0.5	0.7	1.4	0.6	++	++	0.1	0.1	0.5
Senegal . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	++	++	++	++	++	++	++	++	++
Mauritania . . . . .	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	++	++	++	0.1	0.0
Morocco . . . . .	++	++	++	0.1	0.2	0.7	0.4	0.6	1.0	0.5	0.0	0.0	0.1	++	0.5
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
<b>OTHERS</b>															
ATLANTIC + MEDITERRANEAN	7.9	8.2	13.1	10.6	12.5	8.3	7.6	9.8	8.3	9.4	7.6	6.3	6.5	7.4	2.1
MEDITERRANEAN . . . . .	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	2.1	++
Greece . . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	++	0.1	0.1	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
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
Lebanon . . . . .	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	0.0
Malta . . . . .	0.1	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Spain . . . . .	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
Tunisia . . . . .	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	0.0

Table 26. (Cont.)

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
OTHERS - Cont.															
ATLANTIC. . . . .	3.3	2.0	3.8	1.8	3.1	3.3	4.5	7.3	6.0	5.8	6.6	6.7	12.7	11.4	15.5
Argentina. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barbados. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil. . . . .	0.0	0.0	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
Bulgaria. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cameroon. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China-Taiwan. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.2	0.4	1.1	0.8	0.7	0.9
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	0.0	0.4	0.6
Equatorial Guinea. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3
Germany, 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
Germany, F. 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
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	1.0	0.9	0.0
Guadalupe. . . . .	0.9	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
Guinea Bissau. . . . .	0.0	0.0	0.0	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	0.5	0.1	0.0	0.0	0.3	0.0	0.0	0.0
Japan. . . . .	0.2	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
Korea. . . . .	0.0	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
Liberia. . . . .	0.0	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
Mexico. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	++
Morocco. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Panama. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Poland. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Portugal. . . . .	1.8	0.8	1.5	0.3	0.8	0.7	0.8	0.5	0.1	0.1	0.3	0.5	0.3	0.5	0.2
Russia. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
São Tomé. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Leone. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain. . . . .	0.1	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
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	0.4	0.5	0.5
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	0.4	0.4	0.1
U.S.A. . . . .	0.0	0.0	0.0	0.0	0.0	++	0.1	0.1	++	++	++	++	0.0	0.1	0.0
U.S.S.R. . . . .	0.0	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
Venezuela. . . . .	0.3	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

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
OTHERS - Cont.															
ATLANTIC. . . . .	7.4	7.8	12.3	10.1	12.1	7.9	7.4	7.8	6.8	7.6	6.2	4.8	4.4	5.2	2.1
Argentina. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	++	++	0.0	0.0	0.0
Barbados. . . . .	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil. . . . .	0.1	0.1	0.1	0.2	0.5	0.3	0.5	0.9	0.4	1.1	0.9	++	++	0.2	++
Bulgaria. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0
Cameroon. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	++	0.0	0.0
China-Taiwan. . . . .	1.0	0.9	0.4	1.0	++	0.5	1.3	0.8	0.8	1.1	0.8	++	++	0.1	0.3
Colombia. . . . .	0.0	++	0.1	++	++	++	++	++	++	0.3	++	0.3	0.3	0.7	0.0
Cuba. . . . .	1.1	0.3	1.0	0.4	0.1	0.1	0.1	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Equatorial Guinea. . . . .	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.4	0.4	0.5	0.0
Germany, D. R. . . . .	0.0	++	0.0	++	0.0	++	0.1	0.1	++	0.0	0.0	++	0.0	0.0	0.0
Germany, F. R. . . . .	0.0	0.0	0.0	0.1	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ghana. . . . .	0.0	0.0	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
Guadalupe. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Guinea Bissau. . . . .	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. . . . .	0.5	0.6	0.4	1.0	0.8	1.0	1.6	1.3	0.8	0.7	0.1	0.3	0.5	0.4	0.0
Korea. . . . .	2.4	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
Liberia. . . . .	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.2	0.4	0.4	0.4	0.3	0.2	0.2	0.0
Mexico. . . . .	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Morocco. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Panama. . . . .	1.0	0.0	0.0	1.4	2.6	0.8	0.2	0.7	1.1	0.6	0.7	0.0	0.4	0.4	0.5
Poland. . . . .	0.0	0.0	++	++	0.1	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	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
Russia. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	++	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
São Tomé. . . . .	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	0.0
Sierra Leone. . . . .	0.0	0.0	0.0	++	0.0	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Spain. . . . .	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Togo. . . . .	0.6	0.6	0.8	0.7	0.5	0.5	++	0.4	0.3	0.4	0.3	0.1	0.3	0.1	0.0
Uruguay. . . . .	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	++	++	0.1	++	0.1	++	0.0
U.S.A. . . . .	0.0	++	++	++	0.1	++	++	0.5	0.1	0.2	0.4	0.9	0.2	0.3	0.3
U.S.S.R. . . . .	0.2	0.1	0.4	++	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela. . . . .	0.0	0.0	++	0.7	0.0	0.1	++	0.0	0.0	0.0	0.9	0.9	0.4	0.4	++

\* Includes Frigate Tuna (A. Thazard)

\*\* Includes Bullet Tuna (A. Rochei)

&amp; Includes Atlantic Black Skipjack for Atlantic PS Spain beginning in 1978

\*\*\* Includes Serra Spanish Mackerel (S. Brasiliensis)

++ Catches: &lt; 50 MT and &gt;= 1 MT

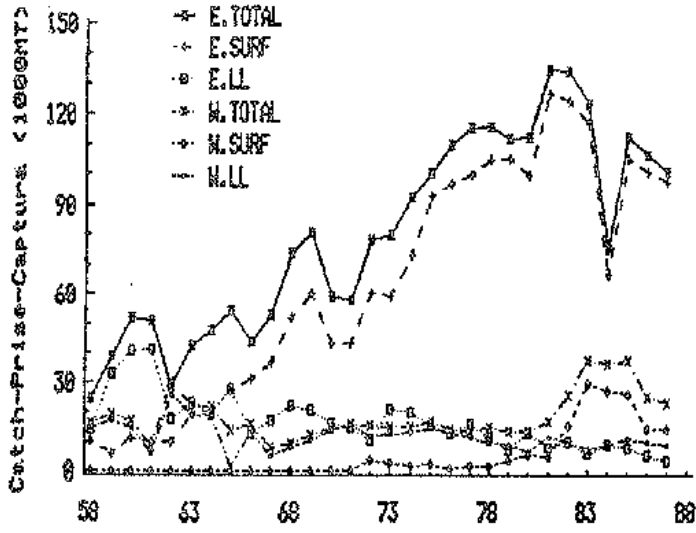


Fig. 1. East and west Atlantic yellowfin catches by longline and surface fisheries, 1960-1987.

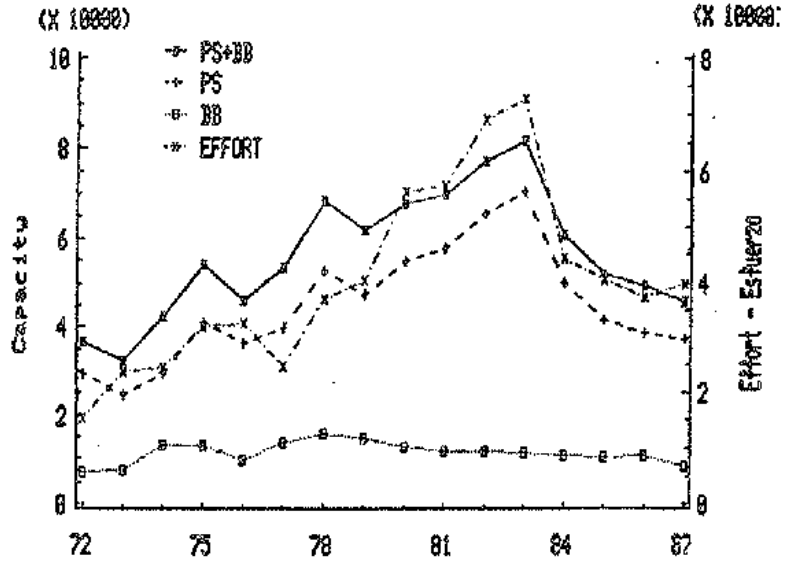


Fig. 2. Carrying capacity of fishing vessels and effective effort (in 1,000 searching hours) for yellowfin in the eastern Atlantic.

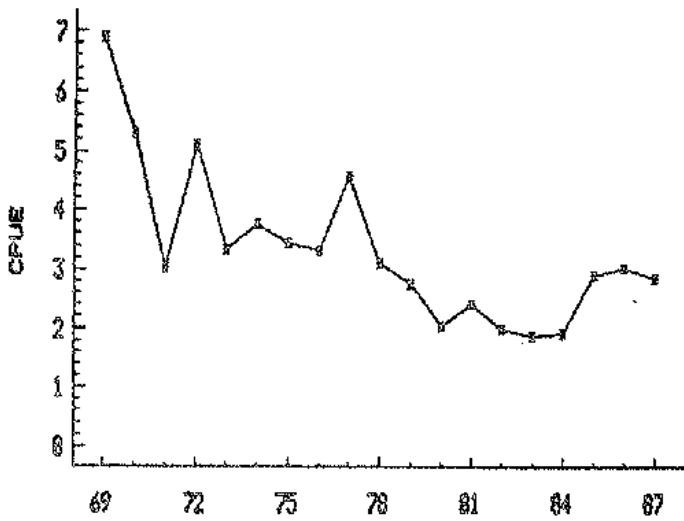


Fig. 3. Calculated abundance index for eastern Atlantic yellowfin (based on FISM and Spanish purse seiners), 1969-1987 (SCRS/88/48).

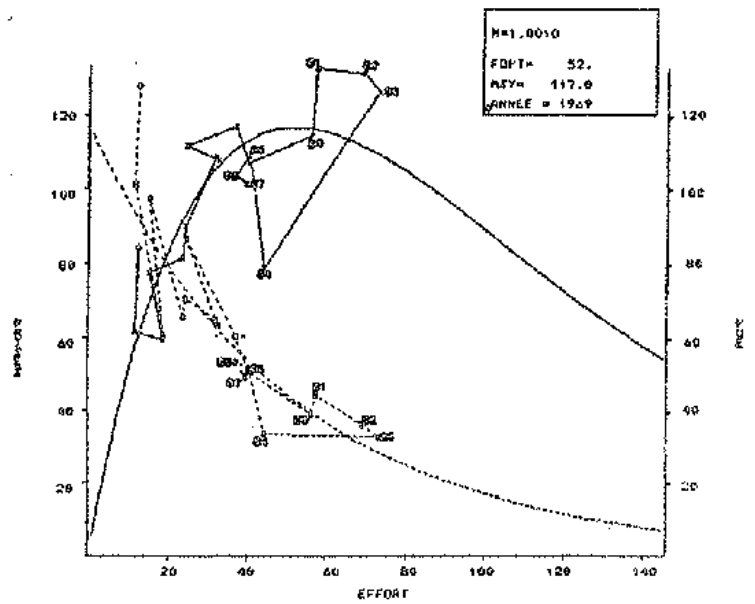


Fig. 4. Relationship between catch and effective effort and between CPUE and effective effort, observed for eastern Atlantic yellowfin tuna. The equilibrium production curves and yield were applied to observations with  $k=4$ ,  $m=1.0$  (SCRS/88/48).

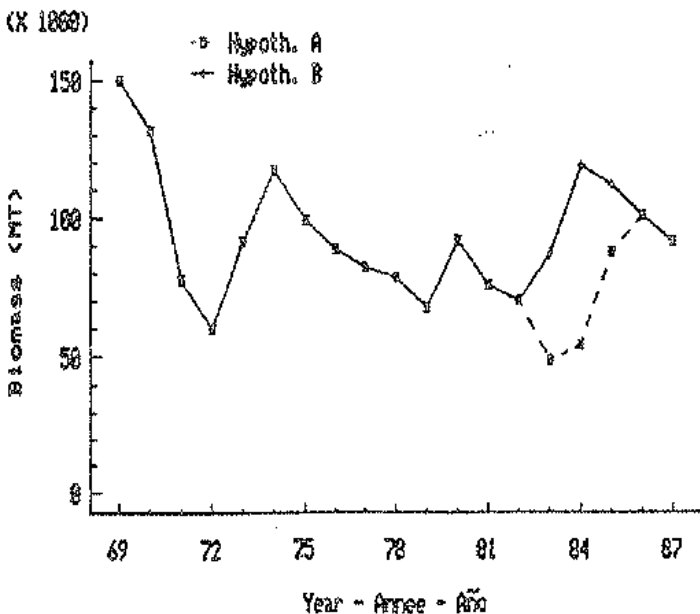


Fig. 5. Adult yellowfin biomass (ages 5-6) estimated by cohort analysis with the two hypotheses on catchability in 1983 and 1984.

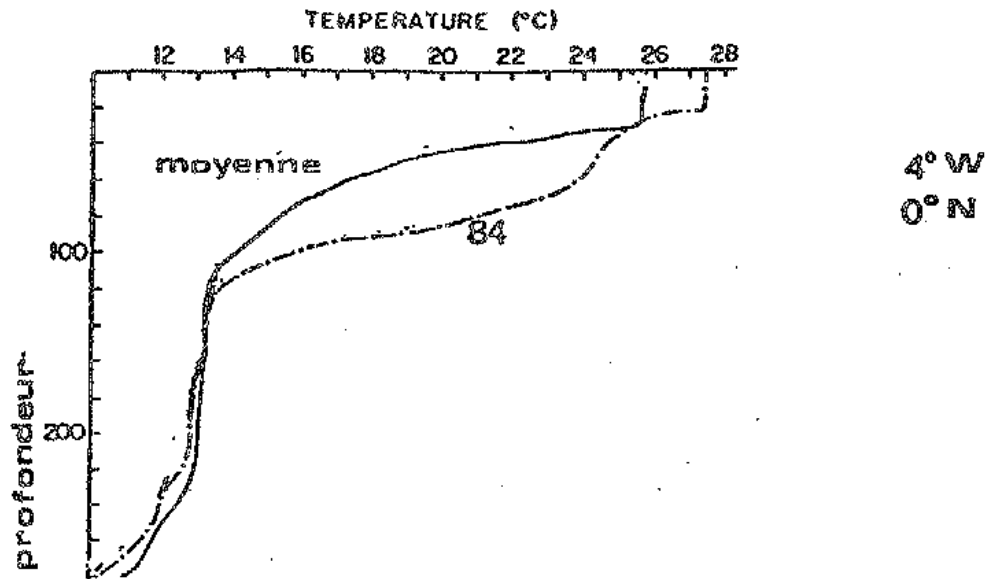


Fig. 6a. Anomaly of the thermocline at the first quarter of 1984 (from Houghton and Colin, 1986) (SCRS/88/48).

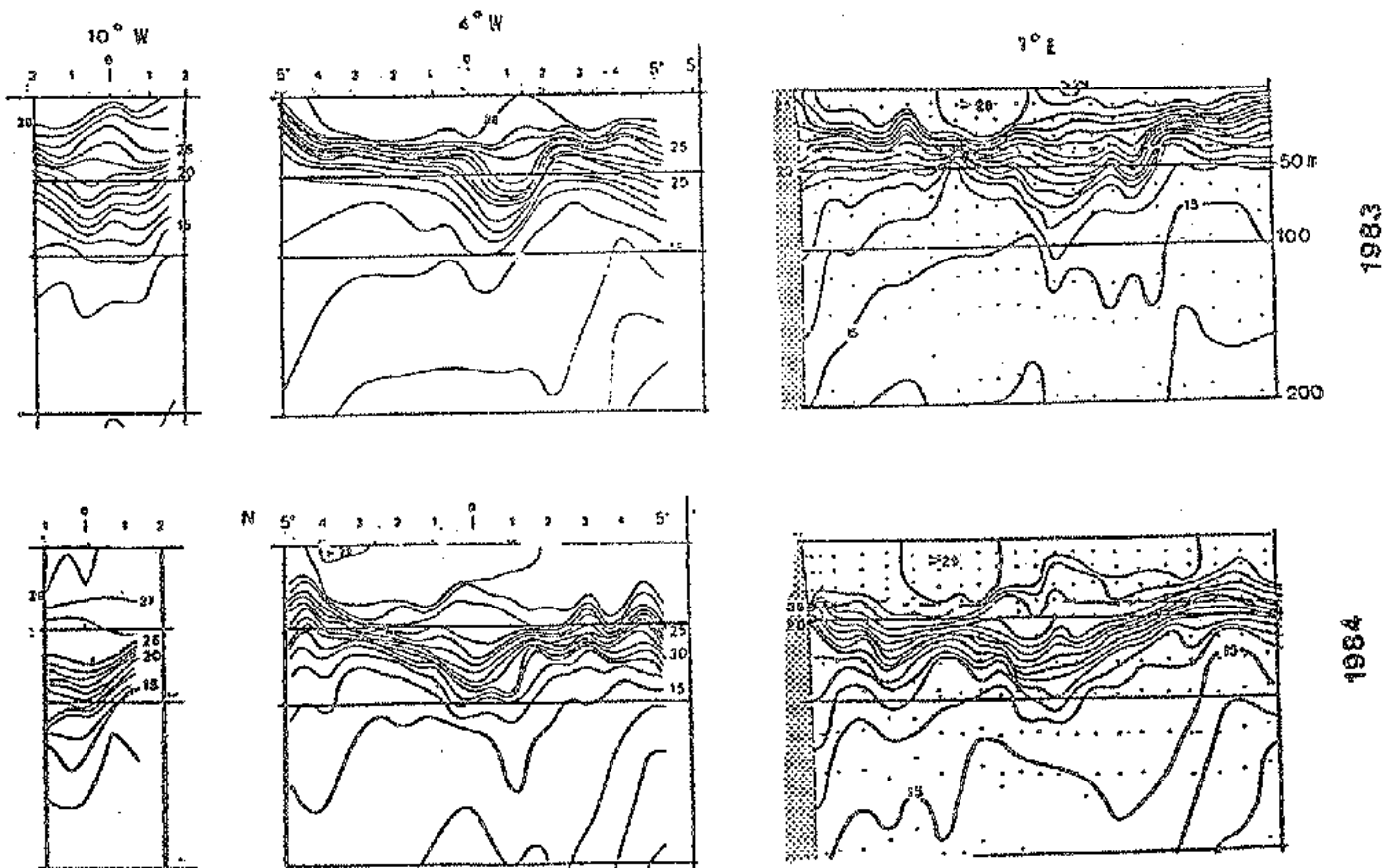
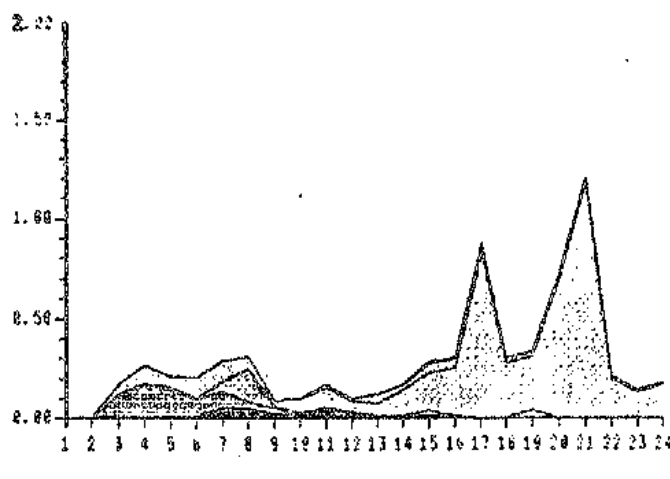
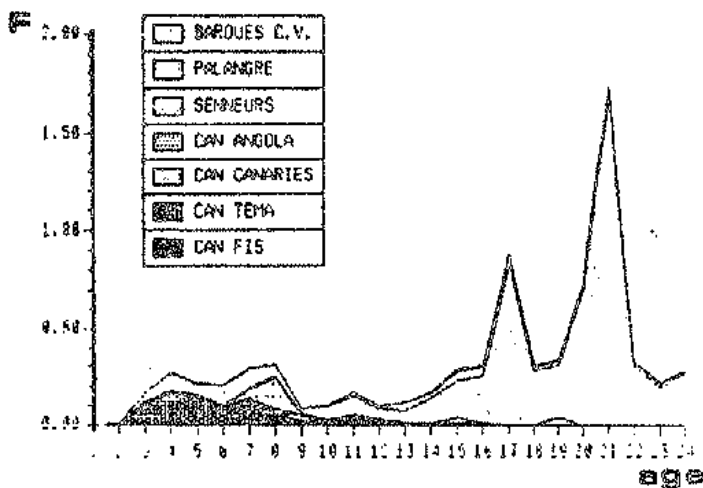
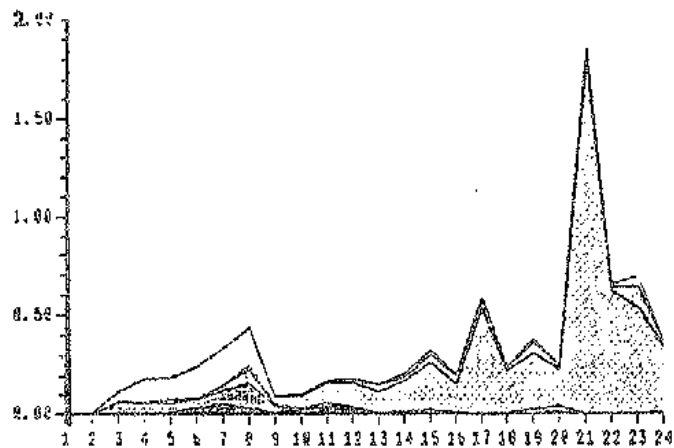
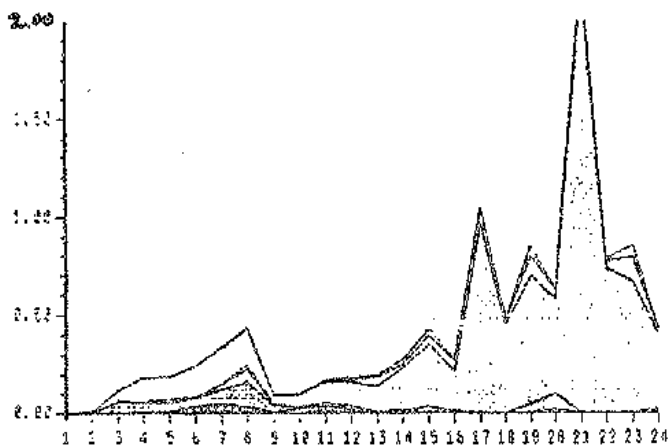


Fig. 6b. Thermal structure at the north-south cross section at 10°W, 4°W and 1°E in February, 1983 and 1984 (from Henin et al., 1986).

1980 - 1982



1983 - 1984



1985-1987

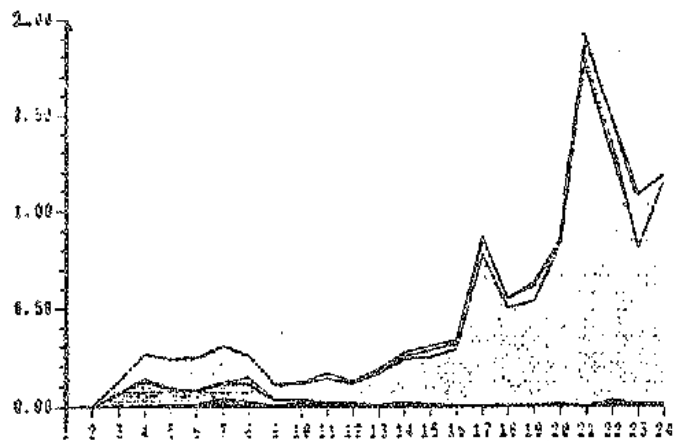
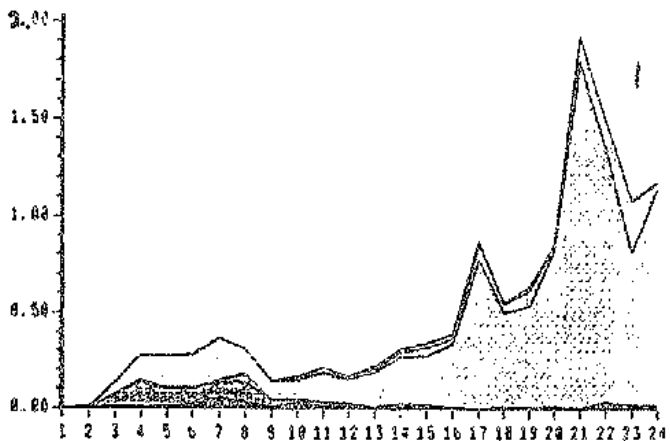


Fig. 7. Age-specific fishing mortalities by gears, for recent three periods, calculated under different hypotheses of: a constant catchability of adults in 1983 and 1984 (left); and a reduced catchability during these two years (SCRS/88/48).

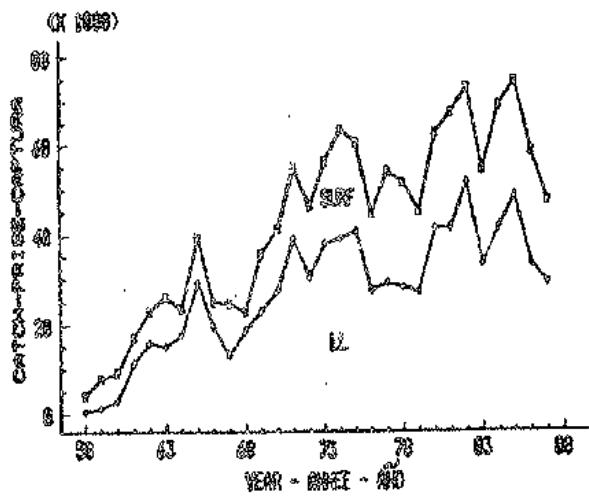


Fig. 8. Bigeye tuna catches by surface and longline fisheries, entire Atlantic, 1958-87.

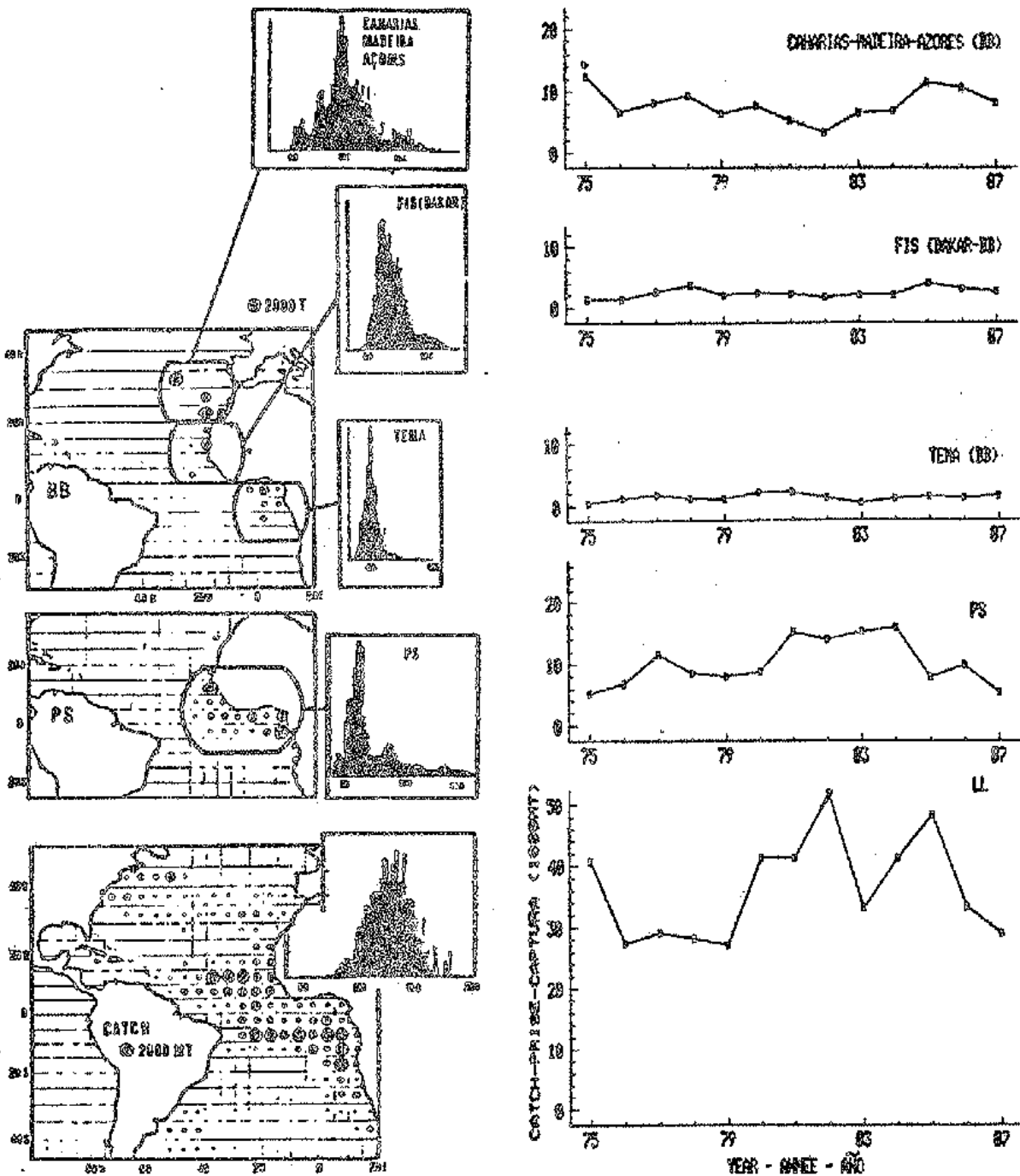


Fig. 9. Fishing areas, size frequencies and catches of major bigeye fisheries in the Atlantic.



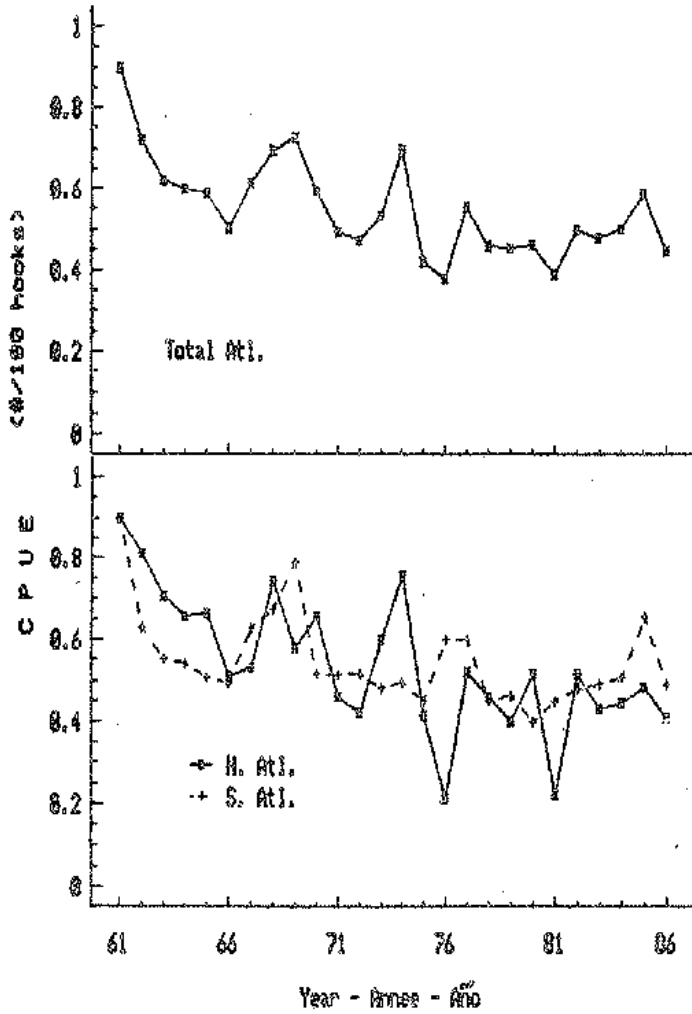


Fig. 10. Annual bigeye CPUE trends for Japanese longline fishery in the north, south and whole Atlantic, 1961-86 (SCRS/88/26).

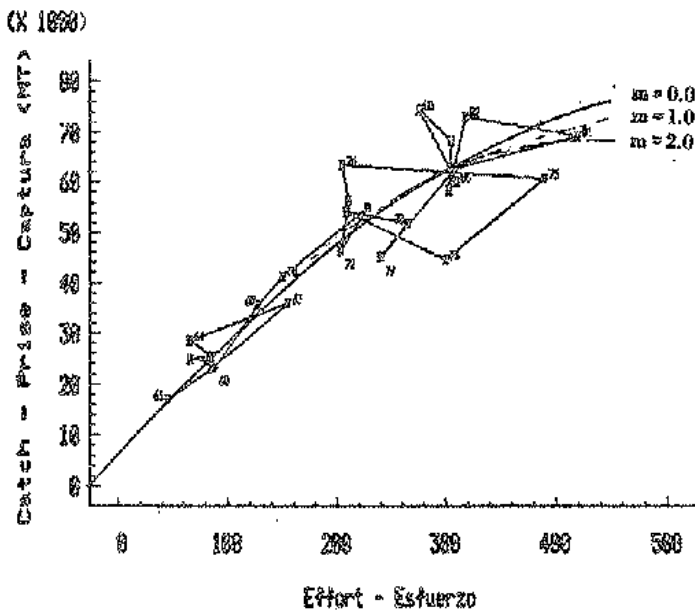


Fig. 12. Yield curves of the production model analysis for bigeye tuna in the whole Atlantic, 1961-86 (SCRS/88/26).

