INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

R E P O R T
for biennial period, 1976-77
PART II (1977)
English version

MADRID, SPAIN 1978

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

Member Countries (as of Feb. 28, 1978)

Angola, Benin, Brazil, Canada, Cuba, France, Gabon, Ghana, Ivory Coast, Japan, Korea, Morocco, Portugal, Senegal, South Africa, Spain, U.S.A., U.S.S.R.

Chairman of Commission

Dr. I. MALICK DIA, Senegal
(to November 22, 1977)
Mr. E. B. YOUNG, Canada
(from November 22, 1977)

First Vice-Chairman of Commission

Mr. Y. S. KANG, Korea
(to November 22, 1977)
Dr. L. KOFFI, Ivory Coast.
(from November 22, 1977)

Second Vice-Chairman of Commission

Mr. E. B. YOUNG, Canada
(to November 22, 1977)
Mr. H. ROSA, Brazil
(from November 22, 1977)

Panel Membership (as of Feb. 28, 1978)

Panel	Contracting Parties	Chairman
1	Angola, Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Korea, Morocco, Portugal, Senegal, Spain, U.S.A., U.S.S.R.	U.S.A. (to November 22, 1977) Canada (from November 22, 1977)
2	Canada, France, Japan, Korea, Morocco, Portugal, Spain, U.S.A., USSR.	Morocco
3	Brazil, Japan, Korea, South Africa, U.S.A., USSR.	Japan
4	Angola, Canada, Cuba, Japan, Korea, Portugal, Spain, U.S.A., U.S.S.R.	Spain

Council (to November 22, 1977)

Chairman: SENEGAL
First Vice-Chairman: KOREA
Second Vice-Chairman: CANADA
Countries: BRAZIL,CUBA, FRANCE, IVORY COAST, JAPAN, MOROCCO, SPAIN, U.S.A. (from November 22, 1977)
No election was conducted for the 1978-79 biennial period.

Standing Committees

Committees:	Chairman
Committee on Finance and Administration (STACFAD)	Mr. K. YONEZAWA, Japan (to November 22, 1977) Mr. C. J. BLONDIN, U.S.A (from November 22, 1977)
Committee on Research and Statistics (SCRS)	Dr. B. J. ROTHSCHILD, U.S.A. (to November 22, 1977) Mr. A. FONTENEAU, France (from November 22, 1977)

Secretariat
General Mola, 17, 28001 Madrid (Spain)
Executive Secretary: O. RODRÍGUEZ-MARTÍN
Assistant Executive Secretary: P. M. MIYAKE

LETTER OF TRANSMITTAL

The Chairman of the International Commission for the Conservation of Atlantic Tunas presents his compliments to the Member Governments to the Convention for the Conservation of Atlantic Tunas (signed in Rio de Janeiro, May 14, 1966), and to the Delegates and Observers representing said Governments, and has the honor to transmit the ***"Report for the Biennial Period, 1976-77, Part II (1977)"***, describing the activities of the Commission during the second half of said biennial period.

The volume contains reports of the Fifth Regular Meeting of the Commission, held in November, 1977, and of all the associated meetings of the Standing Committees and Sub-Committees. In addition, it contains a summary of the activities of the Secretariat, and the National Reports on scientific activities related to tuna fisheries carried out by the various countries.

This Report has been drafted, circulated and approved 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.

I. Malick Dia
Commission Chairman

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CHAPTER I
Secretariat Reports

ADMINISTRATIVE REPORT 1977

COM/77/15 (Amended) *

1. Member Countries of the Commission

The Food and Agriculture Organization of the United Nations (FAO) informed the Secretariat that on January 7, 1977, the Union of Soviet Socialist Republics had deposited with the Director General of FAO an instrument of adherence to the International Convention for the Conservation of Atlantic Tunas, signed in Rio de Janeiro (Brazil) on May 14, 1966. Likewise, on September 19, 1977, the Republic of Gabon deposited an instrument of ratification to the same Convention with the Director General of FAO.

In accordance with Article XIV, paragraph 3, of the Convention, an adherence or ratification becomes effective on the date the instrument is deposited. Therefore, as of January 7, 1977, the U.S.S.R. and as of September 19, 1977, the Republic of Gabon are members of the International Commission for the Conservation of Atlantic Tunas.

The Commission has, as of December 31, 1977, the following seventeen (17) member countries, listed here below in order of their incorporation:

United States of America	ratification,	May 18, 1967
Japan	"	August 24, 1967
South Africa	adherence,	October 17, 1967
Ghana	"	April 17, 1968
Canada	"	August 20, 1968
France	"	November 7, 1968
Spain	ratification,	March 21, 1969 **
Brazil	"	April 1, 1969
Portugal	adherence,	September 3, 1969
Morocco	"	September 26, 1969
Korea	ratification,	August 28, 1970
Senegal	adherence,	August 25, 1971

* The Administrative Report presented at the Commission meeting was revised.
** In accordance with Article XIV, paragraph 3, the Convention entered into effect on March 21, 1969.

Ivory Coast	adherence	December 6, 1972
Cuba	"	January 15, 1975
Angola	"	July 29, 1976