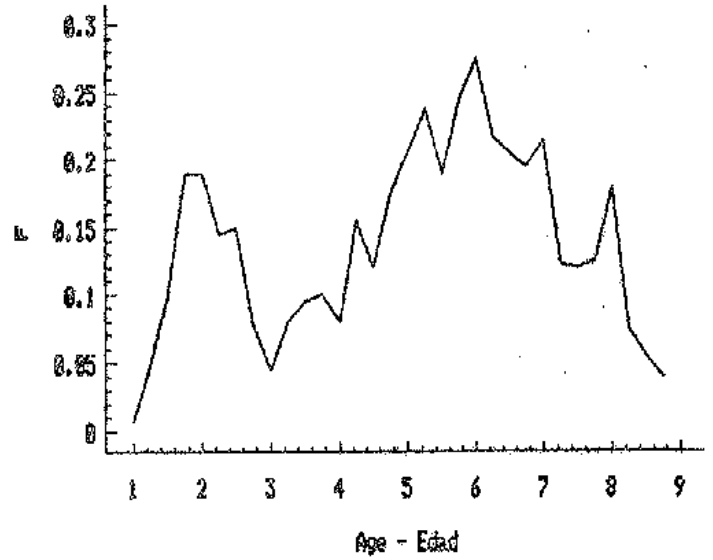


Fig. 11. Fishing mortality by age for bigeye tuna, all gears, 1980-86 (SCRS/88/76).

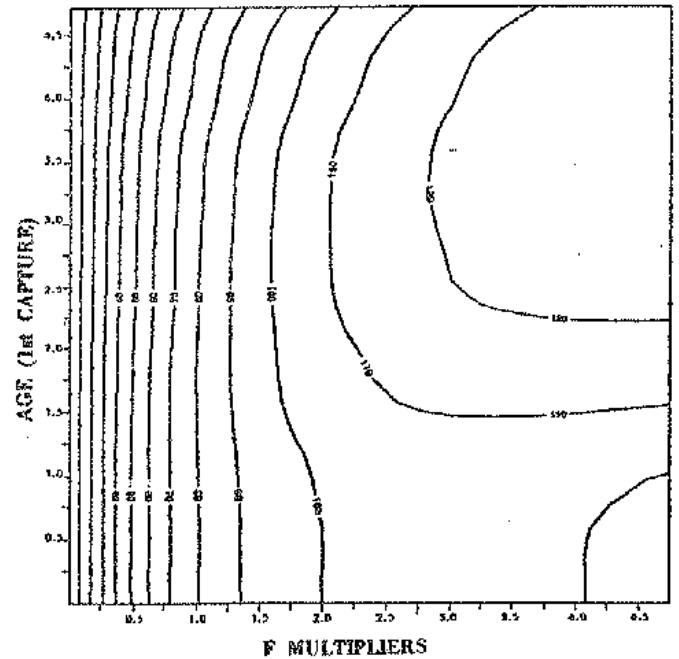


Fig. 13. Yield-per-recruit isopleths, estimated for Atlantic bigeye fishery, for 1986 (SCRS/88/76).

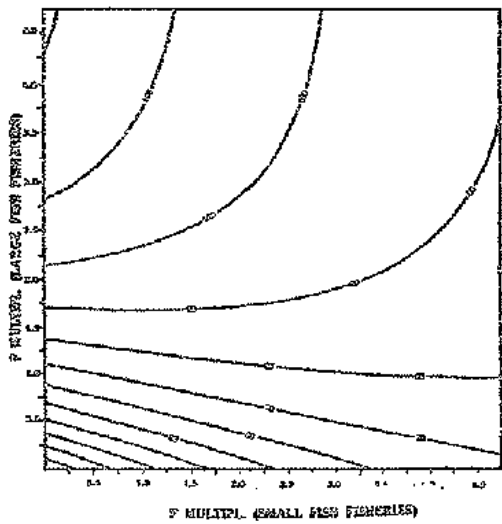


Fig. 14. Multi-gear (large fish vs. small fish fisheries) yield-per-recruit isopleths for Atlantic bigeye, 1980-86 (SCRS/88/76).

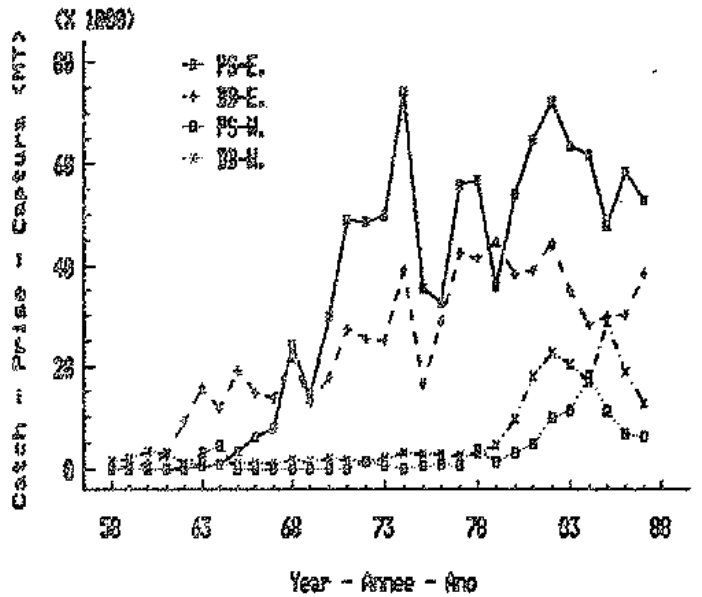


Fig. 15. Skipjack catches, by gear, in the eastern and western Atlantic, 1958-87.

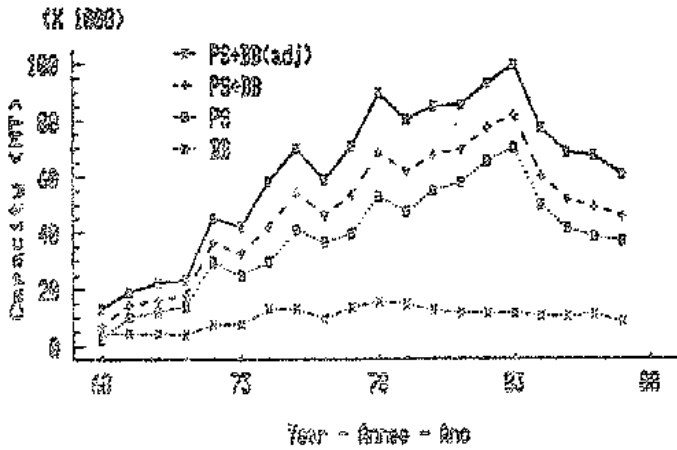


Fig. 16. Carrying capacity by gear of the eastern Atlantic surface fishing fleet. (PS+BB(adj) refers to purse seiner and bait-boat carrying capacity standardized to purse seine units).

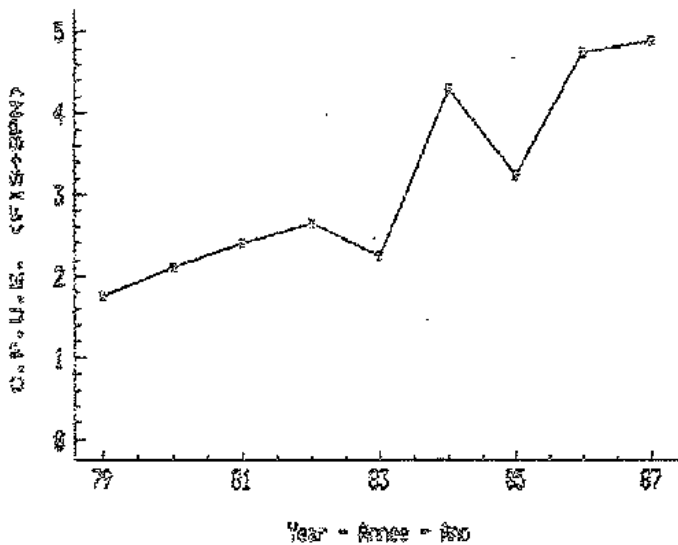


Fig. 18. Annual skipjack CPUE (in MT per fishing day) of FIS and Spanish purse seiners in the eastern Atlantic, 1980-87.

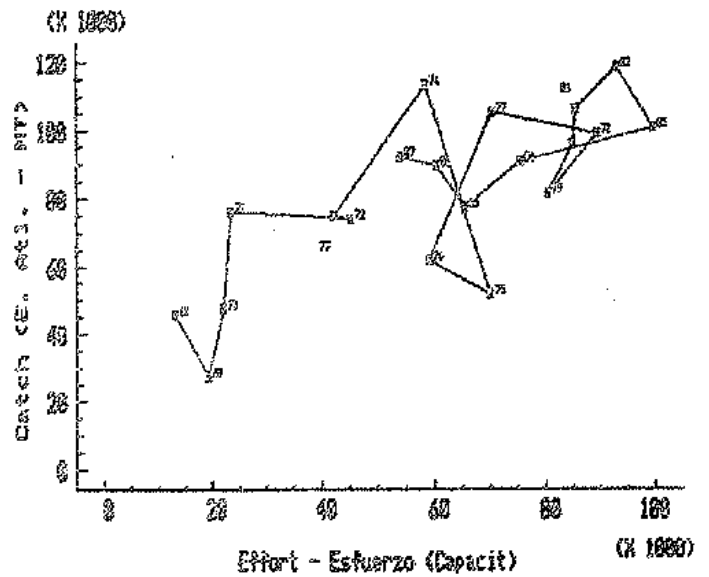


Fig. 17. Relation between skipjack catches and standardized bait-boat and purse seine fleet carrying capacity, eastern Atlantic, 1968-87.

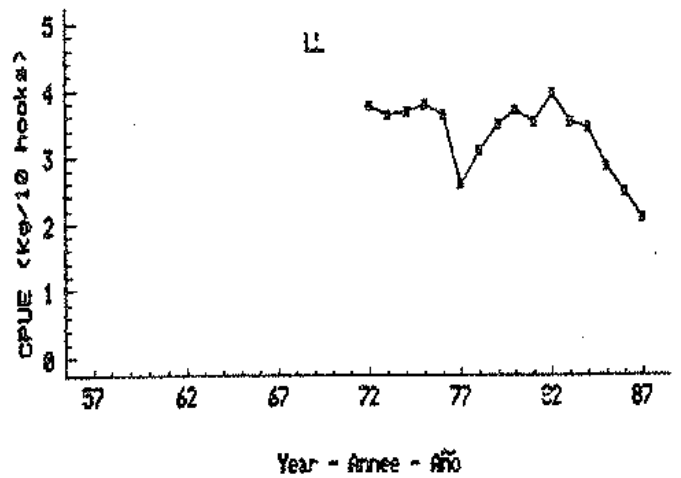
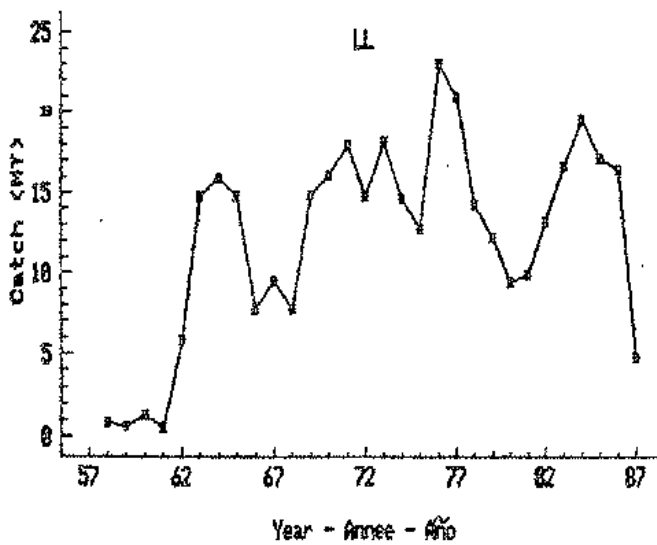
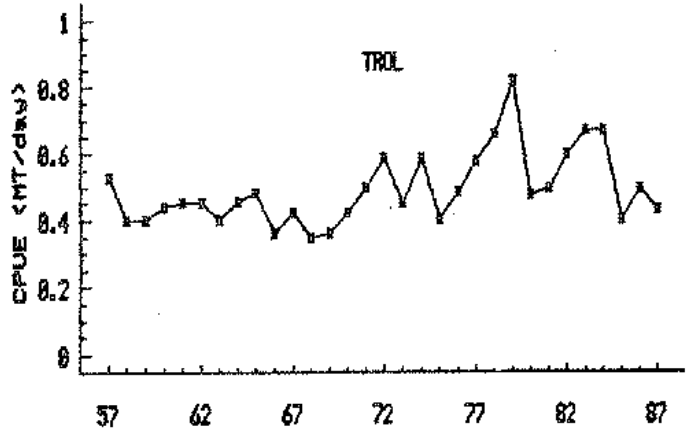
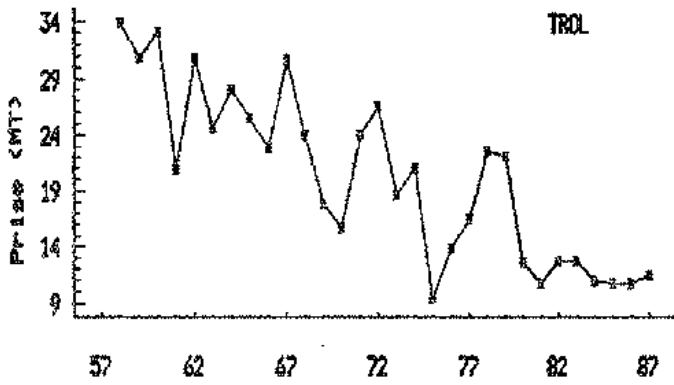
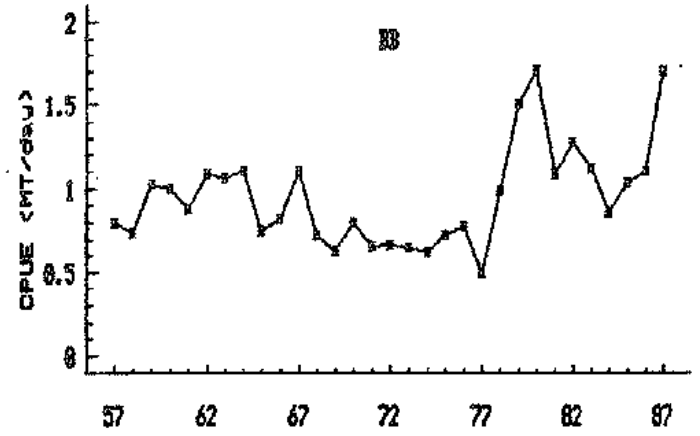
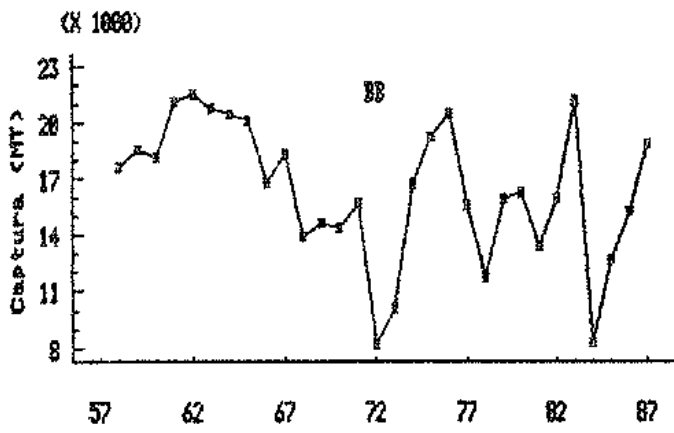


Fig. 19. North Atlantic albacore catch and catch per unit of effort for baitboat, troll and longline fisheries. (The effective CPUE for the Taiwanese longline fishery is shown for longline.)

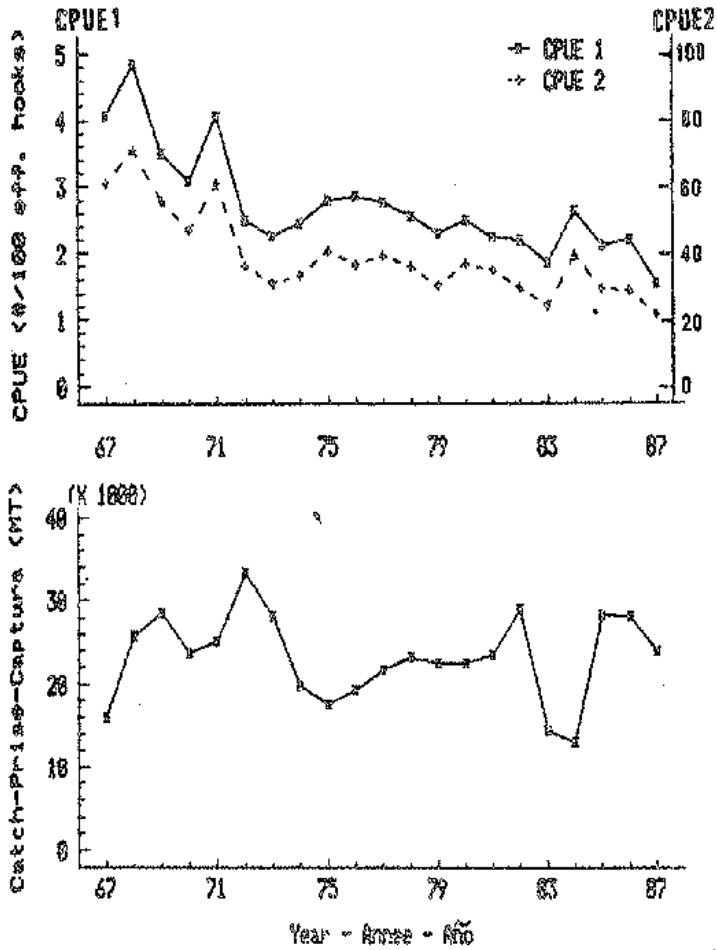


Fig. 20. Annual albacore CPUE trends (CPU1: in number of fish per 100 effective hooks, CPU2: in weight per 100 hooks), and total catch, 1967-87 (SCRS/88/60).

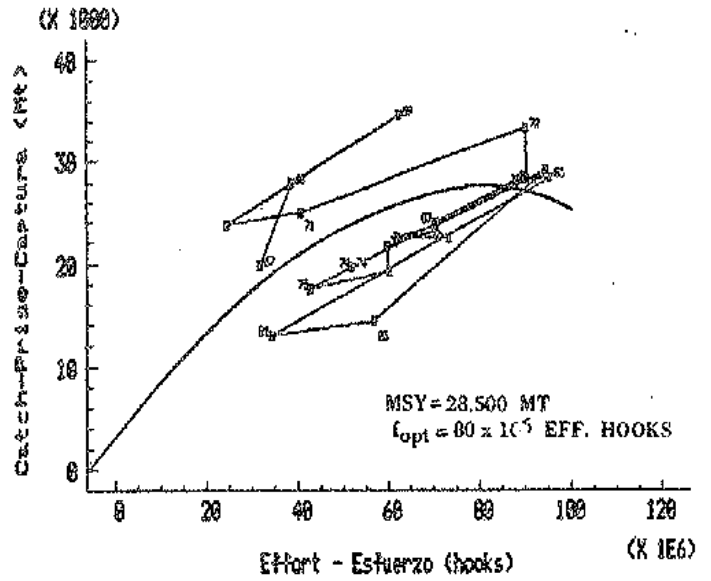


Fig. 21. Equilibrium yield curve and the observed data for south Atlantic albacore fisheries, 1967-87 (SCRS/88/60).

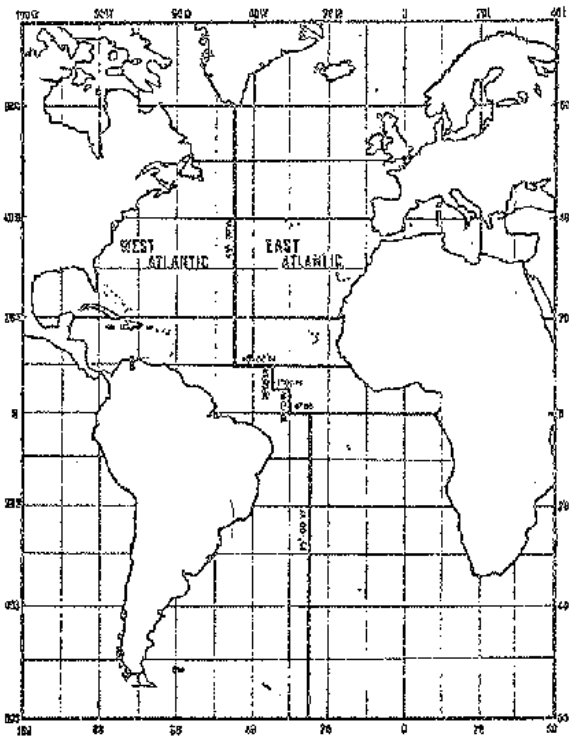


Fig. 22. Map of Atlantic Ocean showing the lines used to divide east and west bluefin tuna stocks.

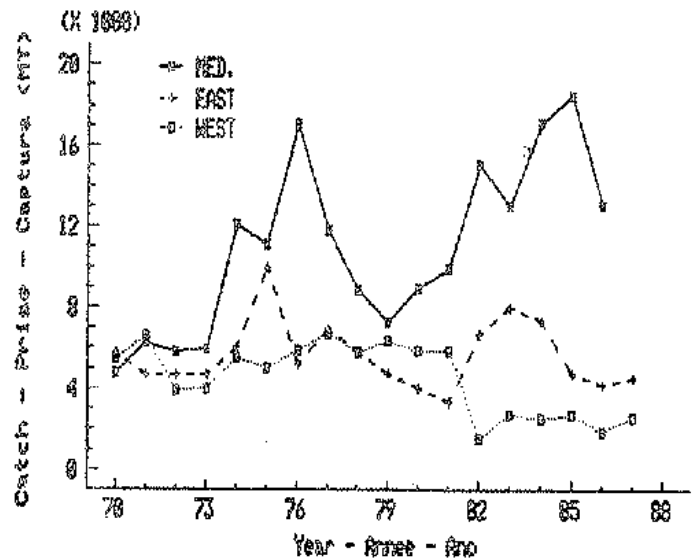


Fig. 23. Atlantic bluefin tuna landings by area, 1970-87.

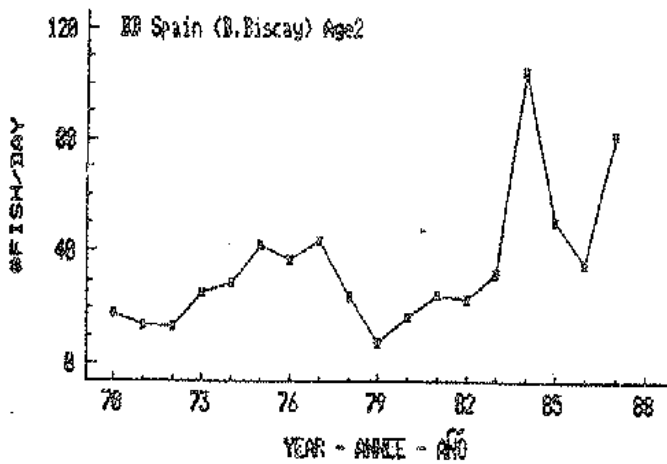
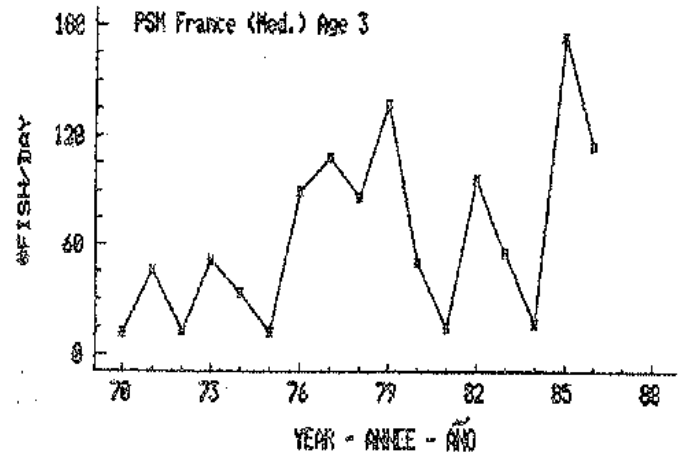
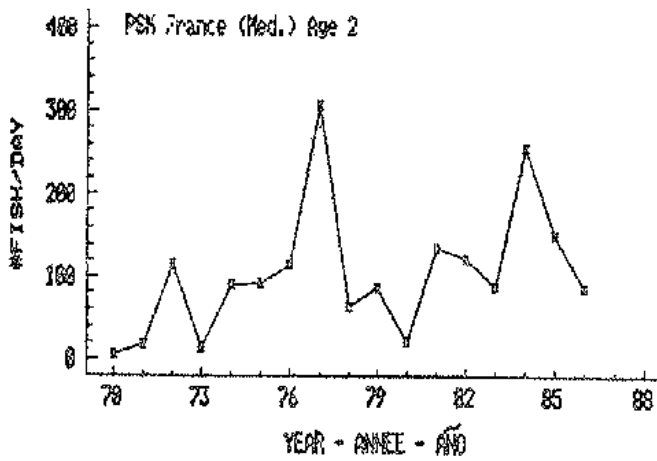
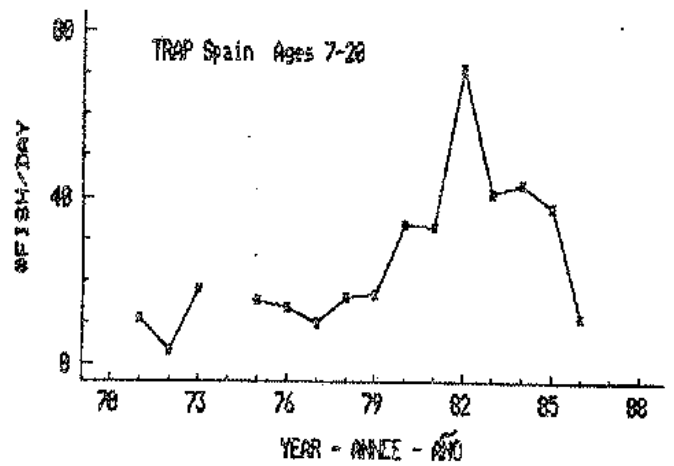
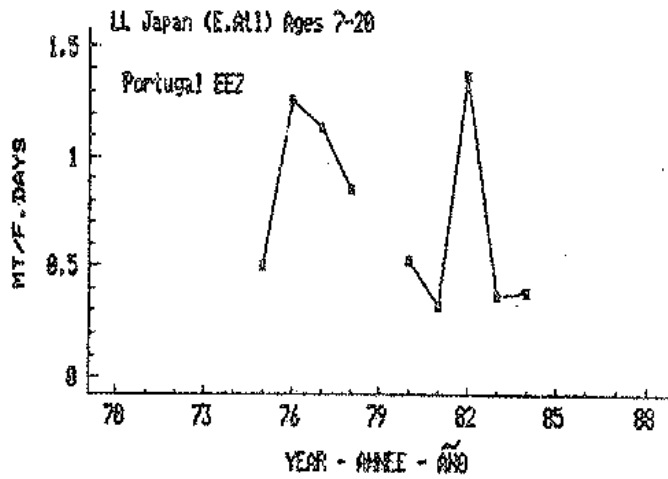


Fig. 24. Abundance indices considered for use in VPA calibration for the east Atlantic (including Mediterranean) bluefin tuna (see Table 8).

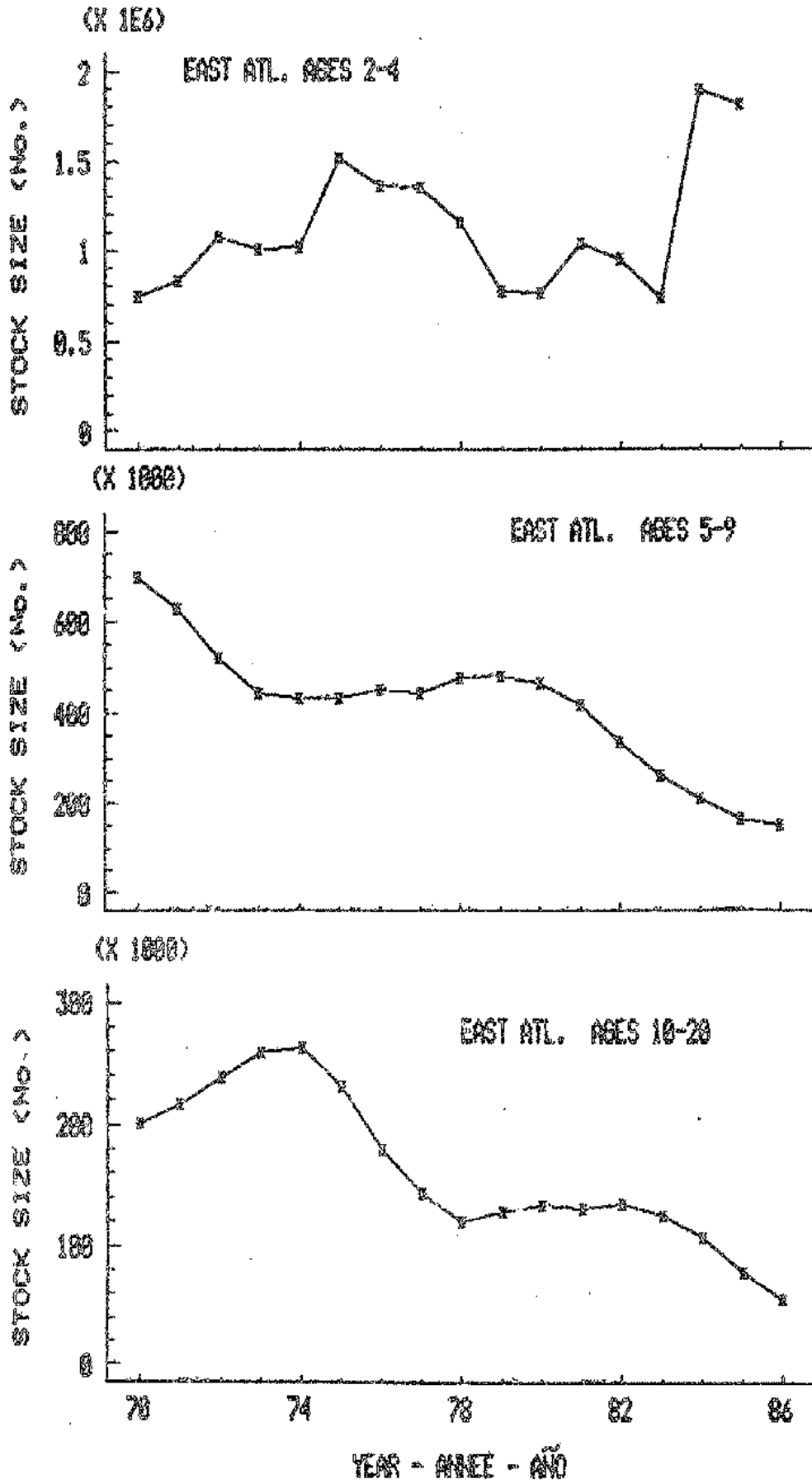


Fig. 25. East Atlantic (including Mediterranean) bluefin tuna stock size estimated by VPA and the high estimate of terminal F (0.83).

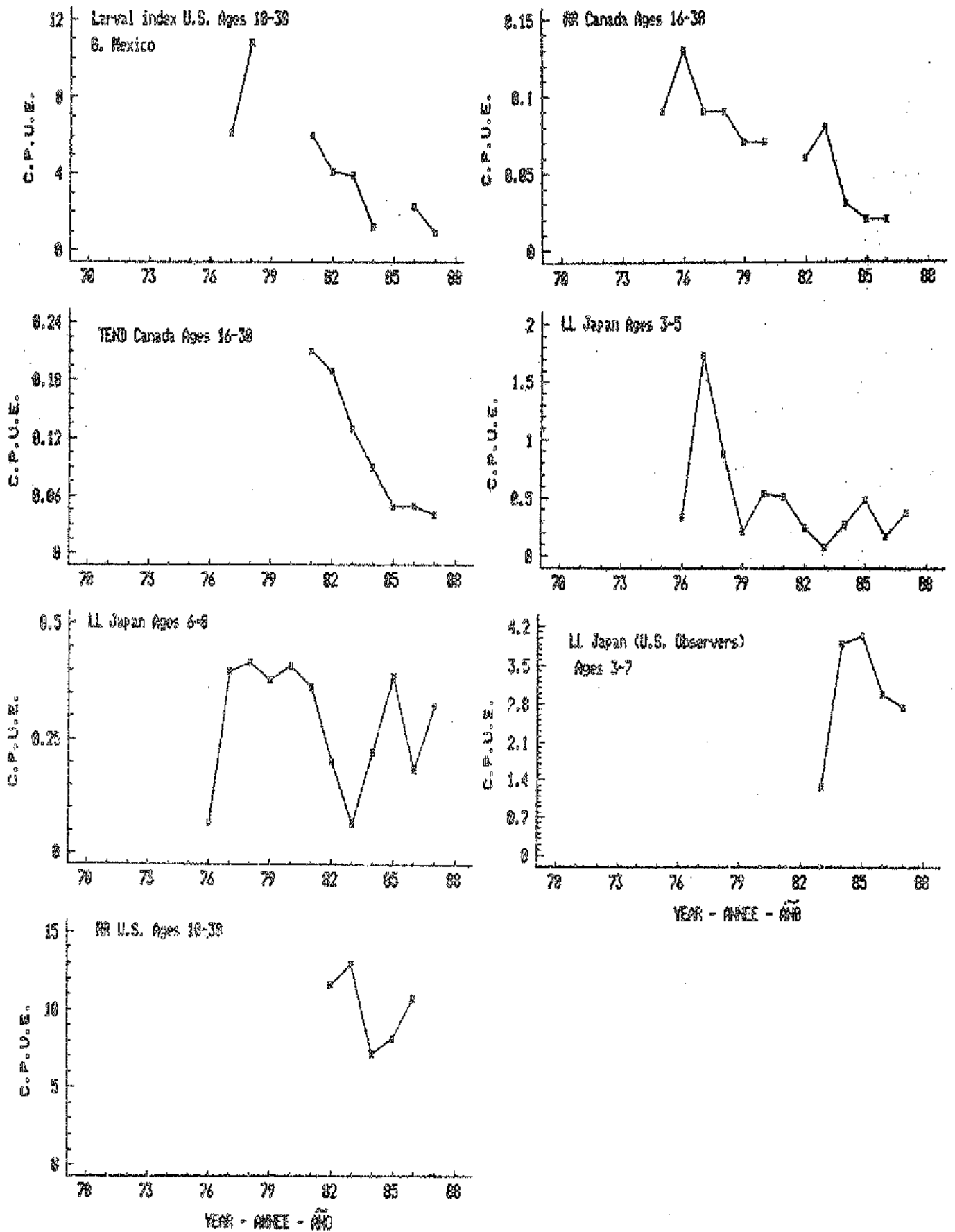


Fig. 26. Abundance indices considered for use in VPA calibration for the west Atlantic bluefin tuna (see Table 11).

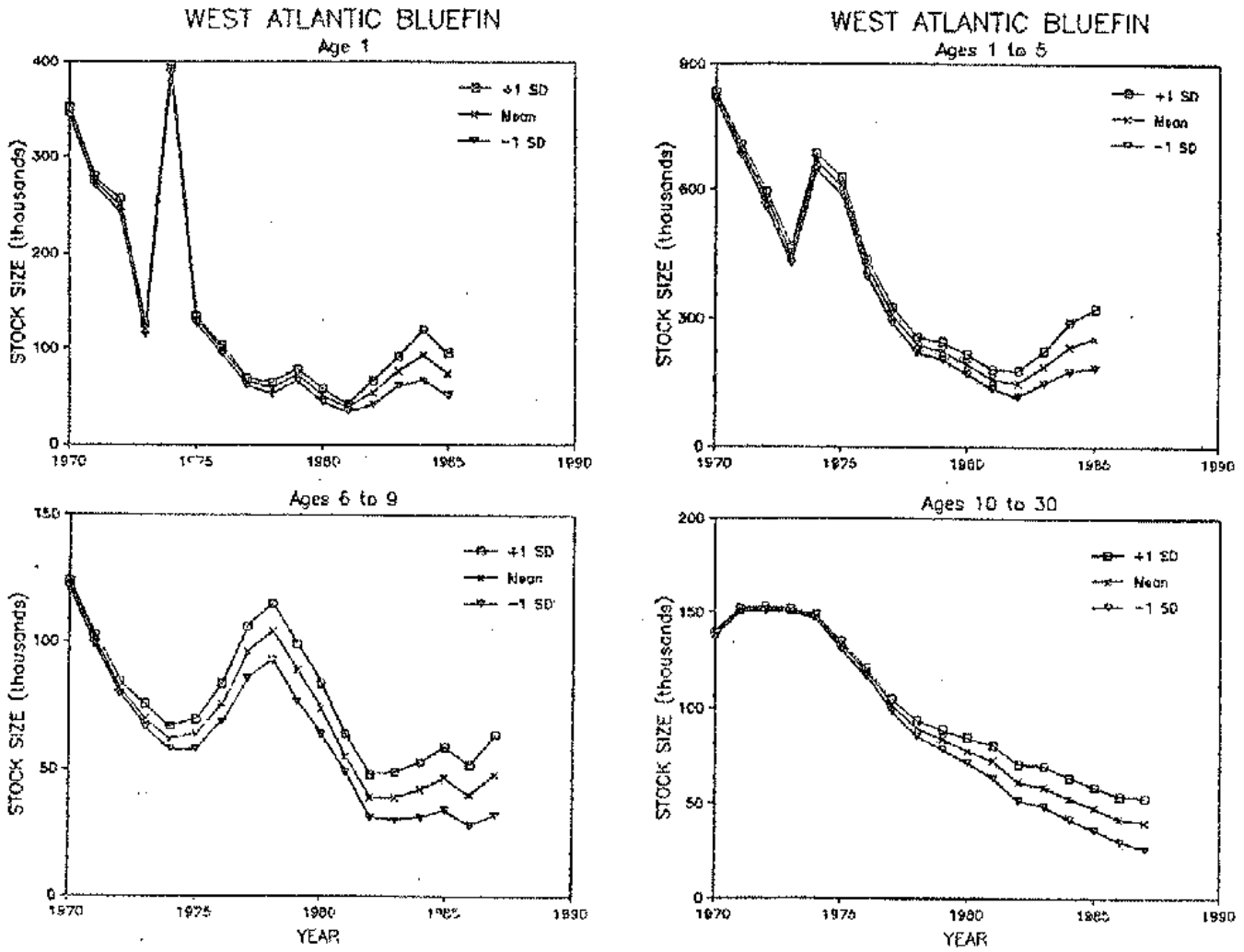


Fig. 27. West Atlantic bluefin tuna stock size estimated by VPA. It is important to note that the estimates for the younger ages in the terminal year are largely dependent on the input fishing mortality used by the SCRS. The upper and lower bands indicate 1 standard deviation above and below the mean (approximately equal to 66 percent confidence intervals).

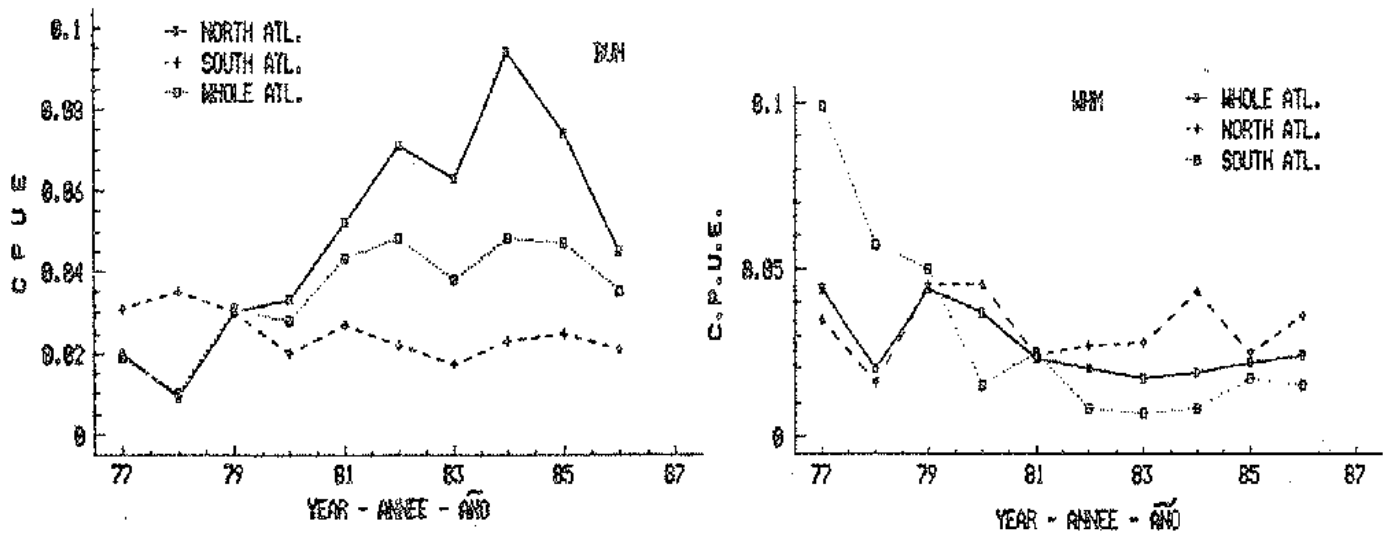
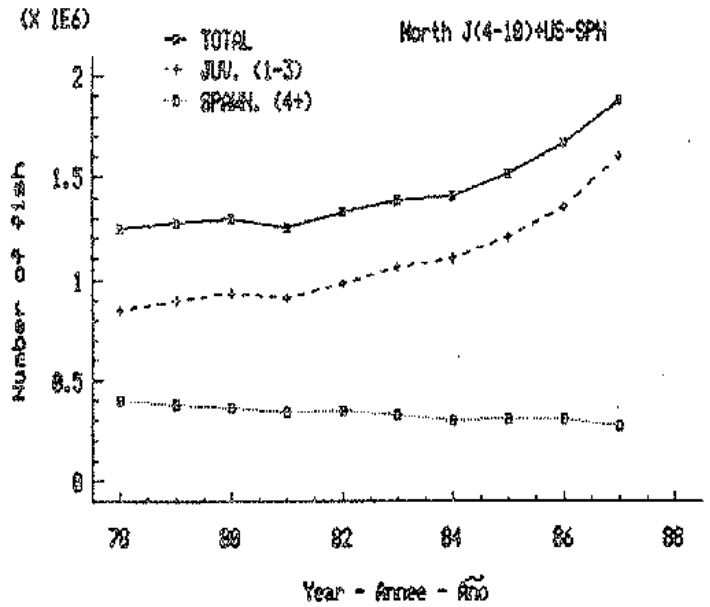
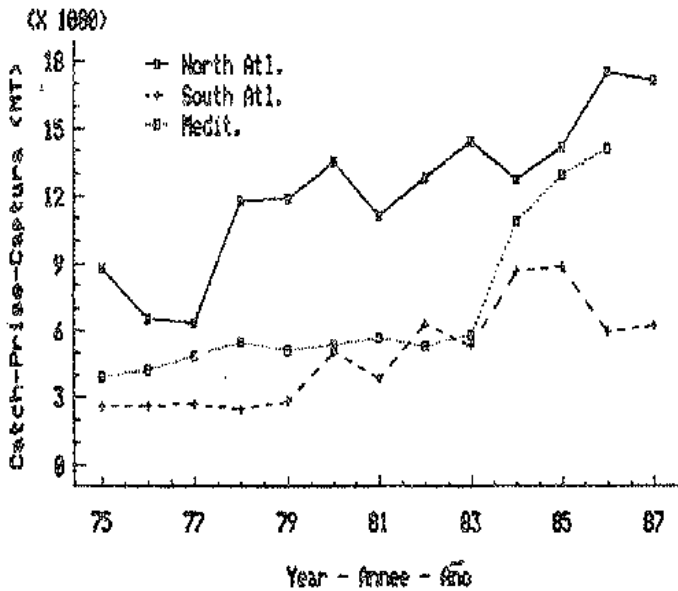
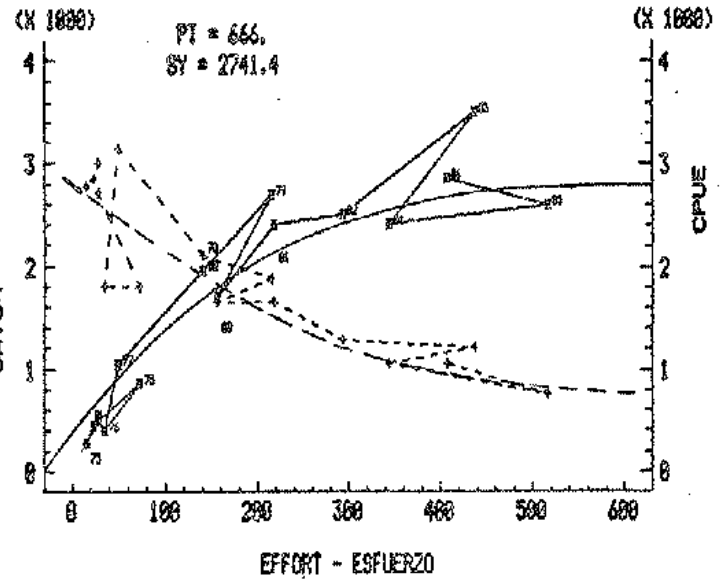
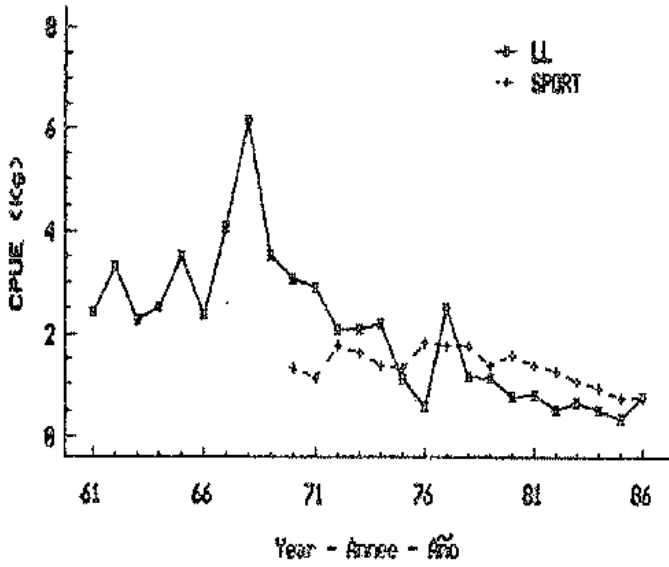


Fig. 28. CPUE (number of fish per 1,000 hooks) for blue marlin (BUM) and white marlin (WHM) by the Japanese longline fishery in the south, north and whole Atlantic, 1977-86.





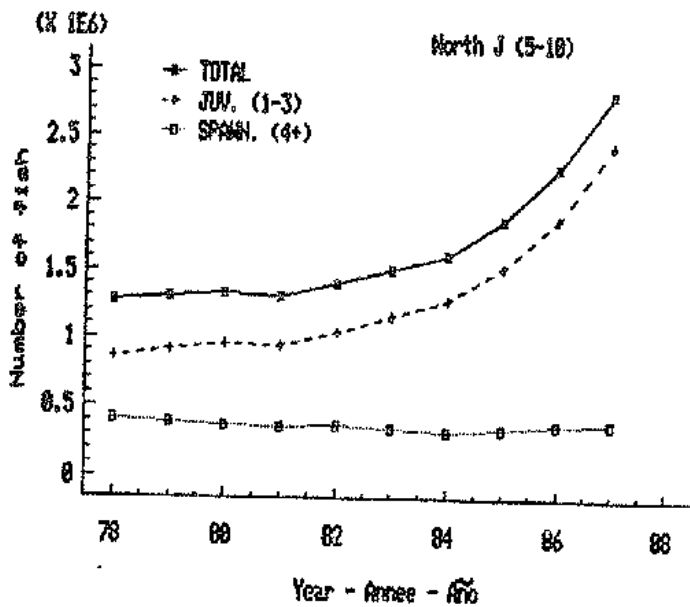


Fig. 33. Estimated number of juveniles (ages 1-3) at the beginning of the year, spawners (ages 4+) and total population, based on VPA tuned to the Japanese index applied to ages 5-10 fish, North Atlantic ( $M=0.2$ ).

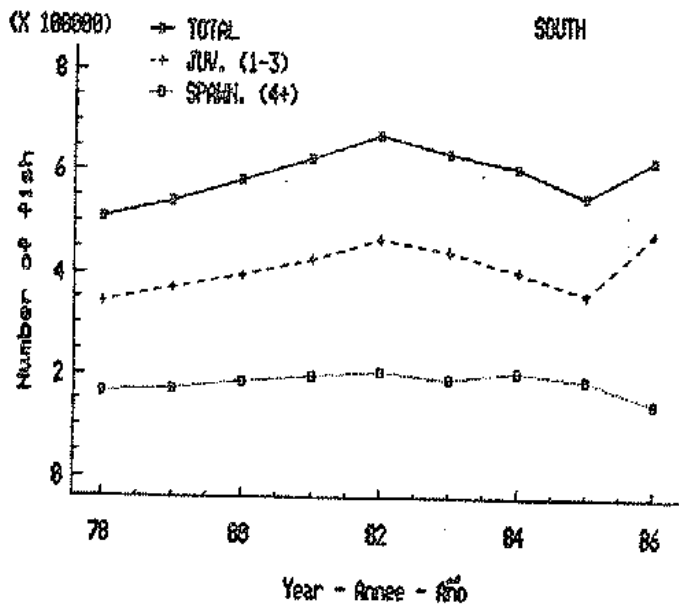


Fig. 34. Estimated number of juveniles (ages 1-3) at the beginning of the year, spawners (ages 4+) and total population, based on VPA tuned to the Japanese index applied to ages 4-14 fish, South Atlantic ( $M=0.2$ ).

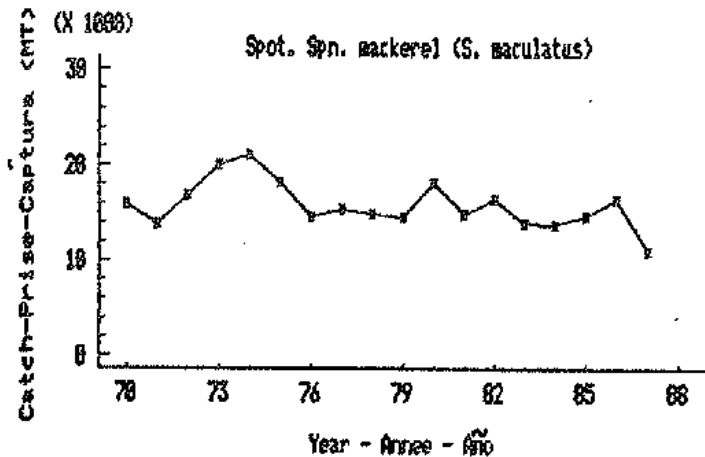
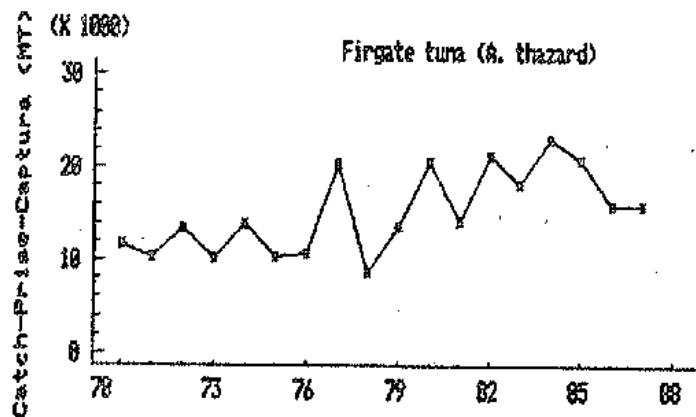
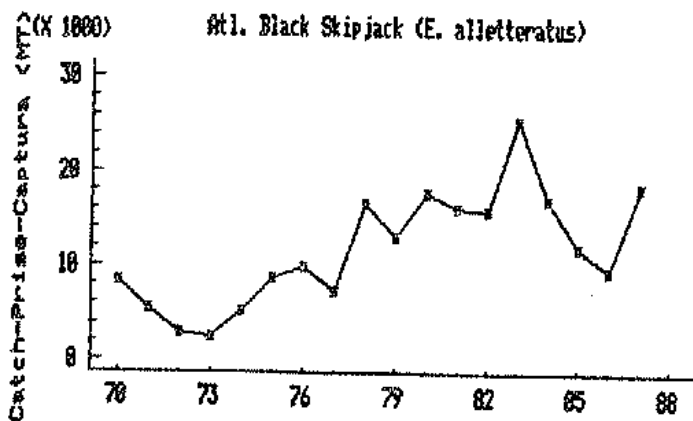
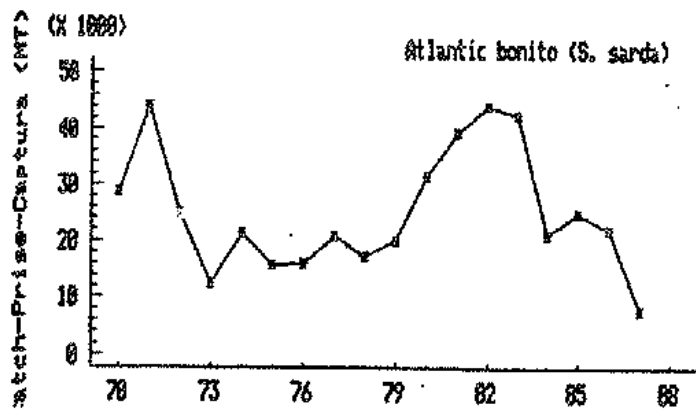


Fig. 35. Annual catches (in MT) of the major small tunas, by species, 1970-87.

### SCRS Agenda

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of delegations
4. Admission of observers
5. Admission of scientific papers
6. Review of national fisheries and research programs
7. Report of the Swordfish Workshop
8. Report of the Data Preparatory Meeting for the Yellowfin Year Program
9. 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
10. Review of the progress made by the Yellowfin Year Program
11. Review of the progress made by the Enhanced Billfish Research Program
12. Report of the Sub-Committee on Statistics and review of Atlantic tuna statistics and data management system:
  - a) National statistics and Secretariat reporting
  - b) Biostatistical studies
  - c) Review of Commission's computer usage
  - d) Others
13. Review of editorial and publication policy
14. Review of future SCRS research programs and consideration of SCRS meeting procedures
15. Cooperation with other organizations
16. Recommendations
17. Other matters
18. Election of Chairman
19. Adoption of Report
20. Adjournment

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List of SCRS Documents

- SCRS/88/1 1988 Tentative SCRS Agenda - Secretariat
- SCRS/88/2 1988 SCRS Annotated Tentative Agenda - Secretariat
- SCRS/88/3 Tentative Program of ICCAT Meetings - Secretariat
- SCRS/88/4 1988 Tentative Agenda of the Sub-Committee on Statistics - Secretariat
- SCRS/88/5 Organization of the 1988 SCRS Meeting - Secretariat
- SCRS/88/6 1988 SCRS Document Policy - Secretariat
- SCRS/88/7 Report of the Data Preparatory Meeting for the Yellowfin Year Program
- SCRS/88/8 History of the ICCAT Tagging Program, 1971-1986 - P. M. Miyake
- SCRS/88/9 Preliminary evaluation of ICCAT port sampling - P. M. Miyake, P. Kebe, ICCAT Secretariat Staff
- SCRS/88/10 Progress of the ICCAT Enhanced Research Program for Billfish during 1988 - E. Prince, B. Brown, T. Diouf, P. M. Miyake
- SCRS/88/11 Secretariat Report on Statistics and Coordination of Research - Secretariat
- SCRS/88/12 Second ICCAT Swordfish Workshop
- SCRS/88/13 Program Plan for the ICCAT Enhanced Billfish Research Program for 1989 - E. D. Prince, B. Brown, T. Diouf, P. M. Miyake
- SCRS/88/14 Swordfish data preparation for 1988 workshop done by the Secretariat - P. M. Miyake, P. Kebe, D. DaRodda (Rev.)
- SCRS/88/15 Report of the Second Billfish Symposium - P. M. Miyake
- SCRS/88/16 Características del emperador (Xiphias gladius) en las proximidades de Cuba - A. Rodríguez, L. Muñoz, M. P. Frias, S. Moreno, J. Pol
- SCRS/88/17 L'évaluation du stock est-Atlantique de thon rouge par le programme CAL - B. Liorzou, J. L. Cort

- SCRS/88/18 Les nouveaux engins de pêche pour la capture du germon. Description, statistiques, impact sur le stock nord-Atlantique - B. Liorzou
- SCRS/88/19 Pesca exploratoria del pez espada, Xiphias gladius, y especies acompañantes en aguas oceánicas de Venezuela - L. W. González
- SCRS/88/20 Estimation of standardized CPUE for the Atlantic swordfish (Rev.) using the data from the Japanese longline fishery - N. Miyabe
- SCRS/88/21 Catch per unit effort information from the U.S. swordfish fishery - J. Hoey, R. Conser, E. Duffie
- SCRS/88/22 CPUE indices derived from combined Spanish and U.S. catch and effort data - J. Hoey, J. Mejuto, R. Conser
- SCRS/88/23 Problems in the stock assessment of west Atlantic bluefin tuna - N. Miyabe, Z. Suzuki
- SCRS/88/24 National Report of Japan - Far Seas Fisheries Research Laboratory
- SCRS/88/25 Catch trends of Atlantic white and blue marlins by the Japanese longline fishery - Y. Watanabe, H. Nakano, Y. Nishikawa
- SCRS/88/26 An updated production model analysis on Atlantic bigeye tuna as of 1986 - N. Miyabe
- SCRS/88/27 The skipjack tuna fishery in southern Brazil - J. P. Castello, R. Perez Habiaga
- SCRS/88/28 ICCAT Tagging Program for Billfish and Interim Sampling Instructions for the ICCAT Enhanced Research Program for Billfish
- SCRS/88/29 Una revisión de las pesquerías de túnidos y afines en aguas cubanas - A. Rodríguez
- SCRS/88/30 On spawning of skipjack tuna (Katsuwonus pelamis L.) - K. Ya. Batalyants
- SCRS/88/31 Evolución de la captura, el esfuerzo y la captura por unidad de esfuerzo en la pesca palangrera del atún aleta amarilla (Thunnus albacares) del Golfo de México - G. A. Compeán Jiménez
- SCRS/88/32 Sur le comportement des bancs de thons observés par avion - M. Petit, J. M. Stretta
- SCRS/88/33 Potentiel et avantages d'un réseau électronique pour les scientifiques experts en pêche thonière - M. Petit, P. Kleiber
- SCRS/88/34 L'environnement des thonidés au large de la Côte d'Ivoire - J. M. Stretta, M. Petit

- SCRS/88/35 Análisis de las pesquerías de listado (Katsuwonus pelamis) y de atún aleta negra (Thunnus atlanticus) en el Atlántico Occidental - C. A. Carles, S. V. Valle
- SCRS/88/36 Estado actual de la pesquería cubana de listado (Katsuwonus pelamis) y atún aleta negra (Thunnus atlanticus) - S. V. Valle
- SCRS/88/37 Electrophoretic separation of muscle proteins from blue marlin, white marlin, and sailfish from the western Atlantic Ocean-- isolation of biomarker proteins for identification of billfish carcasses - J. K. Hartmann, R. E. Waldner
- SCRS/88/38 An examination of the utility of integrated approaches for bluefin tuna catch-at-age analysis - R. Conser
- SCRS/88/39 Standardized catch rates of large bluefin tuna in the New England (U.S.) rod and reel/hand line fishery 1982-1986 - C. A. Brown, S. C. Turner
- SCRS/88/40 Standardized catch rates of bluefin tuna from the Japanese longline fishery in the United States Exclusive Economic Zone for 1983-1987 - K. S. Davis, S. C. Turner
- SCRS/88/41 Preliminary investigation of the effects of weighting CPUE indices on estimates of fishing mortality from the CAL VPA Program - D. S. Vaughan, S. C. Turner, J. M. Hoenig
- SCRS/88/42 Descriptive review of the U.S. pelagic longline fishery data system, 1986 to 1987 - A. R. Bertolino, J. J. Hoey
- SCRS/88/43 Development of length regressions for Atlantic Istiophoridae - E. D. Prince, D. W. Lee
- SCRS/88/44 Methods of dressing Atlantic billfishes (Istiophoridae) by ICCAT reporting countries - E. D. Prince, P. M. Miyake
- SCRS/88/45 La pesca deportiva de los peces de pico en Venezuela. Análisis de los datos del Club de Playa Grande (1961-1987) - D. Gaertner, J. J. Alió, R. García de los Salmones
- SCRS/88/46 Les thons et espèces voisines dans les pêcheries artisanales martiniquaises en 1987 - B. Gobert
- SCRS/88/47 Statistique de la pêche thonière FIS durant la période 1969 à 1987 - T. Diouf, A. Fonteneau
- SCRS/88/48 Etat du stock d'albacore de l'Atlantique est au 30 Septembre 1988 - A. Fonteneau, T. Diouf
- SCRS/88/49 Environment et thons tropicaux de l'Atlantique: Introduction au problème - A. Fonteneau

- SCRS/88/50 Le voilier de l'Atlantique est, Istiophorus albicans (Latreille, 1804): Quelques aspects de la biologie et de la reproduction - C. Capisano
- SCRS/88/51 Rapport national sur la pêche et la recherche thonières au Sénégal en 1987 - T. Diouf
- SCRS/88/52 Comments on bigeye tuna fishery in Madeira, 1979-1987 - L. Gouveia
- SCRS/88/53 Etat des marquages-recaptures d'albacore en Océan Atlantique - F. X. Bard
- SCRS/88/54 Etat d'avancement des échantillonnages de poissons porte-épée au port d'Abidjan - J. B. Amon Kothias, F. X. Bard
- SCRS/88/55 Reproducción y alimentación de los peces de pico (Istiophorus albicans, Tetrapturus albidus y Makaira nigricans) en la costa central de Venezuela - R. García de los Salmones, O. Infante, J. J. Alío
- SCRS/88/56 Influencia de las condicionantes medioambientales en la pesquería superficial del atún listado (Katsuwonus pelamis) en aguas del archipiélago canario - A. J. González-Ramos
- SCRS/88/57 An historical review of recreational and artisanal fisheries for billfish in Jamaica 1976-1988 - G. C. McN. Harvey
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## Progress of the Enhanced Research Program for Billfish During 1988

### INTRODUCTION

Research activities during 1988 actually began on a limited scale shortly after the 1987 SCRS meeting in October, although major tasks did not make significant progress until after the first of the year. The three major objectives of the Plan are to: (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.

Two major areas are identified in the Plan as locations for intensive scientific study--the Caribbean Sea and the west coast of Africa. The 1987 SCRS appointed two area coordinators to organize research efforts in these two locations. The coordinators are Dr. Eric Prince (U.S.A.) for the western Atlantic Ocean and Mr. Taib Diouf (Senegal) for the eastern Atlantic Ocean. The following report will be organized on the basis of these two area designations and the coordination done by the Secretariat.

### WESTERN ATLANTIC OCEAN

#### Objective 1--Landing Statistics

#### Development of Caribbean Research Plan

Drs. Eric Prince and Rolf Juhl (Caribbean basin expert, U.S. National Marine Fisheries Service) made a trip to ten Caribbean Island nations on April 7-19, 1988, for the purpose of identifying potential research areas and developing contacts with research personnel. Dr. Bradford Brown made the first segment of the trip to the transshipment port of St. Maarten, Netherlands Antilles. Besides using the ICCAT Trust Fund, travel funds (in part for Dr. Brown and in full for Dr. Juhl) were provided by the U.S. National Marine Fisheries Service.

Shore-based billfish sampling was started in Cumaná, Venezuela, in 1987 and ICCAT port sampling for tunas, which has been in effect since 1975 in St. Maarten, Netherlands Antilles, was expanded to include billfish sampling in 1988. The locations visited on the trip were analyzed according to

the type of fishery and the quality and quantity of billfish data potentially available (Table 1). Grenada, Barbados, Jamaica, and Dominican Republic were targeted for billfish work as a result of this analysis.

Grenada. Landings in 1986 of sailfish (*Istiophorus platypterus*), locally referred to as ocean gar, were almost 200 MT. Research in Grenada will concentrate on the size frequency of landings and better documentation of total landings. Historical landings statistics were obtained for 1978-1986 which verified the catches reported previously from various sources. We anticipate complete coverage of shore-based sampling by the Ministry of Education, Culture, and Co-operatives and Fisheries for the 1988-89 season, ending in November, 1989. Research in this location will be re-evaluated at the 1989 SCRS Meeting.

Barbados. Historical landings statistics from Barbados were supplied to us by Dr. Hazel Oxenford of Bellaires Research Institute dating back to 1957, which are used for verifying Task I data. Unfortunately, billfish catches are not broken down by species, although 1988 data sheets indicate three billfish species separately (blue and white marlin, sailfish). Therefore, one of the most important research tasks in Barbados will be to develop a method for partitioning out past landings statistics by species. In addition, a more concentrated effort will be made to document total landings and obtain size frequency data. Funding for this work has been provided for the 1988-89 sampling season, and will be re-evaluated at the 1989 SCRS Meeting.

Jamaica. Landing statistics for Jamaica were obtained for 1976-1986 and were prepared as an ICCAT working document by Dr. Guy Harvey, University of West Indies (SCRS/88/57). The proposed work in this location will also document the extent of the artisanal fishery, including size frequency measurements. Several billfish tournaments were sampled for size frequency data for 1988, including unexpected data from the Cayman Islands, British West Indies. These data were incorporated into an analysis for developing length regressions for Istiophoridae (SCRS/88/43). Funding for this work has been provided for the 1988-89 sampling season, and will be re-evaluated at the 1989 SCRS Meeting.

Dominican Republic. A data set on billfish tournaments exists with "Club Náutico de Santo Domingo", dating back to the mid-1970's, and retrieving these data will be a major objective of the research in this area. Sampling these tournaments for size frequency data and biological sampling of landed fish for the development of species identification kits will also be a major task. In addition, the visit to Santo Domingo this spring indicated that juvenile billfish (blue marlin, white marlin, and sailfish) are frequently landed and processed through a local taxidermy shop. Arrangements will be made to obtain skeletal structures from these rarely caught sizes for age and growth research. This research will be conducted through the Dominican Foundation to Preserve and Research the Marine Resources (MAMMA). Funding for this work has been provided for the 1988-89 sampling season, and will be re-evaluated at the 1989 SCRS Meeting.

Venezuela. At-sea and shore-based sampling activities continued at the port of Cumaná, Venezuela, where 19 longline boats target yellowfin tuna but take significant quantities of marlin and sailfish. A total of five



observer trips were successfully completed during 1987-88. The data from all five trips have been received in Miami, but only a portion of this information has been computerized. The incidental catch of billfish is highest in the fall and winter months and falls off substantially in the late spring and summer. Future trips will be scheduled to coincide with the peak of billfish landings to maximize the quality and quantity of data obtained. Observer data have been used so far to help compute length regressions for Istiophoridae (SCRS/88/43) as well as to calculate, in part, dead discards for total landing reports for the U.S. longline fishery in the Caribbean Sea.

Data from a total of 16 days of shore-based sampling in Cumaná harbor have been received as of the date of this report. Two days sampling was done in 1987 and 14 samples have been received for 1988. It is unclear whether maintaining the proposed schedule of two sampling days per week is now being met. This aspect of the shore-based sampling in Cumaná harbor needs to be resolved.

St. Maarten, Netherlands Antilles. A contract for sampling billfish landings for size frequency data was initiated in the spring of 1988 with the Curaçao Pioneering Company in St. Maarten, Netherlands Antilles. Carcasses off-loaded at this transshipment port are without heads, viscera, and in most cases, without fins. Therefore, positive species identification and detailed information on sex cannot be obtained at this time. The larger blue marlin are easily distinguished from the smaller white marlin and sailfish, but identifications will remain questionable until the species identification kits (discussed below) become available. Nevertheless, two measurements of length and dressed round weight will be taken and converted to desired measurements at a later date. As of this date, data from the off-landing of one longliner (August, 1988) have been received.

Species Identification Kits. A contract was made with the Biological Science Department of Florida Atlantic University to isolate biomarker proteins to identify three major species of billfishes. ICCAT provided \$2,000 from the Trust Fund and the initial stage of the study was successfully completed. A document on development of species identification kits for billfishes was submitted to the SCRS by Drs. J. X. Hartmann and R. E. Waldner (SCRS/88/37). Additional samples for this work are planned for white marlin in the fall from the Dominican Republic and for sailfish in the winter along the south Florida coast.

#### Objective 2--Billfish Tagging Program

The adoption of an ICCAT billfish tagging program in the western Atlantic Ocean and Caribbean Sea has been slow to develop. This is due primarily to the existence of the cooperative game fish tagging program of the U.S. NMFS and the commercial value of billfish as food by most of the Caribbean Island nations. However, ICCAT cooperators in Venezuela, the Dominican Republic and Jamaica believe that once the ICCAT billfish tagging program gets further along, including the availability of official brochures and posters, this program will be well received.

## Objective 3--Age and Growth

Several samples of skeletal structures were obtained from observers aboard Venezuelan longliners. These samples are currently being held in freezer facilities in Cumaná, Venezuela, and will be shipped to Miami this winter. Additional samples have not been acquired this year, but we anticipate receiving additional material during the 1988-89 sampling season, particularly from the Dominican Republic.

## Eastern Atlantic Ocean

Mr. T. Diouf, Eastern Atlantic Program Coordinator, has developed a sampling plan for the eastern Atlantic artisanal fisheries. Although his plan requires more funds than are available, Dr. B. Brown (General Coordinator) suggested starting this sampling program at a reduced level utilizing the funds now available. His full scale plan will be considered for 1989 (SCRS/88/13).

Billfish research in the eastern Atlantic was carried out by Senegal and Côte d'Ivoire in 1988 and included:

- collection of statistical data from the artisanal, sport and industrial fisheries
- collection of biological data (gonads and size frequencies)
- tagging operations in collaboration with the sport fishing center in Dakar.

Fishery statistics

The collection of artisanal statistical data has improved through a better monitoring of the fisheries and by increasing the sampling rate. The fishing gears have been carefully identified (gillnets in Cote d'Ivoire, hand line and purse seine in Senegal). Fishing effort in number of specialized canoes exploiting these species is known in Abidjan (13 canoes); a method for estimating effort is being studied in Senegal.

Catch and effort statistics for the sport fisheries were reported on the forms sent for this purpose to the authorities of the fishing vessels (around 20).

The by-catches of the industrial purse seiners and sardine vessels are also collected and the discards are estimated from interviews with the captains.

Biological data

Measurements taken are processed in Abidjan by species (sailfish and blue maxlin) from 1983 to 1987. There are data on sailfish for 1981 to 1987

in Dakar. Size frequency distributions are used to study growth and to calculate the landing weight from the length-weight relationship and from the number of individuals caught.

The collection and examination of gonads from fish landed by the Senegalese artisanal fishery were also carried out, as well as the distribution of the catches by sex.

#### Tagging

Tagging was done in Senegal in collaboration with the Dakar sport fishing center. Several cruises are planned for the season (June-August). The first tagging has provided satisfying results (some 110 individuals were released in July).

#### Stock dynamics and evaluation

This operation is conducted in Senegal by a trainee on Atlantic sailfish. A data base containing the data from the international longline fisheries and from the west African artisanal fisheries was created (SCRS/88/50). Coherent CPUE series were defined and a production model was applied. A map of the sailfish catches was also made to determine the areas of abundance of this species and to isolate the possible different stocks in the Atlantic.

#### Secretariat Coordination

In this Program, the Secretariat is serving as a logistic center of the Program Plan. All the circulars, sampling instructions, etc., have been developed in collaboration between the Coordinators and Secretariat and then translated into other official languages before circulation. Also all the official contracts were drafted by the Secretariat, negotiated and finalized in collaboration with Coordinators. Since all the funds are sent to the Secretariat, they are also administered and transferred to various local contractees by the Secretariat. The following summarizes 1988 Secretariat involvement in the Program.

#### Coordination

- The survey as to how the billfish are dressed was developed and the results were summarized with the Program Coordinators (SCRS/88/44).
- Contract with the Biological Science Department of Florida Atlantic University (through the Program Coordinator) to isolate biomarker proteins was drafted and made.
- The interim port sampling instructions for billfish were developed through the joint efforts of the Coordinators and the Secretariat and were distributed to the pertinent scientists (SCRS/88/28).

- Instructions for tagging and releasing fish to be included in the tagging kit have been drafted and circulated in collaboration with the Program Coordinators (SCRS/88/28).
- Contract with the Curaçao Pioneering Company to include billfish sampling in ICCAT regular port sampling was made.

Administration of funds

During Fiscal Year 1987, a Trust Fund was established in which all the money received from the private sector was deposited. Details of the financial situation is reported in the Financial Report (COM/88/9). The Fund now stands as follows:

1) Balance at the end of FY 1987 .....		\$18,071.26
2) Funds received to date in 1988:		
Mr. Pierre Closterman (France).....	\$ 500.00	
South Florida Fishing Classic, Inc..	10,000.00	
Florida Conservation Association ...	5,000.00	
The Billfish Foundation.....	2,000.00	
Pete Leonard Plumbing & Heating.....	50.00	<u>\$17,550.00</u>
3) Total funds available .....		\$35,621.26
4) Total expenditures (in 1988).....		<u>\$14,711.05</u>
5) Total funds remaining (as of October 24, 1988) ....		\$20,910.21

## STATUS OF BILLFISH PROGRAM BUDGETED FUNDS

(as of October 24, 1988)

ITEMS	AMOUNT BUDGETED	AMOUNT APPLIED IN 1987*	AMOUNT APPLIED IN 1988*	BALANCE
<b>SHORE-BASED (Port) SAMPLING</b>				
Sampling at Cumaná	1,000	603.00	205.00	192.00
Secretariat port sampling:				
St. Maarten	1,500	0	184.00	1,316.00
West African ports (Dakar)	1,500	0	1,505.00	-5.00
Caribbean	6,500	0	5,791.56	708.44
Others (Abidjan)	1,000	0	1,005.00	-5.00
<b>AT-SEA OBSERVER PROGRAM</b>				
Small longliners (6 trips)	5,000	2,409.00	0	2,591.00
Large longliners - Species ID/Conversion factors	3,000	0	2,005.00	995.00
<b>AGE AND GROWTH</b>				
Purchase of hard parts	2,000	0	0	2,000.00
<b>TAGGING</b>				
Tags/applicators	2,000	1,581.00	0	419.00
Tag rewards	500	0	0	500.00
Lottery rewards	1,000	0	505.00	495.00
Hard parts rewards	500	0	0	500.00
Posters	1,000	0	0	1,000.00
<b>COORDINATION</b>				
Trips	6,500	2,835.74	3,510.49	153.77
Shipping	1,000	0	0	1,000.00
Data processing	1,000	0.	0.	1,000.00
<b>TOTAL</b>	<b>35,000</b>	<b>7,428.74</b>	<b>14,711.05</b>	<b>12,860.21</b>

\*Includes bank charges.

Table 1. Quality and quantity of billfish data (landings in metric tons, MT) potentially available in Caribbean Island nations, as determined during a trip to ten locations by ICCAT billfish scientists, April 7-19, 1988.

Large ( $\geq$ 50 MT)	Documented on trip	
	Moderate ( $\geq$ 10-49 MT)	Small ( $<$ 10 MT)
1. Venezuela (b,c,d,e)	1. Curaçao (a,f)	1. Antigua (d)
2. Grenada (c,f)	2. Aruba (f)	
3. St. Maarten, N.A. (c,e)	3. Martinique (a,f)	
4. Barbados (c,f)	4. St. Lucia (f)	
	5. Dominican Republic (b,d)	
	Documented by phone or contacts	
1. St. Vincent (c,f)	1. Trinidad & Tobago (f)	1. Bermuda (a,d)
	2. Jamaica (b,d,f)	2. Dominica (f)
	3. Cayman Islands (b,d)	

- a. Sampling available at no cost.
- b. High quality data available.
- c. High volume data available.
- d. Recreational data.
- e. Industrialized commercial data.
- f. Artisanal data.

## Program Plan for the Enhanced Research Program for Billfish in 1989

INTRODUCTION

The original plan for the Enhanced Billfish Research Program (COM-SCRS/87/14) was formulated with the intent of developing the data necessary for assessing the status of the billfish stocks and included the following three major objectives: (1) To provide more detailed catch and effort statistics and 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. These general research categories have long been recognized by the SCRS in its reports as being inadequate for stock assessment. It was clearly recognized that this program would require considerable effort and funds for an extended period of undetermined length (at least five years, if not continuous). The ICCAT Enhanced Research Program for Billfish was singled out at the Second International Billfish Symposium (reviewed in SCRS/88/15) as the one exception to an otherwise pessimistic world-wide outlook for developing the data necessary to assess the status of the world's billfish stocks. Recommendations for acquisition of statistics and research made at the Symposium concerning stock assessment in the Atlantic Ocean included: (1) more detailed landings statistics (particularly sex ratio and size frequency of the landings) and detailed effort data; (2) age, growth and reproductive studies (including age at maturation); (3) stock identification; and (4) development of new stock assessment techniques.

Two major areas were identified as locations for intensive scientific study (Caribbean Sea and west coast of Africa) and program coordinators for the western Atlantic Ocean (Dr. Eric D. Prince, U.S.A.) and the eastern Atlantic Ocean (Mr. Taib Diouf, Senegal) were appointed during the 1987 plenary session. Initial research results are presented to the 1988 Commission meeting (Appendix 4 to Annex 10) and the financial situation is reported in the Financial Report. On the basis of the first year's experience, research activities for 1989 have been drafted.

Funds for some 1988 research activities were either totally or partially spent, while for other activities 1988 funds were transferred to the contractees but have not yet been totally spent. They were taken into consideration when estimating 1989 funding needs. The 1989 proposed budget is attached to this report as Table 1. Due to the uncertainty in the amount of funds available for 1989, the budget is proposed with priority 1 (absolute necessity) and priority 2 (optional).

Quarterly highlight reports of research activities will continue to be provided to interested parties. In addition, names and addresses of in-

dividuals 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 Program Progress Report (Appendix 4 to Annex 10) and in the ICCAT Financial Report (COM/88/9) and projected funds for future research activities will be available in subsequent annual program plans. No funds are allocated for artisanal longline observers.

#### A) SPECIES IDENTIFICATION KITS

As reported in Appendix 4, a study to isolate bio-markers was started in 1988 in order to identify carcasses of billfish unloaded by the industrialized longline fleet at ports. Peer review of the document on this work (SCRS/88/37) by experts in biochemistry indicated justification for continuance. Additional tissue samples of the required billfish species have been provided to the researchers at Florida Atlantic University. The next phase of this program is to develop 150 field kits for testing of false positives. The kits should be available sometime during 1989. Funding for 1989 is \$4,600.00.

#### B) SHORE-BASED SAMPLING

Cumaná, Venezuela. Shore-based sampling of size frequency data for billfish carcasses off-loaded from industrial longline boats at the port of Cumaná will be continued in 1989. For this program \$500.00 will be needed in 1989. A few multi-purpose trips may be required by the coordinator to monitor the sampling (see section on Coordination).

Caracas, Venezuela. Shore-based sampling and detailed analysis of the recreational fishery (centered in La Guaira, Venezuela) to be carried out as part of a masters degree for Mr. Ramon García de Los Salmones through the University of Oriente (Institute of Oceanography). Dr. José Alio (FONAIAP) will direct this research effort which will provide a detailed analysis of catch, effort, size, and sex of landings for the two largest marinas in La Guaira (and other locations). This includes analysis of the historical data base dating back to 1961. For this program \$1,500.00 will be needed for the 1988/89 sampling season.

Grenada. Shore-based sampling of size frequency and total landings from the artisanal fishery for billfish will be conducted by governmental personnel in 1989. Funds for this activity were released in the third quarter of 1988 for sampling in 1989. Thus, no additional funds will be necessary for 1989.

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 1989. Emphasis will be placed on developing a mechanism for partitioning out billfish landings by species. Funds for this activity were released in the third quarter of 1988 and thus, no additional funds will be necessary for 1989.



Jamaica. Shore-based sampling of size frequency and total landings from the artisanal and recreational fishery will be conducted by personnel from the University of West Indies in 1989. Funds for this activity were released during the third quarter of 1988 for 1989. Thus, no additional funds will be necessary in 1989.

Dominican Republic. Shore-based sampling of size frequency and total landings from the recreational fishery will be conducted by personnel from MAMMA for 1989. Historical data on billfish tournaments and acquisition of data from juvenile billfish for age and growth studies will also be obtained. Funds for this activity were released during the third quarter of 1988 for sampling in 1989 and hence, no additional funds will be necessary for 1989.

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 1989 through the Curaçao Pioneering Company. Since the sampling started late in 1988 and the contract has not been fully implemented by the contractee, only one sample was obtained in 1988. Most of the funds budgeted for this activity in 1988 are left over and could be reallocated to the 1989 budget. The sampling cost is estimated as \$1,500.00 for 1989. If the present situation continues, one trip may be required to implement the contract.

Las Palmas, Tenerife. ICCAT port sampling for tuna will be expanded to include billfishes. The longliners unloading at these ports include fleets from China (Taiwan), Cuba, Japan, Korea and Panama. Even though the ports are located in the eastern Atlantic, about half of the catches come from the northwestern Atlantic. The other half comes from the northeastern and central eastern Atlantic. A substantial amount of billfish by-catches have been unloaded just as they are in St. Maarten in the form of gilled, gutted, finned and occasionally fileted. To start sampling would require one trip to make arrangements with local authorities and industry and to train a locally contracted sampler (see section on Coordination) and \$1,200.00 for the sampling.

Senegal. Shore-based sampling for the four-month billfish season will include size frequency sampling and documentation of total landings from the artisanal and recreational fishery. Sampling of sex ratio and round (live) weight/lower jaw fork length will also be attempted, probably from the recreational fishery. A limited number of sailfish and blue marlin will be sampled for muscle tissue for development of species identification kits. Funding for 1989 is \$2,000.00.

Côte d'Ivoire. Shore-based sampling for size frequency (length only) and total landings will be conducted for the artisanal gillnet fishery (sailfish and blue marlin). Information on the recreational fishery will also be collected. Funding for 1989 is \$1,500.00.

Ghana, Benin, Côte d'Ivoire, Sierra Leone. After the Eastern Atlantic Coordinator makes a feasibility trip to each of these countries to determine the type of shore-based sampling and data that can be collected and costs involved, more detailed proposals for each country will be developed. Funding for 1989 is \$4,500.00.

### C) AT-SEA OBSERVERS

Venezuela. Five observer trips are planned on industrial longline boats fishing in the Caribbean Sea for 1989. These boats use the port of Cumaná as a landing base and sampling will be conducted by personnel from FONAIAP. The five trips will be scheduled from November 1988 to May 1989 to coincide with the highest billfish catch rates. Funds of \$3,000 will be required (or \$600 per trip) for 1989.

Other Caribbean Island nations. Recent information indicates that U.S. longline boats may be operating in the territorial waters of each of the following Caribbean island countries during the 1988-89 sampling season: Grenada, Barbados, Trinidad and Tobago, and Venezuela. Observers for each island country will be provided by local research personnel already cooperating in the ICCAT billfish program for the countries of Grenada, Barbados, and Venezuela. Research contacts in Trinidad and Tobago have also been made and these will be pursued to provide observers for this location.

Funds for two observer trips for each country (or 8 trips) totaling \$3,600 will be required (or \$600 per trip) for 1989. Coordination travel by the Western Atlantic Coordinator will be necessary to train observers from each location. Since those trips are of a multi-purpose nature, funding requirements are listed in an independent section.

Spanish longliners (in Senegal EEZ). This fishery has an unknown by-catch of marlin and sailfish which is either rejected or used as bait (Caverivière and Cayré, 1985). An estimate of the rejected tonnage (by species), as well as size and sex of the billfish by-catch, will be made. Senegalese observers are already planned for all 20 boats. Five of these observers will be trained and funded to do additional work for the Billfish Program. Funding for 1989 is \$700.00.

### D) AGE AND GROWTH

Acquisition of samples for age and growth studies will be intensified during 1989, particularly from Caribbean island locations identified during 1988 (i.e., the Dominican Republic). Funding for 1989 is \$1,000.00.

### E) TAGGING PROGRAM

After approval of the tagging brochure by the 1988 SCRS, brochures and posters will be prepared for distribution. In addition, in 1989 other tagging materials (tagging poles, hats, lock bags for holding tagging equipment) will be obtained for distribution (\$1,000). Funds for brochures and posters were obligated in the 1988 but not spent. These funds (totaling \$1,000) should be reallocated for the 1989 budget. Funds of \$500 each for the regular rewards, lottery prizes and hard parts are required in 1989. Funding for 1989 is \$3,500.00.

## F) COORDINATION

### F.1 Travel/Coordination

Experience in the Caribbean during 1988 (Appendix 4 to Annex 10) indicated that it will be necessary to make a series of trips to specific Caribbean islands 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 is essential by the Eastern Atlantic Coordinator to initiate and maintain the Billfish Program. Travel by the ICCAT Secretariat may also be necessary. Funding for 1989 is \$12,000.00.

Travel will include the following areas:

- Cumaná and Caracas, Venezuela
- Grenada
- Barbados
- Jamaica
- Dominican Republic
- Trinidad & Tobago
- St. Maarten
- Las Palmas
- Abidjan
- Sierra Leone
- Benin
- Côte d'Ivoire
- Ghana

### F.2 Miscellaneous/Mailing

Eastern Atlantic Coordinator miscellaneous and mailing. Funding for 1989 is \$500.00.

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 (\$1,500.00) and for miscellaneous expenses and contingencies (\$1,000.00) for 1989 is included. Funding for 1989 is \$2,500.00.

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 - 1989

ITEMS	AMOUNT BUDGETED (US\$)			TOTAL
	PRIOR.1	PRIOR.2	SUB-TOTAL	
Species Identification Kits	4,600.00		4,600.00	4,600.00
Age and growth				
Purchase of hard parts	500.00	500.00	1,000.00	1,000.00
Tagging				3,500.00
Tagging kit	1,000.00		1,000.00	
Tag rewards	500.00		500.00	
Lottery rewards	500.00		500.00	
Hard parts rewards	500.00		500.00	
Posters and brochures	1,000.00		1,000.00	
Statistics & sampling enhancement				20,000.00
Cumaná, Venezuela	500.00		500.00	
Caracas, Venezuela	1,000.00	500.00	1,500.00	
Venezuelan at-sea sampling	2,000.00	1,000.00	3,000.00	
Caribbean Is. at-sea sampling		3,600.00	3,600.00	
St. Maarten, Neth. Antilles	800.00	700.00	1,500.00	
Las Palmas/Tenerife, Canary Is.,	600.00	600.00	1,200.00	
Spain, Senegal	2,000.00		2,000.00	
Senegal at-sea sampling (Spanish				
longline vessels)	700.00		700.00	
Côte d'Ivoire	1,500.00		1,500.00	
Other West African countries				
(Ghana, Benin, Côte d'Ivoire,				
Sierra Leone		4,500.00	4,500.00	
Coordination				15,000.00
Travel by Coordinators and				
Secretariat-to establish pro-				
jects and maintain quality				
control	8,000.00	4,000.00	12,000.00	
Mailing and Miscellaneous-East				
Atlantic Coordinator	500.00		500.00	
Secretariat support-mailing,				
shipping, publications, data				
management, miscellaneous	2,000.00	500.00	2,500.00	
GRAND TOTAL	28,200.00	15,900.00		44,100.00

**Report of the Meeting of the Activity Team Leaders  
of the Yellowfin Year Program (YYP)**

During the SCRS meeting, the Activity Team Leaders of the Yellowfin Year Program (YYP) met to analyze the progress made in data processing with respect to the Data Preparatory Meeting held in Dakar in July, 1988, and to set the dates for the final Program meeting.

The following team leaders attended the meeting: A. Fonteneau (General Coordinator), J. Ariz (Observer Program), F. X. Bard (Tagging Program), B. Brown (Data Processing), as well as other scientists who participated in the Working Group.

A review of the Report of the Working Group on Data Preparation for the Yellowfin Year Program (contained in Col. Vol. XXIX) indicates that progress has been made in the completion of the recommendations contained in the Report, in particular as concerns the following sections of the report:

**4/5 ANALYSIS OF CATCH, EFFORT AND SIZE FREQUENCY DATA**

**4.1/5.1 State of the fisheries**

Brazil. The creation of a global longline file raised to the total catch (Brazil + Brazil-Spain + Brazil-Japan + Brazil-Korea) has been completed. This file will be available very shortly.

Cape Verde. Data corresponding to 1987 have been entered in the data base.

Ghana. Catch and effort data up to 1987 have been entered in the data base. Sampling carried out in 1987 to estimate species composition of the catch for the local market is considered correct.

Japan. After making corrections on the species composition in accordance with the Japanese scientists, the catch and effort data are considered correct. The size frequencies have been entered in the data base up to 1986.

Morocco. Purse seine catches since 1984 are still unknown. However, since there is only one vessel involved, the modifications to the data base will be minimal.

U.S.A. Data corresponding to 1987 have been entered in the data base by  $l^{\circ}xl^{\circ}$  and by round weight. However, the bases used to estimate the correction coefficient for gilled and gutted-round weight are unknown.

Therefore, it is recommended that reservation be exercised when using these data for scientific purposes, since presumably the criteria followed to obtain this coefficient were purely statistical. The U.S. scientists offered to investigate the bases of this correction coefficient.

Venezuela. Raw data corresponding to 1987 were just given to the Secretariat. It is recommended that these data be entered in the data base as soon as possible. The Group also emphasized that IATTC sampling data also be urgently entered in the data base.

4.3 Dr. B. Brown informed the Group that Dr. M. Parrack was working on the development of a specific generalized linear model (GLM) to study the changes in target species and that this could be available by February.

## 7. ANALYSIS OF TAGGING FILES

### 7.1 Status of yellowfin tagging since 1970

The files on recaptures are all considered correct (SCRS/88/53). With regard to the release file, the Group considered that it may be incomplete, although it was recognized that the volume and complexity of this file make revision difficult.

## 8. ANALYSIS OF THE FILES ON THE GONAD-FECUNDITY INDEX

Data from Cape Verde have been compiled and entered in the file in standard format.

It is recommended that Abidjan data become available, in standard format, as soon as possible.

## 9. ANALYSIS OF ENVIRONMENTAL DATA: XBT, OCEANOGRAPHIC VESSELS, COMMERCIAL VESSELS, AND BIBLIOGRAPHY OF THE PAPERS BY OCEANOGRAPHIC PHYSICISTS

A file was created from XBT data for the 1984-87 period. Software to permit access to this file is being developed and will be available shortly. It would be convenient to expand this file to include the years before 1984.

## 10. UPDATING A COMPLETE STRATEGY OF DATA ANALYSIS; PREPARATION OF THE FINAL YYP MEETING

### 10.1 Biology-Ecology

As regards growth studies, the Group was informed that analysis of hard parts could be carried out in U.S. laboratories, where otoliths and vertebrae should be sent.

## 10.2 Fine analysis of recovery of the stock

The necessary modifications to use the CAL model for an analysis of the eastern Atlantic yellowfin stock (acceptance of quarterly periods and natural mortality variable with age) have been made. The adopted CAL model is available on diskette at the ICCAT Secretariat.

## 10.3 Final meeting of the Yellowfin Year Program

The dates (end of May 1989), place (Madrid) as well as the objectives of the final meeting of the Yellowfin Year Program were confirmed.

Until that meeting, the work will be carried out in a coordinated fashion between the scientists involved, for the eastern and western Atlantic.

## 11. BUDGET

The cost of research activities in 1988 amounted to: trip expenses - \$2,000, Dakar meeting expenses - \$3,000, and tag lottery prize - \$500. In 1989, the following amounts will be spent (as estimated in the 1987 YYP Budget):

Meeting in Madrid	\$2,000
Analysis of hard parts	8,000
Publication of results	5,000
Miscellaneous	4,000
YYP Lottery	500
	<u>\$19,500</u>

**Glossary of Some Technical Terms Used  
in Fish Stock Assessment \***

**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 sample which is assumed to represent the CATCH. These are used to convert catch at length to CATCH AT AGE.

**CALIBRATION** - The use of an ABUNDANCE INDEX to select the TERMINAL F for a range of FISHING MORTALITIES 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 (eg., 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.

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\*This glossary was prepared by members of the SCRS who wish to acknowledge access to glossaries prepared by ICES and from the following text: May, R. M. (Editor). 1984. Exploitation of Marine Communities. Publ. Springer-Verlag. Berlin. 360 pp.



**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).

**FISHING MORTALITY** - see MORTALITY.

**FISHING POWER** - The relative fishing power is the ratio between the catches of two vessels or gear types that 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.

**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, de-

noted 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.

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.

**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.

## Documentation of Bluefin Assessment Work

### I. Derivation of Parameters

#### 1) Catch and Effort

The ICCAT Secretariat presented documentation (SCRS/88/64) on updates to the total landings and size data available for 1988 and the substitutions used to derive the catch at age (1986 for the eastern Atlantic and Mediterranean Sea and 1987 for the western Atlantic). The changes to the catch at age used by SCRS in the 1987 assessment were minor. This does not imply there were no problems, only that no better solutions to existing and past problems were available.

##### a) Effort in the eastern Atlantic

No recent increases in directed effort were reported for the eastern Atlantic. A new fishery in France using gillnets and pair trawl for albacore has been limited to a 6 percent by weight by-catch of bluefin tuna.

##### b) Effort in the Mediterranean

Spain reported no increase in effort, it was noted that three purse seiners that have been fishing for three years have minor by-catches of bluefin. France reported four additional purse seine vessels in 1987.

##### c) Effort in the western Atlantic

Catch has been restricted to 2,660 MT in the western Atlantic and therefore little scope is available for increased effort. Canada reported no change in effort in the traditional inshore fisheries although the two longline vessels which first began an experimental fishery in 1986 have continued in 1987 and 1988.

The U.S. rod-and-reel fishery for tuna, billfish and sharks in the mid-Atlantic coastal region is believed to have increased in both fleet size and number of trips. It is also believed that the number of active vessels in the Gulf of Mexico longline fleet has increased and there may have been a shift in the directed activities of some northern swordfish longline operations on Georges Bank from swordfish to tuna.

Japan reported the western Atlantic fleet was limited to 45 vessels and the 1987 season was shorter than usual due to slightly higher catch rates.

ii) Catch at age

Catch at age was derived by the use of a single growth equation (the Parrack and Phares growth equation for the west and the Farrugio growth equation with  $L_{\infty} = 351$  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 were 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 decision could be made regarding valid substitutions.

a) Eastern Atlantic and Mediterranean

Two very significant factors arose this year which point out the increasing deficiencies in data collection. The first was brought to the group's attention by data which were made available by Spanish scientists for the year 1985. In this year additional resources were made available for sampling the inshore bluefin fisheries. Estimates were made of age composition and numbers at age although no corresponding length frequencies were gathered. This additional data indicate an increase in orders of magnitude in the estimated number of 0-group fish landed. Although essential to the understanding of the stock structure of the eastern bluefin, these data cannot be used in any quantitative analysis as these fisheries were not sampled before nor since this special project. These data indicate our estimates of undersized fish (SCRS Report, Table 18) are indeed underestimates.

The second example of difficult decisions that had to be made dealt with the fisheries of the Adriatic Sea. These fisheries have recently increased in landings to 1,400 MT from approximately 100 MT before 1984. In the past (1971 to 1978) the landings from these fisheries were sized using available samples from these fisheries. Since 1981 samples from Spanish Mediterranean baitboat catches using only fish of lengths less than 100 cm were substituted. No Spanish baitboat size data were available in 1986 nor 1985 and two alternate options were available. Both of these were tested to obtain an indication of the size of error that might arise from incorrect substitutions and to indicate the importance of impartial selection. The options tested were the use of length sampling data from either French purse seine catches using only fish of less than 102 cm or Spanish surface fisheries. Using the size samples for the Spanish surface fisheries to size the Adriatic catch, the 0-group is six times larger than that obtained when using the samples from the French seiners. The French purse seine samples were used to produce the 1986 catch at age (SCRS Report, Table 10).

These two problems give an indication of the uncertainty that must be associated with the numbers in the youngest age groups. For this reason the 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 2 year-old fish. Percent composition tables show the number of fish in age groups 21 to 30 are less than 0.1 percent. Thus, the group felt the catch above age 20 should be truncated.

## b) Western Atlantic

Some members of the group noted that the approximately 200 MT reported by the Dominican Republic creates considerable uncertainty in the numbers of fish if the size composition is smaller than previously believed.

A catch at age for the west (SCRS Report, Table 14) was produced and it was noted that future investigations should look at the use of a plus group for the west similar to what was done in the east. The percent composition (SCRS Report, Table 15) of ages 21 to 30 has ranged from 1 to 3 percent since 1970. For the purposes of our assessment the numbers at age for ages 21 to 30 could have been added into a single plus group (20+). This should have reduced the variability due to the small numbers of fish in these older age groups. However, this was not possible with the time constraints on the group at this meeting of the SCRS.

## iii) Weight at age

Mean weight at age of the catch was calculated this year by using seasonal length weight relationships (Appendix 8, Table 1) and converting the catch numbers by length to catch biomass by length and then using the standard ICCAT Secretariat software to convert catch-biomass by 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 Appendix 8, Table 2a and 2b for the eastern and western stocks, respectively.

## iv) Natural mortality

The natural mortality (M) used for this year's assessment of the western Atlantic was 0.1 and for the eastern 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 Recommendations in the SCRS Report).

## v) Partial recruitment

Partial recruitment (PR) was investigated using separable VPA (SVPA) as was done last year. The first assumption of this method is that the years used in the analysis have a stable exploitation pattern. It was decided by the 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 group that with our limited number of years of data available, the variability made it difficult to identify which years to eliminate.

a) Eastern Atlantic and Mediterranean

The group accepted the above premise and identified 1982 to 1986 as basically a stable period in the fishery. The years prior to 1982 were rejected as spotter aircraft were first used in 1982 to improve the catchability in the purse seine fishery. This fishery contributes up to 50 percent of the nominal catches.

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, analysis was conducted on ages 1 to 18, 2 to 18 and 3 to 18 respectively. The exploitation pattern was found to be stable over the common ages. Thus the SVPA analysis for 1982 to 1986 ages 1 to 18 (Appendix 8, Table 3) was accepted for determination of the PR. No smoothing was carried out on this estimate.

b) Western Atlantic

Initial analysis using catch at age in SVPA indicated 1983 and 1985 were possibly anomalous. No explanation was advanced for the 1983 anomaly. Several possible reasons were suggested for the 1985 anomaly which appeared to be primarily related to differences in the Japanese longline catch at age. First, unusual oceanographic conditions in 1985 resulted in extremely high catch rates in the Japanese longline fishery at the beginning of 1985. Secondly, the Japanese longline fleet took nearly 70 percent of their catches in 1985 in the U.S. EEZ with no fishing in the second half of the year. Normally these would be expected to be less than 50 percent of the catch taken in the U.S. EEZ. Fish caught in the U.S. EEZ tend to be smaller than those landed further north and east.

One anomalous year in SVPA affects not only that year but the two adjoining years as it uses the log ratio of 2 years of catch at age. To investigate the effect of data from 1985, an averaging of historical F values was used both with and without the 1985 data in the average. This indicated that 1985 did affect the results, however, it did not indicate which of these different answers was a better representation of the fishery. The working group felt that the limited data (5 years) precluded the exclusion of these two years.

After this review, the group, following the earlier premise, agreed to use all years since the introduction of the 2,660 MT quota in 1983 as input to SVPA (Appendix 8, Table 4). This was based on the assumption that these represented a fundamentally similar fishery. Ages 1 to 15 were accepted as the basis for this analysis. An additional estimation was made using ages 1 to 25, only to confirm the estimate of the value at age 15. Some concern was expressed on the effect of the PR on the assessment results.

Last year a smoothing function was applied to the PR estimated by SVPA. This was not followed this year as the group considered some of the variability in the pattern reflected real differences by age in the fishery.

## vi) F on the oldest age (F oldest)

## a) Eastern Atlantic and Mediterranean

F on the oldest age group (age 20), in years before the most recent year, was estimated by a weighted (catch numbers) average of the F's on ages 13 to 19. This average was applied to age 20.

## b) Western Atlantic

In previous assessments, the F on the oldest ages in years before the most recent year was calculated as the unweighted mean of the F on ages 15 to 29 and applied to age 30. It was decided by the group that the highly variable F's of the oldest age groups could make this estimate unrealistically high. It was therefore agreed to use a weighted average for the F over ages 15 to 20. Ages 15 to 20 were used to reflect the fully recruited age groups represented by sufficient numbers to provide stability (SCRS Report, Tables 14 and 15).

## vii) Terminal F

Two modifications to the software CAL (see Section III.b) were employed in the calculation of terminal F.

## a) Eastern Atlantic and Mediterranean

Terminal F was estimated from the three selected indices (SCRS Report, Table 9) using the computer software CAL. This software has been used in analytical assessments by SCRS of the western bluefin since 1985. The terminal F which gave the lowest sum of squares on the three indices was 0.83. A second more limited software package TUNE, able to calibrate on only one index at a time, was run in parallel. This program indicated a terminal F in the range of 0.5 to 0.6. This difference was a cause for some concern. It was felt it may be due to the total lack of indices on other than juvenile fish. The CAL runs were used in all discussions of this stock.

## b) Western Atlantic

The terminal F was estimated (using the computer software CAL) as F which gave a minimum sum of squares for the three indices used (SCRS Report, Table 16). The F estimated was 0.23. A second software package, ADAPT, was used in parallel this year. It follows similar minimization principals using a different optimization algorithm--it also found terminal F to be 0.23. The CAL runs were used in all discussions of this stock.

## II. INDICES OF ABUNDANCE

Following SCRS recommendations in 1987, the weighting of abundance indices used in the software CAL for calibration of the VPA's was inves-



tigated (SCRS/88/41). Weighting to reduce the effect of highly variable indices appears to be useful and for this year's assessment weighting by the inverse of the mean square error divided by the degrees of freedom was used. This methodology allowed the group to abandon one of the three quantitative index selection criteria used in the past. The eliminated criterion, probability of positive correlation, has been criticized for possibly eliminating useful indices.

Indices were investigated by a two-stage process. The first was a qualitative appraisal to determine if there were any reasons why an index should not be included. Incorporated in this stage was the basic assumption that only one index would be used to represent a range of ages in a fishery. The second stage was quantitative. The selection was made to keep or reject an index on the basis of: 1) the fully recruited  $F$  derived from calibration with that single index should fall within the range 0.01 to 0.99, and 2) the distribution of the residuals should show no trend nor be dome shaped). The results are presented in SCRS Report, Tables 9, 16. The correlation coefficient and the probability of a positive correlation are presented but were not used as acceptance criteria (see above).

a. Eastern Atlantic and Mediterranean

The same abundance indices as used in the 1987 assessment were examined. Six series were qualitatively reviewed; five were accepted for quantitative review, two for 7+ year-olds and three for small 2 and 3 year-olds (SCRS Report, Figure 24 and Table 8).

1) Japanese longline (Atlantic)

The Japanese longline CPUE from the Portuguese EEZ were collected between 1975 and 1984. It deals with age 7+ fish and is based on biomass.

2) Spanish trap (Atlantic)

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 1986.

3) French purse seiners (2 indices) (Mediterranean)

These indices represent age 2 and 3 CPUE from French purse seiners operating in the Mediterranean (SCRS/88/17). These series were obtained by dividing the number of fish of each age by the number of positive fishing days.

From the preliminary analysis of these series, the group considered the CPUE of age 2 from 1977 to be too high. It was therefore decided to use only the most recent years (1978 to 1986).

4) Spanish baitboats (Atlantic)

This series represents the CPUE of age 2 bluefin from Spanish baitboats operating in the Bay of Biscay (SCRS/88/75). Preliminary analysis of com-

parable data with age-3 fish had been qualitatively rejected because the correlation between the age-2 series for year  $n$  compared to the age-3 series for year  $n + 1$  did not appear significant. The data of this series are different from those of last year; the separation into age groups was improved by using age at length keys based on yearly aging of hard parts, and improved precision in calculating bluefin directed effort was achieved by identifying the seasonally directed effort in this albacore fishery.

#### b. Western Atlantic

The Committee examined seven indices of abundance. The method of calibration of the VPA used by the SCRS in 1986 and 1987 involved indices of abundance for different ranges of ages. This year, updated information was provided for the Gulf of Mexico bluefin larvae index, the Canadian handline fishery, 3 to 7 year-old bluefin tuna from records of U.S. observers on Japanese longline vessels, Japanese longline CPUE at age estimated for ages 3 to 5 and ages 6 to 8, and the U.S. rod and reel and handline fishery for large fish along the New England coast (SCRS Report, Table 13).

##### 1) Larval bluefin survey (Gulf of Mexico)

The indices of abundance of bluefin larvae from a U.S. ichthyoplankton survey (SCRS/88/74) in the Gulf of Mexico continued to indicate a sharply declining spawning stock of adult fish (ages 10+) (SCRS Report, Figure 26). Last year the group suggested caution in the use of this index because of the low levels of sampling and low numbers of individuals captured during the surveys.

This year, with the addition of the 1987 value, the data series continued its downward trend, however, it was noted that the data also appeared to separate into two distinct time periods. From 1977 to 1983 the estimated catch averaged 7.0 larvae per 10 square meters and from 1984 to 1987 the estimated catch averaged 1.5 larvae, with an abrupt drop between time periods (Appendix 8, Figure 1). These data were not the index but provided the measure of catch per effort for the larvae. The index was obtained by adjusting these values by estimated spawning area and other factors. In addition, the decline is substantially greater than was indicated by the stock estimates produced by last year's assessment. These observations led several members of the group to conclude that there have been changes in the behavior of the spawning fish and/or the temporal and spatial coverage of the surveys which may result in a downward bias in the larval index after 1983. The group felt unqualified to define the significance of this potential difficulty and recommends the scientists familiar with the data to investigate possible explanations.

##### 2) Canadian inshore fishery

This index has continued to indicate a sharp decline in the abundance of large adults (ages 16+) (SCRS Report, Figure 26). This decline is similar to that observed for the above index. Concern was expressed over the few fish currently composing this index (SCRS/88/71).

3) Japanese longline

This index, similar to that used in the 1987 assessment, is based on the Japanese fishery year (July 1 to June 30). Some major improvements have been incorporated for 1988 (SCRS/88/23). The most important of these improvements is the allocation of the fish into age groups by the use of a growth equation. Thus, only ages 3 to 5 and 6 to 8 are used for the two indices. In 1987, the entire catch was assumed to be 3 to 6 years of age.

4) U.S.A. observer CPUE

This index for 3 to 7 year-old bluefin caught by Japanese longliners was calculated from set by set data on a calendar year basis (SCRS/88/40). It was felt that this index generally represented a subset of the Japanese longline CPUE index (SCRS/88/23) and should only be used if this latter index failed to meet the minimum criteria.

5) U.S. rod and reel

This revised and updated index covers large fish over 200 cm (age 10+) (SCRS/88/39). This index (zeros of combined trips excluded--see SCRS/88/39) has high variance estimates. 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. Despite concern with this series it was felt it should be tested quantitatively.

### III. ANALYSIS (SPA)

a) Eastern Atlantic and Mediterranean

Using the high estimate of terminal  $F$  of 0.83, the catch at age for the eastern bluefin (SCRS Report, Table 10),  $M = 0.18$ ,  $PR$  from Appendix 8, Table 3 and the  $F$  oldest as derived above, the initial stock sizes (SCRS Report, Table 12) and  $F$  levels (Appendix 8, Table 5) were estimated by VPA.

b) Western Atlantic

Using a terminal  $F$  of 0.23, the catch at age for the western bluefin (SCRS Report, Table 14),  $M = 0.10$ ,  $PR$  from Appendix 4, Table 4 and the  $F$  oldest as derived above, the initial stock sizes (SCRS Report, Table 17), and  $F$  levels (Appendix 8, Table 6) were estimated by VPA.

Various recommendations made in last year's assessment and by this year's group have been given priorities. These proposed alterations to our calibration techniques used by the software CAL will require more time than is currently available for implementing and validating. The first two improvements were made to CAL during the 1988 meeting, the last three are proposed for more detailed investigation over the coming year. These changes by order of importance are:

- 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 for 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.

Table 1. Length-weight regression parameters used for bluefin tuna. These parameters estimating weight at age of Atlantic bluefin follow the form  $WGT (kg) = A \times L (cm)^B$

WEST ATLANTIC (from SCRS/79/78 and corrected in September, 1985)						
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
A	2.861 E-05	2.861 E-05	2.861 E-05	6.043 E-05	6.043 E-05	4.044 E-05
B	2.9290	2.9290	2.9290	2.7794	2.7794	2.8370
	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
A	3.733 E-05	2.227 E-05	1.520 E-05	3.871 E-06	3.871 E-06	2.861 E-05
B	2.8683	2.9704	3.0531	3.3172	3.3172	2.9290

#### EAST ATLANTIC

	Less than 101 cm Jan.-Dec.	Jan.-May	Larger than 100 cm Jun.-Dec.
A	4.389 E-05	1.9000 E-05	5.3000 E-05
B	2.81516 (1)	3.0000 (2)	2.8000 (2)

#### MEDITERRANEAN

	Less than 101 cm Jan.-Dec.	Larger than 100 cm Jan.-Dec.
A	4.389 E-05	1.9607 E-05
B	2.81516 (1)	3.0092 (3)

(1) J. L. Cort (personal communication) regression from 50 to 200 cm fish in June to September n = 172.

(2) Rodríguez Roda, J. (1964). Biología del atún (*Thunnus thynnus*) de la costa sudatlántica de España, Ind. Pesq. 25.

(3) SCRS (1984). ICCAT Report of the Bluefin Workshop (Japan, 1983) pp. 14.

Table 2-A. Weight at age (kg) for bluefin tuna from the eastern Atlantic and Mediterranean

Year	1970	1971	1972	1973	1974	1975	1976	1977
AGE								
1	4.500	4.600	4.500	4.000	4.100	4.200	4.500	4.200
2	10.300	10.100	10.600	10.200	11.000	10.800	11.900	11.200
3	21.200	19.300	20.400	18.700	21.200	21.900	18.800	21.100
4	35.200	34.900	35.400	33.600	35.600	36.900	35.400	33.200
5	53.000	53.500	55.900	54.400	55.100	51.100	52.700	55.900
6	72.800	70.800	71.800	72.200	73.400	72.600	75.800	74.100
7	101.200	102.100	94.700	99.700	97.700	95.000	95.600	95.300
8	120.600	133.600	117.800	126.800	126.100	123.200	123.900	117.900
9	148.700	150.500	150.600	146.800	157.000	152.300	156.400	144.900
10	179.300	177.100	176.900	176.400	179.200	178.000	179.300	175.400
11	207.900	205.800	207.300	207.500	207.800	203.600	206.400	201.900
12	229.800	232.800	235.400	236.600	237.300	234.000	235.100	233.500
13	231.900	254.900	263.900	265.900	267.300	263.400	259.400	263.500
14	253.000	269.000	284.100	295.200	296.100	290.900	293.900	293.900
15	281.400	292.000	298.100	314.200	323.700	317.900	324.500	324.000
16	304.100	317.500	316.300	325.400	340.400	341.900	354.400	349.100
17	332.900	345.100	345.900	342.000	352.900	354.700	382.100	381.000
18	360.000	380.300	378.500	378.600	372.300	367.000	407.000	412.200
19	389.500	411.400	412.400	403.800	389.000	379.600	414.300	424.900
20	410.400	435.800	434.300	421.900	416.000	405.800	433.200	442.600
MEAN	187.385	195.055	195.740	196.695	198.160	195.240	203.230	202.990
	53.316	51.832	50.173	50.798	40.365	33.839	36.313	35.638

Table 2-A (Cont.)

Year	1979	1980	1981	1982	1983	1984	1985	1986
AGE								
1	4.600	4.700	4.700	5.800	5.100	5.800	5.600	5.000
2	10.700	11.000	11.000	12.600	13.100	12.300	11.500	11.800
3	19.200	18.600	18.000	20.700	18.900	24.000	22.500	19.000
4	33.400	32.600	31.400	34.200	31.500	35.400	36.400	33.300
5	50.300	52.700	52.600	51.000	53.600	51.000	53.200	54.500
6	70.700	72.200	72.000	73.000	71.300	75.000	72.900	70.700
7	93.100	93.900	94.900	95.100	101.100	97.000	96.200	95.500
8	116.000	118.700	117.800	115.700	118.800	120.900	122.700	120.400
9	140.900	146.100	147.200	147.000	148.100	146.700	151.700	146.700
10	173.500	177.700	178.300	177.900	175.300	174.800	179.000	177.800
11	203.300	205.400	208.500	205.400	203.300	207.100	207.500	207.300
12	234.200	235.100	234.500	231.200	233.300	241.300	237.600	235.700
13	268.600	268.800	264.600	257.200	263.900	269.800	267.300	265.900
14	294.600	298.500	296.200	294.600	297.400	300.900	296.400	297.400
15	325.100	331.600	324.600	332.800	328.600	329.500	327.100	325.700
16	354.600	360.300	353.800	366.400	342.400	360.700	358.900	355.200
17	376.500	385.800	375.600	391.900	374.100	394.900	390.000	381.300
18	412.800	405.000	406.600	426.100	385.500	422.000	412.000	407.700
19	419.900	429.600	438.200	454.100	420.000	455.300	441.900	434.100
20	425.400	423.400	465.500	487.300	406.000	478.300	470.800	428.200
MEAN	201.370	203.585	204.800	209.000	199.565	210.140	208.060	203.660
MEANPOP	43.525	37.056	36.051	33.482	21.047	22.272	19.922	17.094

Table 2-B. Weight at age (kg) for bluefin tuna from the western Atlantic

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978
AGE									
1	1.400	0.000	0.000	3.000	2.000	1.800	1.300	1.400	1.300
2	3.400	3.600	4.400	3.800	3.600	3.900	3.900	4.500	5.200
3	9.500	8.400	9.800	8.900	9.900	8.700	9.800	10.000	10.700
4	17.800	21.100	19.200	20.400	16.500	20.400	17.800	19.400	19.800
5	34.500	31.800	34.800	33.200	31.900	31.000	29.500	30.100	28.300
6	45.300	43.100	49.100	43.900	44.300	41.300	40.400	39.300	42.400
7	64.100	67.100	60.700	67.900	62.300	63.700	59.000	58.300	58.800
8	83.300	85.000	88.100	82.600	85.500	82.200	86.000	75.200	76.500
9	109.600	104.100	112.200	111.900	99.100	108.100	110.900	94.100	101.200
10	121.100	120.900	124.400	129.800	128.000	132.200	143.300	125.700	130.400
11	148.500	142.800	145.300	146.900	141.100	149.100	158.700	149.500	159.900
12	169.200	167.100	170.700	169.000	166.000	165.400	173.300	171.200	182.600
13	194.200	196.500	199.900	203.500	185.300	189.200	192.100	192.500	199.000
14	218.300	221.200	226.900	225.000	210.400	209.300	213.300	214.300	217.000
15	243.700	245.700	246.300	245.600	241.900	235.100	228.500	236.100	235.400
16	259.400	269.300	269.000	271.800	256.300	258.600	250.000	253.600	256.600
17	284.900	281.100	289.500	295.000	284.900	280.100	276.100	273.000	274.200
18	309.200	310.300	318.500	314.600	301.900	305.500	294.900	295.600	292.800
19	328.900	331.100	340.500	335.600	316.300	321.400	319.200	314.100	311.900
20	347.100	347.700	355.000	356.600	336.600	347.500	344.000	337.600	337.900
21	365.700	367.500	367.100	375.900	361.300	355.300	357.200	355.400	354.200
22	379.300	379.900	395.500	387.400	360.800	373.700	382.900	373.000	372.100
23	404.300	397.400	406.000	405.800	371.600	397.700	412.200	392.600	393.000
24	411.800	404.500	422.100	428.000	403.300	406.500	415.700	411.700	407.300
25	430.000	429.300	451.300	432.500	403.200	421.700	444.800	412.800	424.600
26	433.800	425.400	455.900	439.400	424.200	432.100	448.900	433.400	435.900
27	461.300	0.000	445.100	0.000	415.600	440.700	457.400	449.600	445.800
28	448.800	510.100	425.100	0.000	432.000	457.600	453.200	453.500	463.500
29	0.000	473.100	435.800	0.000	435.800	458.800	451.800	454.500	475.500
30	0.000	491.600	0.000	0.000	0.000	472.300	502.200	466.000	501.800
MEAN	210.947	229.223	228.940	184.600	217.720	239.030	242.610	236.600	240.520
AVGPOP	36.567	42.333	49.904	61.734	45.243	47.324	60.159	65.599	67.895



Table 2-B. (Cont.)

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987
AGE									
1	2.800	1.000	1.800	1.600	0.000	1.000	1.200	0.800	1.200
2	5.300	5.300	5.600	4.100	3.800	4.600	3.700	4.000	4.000
3	10.700	12.800	10.800	10.900	9.700	10.400	9.800	9.000	9.000
4	19.700	21.800	20.700	21.400	19.700	21.700	17.000	18.400	20.200
5	31.300	31.600	32.000	33.100	34.300	36.300	30.600	36.700	33.000
6	40.100	45.000	44.600	55.300	53.600	53.000	44.800	49.000	47.000
7	62.100	66.300	63.700	68.000	69.300	77.200	64.000	70.800	65.600
8	80.100	86.100	83.800	88.000	92.200	95.100	82.600	91.900	86.900
9	102.700	109.300	104.500	111.900	112.900	114.700	104.400	117.000	111.600
10	126.100	128.500	126.500	136.700	138.100	137.500	127.100	137.900	136.600
11	155.100	156.600	150.300	156.400	158.500	157.600	151.100	157.100	157.800
12	180.300	185.000	174.900	181.200	184.600	181.900	174.300	176.300	180.200
13	200.600	212.500	200.500	201.900	205.800	203.000	198.300	201.400	200.900
14	217.300	235.400	221.900	227.200	229.400	228.100	220.000	226.400	228.500
15	235.800	251.400	237.400	247.900	253.100	246.500	237.600	247.900	254.800
16	255.900	263.900	256.100	269.500	272.400	276.700	260.100	272.400	276.700
17	277.900	286.900	278.100	299.000	294.700	300.300	283.400	295.500	299.800
18	297.100	303.800	296.000	319.100	323.100	320.900	301.700	318.500	322.200
19	316.700	323.400	320.400	339.600	347.300	341.600	322.200	347.300	342.600
20	340.100	343.200	234.700	354.600	368.100	361.700	345.800	360.300	366.700
21	360.300	365.100	357.200	370.800	385.900	384.800	368.000	381.400	382.100
22	376.500	378.900	373.000	394.700	393.100	399.200	372.600	399.300	411.400
23	396.600	401.400	397.300	413.800	406.800	423.700	391.700	405.500	428.300
24	408.900	411.100	411.900	427.700	433.700	444.900	413.400	411.100	435.200
25	427.100	423.500	425.400	445.700	438.100	461.300	434.400	424.200	446.200
26	440.700	435.900	434.900	445.900	445.500	473.900	450.200	451.200	468.700
27	451.600	452.000	448.700	463.000	461.600	472.700	4461.700	474.500	458.600
28	458.900	458.500	458.400	466.800	468.800	488.000	475.700	566.800	497.800
29	480.800	463.200	470.400	478.300	463.800	490.100	503.300	462.100	516.800
30	500.800	484.300	479.600	480.500	506.200	516.300	508.500	489.700	535.100
MEAN	241.997	244.790	240.703	250.487	252.470	257.490	245.307	253.480	257.517
AVGPOP	61.627	54.691	47443.000	30.447	27.187	28.963	29.498	36.327	45.422

Table 3. Output from Separable VPA (SVPA) for blue-  
fin tuna from the eastern Atlantic and  
Mediterranean

INPUT DATA USED FOR ANALYSIS:-

FIRST YEAR	82	LAST YEAR	86	TOTAL YEARS	5
FIRST AGE	1	LAST AGE	18	TOTAL AGES	18

CATCH DATA USED IN THE SEPARABLE ANALYSIS

YEAR AGE	CATCH NUMBERS IN THOUSANDS OF FISH				
	82	83	84	85	86
1	636.	689.	228.	572.	665.
2	195.	157.	590.	306.	314.
3	189.	115.	42.	296.	152.
4	23.	29.	32.	33.	74.
5	5.	11.	22.	14.	7.
6	4.	4.	10.	6.	4.
7	6.	9.	7.	4.	2.
8	9.	6.	8.	3.	2.
9	6.	6.	11.	3.	2.
10	6.	14.	12.	6.	3.
11	7.	6.	9.	6.	4.
12	8.	6.	10.	6.	5.
13	10.	6.	5.	4.	4.
14	3.	4.	3.	2.	2.
15	1.	1.	1.	1.	1.
16	1.	0.	1.	1.	0.
17	1.	0.	1.	0.	0.
18	0.	0.	0.	0.	0.

NATURAL MORTALITY = .180  
 TERMINAL F= .200  
 TERMINAL S= 2.000

REFERENCE AGE (FOR UNIT SELECTION) IS 1

NO. OF ITERATIONS CHOSEN IS 30

Table 3. (Cont.)

ITERATION	SSQ
1	36.5149
5	17.8150
10	14.8235
15	13.8447
20	13.8028
25	13.5691
30	13.5472

APPROX. COEFF. VARIATION OF CATCH DATA = 37.6%

APPROX. TWICE S.E. ( $2 \ln(1 + cv/100)$ ) = .84

YEAR	82	83	84	85	86
F(I)	.322	.277	.373	.303	.200

AGE	1	2	3	4	5	6	7
S(J)	1.000	1.143	.962	.510	.337	.272	.343

AGE	8	9	10	11	12	13	14
S(J)	.320	.371	.714	.821	1.482	1.990	2.126

AGE	15	16	17	18
S(J)	1.999	2.293	2.473	2.000

PR standardized to age 13

AGE	1	2	3	4	5	6	7
PR	0.525	0.610	0.515	0.267	0.171	0.134	0.185

AGE	8	9	10	11	12	13	14
PR	0.153	0.176	0.347	0.403	0.727	1.000	1.000

AGE	15	16	17	18
PR	1.000	1.000	1.000	1.000

Table 4. Output from Separable VPA (SVPA) for blue-  
fin tuna from the western Atlantic

INPUT DATA USED FOR ANALYSIS:-

FIRST YEAR 83 LAST YEAR 87 TOTAL YEARS 5  
FIRST AGE 1 LAST AGE 15 TOTAL AGES 15

CATCH DATA USED IN THE SEPARABLE ANALYSIS

YEAR AGE	83	84	85	86	87
1	4114.	917.	563.	583.	1511.
2	2583.	7164.	5689.	5548.	13018.
3	3040.	2001.	11854.	7018.	7506.
4	889.	1684.	2460.	2833.	4884.
5	669.	2021.	3883.	1876.	3997.
6	739.	1600.	3855.	1325.	4445.
7	620.	746.	1769.	1333.	1153.
8	994.	455.	670.	975.	1432.
9	966.	506.	419.	515.	965.
10	851.	629.	434.	580.	929.
11	707.	768.	455.	471.	505.
12	649.	689.	499.	393.	511.
13	806.	667.	706.	574.	472.
14	922.	703.	851.	595.	464.
15	663.	917.	959.	835.	591.

NATURAL MORTALITY = .100  
TERMINAL F= .200  
TERMINAL S= .750

REFERENCE AGE (FOR UNIT SELECTION) IS 6

NO. OF ITERATIONS CHOSEN IS 30

Table 4. (Cont.)

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ITERATION	SSQ
1	39.4092
5	10.4240
10	9.1229
15	8.9539
20	8.9318
25	8.9258
30	8.9212

APPROX. COEFF. VARIATION OF CATCH DATA = 33.8%

APPROX. TWICE S.E. ( $2 \ln(1 + cv/100)$ ) = .58

YEAR	83	84	85	86	87		
F(I)	.115	.117	.152	.137	.200		
AGE	1	2	3	4	5	6	7
S(J)	.077	.539	.681	.410	.660	1.000	.842
AGE	8	9	10	11	12	13	14
S(J)	.719	.587	.668	.621	.567	.701	.652
AGE	15						
S(J)	.750						

Table 5. Fish mortalities estimated by VPA for east Atlantic and Mediterranean bluefin tuna

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
2	0.2691	0.2337	0.3004	0.1861	0.3574	0.3594	0.4620	0.4883	0.5007	0.1609
3	0.1572	0.2927	0.3016	0.2686	0.2312	0.1452	0.6895	0.1763	0.5004	0.5191
4	0.0995	0.1245	0.1262	0.0378	0.3278	0.1149	0.2531	0.3321	0.1688	0.2917
5	0.0594	0.0959	0.0816	0.0343	0.0551	0.0509	0.1635	0.0193	0.0357	0.0543
6	0.0638	0.0323	0.0823	0.0504	0.0695	0.0439	0.0512	0.0582	0.0185	0.0238
7	0.0333	0.0412	0.0417	0.0914	0.0537	0.0576	0.0390	0.0506	0.0359	0.0333
8	0.0363	0.1140	0.0275	0.1291	0.0947	0.0776	0.0436	0.0356	0.0264	0.0641
9	0.0794	0.0386	0.0390	0.0932	0.1880	0.1361	0.1179	0.0749	0.0234	0.0743
10	0.1427	0.0299	0.0174	0.0237	0.0856	0.1432	0.0974	0.1453	0.1277	0.0782
11	0.1164	0.0312	0.0252	0.0336	0.0882	0.1845	0.1403	0.1661	0.1115	0.1150
12	0.1781	0.0463	0.0524	0.0446	0.1469	0.2778	0.1960	0.2216	0.1866	0.1613
13	0.0559	0.1084	0.1142	0.0936	0.2339	0.3806	0.3483	0.2869	0.2709	0.3508
14	0.1315	0.1734	0.2011	0.1720	0.3563	0.4486	0.4529	0.4954	0.6123	0.4085
15	0.1999	0.2736	0.2295	0.2066	0.3485	0.4810	0.5145	0.7055	0.5758	0.4726
16	0.3055	0.5298	0.3171	0.2402	0.4285	0.5335	0.6064	0.7841	0.4923	0.9827
17	0.2681	0.7384	0.3581	0.3158	0.3171	0.6409	0.5461	0.9513	0.4509	1.1881
18	0.2188	0.7241	0.5125	0.3758	0.4815	0.4752	1.1822	0.9448	1.5912	1.1255
19	0.1044	0.9087	0.2694	0.3286	0.5602	0.5106	0.4689	1.1701	1.4106	2.5509
20	0.1490	0.3047	0.2037	0.1681	0.3159	0.4430	0.4536	0.5301	0.5033	0.5428

Age	Unweighted Average $F$ 's									
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1-4	0.1886	0.1665	0.2369	0.1823	0.2660	0.3430	0.3763	0.3264	0.3862	0.2799
5-9	0.0545	0.0644	0.0544	0.0797	0.0922	0.0732	0.0830	0.0477	0.0280	0.0500
10-20	0.1700	0.3517	0.2092	0.1820	0.3057	0.4108	0.4551	0.4819	0.5757	0.7251

Age	Average $F$ 's Weighted by Catches									
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1-4	0.2247	0.2287	0.2665	0.2299	0.2481	0.6096	0.4973	0.3864	0.4466	0.3189
5-9	0.0583	0.0829	0.0644	0.0937	0.1087	0.0747	0.1223	0.0506	0.0307	0.0533
10-20	0.1547	0.3103	0.1855	0.1478	0.2428	0.3471	0.3710	0.4599	0.4365	0.4559

Table 5. (Cont.)

Age	1980	1981	1982	1983	1984	1985	1986
2	0.4955	0.6349	0.5089	0.6143	0.5088	0.4595	0.5063
3	0.7232	0.6434	0.9765	0.6280	0.3186	0.5089	0.4275
4	0.2545	0.1784	0.3107	0.3641	0.3526	0.4287	0.2216
5	0.0748	0.1680	0.1009	0.2212	0.4990	0.2398	0.1419
6	0.0533	0.0799	0.0674	0.0934	0.3439	0.3196	0.1112
7	0.0353	0.0528	0.0922	0.2393	0.2416	0.2009	0.1370
8	0.0352	0.0684	0.1421	0.1154	0.2970	0.1595	0.1270
9	0.0550	0.0775	0.1041	0.1303	0.3302	0.2003	0.1477
10	0.0951	0.1046	0.1687	0.3883	0.4025	0.2706	0.2880
11	0.1178	0.1534	0.2968	0.2352	0.4354	0.3519	0.3345
12	0.2875	0.1524	0.4360	0.4437	0.7322	0.5750	0.6034
13	0.4830	0.2491	0.7693	0.6753	0.6776	0.7955	0.8300
14	0.6183	0.3370	0.6167	0.8542	0.7301	0.8167	0.8300
15	0.6934	0.4034	0.5954	0.4483	0.7780	0.8901	0.8300
16	0.6978	0.3696	0.8996	0.3689	0.9094	1.0408	0.8300
17	0.6408	0.4135	1.1188	0.4966	1.0670	0.9362	0.8300
18	0.4532	0.9778	0.9203	0.3938	0.0506	0.8402	0.8300
19	0.1568	0.5348	0.8295	0.4274	0.8646	1.2068	0.8300
20	0.5844	0.3326	0.7571	0.6737	0.7459	0.8381	0.8300

Age	Unweighted Average F's						
	1980	1981	1982	1983	1984	1985	1986
1-4	0.4004	0.4209	0.6945	0.4839	0.3469	0.4677	0.3978
5-9	0.0507	0.0893	0.1013	0.1599	0.3423	0.2240	0.1330
10-20	0.4389	0.3662	0.8553	0.4914	0.7630	0.7784	0.7151

Age	Average F's Weighted by Catches						
	1980	1981	1982	1983	1984	1985	1986
1-4	0.4327	0.5208	0.8821	0.4101	0.4172	0.4776	0.4399
5-9	0.0575	0.1080	0.1075	0.1802	0.3812	0.2425	0.1325
10-20	0.3867	0.2159	0.5196	0.4740	0.5813	0.5495	0.5709

Table 6. Fish mortalities estimated by VPA for west Atlantic bluefin tuna

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1	0.2428	0.2836	0.2125	0.0490	0.1616	0.4412	0.0591	0.0217	0.1095	0.0446
2	0.9343	1.0222	0.7871	0.5462	0.2154	0.7070	0.3156	0.3263	0.2038	0.2681
3	0.8314	0.7432	0.5694	0.4919	0.2776	0.0598	0.7889	0.1681	0.4124	0.4282
4	0.5136	1.0151	0.0914	0.1509	0.1094	0.2583	0.0567	0.5254	0.1649	0.2854
5	0.3248	0.0725	0.1600	0.1920	0.1593	0.0678	0.0681	0.3441	0.3197	0.5313
6	0.0629	0.0405	0.1305	0.1448	0.1094	0.0353	0.0610	0.0846	0.2538	0.0865
7	0.0217	0.0564	0.0051	0.0453	0.0435	0.0241	0.0124	0.1356	0.0853	0.1281
8	0.0039	0.0562	0.0203	0.0354	0.0770	0.0197	0.0104	0.0497	0.0240	0.0950
9	0.0029	0.0529	0.0196	0.0717	0.0344	0.0391	0.0622	0.0292	0.0295	0.0473
10	0.0086	0.0336	0.0161	0.0587	0.0504	0.0583	0.0813	0.0646	0.0301	0.0311
11	0.0171	0.0332	0.0072	0.0184	0.0571	0.1011	0.0460	0.1285	0.0255	0.0420
12	0.0229	0.0347	0.0167	0.0223	0.0311	0.0709	0.0691	0.1103	0.0636	0.0682
13	0.0368	0.0614	0.0375	0.0332	0.0355	0.0580	0.1196	0.0881	0.0583	0.1431
14	0.0518	0.0774	0.0691	0.0442	0.1090	0.0851	0.1773	0.1128	0.0855	0.1969
15	0.0682	0.0752	0.0841	0.0459	0.1147	0.1055	0.2044	0.1813	0.1627	0.2719
16	0.0686	0.1359	0.0747	0.0643	0.1593	0.1411	0.2083	0.2058	0.1835	0.3430
17	0.0767	0.0975	0.0982	0.0582	0.1999	0.1190	0.1649	0.2344	0.2373	0.3179
18	0.0681	0.0958	0.1090	0.1016	0.4067	0.1703	0.1977	0.2961	0.3687	0.3420
19	0.0879	0.1015	0.1167	0.0884	0.2083	0.1238	0.1801	0.2350	0.3109	0.2670
20	0.1698	0.0528	0.0782	0.0676	0.2609	0.1396	0.2165	0.2706	0.3530	0.3367
21	0.0663	0.0885	0.1126	0.0440	0.3546	0.1184	0.2039	0.2631	0.3440	0.3469
22	0.0638	0.0952	0.1367	0.0478	0.2832	0.0930	0.1320	0.2236	0.3351	0.3405
23	0.3310	0.0177	0.0633	0.0555	0.0456	0.1279	0.1640	0.2252	0.3326	0.3835
24	0.5845	0.0641	0.0345	0.0368	0.0485	0.0452	0.1035	0.1233	0.3115	0.2649
25	0.6522	0.1167	0.0760	0.0196	0.0294	0.1204	0.0465	0.1302	0.2903	0.2672
26	0.7085	0.0000	0.0709	0.0000	0.0296	0.1095	0.0906	0.0697	0.2431	0.2842
27	0.2650	0.0743	0.2374	0.0000	0.1560	0.0731	0.0912	0.2491	0.1830	0.3334
28	0.0000	0.0960	0.0890	0.0000	0.1975	0.1690	0.0821	0.1848	0.7533	0.0806
29	0.0000	0.0960	0.0000	0.0000	0.0000	0.1286	0.1303	0.0423	0.3682	0.3471
30	0.0000	0.0960	0.0000	0.0000	0.0000	0.1286	0.0000	0.2292	0.2544	0.3126

Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1-5	0.7109	0.8220	0.5820	0.4781	0.1934	0.6017	0.6143	0.3705	0.2859	0.3696
6-9	0.0488	0.0527	0.0966	0.1000	0.0831	0.0318	0.0541	0.0988	0.1963	0.1009
10-30	0.0608	0.0707	0.0706	0.0531	0.1906	0.1070	0.1693	0.1969	0.2537	0.2740



Table 6. (Cont.)

Age	1980	1981	1982	1983	1984	1985	1986	1987
1	0.0751	0.1894	0.0758	0.0586	0.0104	0.0081	0.0047	0.0174
2	0.3687	0.2853	0.1442	0.0626	0.1234	0.0746	0.0929	0.1230
3	0.2917	0.5319	0.0566	0.1540	0.0569	0.2743	0.1116	0.1571
4	0.3371	0.2636	0.0243	0.0379	0.1075	0.0829	0.0872	0.0952
5	0.2516	0.4052	0.0163	0.0389	0.1022	0.3406	0.0756	0.1531
6	0.1085	0.2749	0.0441	0.0587	0.1106	0.2568	0.1664	0.2300
7	0.1382	0.2383	0.0505	0.0795	0.0699	0.1542	0.1188	0.1916
8	0.2465	0.1838	0.0495	0.1180	0.0695	0.0746	0.1071	0.1622
9	0.2259	0.1720	0.0335	0.1392	0.0731	0.0760	0.0680	0.1320
10	0.0944	0.1875	0.0495	0.1122	0.1137	0.0746	0.1287	0.1511
11	0.0714	0.1583	0.0684	0.0848	0.1261	0.1012	0.0975	0.1418
12	0.0804	0.1350	0.0802	0.0697	0.1002	0.1015	0.1073	0.1310
13	0.1039	0.1464	0.0864	0.1120	0.1126	0.1270	0.1459	0.1628
14	0.1933	0.1741	0.0615	0.1473	0.1213	0.1384	0.1349	0.1512
15	0.2676	0.2611	0.0513	0.1569	0.1916	0.2159	0.1755	0.1725
16	0.4741	0.3619	0.0603	0.1366	0.1630	0.2593	0.2083	0.1725
17	0.5156	0.3756	0.0903	0.2683	0.1236	0.2426	0.1662	0.1725
18	0.6110	0.4124	0.0989	0.4042	0.2507	0.2002	0.2010	0.1725
19	0.5525	0.5126	0.1557	0.3580	0.2419	0.2904	0.1488	0.1725
20	0.4160	0.5472	0.2671	0.5394	0.2505	0.2132	0.2785	0.1725
21	0.4794	0.6347	0.1841	0.3662	0.2201	0.1713	0.0524	0.1725
22	0.3547	0.8016	0.2518	0.3767	0.3239	0.2440	0.2749	0.1725
23	0.3698	0.9664	0.3277	0.5022	0.4586	0.4412	0.1340	0.1725
24	0.3543	0.5758	0.2708	0.4624	0.2033	0.2500	0.2967	0.1725
25	0.3371	1.0985	0.1483	0.4867	0.6210	0.2178	0.2630	0.1725
26	0.2780	0.9422	0.2212	0.3591	0.4785	0.6677	0.2101	0.1725
27	0.4871	0.9684	0.3768	0.4944	0.1761	0.6008	0.6442	0.1725
28	0.2046	0.8271	0.2575	0.3168	0.8705	0.1594	0.8563	0.1725
29	0.0805	0.6571	0.9712	0.2268	0.7010	1.1895	0.1860	0.1725
30	0.4655	0.3935	0.0959	0.2449	0.1849	0.2341	0.1860	0.0000

Age	1980	1981	1982	1983	1984	1985	1986	1987
1-5	0.3104	0.3742	0.0947	0.0824	0.1012	0.2130	0.0946	0.1256
6-9	0.2032	0.2270	0.0455	0.1038	0.0900	0.2003	0.1249	0.2005
10-30	0.3703	0.3772	0.1189	0.2188	0.1722	0.1903	0.1651	0.1596

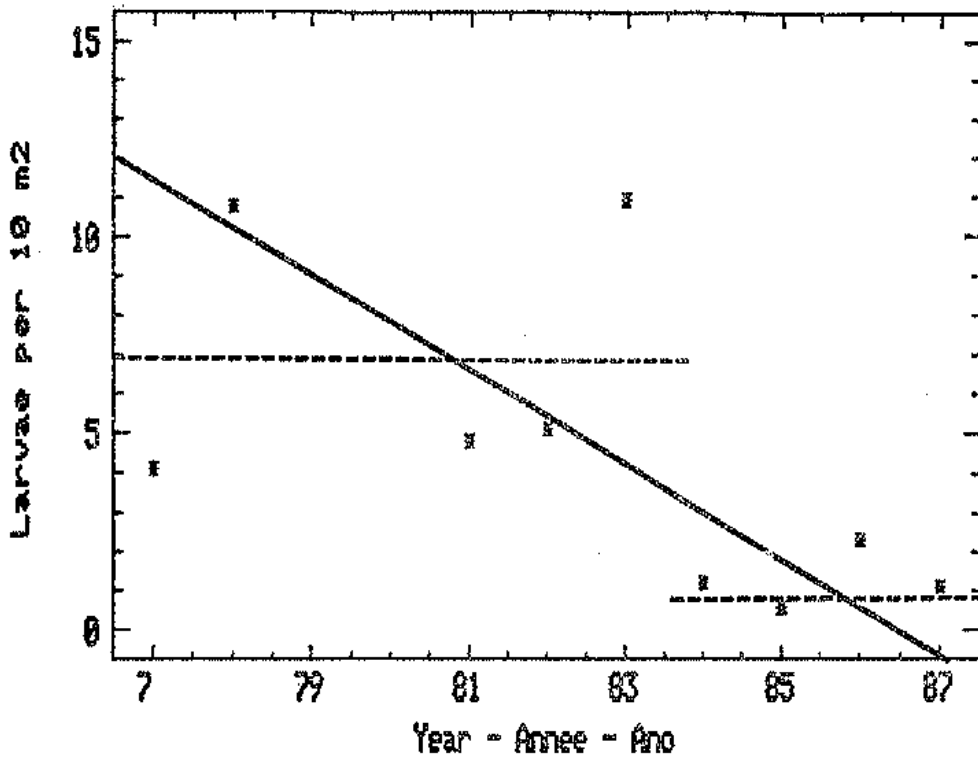


Figure 1. Abundance of bluefin larvae per 10 square meters in the Gulf of Mexico. (These are not the data used as the index—see text.)

## 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 9, 1988. Dr. R. Conser (U.S.A.), Convener of the Sub-Committee, chaired the entire session.

### 2. ADOPTION OF AGENDA AND ARRANGEMENTS FOR THE MEETING

The Tentative Agenda was adopted and is attached as Addendum 1 to this Report. Dr. P. M. Miyake (Secretariat) served as rapporteur.

### 3. REVIEW OF THE STATISTICAL PROGRESS MADE BY NATIONAL OFFICES

#### 3.1 National data collection systems

The Secretariat Report on Statistics and Coordination of Research (SCRS/88/11) was reviewed as to the progress made by the national offices in the collection of data. Table 1 shows the availability of 1987 data at the time of this meeting. The Sub-Committee noted that the improvement of Mediterranean statistics has been very slow except in Turkey where biological sampling has started.

#### 3.2 Data processing by national offices

The Secretariat reported that there are a few countries which provide raw data that are processed by the Secretariat. It was recognized that raw data are preferred to data which are improperly processed. However, it was also recognized that data entry at the Secretariat is adding an extra burden and encouraged national offices to enter their data and submit them on diskette (IBM-compatible) or on magnetic tape.

#### 3.3 Reporting to ICCAT

The Sub-Committee was informed that submission of the previous year's Task I data by national offices was slow in 1988. Thus, it was difficult to compile them before the SCRS meeting. Since special emphasis was placed on the swordfish data, these catch-at-size data (for the entire Atlantic) have been improved up to 1987. However, the reporting of Task II catch and effort data as well as biological data has, in general, also been slow.

The Sub-Committee urged the scientists in charge to observe the deadlines for the submission of data. Deficiencies in the national mailing systems have caused some problems. It was noted, however, that the Secretariat sends an acknowledgment every time it receives data, so that the national scientists can be sure that their data have been received by the Secretariat. The Secretariat was asked to send the reminders periodically to those countries that delayed the submission of data. On the other hand, the Sub-Committee was reminded that the national offices have a responsibility to submit their data in the format defined by the Commission, even if reminders are not received.

Noting that Ghanaian Task II catch and effort data have not been submitted to the Secretariat, although these data are available to the scientists, the Sub-Committee urged that these data be officially obtained and entered to the ICCAT common data base.

### 3.4 Improvements to be made

The Secretariat reported that no substantial improvements could be made to Mediterranean statistics during 1988. There are two basic problems. In some areas, there is no sampling and there are no data. In other areas, some data exist but they are not made available to the ICCAT scientists.

The observer from EC/EUROSTAT commented that the EC Commission will shortly submit a proposal to EC Member States on legislation covering the reporting of landings of fish. The regulation may not enter into force until 1990, but once implemented the data would be available to ICCAT. The Sub-Committee was pleased to learn of this development.

The SCRS Chairman raised the question as to why \$8,000 appropriated for travel and \$10,000 for biostatistical work in the Commission budget were not utilized for the improvement of statistics. He insisted that such resources should be properly utilized in the future. The Executive Secretary responded that the problem was that the cash was not available, even though it was budgeted. Since the cash availability has recently improved, it may now be possible to use a part of the budget for these items.

Since this problem is largely related to establishing work priorities, the Convener suggested that discussions continue under Agenda Item 6.

## 4. EXAMINATION OF PROGRESS MADE BY THE SECRETARIAT

### 4.1 Data processing carried out in 1988

The Sub-Committee noted that due to the efficient use of the in-house computer the Secretariat is gradually reducing its backlog of data management tasks accumulated over the last few years. It recommended that as soon as the reorganization of the size files is completed, the tagging file should be reorganized into a common data base (SCRS/88/8). In order to facilitate this task, the SCRS is asked to make the necessary arrangements to secure all past and future tag release information, including those tags which were released but were not recovered.

The Sub-Committee was pleased that the size samples collected by IATTC at Cumaná, Venezuela, were made available by that Commission. The Dakar Working Group (July, 1988) asked the Secretariat to process these data as soon as possible. Due to the Secretariat's work load, and to awaiting confirmation that these data had not been reported by the U.S., processing was not completed. However, the Sub-Committee urged that this work be done well in advance of the final Yellowfin Year Program meeting (May, 1989).

#### 4.2 Port sampling program

##### a) Secretariat port sampling

The Sub-Committee was informed that routine port sampling from long-liners at various transshipment ports was continued by ICCAT. The current port sampling scheme also serves as the basis for billfish port sampling.

The Sub-Committee reviewed document SCRS/88/9, which presented a comparative study between Taiwanese at-sea sampling of albacore and the ICCAT port sampling of the same species. Concern was expressed about the discrepancies between the two sampling systems and the Sub-Committee endorsed the data preparatory meeting proposed by the SCRS for the albacore data base. At the same time, it recommended that the working plan proposed in SCRS/88/9 be carried out to make more in-depth comparisons.

##### b) Sampling from Ghanaian fleet

The Sub-Committee recommended that the Commission renew on a continuing basis its contract with the CRO to sample Ghanaian boats unloading at Abidjan, as long as such unloading continues, with the possibility of annual revisions. It also recommended that the size data be sent to the Secretariat after being verified so that they can be included in the ICCAT common data base.

A suggestion was made that such a contract include provision to finance an annual trip for coordination between Côte d'Ivoire and Ghana. Since a part of the catches are landed in Abidjan by this fleet while another part are unloaded at Tema, this proposal was approved. It was further recommended that all the data obtained be made available to the Commission with appropriate documentation.

#### 4.3 Secretariat data management policy

The Sub-Committee agreed with the general priorities of data management proposed by the Secretariat, (i.e., to finish the size data reorganization and start working on the tagging data base).

#### 4.4 Data dissemination and publication

The time lag between the receipt of data at the Secretariat and their availability to users was questioned. The Secretariat gives first priority

to entering data received into the base. However, verification of the raw data (e.g., Venezuelan catch and effort and size data) and a shortage in man-power is a problem. The submission by the national offices of verified (or not verified) data on magnetic tape and diskette, including a description of the file specifications and format, was encouraged.

The Sub-Committee noted that "Historical Series 3" of the Statistical Bulletin, covering the 1970-1979 period, had been published. The Secretariat asked if issuance of the Preliminary Statistical Bulletin prior to the Commission meetings is still warranted, in light of the completeness of the species tables. The Secretariat also pointed out that the time factor is very critical before the meeting and proposed the elimination of publishing the Preliminary Bulletin, so as to ease the heavy work load immediately prior to the meeting.

The Sub-Committee agreed with this proposal assuming that the Secretariat will compile the species tables in the new form. The Sub-Committee also recommended that the species tables be abbreviated somewhat by establishing criteria for listing countries. Those countries which catch less than a certain level (e.g., 1,000 MT over the history of the fishery for yellowfin) could be lumped into one line.

Progress on issuing a new "Field Manual" was reviewed. It was agreed that, in order to reduce the work load, only minimal modifications would be made in the sections on species sheets, vernacular names, or identification keys. On the other hand, the sampling of the artisanal fisheries and proportional sampling, as well as billfish sampling, should be added. The manuscript should be circulated as soon as possible among the field scientists for improvements before publication. Printing, using a less formal format, should be complete before the 1989 SCRS meeting. Any significant changes that cannot be incorporated by the target date will be omitted. However, these changes will be considered in a long-term plan to improve the "Field Manual" in the future. It was recommended that the billfish tagging instructions not be included in the Manual.

#### 4.5 Biostatistical assignments

The Sub-Committee noted that there was no outside contract or assistance for biostatistical work in 1988. On the other hand, the Secretariat carried out several biostatistical tasks, such as a review of the tagging data base (SCRS/88/8), a critical review of port sampling data (SCRS/88/9), a special in-depth review of the bluefin and swordfish data base (SCRS/88/15 and 64); and, in collaboration with the Billfish Program Coordinators, a survey of billfish dressing methods (SCRS/88/44) and a billfish sampling manual (SCRS/88/28). Further discussion relating to the priority of this work was delayed for Agenda Item 6.

#### 4.6 Other matters

The Sub-Committee noted that hardware (IBM-Compatible PC (Compaq) and a stabilizer), and software (Graphics, FORTRAN, APL and communication) have been added to the Secretariat's computer system as reported in SCRS/88/11.

The Sub-Committee hopes that these additions will be well utilized by the scientists during the scientific sessions, in addition to assisting the Secretariat in its data management work. Among the items proposed by the SCRS in 1987, the expansion of disk space, the expansion of real memory (2 MB) and a console have not yet been acquired. The Sub-Committee also recognized that funds to expand the disk space of the Micro-VAX computer have been budgeted for 1989.

The Sub-Committee recommended that these maintain their high priority status established by SCRS in 1987 and urged the Commission to provide the necessary funding from the budget for 1989.

#### 5. REVIEW OF PROGRESS MADE ON RECOMMENDATIONS FOR STATISTICS AS CONTAINED IN THE 1987 SCRS REPORT

The Convener noted that the species sections of the SCRS Report show the results of appraisals of recommendations made previously on statistics for each species.

#### 6. FUTURE PLANS TO IMPROVE STATISTICS, AND RECOMMENDATIONS TO THE SCRS

##### 6.1 Collaboration with other agencies

The Sub-Committee reviewed the relationship which ICCAT has maintained with other organizations regarding statistics, as reported in SCRS/88/11. It found that cooperation with other agencies has been maintained. In particular, a few activities were specified:

##### a) FAO

The Sub-Committee was pleased to note that the General Fisheries Council for the Mediterranean (GFCM) tried to follow up a proposal previously made by ICCAT for collaboration. It noted that the GFCM has asked ICCAT's help in conducting a survey of the adequacy of Mediterranean statistics, in developing a sampling program (SCRS/88/11 and COM/88/8), and making stock assessments.

The Sub-Committee recommended that the ICCAT Secretariat prepare and present a document to the GFCM in which all the data available in the ICCAT data base on Mediterranean tuna and tuna-like species are catalogued, and the areas where improvements needed are identified before any stock assessments can be made.

Also, the Sub-Committee encouraged the ICCAT scientists and the Secretariat to join efforts with the GFCM to investigate existing statistics which have not yet been made available to the common data base, and to establish a proper data collection and sampling system.

In comparing the ICCAT/FAO data bases, it was recognized that some discrepancies are due to the fact that FAO and ICCAT have adopted distinct definitions of the boundary between the Indian Ocean and the Atlantic Ocean

(30° and 20°E, respectively). Some studies on these differences are presented by FAO (SCRS/88/66).

#### b) Coordinating Working Party on Atlantic Fishery Statistics (CWP)

The representative from FAO noted that this year for the first time ICCAT did not attend the CWP Meeting. It was appreciated that in the present financial circumstances ICCAT might be tempted to give less priority to inter-agency collaboration. But it was noted that there are benefits to be obtained in more coherent statistics. The greater similarity, which now exists between the FAO and ICCAT data bases, has brought greater credibility to the data. This has benefited both ICCAT and FAO, and especially the users of the data.

The FAO representative further noted that this work had been achieved within the framework of the CWP to which ICCAT had also made valuable contributions in other fields. The next session of the CWP is to be held in Miami in February, 1990, and ICCAT participation was urged.

#### c) Global tuna statistics consultation

The follow-up of the global tuna statistics consultation meeting held in La Jolla, California, in 1987 was reported by the FAO representative. He again emphasized that ICCAT's collaboration is essential to the improvement of statistics on world tuna and tuna-like fishes. In this respect, he noted that a major recommendation of the Consultation had been to compile a world-wide register of tuna vessels but this had not been done due to the non-availability of data from ICCAT.

The Sub-Committee noted that one of the major conclusions of the Second International Billfish Symposium (Kona, Hawaii, SCRS/88/15) was to organize a world-wide mechanism to collaborate in improving tuna and billfish statistics. The Sub-Committee was also informed that Dr. J. Gulland is proposing a workshop to study the possibility of developing a world tuna statistics data base and alternatives of assessment and management choices under the sponsorship of the International Federation of Institutes for Advanced Study (IFIAS).

The Sub-Committee, while recognizing the usefulness of such international collaboration for the improvement of statistics, also recognized that priorities needed to be established for the Secretariat's work. These priorities should take into account the Commission's financial situation and Secretariat time devoted to such activities.

### 6.2 Priority of various statistical assignments.

The Sub-Committee formed a small working group to study the priority of various programs as well as the best use of 1988 and 1989 funds for statistics and biostatistics. The conclusion of the group, convened by Dr. F. X. Bard, are given in Addendum 2 to this report. The Committee fully endorsed the report and concluded that all items contained therein could be



carried out during the coming year using funds already budgeted. In doing so, it recognized the need to utilize part of the fund from biostatistical tasks for data entry of all size data collected by Venezuela and provided to ICCAT by the IATTC (approximately \$600-700).

#### 7. OTHER MATTERS

No other matters were discussed.

#### 8. ADOPTION OF REPORT

The Sub-Committee adopted the Report and endorsed the recommendations made by the Working Group.

#### 9. ADJOURNMENT

The meeting was adjourned.

Table 1. Progress in the collection of 1987 statistics (as of November 10, 1988)

SPECIES, GEAR & COUNTRY	TASK I			TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	DATE REC'D		BOATS	DATE REC'D		DATE REC'D		
	1987	1988		1987	1988	1987	1988	
<b>YFT, BET, SKJ - Surface Fleet</b>								
<b>BAITBOAT</b>								
Angola	May 21	May 9	X		Aug 29			Preliminary Task I
Brazil	Oct 20	Jul 6	X	Oct 20	Jul 6	Oct 20	Jul 6	
Brazil-Japan	May 18	Jul 6	X	May 18	Jul 6	May 18	Jul 6	
Cape Verde		Oct 25			Nov 9		Nov 9	YFT 86-87 C&E and SIZE SKJ (and BLP)
Cuba	Nov 20	Nov 8	X			Jul 28		
FIS	Jul 3	Oct 17		Oct 3	Oct 10	Oct 3	Oct 10	
Ghana	Nov 13	Nov 1	X	May 11		Dec 6	May 4	Abidjan landings 1987
Portugal (Madeira)	Oct 16			Oct 16		Oct 16		Data for January - June
		Mar 24	X		Mar 24		Mar 24	Data for June - December
(Azores)	Oct 12	Oct 11		Oct 12		Oct 12	Jul 4 Nov 4	Size data for 1986
South Africa	Aug 13	Aug 19	X	Aug 13	Aug 19			
Spain (Canary Islands)	May 26	Aug 19		May 11	May 11	May 11	May 17	
(Peninsula)	Jul 6	Oct 10		Jul 17	Oct 10	Sep 30	Oct 10	
Venezuela		Oct 24		Nov 4		**	**	C/E for 1986
VEN-FOR				Nov 4		**	**	
<b>PURSE SEINE</b>								
Benin		Apr 19	X					
Cuba	Nov 20	Nov 8	X					
FIS	Jul 3	Oct 17		Oct 5	Oct 10	Oct 5	Oct 10	
Ghana	Nov 13	Nov 1	X			Dec 10	May 4	Abidjan landings for 1987
Japan	May 11	Apr 22		May 11	Apr 22			
Morocco	Jul 15							
Portugal (Mainland)	Jul 6	May 19		Jul 6	May 19			Task I 1987 & 1986 revised
(Azores)	Oct 12			Oct 12		Oct 12		
Portugal (Madeira)	Oct 16	Mar 24	X			Oct 16	Mar 24	Data for Jan - June Data for July - December
<b>TASK I</b>								
SPECIES, GEAR & COUNTRY	DATE REC'D		BOATS	TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	1987	1988		DATE REC'D	DATE REC'D	DATE REC'D	DATE REC'D	
South Africa	Aug 13			Aug 13				
Spain (Tropical)	Jul 22	Oct 10		Jul 17	Oct 10	Oct 2	Oct 10	86-87 size rec'd from CRODT.
(Peninsula)					Oct 26		Oct 26	1986 C&E and SIZE
U.S.A.	Aug 19	Aug 2	X	Aug 19	Aug 8	Aug 19	Aug 8	Boats - 1986 (Task II-tape)
U.S.S.R.	Oct 1	Jul 19	X	Aug 26	Oct 13	Dec 9		
Venezuela		Oct 24		Nov 4		Feb		
VEN-FOR				Nov 4				
NET								
<b>UNCL &amp; OTHERS</b>								
Angola	May 21	May 9	X					Preliminary Task I data
Argentina	Mar 12	Oct 21						
Benin	Feb 10	Apr 19	X					
Brazil	Mar 9	Jul 6						
Brazil-Japan							May 30	
Cuba	Nov 20							
Cape Verde		Oct 25			Nov 9		Nov 9	YFT 86-87 C&E and SIZE
Ghana		Nov 1						
Morocco	Jul 15	Oct 13						
Portugal (Mainland)	Jul 6	May 19		Jul 6	May 19			Task I 1987 & 1986 revised
(Madeira)	Oct 16		X	Oct 16		Feb 17	Mar 24 Jul 29	Boats for 1979-84
St. Helena	Jun 25	Jun 8	X	Jun 25	Jun 8	Dec 21		Size for 1986-87
Sao Tomé & Principe								
South Africa	Aug 13	Aug 19	X	Aug 13	Aug 19			
Spain (Peninsula)	Oct 20	Oct 10		Oct 30	Oct 10		Oct 10	
					Oct 26			1986 C&E
U.S.A.	Aug 19	Aug 2		Aug 19	Aug 8	Aug 19	Aug 8	Task II - mag. tape
U.S.S.R.	Jun 1			Aug 26	Oct 13			
Venezuela							**	
VEN-FOR							**	

\*\*Field reports periodically.

Table 1 (Cont.)

SPECIES, GEAR & COUNTRY	TASK I			TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	DATE REC'D		BOATS	DATE REC'D		DATE REC'D		
	1987	1988			1987	1988	1987	1988
<b>Albacore - Surface Fleet</b>								
BAITBOAT								
Angola	May 21	May 9	X					Preliminary Task I data
Brazil	Jul 8	Jul 6	X	Jul 8	Jul 6			
Brazil-Japan		Jul 6		May 18		May 18		
France	Jul 29	Aug 23						Preliminary Task I
Portugal (Azores)	Oct 12	Oct 11					Jul 4	Size data for 1986 - 87.
(Madeira)	Apr 15		X	Apr 15		Sep 8	Nov 4 Mar 24 Jul 29	Boats for 1979-87
South Africa	Aug 13	Aug 19	X	Aug 13	Aug 19			
Spain (Canary Islands)	Jul 6	Aug 19		May 11	May 17	May 11	May 17	
(Bay of Biscay)	Jul 6	Jun 9			Jun 9		Jun 9	Data for 1986 - 1987
(Mediterranean)	Oct 6					Sep 30		
Venezuela				Nov 4				C/E for 1986
VEN-FOR				Nov 4				C/E for 1986
PURSE SEINE								
FIS	Jul 3							
France	Jul 22	Aug 23						Preliminary Task I
Portugal (Mainland)	Jul 6	May 19		Jul 6	May 19			Task I 1987 (& 1986 revised)
South Africa	Aug 13	Jul 5		Aug 13				Preliminary Task I data
Spain	Jul 6							
TROL								
France	Jul 29	Aug 23						Preliminary Task I
Portugal (Azores)				Oct 12				
Spain (Bay of Biscay)	Jul 6							
Spain (Peninsula)		Jun 9			Jun 9	Sep 30	Jun 9	Data for 1986 - 1987

SPECIES, GEAR & COUNTRY	TASK I			TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	DATE REC'D		BOATS	DATE REC'D		DATE REC'D		
	1987	1988			1987	1988	1987	1988
<b>UNCL &amp; OTHERS</b>								
Argentina		Oct 21						
Brazil	Mar 9	Jul 6	X					
France		Aug 23						Preliminary Task I data.
Italy	Oct 29							Task I data for 1984-1985.
Portugal (Azores)		Oct 11						
(Mainland)	Jul 6	May 19		Jul 6	May 19			Task I 1987 & 1986 revised
(Madeira)						Jul 29		
South Africa	Aug 13	Jul 5	X		Aug 13			Preliminary Task I data
U.S.A.	Aug 19	Aug 2		Aug 19	Aug 8		Aug 8	Task II - mag. tape
Venezuela						May 5		(YYF Observer data)
VEN-FOR								
<b>Bluefin - Surface Fleet</b>								
BAITBOAT								
France (Bay of Biscay)	Jul 29	Aug 23						Preliminary Task I
Portugal (Azores)	Oct 12	Oct 11		Oct 12		Oct 12	Jul 4	Size data for 1986.
(Madeira)	Apr 15			Oct 16		Oct 16		Data for January-June
							Mar 24 Jul 29	Data for July-December
Spain (Canary Islands)	Jul 6	May 17		May 11	May 17	May 11	May 17	
(Bay of Biscay)	Jul 6	May 4				Mar 11	May 4	
(Mediterranean)	Oct 6							
PURSE SEINE								
France (Mediterranean)	Jul 29	Aug 23					Oct 17	Prel. Task I. Size for '86.
Italy								
Morocco	Jun 15							
Norway	Jul 14					Feb 3		Preliminary 1986 & 85 rev.

Table 1. (Cont.)

SPECIES, GEAR & COUNTRY	TASK I			TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	DATE REC'D		BOATS	DATE REC'D		DATE REC'D		
	1987	1988		1987	1988	1987	1988	
Portugal (Mainland) (Azores)	Jul 6 Oct 12	May 19		Jul 6	May 19			Task I 1987 & 1986 revised Size data for 1986. 1986 C&E and SIZE Task I 1986-87. Size - 1988 Boats - 1986 (Task II-tape) BFT catch at length - tape
Spain	Jul 6			Oct 6	Oct 26	Jul 4 Oct 26		
Turkey		Sep 15	X			Sep 15		
U.S.A.	Aug 19	Aug 2	X	Aug 19	Aug 8	Aug 19 Aug 8 Sep 13		
TRAP								
Canada	Jun 26	Jun 21				Jun 26		
Morocco	Jun 15	Oct 13						
Spain (Mediterranean)	Oct 6	Aug 31				Aug 31		
(Peninsula)		Aug 31		Oct 26 Oct 26		Oct 26 Oct 26		1986 C&E and SIZE 1986 C&E and SIZE
UNCL & OTHERS								
Argentina		Oct 21						
Canada	Jun 26	Jun 21				Jun 26	Nov 1	
France (Mediterranean)	Jul 29	Aug 23						Preliminary Task I Task I data for 1984-1985.
Italy	Oct 29							
Portugal (Azores) (Madeira)	Oct 16			Apr 15		Jan 22	Jul 29	
(Mainland)	Jul 6	May 19		Jul 6	May 19	Feb 17		Task I 1987 & 1986 revised
Spain (Mediterranean)	Oct 6			Oct 6	Aug 4 Oct 26		Aug 4	
Turkey		Sep 15	X					1986 C&E
U.S.A.		Aug 2		Aug 3	Aug 2	Aug 3	Aug 2	Task I 1986 -87 Task II - mag. tape
Billfish (including SWO) - Surface Fleet								
Argentina	Mar 12	Oct 21						
Benin	Feb 10							
Brazil	Jul 8	May 30						
Canada								
Ghana		Nov 1						
Morocco	Jun 15	Sep 7					Sep 7	
Small Tunas - Surface Fleet								
Angola	May 21	May 9	X		Aug 29			
Argentina	Mar 12	Oct 21						
Benin	Feb 10							
Brazil	Oct 20	Jul 6			Jul 6			
Cape Verde		Oct 25						
Cuba	Nov 20	Nov 8	X					
FIS								
Ghana	Nov 13	Nov 1	X					
Morocco	Jun 15	Oct 13						
Portugal (Mainland)		May 19			May 19			Task I 1987 & 1986, revised
(Azores)		Oct 11						
(Madeira)	Apr 15 Oct 16			Apr 15 Oct 16				
Spain (Canaries)	Oct 6	Aug 19		Apr 14	May 17	Sep 30	May 17	
(Mediterranean)		Aug 31			Aug 31			1986 C&E
(Peninsula)		Aug 31			Oct 26 Aug 31 Oct 26			1986 C&E

Table 1. (Cont.)

SPECIES, GEAR & COUNTRY	TASK I			TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	DATE REC'D		BOATS	DATE REC'D		DATE REC'D		
	1987	1988		1987	1988	1987	1988	
Turkey		Sep 15	X				Sep 5	Task I 1986 - 87. Size 1988 Boats - 1986 (Task II-tape)
U.S.A.	Aug 19	Aug 2	X	Aug 19	Aug 2	Aug 19	Aug 2	
U.S.S.R.	Oct 1	Jul 19		Aug 26	Oct 13			
Venezuela		Oct 24						
All Species - Longina Fleet								
Brazil		May 11	X					1982-86, 1987 Task I (Santos) Prel. Task I; C/E, Size ~86 SWO data (1985-87)
		May 30	X		May 30		May 30	
Brazil-Japan		May 30	X		May 30		Aug 16	
Canada	Oct 7			Oct 7		Oct 7	May 30	
Canada-Japan	Jun 26	Jun 21				Jul 9	Nov 1	
China (Taiwan)	Aug 27	Sep 30	X	Aug 27	Sep 30	Jan 20	Nov 1	
Cuba	Nov 20	Nov 8	X		Nov 8	Nov 20		
Japan	Dec 16	May 12		Jun 10	May 12	Sep 20		Task I & C/E 1986 (tape)
Japan-Canada-Observer							Jul 19	Size 1986 (+ '85) except BFT
Japan-U.S.-Observer				Jun 26	May 31	Jun 26	May 31	SWO catch at size '86-87.
Korea	Aug 7	Aug 10	X	Aug 7	Aug 10	Aug 7	Aug 10	BFT catch at size '86-87.
Morocco		Aug 5					Nov 1	Reported by Canada
Panama	(Secretariat)	Sep 7		(See Korea+Panama)		(See Korea+Panama)	Oct 13	Reported by the U.S. (tape)
Portugal	Oct 12	Oct 11		Oct 12			Mar 24	SWO data
South Africa	Aug 13	Aug 19	X	Aug 13				SWO data
Spain (Mediterranean)	Jul 6			Oct 6	Jul 8	Oct 6	Jul 8	SWO only
					Aug 4		Aug 4	SWO data
					Oct 26		Oct 26	BFT data
					Jul 4		Jul 4	1986 C/E and SIZE
					Aug 1		Aug 1	SWO data 1986
					Aug 4		Aug 4	SWO data 1987

SPECIES, GEAR & COUNTRY	TASK I			TASK II CATCH & EFFORT		BIOLOGICAL (SIZE)		REMARKS
	DATE REC'D		BOATS	DATE REC'D		DATE REC'D		
	1987	1988		1987	1988	1987	1988	
Uruguay		Aug 12	X	Oct 6	Aug 12	Oct 6		Boats - 1986 (Task II-tape) BFT catch at length
U.S.A.	Aug 19	Aug 2	X	Aug 19	Aug 8	Aug 19	Aug 8	
U.S.S.R.	Aug 26	Jul 19		Aug 26	Oct 13	Dec 9	Sep 13	
Venezuela		Oct 24		Nov 4		Jul 30	**	C/E for 1986.
VEN-FOR				Nov 4		Jul 30	**	C/E for 1986.
VARIOUS:								
FAO		Jan 22						

\*\* Field reports periodically.

**Sub-Committee on Statistics Agenda**

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Review of the statistical progress made by national offices
  - 3.1 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 1988
  - 4.2 Post 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 1987 SCRS Report
6. Future plans to improve statistics, and recommendations to the SCRS
  - 6.1 Collaboration with other agencies
  - 6.2 Priority of various statistical assignments
7. Other matters
8. Adoption of Report
9. Adjournment

**Report of the Special Group on Statistical Priorities**

The Group did not discuss separately the problem of additional data processing material for the Secretariat, since it is a technical item which could be dealt with at the Secretariat level.

The Group considered the degree of adequacy of the different port sampling programs carried out by the Secretariat, and found that:

- Sampling of longliners at Las Palmas de Gran Canaria is presently deficient because the samplers are not reliable.
- Sampling of longliners at Tenerife seems to be better but the sampling rate is low, perhaps reflecting the decline in the amount of tuna landed. This should be verified.

A trip by the Secretariat to these two Canary Island ports is essential. One solution to the problem of the unreliability of the samplers in Las Palmas perhaps might be to make a contract with the University of the Canary Islands.

- Sampling of longliners at St. Maarten is deficient. In fact, the contracted sampler has only made one sample over a long time. A trip by the Secretariat is imperative to rectify the situation.
- Sampling at Montevideo is not perfect, but verification shows that it is of lesser urgency.
- Sampling in Cape Town is excellent and should be continued as is.

The Group considered the problem of Mediterranean tuna statistics. It was brought to the attention of the Group that the annual statutory meeting of the GFCM will take place in February, 1989, at Livorno, Italy. Scientists attend from several coastal countries. This seems, therefore, a good forum for the Secretariat to discuss the general problem of Mediterranean tuna statistics, and to make contacts with concerned scientists.

Eventually, the Secretariat could reach some agreements with these scientists to recover earlier statistics, and to encourage and facilitate the collection of current statistics.

A scientific meeting will take place in Greece at the end of 1989 or early 1990, to evaluate the stocks of migratory fish in the Mediterranean. This meeting will be organized by FAO, and ICCAT has been asked to jointly organize this meeting. The Secretariat should examine the question and make

sure that the available statistical sets are sufficient to carry out the meaningful stock evaluations. If necessary, the Secretariat should insist on postponing the meeting for a while in order to be sure of having available the maximum amount of data. ICCAT scientists are urged to attend this meeting.

The Group brought up the problem of the recent divergence in the size frequencies for albacore caught by longline depending on the type of sampling carried out (SCRS/88/9). It was agreed that the Assistant Executive Secretary, in route to Japan for home leave, should make his trip a bit earlier to attend a working meeting in Taiwan (National Taiwan University) with Taiwanese scientists, in which Japanese and Korean scientists could participate. Thus, the expenditures for such work would be minimized. Such expenses could be charged to the sub-chapter on biostatistical work.

Generally, the Group felt that it is necessary to carry out the same type of verification on other species, according to a combination of trans-shipment ports and fishing area.

The Group recommended that the Secretariat take immediate steps to compile and make available as soon as possible the data from the size sampling carried out on Venezuelan tuna vessels and submitted by IATTC.

The Group was satisfied with the arrangements made between the Secretariat and the CRO-Abidjan for sampling and collecting logbooks on Ghanaian baitboats which unload at Abidjan. The Group encourages the continuation of such arrangements through contract, for as long as these landings take place.



# CHAPTER III

## National Reports

### NATIONAL REPORT OF CANADA

by

D. Clay and T. Huribut

#### 1. Status of the fisheries

##### 1.1 Bluefin tuna

Canadian nominal catch of Atlantic bluefin tuna in 1987 totaled 476 fish weighing 83.8 MT (including 8 discarded fish). Three hundred and thirty-two of these fish were caught by offshore Japanese longline vessels under charter to two Canadian firms. These latter fish were considerably smaller than the fish landed by the traditional Canadian inshore fishery averaging 93 kg.

The trap fishery of St. Margaret's Bay, Nova Scotia, took 49 fish (2 of which died in the pounds), a substantial increase from 1986 when only two fish were captured, both of which died.

The mean weight of bluefin caught in the Gulf of St. Lawrence in 1987 was 449 kg representing the third consecutive year of declining mean weights after over a decade of increasing mean weights.

Several experimental permits were issued to fishermen engaged in the inshore bluefin fishery (trap, harpoon and modified longline). Unfortunately, the fishermen employing the experimental fishing gears were able to land only one fish.

There has been no purse seine fishery for bluefin by Canadian vessels since 1981.

##### 1.2 Swordfish

The nominal landings of swordfish for Canada in 1987 totaled 955 MT, taken mainly on longline with minor catches (78 MT) by the harpoon fishery.

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Original report in English.

## 2. Research studies

### 2.1 Bluefin tuna

Little biological sampling was conducted on the traditional inshore rod and reel and tended line fisheries; however, there was extensive sampling carried out on both the offshore Japanese and Canadian longline fisheries while the vessels were within the Canadian EEZ.

Individual weights were collected from all fish landed in 1987 and inshore vessel log records were collected, coded and edited for computer analysis. The CPUE for 1987 in the tended line fishery reached an all-time low. No tagging was carried out during 1987.

### 2.2 Swordfish

No new studies were initiated and no tagging was carried out during 1987.

## 3. Management

### 3.1 Bluefin tuna

Tuna fishery regulations are enacted under the federal Fisheries Act. The regulations for the Atlantic coast contain the following broad provisions:

- 1) a valid license is required
- 2) by-catch of bluefin by other fisheries is permitted only under specific circumstances
- 3) season quotas and closings are imposed and can be varied annually
- 4) gear restrictions limit vessels to two "tended lines" with up to a total of ten hooks or angling with one hook per line
- 5) all bluefin landed must be tagged with a uniquely numbered identification tag.

Over 700 small (< 13 m) vessels were licensed to fish bluefin tuna. During 1987 they were limited to the following periods and quotas, this was based on location of home port.

AREA (home port)	SEASON (dates)	QUOTA	
		SEASON	DAILY
1) Prince Edward Island	1/Jul - 14/Aug	hook & release	N/A
	15/Aug - 31/Dec	660	1
2) Newfoundland	12/Jul - 19/Oct	50	unrestricted
3) New Brunswick	1/Aug - 31/Dec	157	2
4) Quebec	1/Aug - 31/Dec	83	3
5) Nova Scotia (Gulf of St. Lawrence)	15/Jul - 31/Dec	140	2
6) Nova Scotia (trap fishery)	1/May - 31/Dec	376	unrestricted
7) Nova Scotia (Atlantic)	15/Jul - 31/Dec	26	2
TOTAL		1,521	

### 3.2 Swordfish

Swordfish longline licenses were issued to 70 vessels in 1987. Sixteen of these licenses were new issues, with ten being awarded to fishermen from Nova Scotia, four to Newfoundland and two to Prince Edward Island. The number of longline licenses was increased to promote the economic development of the fishery.

On the Scotian shelf where the majority of the swordfish fishery occurs there were 46 active longline licenses out of approximately 60.

Harpoon licenses were again issued to about 500 vessels (some also have longline licenses).

The swordfish fishery on the Atlantic coast was subject to the following management measures in 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 offshore large pelagic longline vessel.

#### 4. Preliminary information for 1988

##### 4.1 Bluefin

The landings as of October 19, 1988, were approximately 1,521 fish, weighing 404 MT. This represents the greatest number of bluefin landed in Canada since 1977 (1,705). This increase is largely due to the substantial catch (204 MT) of small adults (8-10 years old) from off southwest Nova Scotia (between Browns Bank and the northeast peak of George's Bank) and the Virgin Rocks area (central Grand Banks of Newfoundland). Although these are offshore fisheries, the vessels used are similar to those used in the Gulf of St. Lawrence inshore fishery (< 13 m).

The provisional estimated mean weight for bluefin caught in the Gulf of St. Lawrence in 1988 is 406 kg, extending the series of declining mean weights which begin in 1986.

Two companies have again chartered Japanese longline vessels to participate in the offshore, large pelagic fishery. As of October 19, 1988, 41 MT of bluefin by-catch have been landed in this fishery. The two companies engaged in this fishery are in the process of making the transition from Japanese charter vessels to independent Canadian vessels and crews.

The experimental fisheries (trap net, harpoon and modified longline) were again licensed in 1988 and thus far there have been no landings.

##### 4.2 Swordfish

The quota for 1988 is 3,500 MT with 70 longline licenses issued. Thirty-four vessels of the Nova Scotia longline fleet have been active so far this season.

Records thus far indicate the fishery has landed more than 375 MT and is still in progress.

In an effort to address concerns about the depressed swordfish stock, efforts are under way to resurrect the dormant Canadian swordfish research program. To this end staffing is in progress for a research scientist to work on swordfish at the St. Andrews Biological Station of the Department of Fisheries and Oceans.

# NATIONAL REPORT OF CAPE VERDE

by

H. Santa Rita Vieira

## 1. The fisheries

During 1987, 1,327 small boats (fishing with handline), 66 baitboats without freezers (fishing with pole and line, sometimes with seines using bait seines) and three freezer baitboats were in operation.

## 2. The catches

Tuna catches for 1981-1987 are summarized in Tables 1 and 2; 1988 catches up to the month of October are given in Table 3. The total catches for 1987 were 5,414 MT; of these, 2,997 MT were from baitboats. The 1987 catches were slightly higher than those for 1986, when, because of problems with the bait, the skipjack catches were abnormally low.

As regards the baitboats, the yellowfin catches showed a slight decrease in comparison with 1986. The catches of the small boats remained at the same level.

## 3. Fishing areas

Most of the fishing activities were carried out around Cape Verde, in 1987 as well as in 1988. Two vessels in 1987 and three in 1988 tried fishing in Senegalese waters (Table 4).

## 4. Statistics

Every effort was made to follow ICCAT recommendations for statistics. The catch and effort data for the baitboats are reliable. Due to the wide range of landing points, a sampling system is used to obtain catch statistics for tuna caught by the small boats, but some difficulties still remain.

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Original report in French.

### 5. Research activities

For the ICCAT Yellowfin Year Program, intensive size sampling was carried out on yellowfin caught by the small boats and baitboats during 1986 and 1987. The results were sent to ICCAT.

Also for this Program, yellowfin gonads were sampled and a report of the conclusions was prepared.

Table 1. Cape Verde baitboat catches (MT) (1981-1987)

	1981	1982	1983	1984	1985	1986	1987
Thunnus albacares	877	809	948	862	747	1,322	907
Thunnus obesus	13	137	291	97	32	30	10
Katsuwonus pelamis	1,584	1,584	1,338	1,030	1,961	860	2,052
Euthynnus and Auxis	235	218	4	6	24	12	1
Auxis solandri	<u>26</u>	<u>29</u>	<u>26</u>	<u>25</u>	<u>13</u>	<u>12</u>	<u>27</u>
TOTAL	2,735	2,777	2,607	2,020	2,777	2,236	2,997

Table 2. Cape Verde small boat catches (MT) (1981-1987)

	1981	1982	1983	1984	1985	1986	1987
Thunnus albacares	4,404	2,691	3,392	1,958	1,154	2,004	2,052
Thunnus obesus	59	63	2	4	80	56	25
Katsuwonus pelamis	4	52	62	342	69	17	50
Euthynnus and Auxis	1	40	30	10	136	17	4
Auxis solandri	<u>2,281</u>	<u>1,435</u>	<u>1,562</u>	<u>1,340</u>	<u>119</u>	<u>193</u>	<u>287</u>
TOTAL	6,749	4,281	5,048	3,654	1,558	2,287	2,418

Table 3. Catch and effort statistics, Cape Verde, 1988 (up to October)

Effort	21	545	8	374	Small Boats
Gear	BBF	BB	Net	TOTAL	
Thunnus albacares	7	156	--	163	838
Thunnus obesus	--	1	--	1	119
Katsuwonus pelamis	105	616	11	732	65
Auxis solandri	--	4	2	6	154
Euthynnus alletteratus	--	--	--	--	59
Auxis thazard	--	--	0	0	0
Makaira nigricans	--	0	--	0	--
TOTAL	112	777	13	902	1,235

Table 4. Experimental fishing in Senegal (MT)

1987	Effort	Total	T. albacares	T. obesus	K. pelamis
	91	100	6	3	91
1988	162	94			

## NATIONAL REPORT OF FRANCE

### 1. Status of the fishery

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Yellowfin	38.7	43.6	40.6	29.2	31.9	5.8	9.8	16.6	16.6
Skipjack	15.2	22.5	27.2	26.1	20.5	13.2	8.5	11.7	15.1
Bigeye	3.1	0.8	0.4	3.0	6.0	2.1	4.4	4.6	3.4
Albacore	8.0	4.2	3.3	3.6	3.0	2.9	2.2	1.2	2.0
Bluefin	1.8	1.7	2.4	5.0	4.1	4.2	5.6	3.8	4.9
Total	66.8	72.8	73.9	66.9	65.5	28.2	30.5	37.9	42.0

Catches of tunas by the French Fleet fishing in the Atlantic in 1987 amounted to 42,000 MT.

#### 1.1 Bluefin

Except for 1986, landings of bluefin in the Mediterranean and the Bay of Biscay for 1987 (4,863 MT) returned to the 1982-1985 average. The purse seine fleet in the Mediterranean, comprised of 24 vessels, landed only 4,300 MT.

#### 1.2 Albacore

In spite of the decrease in fishing effort recorded for several years for the traditional Atlantic trollers, the total amount of albacore caught in the Atlantic in 1987 (1,441 MT) surpassed the 1986 total (1,070 MT). Two commercial vessels used drift nets at night in addition to the daytime trolling and caught 88 MT with the drift nets. Five pairs of trawlers were successful in catching albacore with pelagic trawls, landing 262 MT in two trips. In 1988, the development of these new gears (drift nets, paired



pelagic trawls) allowed for a provisional catch of 1,850 MT with 11 trollers, 20 gillnet vessels, 10 live bait vessels, and 27 pairs of pelagic trawlers.

### 1.3 Tropical tunas

The French tropical tuna fishery is characterized by the stability of the fishery.

The purse seine fleet remained comprised of nine vessels since the departure to the Indian Ocean of the majority of the fleet. The French baitboat fleet based in Dakar continued its slow decrease, 13 baitboats operated in 1987 compared to the 28 that were active in 1980. However, the catches of this fleet are stable or increasing. The decrease in effort is largely compensated for by the improved catch rates (1980 catch was 7,500 MT, the 1987 catch was 8,000 MT). As regards the purse seiners, the high catch of 27,000 MT in 1987 resulted from the excellent catch rates observed in 1987 for yellowfin as well as for skipjack, which seems linked to the reduced purse seine fishing effort. Detailed fishery statistics and sampling of the baitboat and purse seine fleets are submitted to ICCAT together with the FISM fleet data.

## 2. Research

The main organizations participating in tuna research programs are ORSTOM (Office de la Recherche Scientifique et Technique d'Outre-Mer) for tropical tunas (yellowfin, skipjack and bigeye), and IFREMER (Institut Français de Recherche pour l'Exploitation de la Mer) for temperate tunas (albacore and bluefin).

### 2.1 Albacore

In 1987, there were no surveys carried out on commercial vessels in the Atlantic. Nevertheless, "La Thalassa", the assistance vessel for the duration of the albacore season, was able to collect daily catch rate data on the French trollers. The "Gwen-Drez", IFREMER's vessel, participated in an Atlantic project on the technique of using a drift net. The Atlantic IFREMER laboratories participated in a study of the characteristics of a pelagic net adapted to catch albacore. This was continued in 1988 and some landings were made. In 1988, considerable effort was exerted by the Atlantic coastal laboratories to sample the new methods practiced by the commercial vessels. These samples, involving filling out fishery files by the commercial vessels, showed that these two new gears could be profitable, their utilization being complemented by the daytime trawls.

In the Mediterranean, the annual cruises of the "Roselys II", an IFREMER vessel, allowed clarification of the albacore environment along the French Mediterranean coasts and tagging of more than 200 fish in two years.

## 2.2 Bluefin

Sampling of bluefin tuna continued in the Mediterranean on the landings of the 24 French purse seiners.

## 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 are attempting to show the effects of possible environment anomalies such as "El Niño" on yellowfin fishing. Current 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.

## 2.4 Billfish

Research carried out on billfish in Senegal and Venezuela by French scientists led to a first evaluation of the state of the sailfish stock in the east Atlantic, as well as a study of the sport fishery in Venezuela.

## 2.5 Tunas and environment

A meeting on this topic was held in September, 1988, in which around 30 scientists participated. Many of these scientists also participate in ICCAT's work. A detailed report of this meeting will be submitted soon to ICCAT.

# NATIONAL REPORT OF GHANA

by

M. A. Mensah

## 1. The fishing fleet

In 1987, a total of 29 tuna vessels operated from Ghana; all were Ghana-flag vessels. They consisted of 27 baitboats and 2 purse seiners.

## 2. Landings

Landings in metric tons, made by all the Ghana-flag vessels were as follows:

Species	Ghanaian industrial	Ghanaian artisanal	TOTAL
Yellowfin	5,545.223	885.811	6,431.034
Bigeye	289.761	61.941	351.702
Skipjack	27,277.734	730.930	28,008.664
Atlantic black skipjack	352.314	---	352.314
Frigate tuna	---	4,689.250	4,689.250
Bonito	---	942.618	942.618
Atlantic little tuna	---	5,198.720	5,198.720
Sailfish	---	2,324.640	2,324.640
Swordfish	---	122.890	122.890
Blue marlin	---	6.410	6.410
<b>Total</b>	<b>33,465.032</b>	<b>14,963.210</b>	<b>48,428.242</b>

The total quarterly baitboat landings were as follows:

Species	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL
Yellowfin	800.627	887.754	1,115.146	1,739.070	4,542.597
Bigeye	24.346	32.892	66.221	163.757	287.216
Skipjack	6,272.813	4,983.665	6,637.944	8,615.111	26,509.533
Atl. black skipjack	70.073	120.724	58.457	68.856	318.110
<b>Total</b>	<b>7,167.859</b>	<b>6,025.035</b>	<b>7,877.768</b>	<b>10,586.794</b>	<b>31,657.456</b>

Original report in English.

The total quarterly landings by purse seiners were as follows:

Species	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	TOTAL
Yellowfin	296.605	685.888	20.133	---	1,002.626
Bigeye	---	0.630	1.915	---	2.545
Skipjack	515.771	244.340	8.090	---	768.201
Atl. black skipjack	32.950	0.310	0.944	---	34.204
Total	845.326	931.168	31.082	---	1,807.576

### 3. Research

Collection of catch statistics (Task I and Task II) continued throughout the year, but this work, especially Task II data collection, was considerably hampered by the dual landing centers (Tema and Abidjan) of the Ghana-flag vessels.

Studies continued on length frequency distribution, sex structure and maturity of the three main species, namely, yellowfin, skipjack and bigeye. During the year, almost all the normal landings were made in Abidjan while the fraction for the local market was discharged at Tema. As a result almost all the sampling in Tema was done on the undersized tunas. A total of 10,242 yellowfin, 2,450 bigeye and 9,709 skipjack were measured for length frequency distribution during the year.

Port sampling was continued but was hampered because most landings were made in Abidjan; sampling was largely done on the local market fish only.

Only one tagged tuna was recovered during the year.

# 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 1987 Japanese catch of Atlantic tunas and billfishes is estimated to amount to 36,886 metric tons (MT), 86 percent of which was taken by the longline fishery (Table 1). The decrease (about 6 percent) compared to the 1986 catch was ascribed mainly to the catch of the longline fishery. The purse seine catch in 1987 was a little more than 5,000 MT. In 1988, no substantial change in the fishing pattern of either fishery has been reported.

### 1.1 The longline fishery

The number of Japanese longliners operating widely in the Atlantic in 1987 decreased to 146 from 190 in 1986; this being the lowest number in recent years (Table 2). The longline catch in 1987 was estimated to be about 31,700 MT, which resulted in a small change (about 5 percent decrease) from the 1986 catch (Table 3). Although the 1987 catch of bigeye tuna decreased to 19,300 MT (61 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 (4,000 MT, 13 percent), swordfish (2,600 MT, 8 percent), followed by bluefin tuna (1,900 MT, 6 percent). To date in 1988, the operational pattern of the longline fishery was reported to be almost the same as the 1987 pattern.

### 1.2 The purse seine fishery

Two Japanese purse seiners operated in the Gulf of Guinea in 1987. The operational pattern of this fishery was stable in recent years. The catch in 1987 was 5,171 MT, which was exclusively composed of skipjack and yellowfin tuna (Table 4), reflecting the nature of a tropical tuna fishery. In 1988, the fishery is continuing its activity with the same fleet size.

## 2. ICCAT regulations

Since the initiation of the various fishery regulations set by the International Commission for the Conservation of Atlantic Tunas (ICCAT) for

bluefin, yellowfin and bigeye tunas, Japanese fishermen have been concurrently under national regulatory measures. To cope with bluefin tuna regulations, area closures have been in effect in the Mediterranean Sea from May 20 to June 30 since 1975 and in the Gulf of Mexico throughout the year since 1982. These closures have been effective to reduce the fishing mortality on the spawning stock. In addition, the bluefin catch has been monitored for the quota in the western and eastern Atlantic, respectively. To patrol the longline fleet, a governmental boat has been dispatched to the Atlantic Ocean, especially in the Mediterranean Sea during the closure periods of 1986 and 1987. 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

During 1987-1988, the FSFRL reported final 1986 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 1987 has been in progress, but delayed due to technical and financial problems. The 1987 catch estimates are given in this report. The size data for swordfish and bluefin tuna in 1987 were prepared and presented to the swordfish workshop held at the ICCAT headquarters in September, 1988, and to this SCRS meeting, respectively. 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 1987 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 five papers presented at the 1988 SCRS meeting including this national report, one paper is related to the second swordfish workshop. Other papers are related to bluefin, bigeye and billfish stocks.

### 4. Papers prepared for 1988 SCRS

Documents presented to the SCRS in 1988 are listed in Appendix 3 to Annex 10 and/or are published in the Collective Volume of Scientific Papers, Vols. XXIX and XXX.

Table 1. Japanese catch (MT) of tuna and tuna-like fishes by types of fisheries, Atlantic and Mediterranean, 1982-1987

Type of fishery	1982	1983	1984	1985	1986	1987
Total	63,174	33,995	42,566	53,731	39,046	36,886*
Longline (Home-based)	50,304	25,685	39,095	48,505	33,241	31,715*
Pole-and-line	10,620	5,577	565	--	--	--
Purse seine	2,250	2,733	2,906	5,226	5,805	5,171

\*Preliminary.

Table 2. Annual number of Japanese tuna boats operating in the Atlantic, 1982-1987

Type of fishery	1982	1983	1984	1985	1986	1987
Longline (Home-based)	269	182	212	208	190	146
Pole-and-line	7	4	2	--	--	--
Purse seine	1	1	1	2	2	2

Table 3. Catches (MT) of tuna and tuna-like fishes taken by Japanese longline fishery, 1982-1987. (1987 figures are preliminary)

	1982	1983	1984	1985	1986	1987
Atlantic						
Albacore	1,350	1,318	800	1,467	1,209	1,400
Bigeye	32,867	15,141	24,310	31,602	22,800	19,300
Bluefin	2,865	3,320	2,210	1,517	1,323	1,900
S. Bluefin	1,135	505	1,636	1,468	389	1,110
Yellowfin	6,062	2,069	3,967	5,308	3,404	4,000
Swordfish	3,723	1,893	3,770	4,309	2,653	2,600
Blue marlin*	1,132	440	833	1,090	508	460
White marlin	111	44	76	126	129	170
Sailfish**	172	69	97	122	99	45
Others	410	114	342	468	378	450
Atl. Subtotal	49,828	24,913	38,041	47,477	32,892	31,435
Mediterranean						
Bluefin	961	677	1,036	1,006	341	280
Swordfish	5	6	19	14	7	--
Bigeye	--	--	--	--	1	--
Med. Subtotal	966	683	1,055	1,020	349	280
TOTAL	50,794	25,596	39,096	48,497	33,241	31,715

\*Includes a 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, 1982-1987

	1982	1983	1984	1985	1986	1987
Bigeye	30	22	23	10	1	--
Yellowfin	810	1,245	1,516	2,789	3,152	3,010
Skipjack	1,410	1,440	1,367	2,427	2,652	2,161
Albacore	--	26	--	--	--	--
TOTAL	2,250	2,733	2,906	5,226	5,805	5,171



# NATIONAL REPORT OF KOREA

by

National Fisheries Research & Development Agency

## 1. Fishing activities

The size of the Korean tuna fleet fishing in the Atlantic Ocean has decreased continuously since 1977 and was comprised of 29 longliners in 1987. No baitboat has been in operation since April, 1985 (Table 1).

The total Korean commercial catch of tuna and tuna-like fishes amounted to 7,625 MT in 1987, which shows a decrease of 23.5 percent compared to that of the previous year (Table 2). The catch composition by major species is as follows:

Bigeye	4,438 MT (58 percent of the total catch)
Yellowfin	1,457 MT (19 percent of the total catch)
Albacore	401 MT (7 percent of the total catch)

There have been no significant changes in fishing patterns or grounds for the Korean tuna longliners in recent years. Bigeye tuna is one of the major species since the Korean deep longline was introduced in 1980 in the Atlantic Ocean (Table 3).

The total catch for the first half of 1988 is estimated to be 3,091 MT.

## 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 1987 were regularly sent to ICCAT.

Table 1. Number of Korean tuna vessels in the Atlantic Ocean, 1975-1987

Type of gear	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Longline	118	121	120	97	66	54	56	52	53	51	45	28	29
Pole-and-line	8	6	15	20	18	16	8	4	4	1	1	--	--
TOTAL	126	127	135	117	84	70	64	56	57	52	46	28	29

Table 2. Korean catch (MT) of Atlantic tunas and tuna-like fishes by type of gear, 1975-1987

Type of gear	1975	1986	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Longline	38,819	31,575	38,849	29,094	20,069	18,952	22,306	21,033	16,224	14,785	17,454	9,965	7,625
Pole-and-line	7,653	3,339	6,202	10,364	17,188	9,901	9,529	3,503	1,697	969	250	--	--
TOTAL	46,472	34,914	45,051	39,458	37,257	28,853	31,835	24,536	17,921	15,754	17,704	9,965	7,625

Table 3. Nominal catch (MT) by species of tunas and tuna-like fishes taken by the Korean Atlantic longline fishery, 1971-1987

Year	BFT	YFT	ALB	BET	SKJ	SWO	BLM	WHM	SAI	Other bill-fishes	Others	Total
1971	3,039	9,901	11,539	7,353	47	--	--	--	--	780	4,078	36,737
1972	30	11,078	13,577	5,730	45	--	--	--	--	1,714	3,562	35,736
1973	66	12,844	8,525	5,829	--	--	--	--	--	1,984	2,809	32,057
1974	56	15,518	5,216	7,376	116	--	--	--	--	1,335	3,951	33,568
1975	23	15,344	6,073	10,162	196	451	--	--	--	990	5,580	38,819
1976	10	11,211	8,755	6,747	26	1,147	--	--	--	1,015	2,664	31,575
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

# NATIONAL REPORT OF PORTUGAL

by

J. Pereira

## 1. The fishery

Portuguese tuna fishing takes place mostly in the Azores and Madeira, where the local baitboat fleets seasonally catch tunas with live bait. Surface longline fisheries, targeting swordfish, operate around continental Portugal and the Azores. In 1987, they caught 520 MT and 335 MT, respectively.

Catches of tunas and tuna-like species in 1987 reached 14,000 MT, which reflects the very high catches made recently. The increase in catches is due to the development of the tuna fishery in the Azores where baitboat catches rose from 7,600 MT in 1985 to 12,368 MT in 1987.

Table 1 summarizes the catches of the main tuna species for the last few years, by fishing area. Preliminary estimates of catches made during the first three quarters of 1988 indicate a catch of 1,800 MT in Madeira and 14,000 MT in the Azores.

## 2. The fleet

The Portuguese tuna fleet is comprised of baitboats in the Azores and Madeira and of some longliners based in Azores and continental Portugal. The number of baitboats, classified by gross tonnage (GRT), of the fleets from the Azores and Madeira are shown in Tables 2 and 3.

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, several new baitboats have entered the Azorean fishery, of which 3 entered in 1986, 6 in 1987 and 7 in 1988.

The Azorean longline fleet in 1987 is comprised of 10 boats, of which there are 4 in the 150-200 GRT category; the rest are less than 50 GRT.

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 and the Laboratory of Fishery Research in Madeira.

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.

In 1988, satellites maps of surface temperatures were distributed regularly to baitboats in Azores and Madeira.

Table 1. Catches of tunas and tuna-like species (MT) made in Azores and Madeira, 1985-1987

	1985		1985		1987	
	Azores	Madeira	Azores	Madeira	Azores	Madeira
BET	5,036	1,403	5,453	1,698	3,877	593
SKJ	2,089	285	5,032	329	7,932	79
ALB	505	127	436	13	401	29
YFT	6	14	34	10	—	44
BFT	3	1	151	1	58	3
OTH	42	39	170	41	393	12
TOTAL	7,681	1,869	11,276	2,092	12,661	760

Table 2. Distribution of the Azorean baitboat fleet by gross registered tonnage (GRT), for 1984-1987

GRT	1984	1985	1986	1987
< 50	11	11	12	14
50-100	18	19	19	19
101-150	1	1	4	7
> 150	0	0	0	3
TOTAL	30	31	35	43

Table 3. Distribution of the Madeiran baitboat fleet by gross registered tonnage (GRT), for 1984-1987

GRT	1984	1985	1986	1987
< 50	17	21	26	19
50-100	5	5	6	7
TOTAL	22	26	32	26

# NATIONAL REPORT OF SENEGAL

by

T. Diouf

## 1. Tuna fishery

### 1.1 Yellowfin, skipjack, bigeye

The tuna fleet based in Dakar in 1987 was comprised of 13 French baitboats, 4 Spanish baitboats, 2 Senegalese baitboats and 3 Senegalese purse seiners. The total landings by this fleet in Dakar reached 10,968 MT. This is less than in 1986 (-7.6 percent, -909 MT). The number of boats went from 25 in 1986 to 22 in 1987 (Table 1).

It should be noted however, that the only large Senegalese purse seiner in operation landed 1,440 MT in Abidjan in 1987, which was close to 74 percent of its catch. The overall yield of the fleet, therefore, was 12,408 MT.

The foreign fleet not based in Dakar is mainly comprised of 7 French, 16 Spanish and 2 Ghanaian purse seiners. The landings and transshipments of this fleet amounted to 19,152 MT, a decrease of 6,766 MT (-26 percent) basically due to a decrease in Spanish purse seine activity in Dakar; 26 boats in 1986 compared to 16 in 1987 (Table 2). The landings and transshipments in Dakar of all fleets combined reached 30,120 MT in 1987, 20 percent less than the 1986 total.

### 1.2 Other species

#### 1.2.1 Small tunas

The total catches of small tunas all fisheries combined reached 9,052 MT in 1987, an increase of 2,940 MT (+48 percent). This is mainly due to an increase in the reported industrial catches of Atlantic black skipjack (Table 3).

As regards the artisanal fishery, the catches are comparable to those made in 1986.

#### 1.2.2. Sailfish

The overall catches of sailfish by the artisanal fisheries are 385 MT. This is a decrease from those of 1986 after correction. Catches of the sport fishery are around 50 MT and are near those of 1986 (Table 4).

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Original report in French.

## 2. Research

The collection of tuna statistics and sampling in the port of Dakar in 1987 continued as usual. The sampling rate of the baitboats was around 80 percent while that of the purse seiners was higher, nearly 90 percent. The number of fish measured as well as the number of samples collected by gear and fleet are shown in Table 5.

The work by the "Centre de Recherches Océanographiques" in Dakar in 1987 dealt with:

- the Yellowfin Year Program
- the study of the relationship between environmental factors and tuna behavior
- interaction between Atlantic tuna fisheries and fleet movements
- the study of small tuna and sailfish stocks off Senegal

## 3. Publications

Documents presented to the SCRS in 1988 are listed in Appendix 3 to Annex 10 and/or are published in the Collective Volume of Scientific Papers, Vols. XXIX and XXX.



Table 1. Statistics of the tuna fleet based at Dakar: number of boats per flag, effort in days at sea by type of fishing and by flag, landings by species, by type of fishing and by flag

	No. of boats	Effort in days at sea	YFT	SKJ	C A T C H E S		YIELD MT/Day at sea
					BET	TOTAL	
Baitboats							
French	13	2,096	3,540	2,135	2,353	8,028	3.83
Senegalese	2	187	216	207	130	553	2.96
Spanish	4	323	326	234	376	936	2.90
Purse seiners							
Senegalese	3	349	387	817	247	1,451	4.16
TOTAL	22	2,955	4,469	3,393	3,106	10,968	3.71
Reported in 1986	23	2,772	5,366	4,059	2,452	11,877	4.28

Table 2. Statistics of the foreign fleet not based in Dakar

	No. of boats	Effort in days at sea	YFT	SKJ	C A T C H E S		TOTAL
					BET	TOTAL	
Purse seiners							
FISM (landings + transshipments)	7	366	1,671	1,709	431		3,811
Spanish (landings + transshipments)	16	1,718	6,066	7,395	477		13,938
Ghanaian and Others	3	120	238	1,164	1		1,403
TOTAL	26	2,204	7,975	10,268	909		19,152
Reported in 1986	32	2,676	9,543	15,558	817		25,918

Table 3. Landings (MT) of small tunas in Senegal in 1987

Species	Artisanal Fishery	Commercial Fishery	Total
Atlantic black skipjack ( <u>Euthynnus alletteratus</u> )	3,086	2,606	5,692
Frigate tuna <u>Auxis thazard</u>	—	1,047	1,047
West African Spanish mackerel ( <u>Scomberomorus tritor</u> )	1,700	—	1,700
Atlantic bonito ( <u>Sarda sarda</u> )	613	—	613
TOTAL	5,399	3,653	9,052
Reported in 1986	5,339	773	6,112

Table 4. Landings (MT) of Atlantic sailfish (Istiophorus albicans) in Senegal in 1987

	1987 Catches (MT)	1986 Catches (MT)
Artisanal fishery	385	438 *
Sport fishery	52	43

\*Corrected data.

Table 5. Number of fish measured by fleet, gear and species in Dakar in 1987 (the number of corresponding samples are shown in parentheses)

Fleet	Gear	YFT	SKJ	BET	OTH	TOTAL
FISM	BB	2,330 (37)	1,216 (16)	997 (23)		4,543 (76)
	PS	490 (8)	388 (5)	89 (4)	94 (2)	1,061 (19)
Spanish	BB	72 (2)	184 (2)	564 (10)		820 (14)
	PS	1,701 (25)	2,207 (26)	114 (10)	432 (19)	4,454 (80)
TOTAL		4,593 (72)	3,995 (49)	1,764 (47)	526 (21)	10,878 (189)

# NATIONAL REPORT OF SOUTH AFRICA

by

A. J. Penney

## 1. Tuna landings

Tuna landings during 1986 and 1987 are shown in Table 1. The overall tuna catch decreased by 8 percent to 5,545 MT as a result of slightly increased pole catches of albacore off the west coast. The by-catch of bigeye tuna increased by 76 percent to 238 MT, but albacore still accounted for 92 percent of the total catch. Tuna longline activity ceased in early 1987, the only longline catches being 5 MT of broadbill swordfish taken on hake and kingklip longlines. There was no tuna purse seine effort.

## 2. Research

### 2.1 Length-frequency monitoring

The tuna port sampler supervised on behalf of ICCAT was incorporated into the research staff of the Institute and the port sampling program in Cape Town harbour continued as a part of regular research responsibilities. Sampling of Taiwanese transshipments decreased slightly due to decreased activity by these vessels, 8,558 albacore being measured from 11,657 MT of albacore and 1,290 MT of other tuna species transshipped in Table Bay Harbour. However, committed staff availability allowed a 64 percent improvement in sampling of South African catches, 4,106 albacore being measured.

### 2.2 Catch and effort data collection

Tuna catch and effort logbooks were issued to all directed tuna fishing boats, while other linefishing vessels continued to report smaller tuna catches on general commercial catch logbooks. Tuna data capture and analysis programs were developed on the national marine linefish system, improving both control and analysis of the collected data.

### 2.3 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.

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Original report in English.

Table 1. Reported South African tuna landings during 1986 and 1987

Species	Catch (MT)	
	1986	1987
Albacore	4,763	5,126
Yellowfin tuna	57	51
Bigeye tuna	135	238
Skipjack tuna	115	125
Swordfish	5	5
Total	5,075	5,545

## NATIONAL REPORT OF SPAIN

by

J. L. Cort

### 1. State of the fisheries

Spanish catches of tunas and tuna-like species amounted to 155,200 MT in 1987, broken down by species for the last five years as follows:

	1983	1984	1985	1986	1987
Yellowfin	53,910	44,037	67,900	61,198	62,900
Skipjack	29,143	49,093	35,600	42,183	37,800
Albacore	30,387	17,323	21,358	24,587	29,000
Bluefin	5,257	7,547	5,101	3,340	2,600
Bigeye	8,794	13,584	10,340	11,390	8,300
Swordfish	8,422	7,560	8,668	9,341	10,200
Small Tunas	6,512	9,279	7,267	5,616	4,400
Total	142,425	148,423	156,234	157,655	155,200

Although the general level of catches has remained since 1983 around 152,000 MT, they have risen by 3 percent in the last three years.

The species distribution in the catches is similar throughout these years, except for bluefin catches which decreased and swordfish catches which increased.

The reduction in bluefin catches is basically due to a decline in trap catches and to the baitboats from the north of Spain not fishing in the Mediterranean since 1985.

### 2. Research

The "Instituto Español de Oceanografía" (IEO) is the organism in charge of research on tunas and tuna-like species. Scientific activities are directed towards the most important species in the temperate and tropical areas.

Original report in Spanish.

### 3. Fisheries and research by areas

#### 3.1 Temperate zone

##### 3.1.1 Bluefin

The number of traps has remained constant in the Strait of Gibraltar (five Atlantic and three Mediterranean) during 1987.

Experience in fattening bluefin tuna in captivity in the Mediterranean traps did not allow for representative sampling of the trap catches. In the Bay of Biscay, catches and fishing effort remained at the same level as in previous years, with 20-25 baitboats operating regularly.

Recent estimates from tag/recapture information indicates that current fishing mortality of juvenile bluefin tuna caught in the Bay of Biscay is low (around 20 percent).

In 1988 a tagging cruise was made in this area, tagging 1,150 fish which belong to the 1987 cohort.

##### 3.1.2 Albacore

Albacore catches rose in 1987 with respect to 1986, mainly due to the increase in the catches with live bait.

It should be emphasized that Spanish fisheries are concerned about the significant expansion of the use of gill nets and pelagic trawls by other countries in the fishing area where traditionally trollers and baitboats are used. This has produced serious problems of cohabitation among the different fleets.

The existing information on albacore fisheries in the north Atlantic was revised. In a document presented to the SCRS where this revision was included, yield per recruit and fishing mortality by each gear in the fishery were analyzed.

In 1988, a tagging cruise was carried out in the Bay of Biscay in which 500 albacore were tagged.

##### 3.1.3 Swordfish

In 1987, 250 longliners in the Atlantic and 140 in the Mediterranean participated in the swordfish fishery. The catches rose in comparison to previous years.

Sampling coverage and information on effort and size continued to be satisfactory.

Preparations for the workshop held in September, 1988, caused research to be centered on ICCAT Task I and II data, as well as on the analysis of these data to obtain standardized abundance indices.

### 3.2 Canary Islands area

Catches of tunas rose by 35 percent in 1988 with respect to the previous year, mainly due to the increase in yellowfin and skipjack catches.

Although the local fleet remained constant in number of vessels (482 in all), the 12 longliners from the peninsula moved to the Canary Islands.

### 3.3 Tropical zone

The Spanish fleet which operated in the eastern Atlantic in 1987 was comprised of 35 vessels, five less than the previous year, due to the moving of the fleet between the Atlantic and the Indian Ocean.

In 1987 statistical data for 1986 were processed to produce ICCAT Task II data.

Two observer cruises in purse seiners were made for the Yellowfin Year Program. The data collected in both cruises included:

- Information on the detection of schools
- Size sampling of caught species
- Activities of the vessels during the cruises
- Experience with tags on board
- Species distribution in the sets

# 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, Miami, Florida. The activities related to these responsibilities in 1987-88 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. Fisheries for billfish, 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 data bases for analyses as well as dissemination to ICCAT and other management organizations.

Since 1986, recreational catches have been estimated for all tunas and billfish taken off the northeast U. S. coast (Virginia to the southern coast of Massachusetts). Only catches of small bluefin have to be estimated, catches of larger bluefin are known. The 1987 recreational catches were dominated by yellowfin tuna (1,526 MT), followed by small bluefin (401 MT), albacore (205 MT) and bigeye (161 MT). Historical catches of Atlantic tunas by U.S. fishermen (1967-1987) 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 1987 was 8,167 MT, an increase of approximately 1,000 MT over the 1986 catch. The figures include a sizable recreational rod and reel catch from the northeast U.S. coast (1,703 MT in 1987) that was not included in total landings reported to ICCAT in years prior to 1986. Commercial landings of tropical tunas in the northwest

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Original report in English.

\*Prepared by staff members of the Southeast Fisheries Center, Miami, Florida.



Atlantic (excluding the Gulf of Mexico) were lower in both 1986 and 1987 than in 1985, probably because recent improved fishing conditions in the Pacific Ocean caused the Pacific-based purse seine fleet to spend more time there and less in the Caribbean Sea. Only one commercial purse seine vessel was active in the Caribbean Sea in 1987, fishing only four days. Two purse seine vessels fished along the U.S. east coast, logging 91.9 fishing days. The commercial catch of yellowfin tuna by U.S. longline vessels amounted to 4,406 MT, of which 3,752 MT came from the Gulf of Mexico.

Monitoring of species composition and size-frequency distributions of the Gulf of Guinea catches landed at Puerto Rican tuna canneries is a reporting responsibility of the U.S. National Marine Fisheries Service. Sampling emphasis in 1987 was on catches from the Tema baitboats, but some catches by seiners also were examined. Puerto Rican cannery receipts suggested that 16,067 MT of skipjack tuna and 4,894 MT of mixed yellowfin and bigeye tuna from the Gulf of Guinea were off-loaded in Puerto Rico in 1987. Sampling levels of 27 percent of the skipjack off-loadings and 14 percent of the mixed yellowfin-bigeye off-loadings showed a mixture of 25 percent bigeye, by weight, and 22 percent bigeye, by number. Based on length measurements, an estimated 80 percent of the yellowfin tonnage and 73 percent of the bigeye tonnage sampled weighed 3.4 kg or less. A total of 465 skipjack, 1,143 yellowfin, and 267 bigeye were examined.

## 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 1,351 MT of bluefin tuna in 1987, which was an increase of 209 MT from 1986. The catch by gear was: 367 MT by purse seine, 122 MT by harpoon, 139 MT longline (of which 109 MT were from the Gulf of Mexico), 538 MT by rod and reel (of which 401 MT was the estimated catch of the small bluefin fishery). The estimated catch of the small bluefin fishery was more than twice as large as the estimated catches for that fishery in 1985 and 1986. This increase is thought to have been associated with environmental conditions off Virginia to Delaware in the early summer and an increase in fishing effort. In addition to the landed catch an estimated 673 bluefin (128 MT) were released dead by U.S. longline vessels.

Albacore catches totaled 270 MT in 1987, almost double that of 1986. Estimated recreational rod-and-reel landings along the northeastern U.S. coast accounted for 220 MT.

## 2.3 Swordfish

U.S. vessels landed 4,887 MT of swordfish in 1987, virtually the same as the 1986 landings (4,906 MT). Swordfish landings by ICCAT area for 1987 (compared to 1986) were: 3,295 MT (3,309 MT) from the northwest Atlantic, 580 MT (422 MT) from the Gulf of Mexico, and 1,012 MT (1,175 MT) from the Caribbean. Regional U.S. landings declined from off the northeast U.S. and in the Caribbean, and increased in the Gulf of Mexico and off the southeast U.S.

## 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 three geographical fishing areas considered in U.S. estimates of total catch are the Gulf of Mexico, the Caribbean Sea, and the northwest Atlantic Ocean (west of the 60°W longitude). The 1987 estimated recreational total catch of blue marlin, white marlin and sailfish were 161.2 MT, 90.6 MT, and 4.1 MT, respectively, for all fishing areas combined. Catches by longline and handline for these areas were 90.8 MT for blue marlin, 89.1 MT for white marlin, and 77.7 MT for sailfish. The 1987 longline catch estimates were improved due to the mandatory submission of pelagic longline logbooks (discussed below), allowing NMFS personnel to estimate the number of dead billfish discarded at sea.

## 3. Research activities

In addition to monitoring the various fisheries, scientists from the Southeast Fisheries Center 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. This research includes updating and revising data bases, preparation of software and analyses in support of domestic and ICCAT goals, and participation in special working groups.

### 3.1 Bluefin tuna

Examinations of virtual population analysis (VPA) methods and programs were continued. Indices of abundance for bluefin tuna were developed for possible use in tuning the VPA at the 1988 ICCAT SCRS Meeting. Two of the indices were based on catch rates from commercial fisheries -- the U.S. rod-and-reel and handline fisheries in the New England area, and the Japanese longline fishery in the U.S. EEZ -- and a third was derived from the bluefin larval survey in the Gulf of Mexico. For the first time, hydrographic information was used in developing standardized catch rates from the fishery data.

In 1987 research was conducted in order to better define the distributions of bluefin tuna larvae distribution for refinement of future surveys and to learn about the processes which account for inter-annual differences in larval abundance. During an ichthyoplankton survey of the Gulf of Mexico in May of 1987, eight transects were made across the Loop current boundary where bluefin larvae are associated in surface waters of 24-26°C. The standard larval survey in the Gulf of Mexico was also conducted during April-May of 1987 and data were used to derive an estimate of larval abundance which has been employed in recent SCRS VPAs as an index of spawning stock size. A summary of catches of bluefin larvae from the standard survey is presented in Table 2.

The effects of hook size on tuna catch rates were examined in two separate studies. The purpose of this work was to determine whether using smaller hooks might reduce bluefin tuna catch rates and thus reduce the

numbers of bluefin released dead by longline fisheries. In one study, two experimental sets were made, and the resulting catch rates from the two hooks were similar. In the second study an insufficient number of yellowfin were caught for reasonable evaluation of the effect of hook size on catch rates.

### 3.2 Swordfish research

Swordfish research activities provided information to domestic and international management groups. An analysis of trends in landings in both weight and number of individuals and by size categories with respect to the U.S. Exclusive Economic Zone (EEZ) was provided to the Regional Management Councils. Catch per unit effort (CPUE) analysis was included in that report and subsequently expanded to incorporate additional by-catch and gear operation type information.

A report was prepared detailing analysis of mandatory swordfish logbook data. This report included: tables of catch, effort, CPUE, and discards summarized by various time-area strata for swordfish, the principal tuna species, and the billfishes; frequency histograms of the CPUE of swordfish and yellowfin by quarter and area; and figures showing relative variability of CPUE data at various sampling levels for swordfish and yellowfin by quarter and area.

A descriptive review of the U.S. pelagic longline fishery data systems is being presented as an SCRS working paper. The paper describes the species composition of the 1986 and 1987 U.S. longline fishery in terms of the number and total dressed weight of individuals sampled. The number of sampled trips are summarized by geographical area. Species composition data are presented by area, and annual size frequency histograms are given for swordfish, mako shark, yellowfin tuna and bigeye tuna.

### 3.3 Billfish research and monitoring

Routine billfish tournament sampling was conducted along the U.S. east coast, Gulf of Mexico, Bahamas, and Caribbean. A total of 105 billfish tournaments were sampled, representing over 80,000 hours of fishing effort. Additionally, recreational billfish fishermen were surveyed at nine docks in the northern Gulf of Mexico. Selected biological samples were collected for age and growth and for electrophoretic studies.

Research on age and growth of blue marlin has continued at the Miami Laboratory. Counts of presumed daily growth increments were made using otoliths from 77 juvenile and young adult blue marlin ranging in size from 4.3 to 212 cm (lower jaw fork length) and 18 larval specimens ranging from 0.5 to 1.0 cm (notochord length). Age estimates ranged from 9 to 495 days. Strong indirect validation of the presumed daily increments was achieved by comparing the microstructure characteristics of zonations to those found in other species where age validation was achieved and by comparing the distribution of the back-calculated spawning dates to the known spawning season. The age data were fitted to various growth models and the rates of growth were compared to other fast growing species. A summary of length and

weight conversion factors for billfish is being presented as an SCRS working paper.

The NMFS Southeast Fisheries Center played a substantial role in the ICCAT Enhanced Research Program for Billfish for 1988, with Drs. Bradford Brown and Eric Prince acting as general coordinator and coordinator for the western Atlantic Ocean, respectively. Major accomplishments in 1988 include the following: (1) Successfully completing five at-sea observer trips aboard Venezuelan industrial longline vessels out of Cumaná, Venezuela; (2) Initiating contracts and sampling activity for shore-based sampling at the transshipment port of St. Maarten, N.A., in addition to Cumaná, Barbados, Jamaica, Grenada, and the Dominican Republic; (3) Completing the first draft of the ICCAT billfish tagging brochure for approval at the 1988 SCRS; (4) Completing the interim sampling manual for billfish; (5) Completing the survey of ICCAT reporting countries on methods of dressing billfish; and (6) Successfully isolating muscle protein biomarkers from blue marlin, white marlin, sailfish, and spearfish, which is the first phase of a project for development of a billfish species identification kit.

Shore-based sampling in St. Maarten involves size frequency sampling of billfishes off-loaded from larger Taiwanese industrial longline vessels (about 200 MT), while sampling in Cumaná is restricted to smaller Venezuelan industrial longline vessels. Shore-based sampling in Barbados and Jamaica covers both artisanal and recreational vessels, while this activity in Grenada involves only the artisanal fishery. In the Dominican Republic shore-based sampling will target recreational tournaments, as well as biological sampling of taxidermist facilities for juvenile billfish for age and growth studies.

### 3.3 Tagging

Program cooperators and scientists tagged and released 4,627 billfish and 355 tuna. There were 65 billfish and 25 tuna recaptured.

The first occurrence of a sailfish recapture off Cancun, Mexico, that had been tagged and released off Cozumel, Mexico, was reported in 1987. This sailfish had been at large for 3.1 years, the longest time at large for a sailfish recaptured in 1987.

Of the 15 white marlin recaptured in 1987, the longest distance traveled was by a fish tagged off Walkers Cay, Bahamas, and recaptured 88 days later northeast of Oregon Inlet, North Carolina. The longest time at liberty was six years, for a fish that had been tagged and released off Virginia Beach, Virginia, and recaptured northeast of Oregon Inlet, North Carolina.

There were two blue marlin recaptured in 1987: one was from a release off St. Thomas, U.S. Virgin Islands, and was recaptured 186 days later off the coast of Venezuela; the other recapture was of a fish released off the coast of Venezuela, and recaptured 636 days later off the northern coast of Puerto Rico.

Four swordfish were recaptured in 1987. The longest time at liberty was by a swordfish released in the northeastern Gulf of Mexico, and recaptured 642 days later off the northern Bahamas.

Ten recaptures of bluefin were recorded in 1987 and eight recorded through September 1988. Seventeen were tagged and recaptured off the northeast coast of the U.S. and one was tagged in that area and recaptured east of Florida. The greatest movement by a bluefin recaptured in 1987 was by a fish tagged off Ocean City, Maryland, and subsequently recaptured 10.2 years later off Cape Cod, Massachusetts. This recapture marked the longest time at large for a bluefin tuna recaptured in 1987; the longest time at large for a bluefin tuna recaptured in 1988 was 11.1 years.

The first two known transatlantic migrations for yellowfin tuna were confirmed in 1987. A yellowfin tagged and released in September 1985, about 270 miles east of Point Pleasant, New Jersey, was recaptured 534 days later south of the Canary Islands. A yellowfin tagged and released off Grand Isle, Louisiana, in August, 1985, was recaptured 814 days later about 750 miles southeast of Monrovia, Liberia.

A paper was developed on the history of the Cooperative Game Fish Tagging Program in the Atlantic Ocean, Gulf of Mexico and the Caribbean Sea, 1954 to 1987.

### 3.5 Domestic Longline Observer Project

The Domestic Longline Observer Project operated during June-December, 1987, in cooperation with voluntary longline vessels in the Gulf of Mexico, primarily targeting yellowfin tuna. The data collected during twelve trips (80 observed sets) included gear information, environmental conditions, species composition, and biological data. In 1988, observer data were collected in the Gulf of Mexico through contract with the Louisiana State University.

### 3.6 Foreign Longline Fishery Observer Project

For several years, the Northeast Regional Office has coordinated a program to place observers on foreign vessels in the U.S. EEZ. The information collected by observers on Japanese longline vessels fishing off the U.S. east coast is processed and maintained by the SEFC. During the first three quarters of 1988, Japanese longline effort in the U.S. EEZ occurred in January and February, while in 1987 effort in the first three quarters occurred in January, February, August and September. The Japanese fleet fished for bluefin tuna from November 1987 into February 1988 before leaving the area.

### 3.7 Special working groups

#### 3.7.1 International Symposium and Educational Workshop on Fish-Marking Techniques

Over 400 participants from more than a dozen countries attended this symposium. Several NMFS personnel from the Southeast Fisheries Center

attended this meeting and presented papers on tagging such species as tunas, billfish, king mackerel and red drum.

### 3.7.2 International Yellowfin Year Program Meeting

The primary purpose of the meeting of the Yellowfin Year Program in Dakar, Senegal, during July, 1988, was to assemble an appropriate data base for analysis. An NMFS scientist from the Southeast Fisheries Center participated in the workshop and provided summary data tables concerning yellowfin catches by U.S. fishing vessels in the Atlantic Ocean. In addition, summary tables on Gulf of Guinea catches transshipped to U.S. canneries in Puerto Rico were provided. The data consisted of total catches, catch and effort by 1-degree square, and length-frequency distributions by area and by vessel type. It is intended that papers prepared based on these data will be presented in May, 1989, at a Yellowfin Year Program meeting in Madrid.

### 3.7.3 International Billfish Symposium (Kona, Hawaii)

Four papers were given by Southeast Fisheries Center staff at the Kona Billfish Symposium: (1) A paper that summarized fishing success and average size of landed blue marlin and white marlin from a 15-year survey of the recreational fishery in the northwest Atlantic Ocean; (2) A paper describing the age and growth of young Atlantic blue marlin from otolith microstructure; (3) An overview paper on the commercial fishery for marlins in the Atlantic Ocean; and (4) A paper describing the status of the stocks of blue marlin and white marlin in the Atlantic Ocean.

### 3.7.4 ICCAT Swordfish Workshop

In preparation for the second ICCAT Swordfish Workshop, U.S. landings and catch-at-size estimates were tabulated for 1987. Working documents were prepared on U.S. CPUE indices and Spanish catch and effort data. The latter analysis represents a continuation of cooperative research between U.S. and Spanish scientists.

## 3.8 Mackerels

The United States has established comprehensive regulatory procedures for king mackerel and Spanish mackerel in U.S. waters of the Gulf of Mexico and the Atlantic. The objective of the regulations is to induce the stocks to recover to levels that existed in the past and/or to maintain maximum long-term yields. As a result of quotas, landings of Spanish mackerel declined from 5,941 MT in 1986 to 3,285 MT in 1987; similarly, landings of king mackerel declined from 5,432 MT in 1986 to 4,563 MT in 1987. However, there are indications that the management objectives are being approached.

Mackerel research in 1987 was conducted to support the stock assessments and to provide advice to U.S. management councils. Sampling was conducted to collect size frequency information throughout the Gulf of

Mexico and the southeastern coast of the United States. CPUE data were also collected. Additional research on aging and stock identification have allowed more detailed analyses to be conducted on mortality and abundance.

### 3.9 Sharks

Sharks, once considered commercially undesirable in the southeastern U.S., now constitute a marketable commodity throughout most of the region. In recent years, a small directed longline fishery for sharks has emerged in this area, though gill nets and trawls are also used to harvest sharks. The expanding commercial shark fishery in this region is monitored by SEFC personnel. In 1987 commercial shark landings from this area were approximately 1,754 MT.

Table 1. Catches and landings (MT) of Atlantic tunas and tuna-like fishes by United States fishermen, 1967-1987<sup>1</sup>

Year	BFT	YFT <sup>2,3</sup>	ALB	BET <sup>2</sup>	LTA	SKJ <sup>2</sup>	BON	SWO <sup>4</sup>	SSM	KGM	Unclas- sified	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	2,204	11	19,077
1980	1,505	2,118	21	202	88	3,589	195	5,624	5,429	3,192	513	22,476
1981	1,530	1,866	54	152	97	5,373	333	4,529	2,748	3,368	200	20,250
1982	812	883	126	377	87	731	209	5,086	3,747	3,713	962	16,733
1983	1,394	226	18	255	107	589	253	4,801	2,784	3,033	453	13,912
1984	1,320	1,252	25	408	41	817	217	4,538	1,892	2,403	883	13,796
1985 <sup>4</sup>	1,423	6,259	17	353	74	1,786	109	4,618	2,787	2,440	247	20,113
1986 <sup>4</sup>	1,142	5,354	162	747	103	1,004	83	4,906	5,941	5,432	337	25,211
1987	1,351	6,509	270	1,008	118	650	130	4,887	3,285	4,563	386	23,157

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.

4. Swordfish and mackerel landings revised for 1986; total revised accordingly.



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, 1981-1987

Year	1977	1978	1981	1982	1983	1983 <sup>1</sup>	1984	1985 <sup>2</sup>	1986	1987
Catch	34	292	51	79	71	71	27	14	20	26
Samples	48	147	65	121	67	92	96	65	69	157
Positive	15	53	13	27	19	19	12	10	8	17
Mean of Ln (positives)	2.434	2.853	2.824	2.621	2.762	2.762	2.245	0.897	2.585	2.301
Variance Ln (positives)	0.456	1.126	0.639	1.060	1.767	1.767	0.350	0.030	0.593	0.195
Mean catch per 10m <sup>2</sup>	4.397	10.802	4.498	5.066	10.038	7.310	1.383	0.383	1.979	1.184
Variance	1.524	4.931	2.306	2.039	16.095	8.718	0.196	0.013	0.706	0.090
S. E.	1.234	2.221	1.519	1.428	4.012	2.953	0.443	0.114	0.841	0.300
S.E./Mean	0.281	0.206	0.338	0.282	0.400	0.404	0.3201	0.298	0.4247	0.253
Survey Area x 10 <sup>11</sup> m <sup>2</sup>	7.327	7.383	8.78	3.94	2.209	3.681	4.624	2.023	4.624	3.970
Larvae x 10 <sup>12</sup> (mean x area)	3.222	7.975	3.949	1.996	2.217	2.691	0.640	0.077	0.915	0.470
Larvae*e**(.1AGE)	7.80	16.07	9.15	4.10	3.93	4.77	1.22	0.19	2.54	1.27
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	8.879	10.200	9.943
Mean Length (mm)	4.6	4.1	4.48	4.15	3.75	3.75	3.95	4.61	4.97	4.9
P=LxS/A <sub>11</sub> <sup>3</sup> (x 10 <sup>11</sup> ) <sup>3</sup>	21.862	68.290	28.204	16.655	15.112	26.332	5.943	0.523	5.384	2.838
Number of Spawners <sup>4</sup>	155353	403925	191785	100338	78611	136978	33270	3730	43822	22512
Biomass tons (242kg/fish)	37596	97750	46412	24282	19024	33149	8051	903	10605	5448

1. Survey in 1983 was incomplete. Low estimate is based on the observed spawning. The high estimate assumes the normal 60-day spawning duration.
2. Cruise was not in the Gulf of Mexico but in the Florida-Georgia bight. Low density of larvae and their age suggest they were transported by currents.
3. Production of larvae adjusted for length of season and age of larvae.
4. Assumes sex ratio 0.565 female and each female produces  $6.03 \times 10^7$  eggs. Also adjusted for assumed mortality of  $0.1 \text{ da}^{-1}$  from spawning to age of capture.

# NATIONAL REPORT OF THE U.S.S.R.

by

V. V. Ovchinnikov and M. E. Grudtsev

## 1. Fishery

In 1987, the total catch of tunas and other species of the tuna fishery in the Atlantic Ocean amounted to 7,840 MT, of which 7,665 MT were caught in the eastern central part of the ocean and 175 MT in the southeastern part. In the eastern central Atlantic 3,659 MT (2,706 MT frigate mackerel and bullet tuna, 925 bonito, 24 king mackerel, 4 swordfish) were taken with the trawl, 1,485 MT (695 yellowfin tuna, 547 skipjack, 182 frigate mackerel and bullet tuna, 61 Atlantic black skipjack) with purse seine and 2,521 MT (1,887 bigeye tuna, 580 yellowfin, 45 marlin, 5 sailfish, 4 king mackerel) with longline. In the southeastern part of the ocean the only gear used was the trawl. The total catch constituted 175 MT and was represented by bonito (158 MT) and frigate and bullet tuna (17 MT).

In 1987, compared with 1986, the catches taken with the trawl and purse seine declined, but the longline catches, particularly of bigeye tuna, increased considerably. Larger trawl catches were also taken in the southeastern Atlantic. On the whole, the catches of tunas and other species of the tuna fishery dropped by 1,853 MT in the recent year which can be related to reduced fishing effort in the trawl and purse seine fisheries. In 1987, in the eastern Atlantic, all fishing gears yielded 2,905 MT of frigate tuna and bullet tuna, 1,887 MT of bigeye tuna, 1,275 MT of yellowfin tuna, 1,083 MT of bonito, 547 MT of skipjack, 61 MT of Atlantic black skipjack, 45 MT of marlins, 28 MT of king mackerel, 5 MT of sailfish and 4 MT of swordfish.

According to preliminary data, 4,579 MT of tunas and other species of the tuna fishery were yielded in the first half of 1988, among which the yellowfin tuna made up 2,322 MT, bonito 73 MT, skipjack 764 MT, Atlantic black skipjack 672 MT, bigeye tuna 148 MT, frigate mackerel and bullet tunas 566 MT, marlins 28 MT, sailfish 4 MT and king mackerel 2 MT.

## 2. Scientific research

In 1987-1988, the analysis of long-term tuna catches taken with purse seine in the Sierra Leone area was continued. The species composition of the catches from that area is subjected annual fluctuations. Reduction of fishing effort has given rise to rehabilitation of yellowfin tuna stocks.

The analysis of the longline tuna fishery showed that the exploitation of the stocks of the major tuna fishery species - bigeye tuna - has been maintained at the MSY level.

The trawling tuna fishery can be related to most prospective fisheries. As is evident from the results of the scientific fishery, the trawl catches taken on the banks in the open part of the Angolan Hollow at night amount to several tons per hauling hour.

Parasitological studies showed that the parasites responsible for epizooty and affecting the product appearance are missing in tunas. Nematodes, potentially dangerous to man, were only found in the body cavity and intestines and are usually removed while dressing.

The results of the analysis of anomalies of geomagnetic disturbance, position of intratropical convergence zone (ICZ), facsimile charts, types of atmospheric circulation and the earth rotation speed can be used for forecasting. According to such forecasts, in particular, maximum tuna catches can be taken with purse seines in the Sherbro Island area during the periods when the ICZ axis occupies the position along the 15°W meridian between 4° and 6°N. Relative to dense nebulosity, these sites are located at a distance of 200 miles at the most.

### 3. Works at sea

In 1987, two expeditions were made to the eastern central Atlantic aimed at provision of commercial vessels with hydrometeorological information. The biological data sampling on commercial ships was made by three observers-ichthyologists. The collected materials include:

massive measurements	6,216
biological analyses	3,154
samples for age determination	551
samples for fecundity studies	35
samples for feeding studies	83

### 4. Publications

1. Kudersky, S. K., A. K. Sigaev, S. A. Sysoev. Foundation of forecast of formation of tuna surface aggregations in the Eastern Tropical Atlantic. Ecological studies in the Atlantic Ocean and South Eastern Pacific: Colln. of Sci. Trans. of the AtlantNIRO. Kaliningrad, 1987, pp. 83-89.
2. Ovchinnikov, V. V., A. A. Nesterov. Fish resources of the epipelagial. Biol. Resources of the Atlantic Ocean. - M.: Knocker, 1986. pp. 199-230.
3. Ovchinnikov, V. V. Biology and fishery of tunas in the World Ocean. Biol. Resources of the Open Ocean. M.:Knocker, 1987, pp. 163-189.

**Table 1. Catches of tunas and other species of tuna fishery taken by the Soviet ships in the first half of 1988 (MT)**

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Yellowfin tuna	2,322
Atlantic bonito	73
Skipjack	764
Atlantic black skipjack	672
Bigeye tuna	148
Frigate and bullet tunas	566
Marlin	28
Sailfish	4
King mackerel	<u>2</u>
TOTAL	4,579

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# NATIONAL REPORT OF VENEZUELA

by

R. Guzmán

## 1. Introduction

In Venezuela, the "Fondo Nacional de Investigaciones Agropecuarias" (FONAIAP), in support of the ICCAT Convention, carries out fishery statistical activities and research on tunas and tuna-like species of the west Atlantic and Caribbean Sea.

## 2. 1987 catches

The tuna catches made by the Venezuelan tuna fleet during 1987 were 64,148 MT, which represents a decline of 16 percent in relation to the 1986 catches.

Of the total catches, 44,620 MT (69.55 percent) correspond to the eastern Pacific Ocean, 19,346.57 MT (30 percent) to the Caribbean Sea and 181.7 MT (0.28 percent) to the western Atlantic Ocean.

Table 1 present a summary of the landing statistics for tunas and tuna-like species caught by the Venezuelan fleet in the Caribbean Sea and western Atlantic.

## 3. The fleet

The Venezuelan tuna fleet for 1987 was comprised of 33 purse seiners, 17 baitboats and 19 longliners.

The decrease in number of longliners from 33 in 1986 to 19 caused the longline catches to decrease from 3,727 MT to 675.4 MT and lowered by 2,775 MT the total catches made in the Caribbean Sea and Atlantic.

## 4. Research

### 4.1 Biological sampling

During 1987 biological sampling in ports continued; 2,660 tuna were measured, of which 1,195 were yellowfin (Thunnus albacares) and 1,465 were skipjack (Katsuwonus pelamis).

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Original report in Spanish.

#### 4.2 Tagging

During the year, two opportunistic tagging cruises were carried out on board baitboats, during which 61 yellowfin were tagged. In addition, an intensive tagging cruise was carried out on board the French motorboat "Nizery", from ORSTOM, with the result of 118 skipjack being tagged.

#### 4.3 Billfish

In relation to the Program of Enhanced Research on Billfish in the Caribbean, two cruises with observers on board longliners were made; three additional cruises are planned for the first quarter of 1988. This work will aid the port sampling, as it will establish conversion parameters.

Table 1. Landings of tunas and tuna-like species by the Venezuelan fleet in the Caribbean Sea and western Atlantic Ocean

Species	Purse Seine	Baitboat	Longline	TOTAL
Yellowfin	8,303.2	2,285.1	552.8	11,141.1
Skipjack	5,511.7	2,068.1		7,579.8
Frigate tuna	356.1	30.9		387.0
Bluefin	71.2	44.3		115.5
Albacore			25.5	25.5
Bigeye			10.8	10.8
Billfish			54.8	54.8
Sharks			27.7	27.7
Wahoo			2.6	2.6
Dolphin fish (mahimahi)			1.2	1.2
TOTALS	14,242.2	4,428.4	675.4	19,346.0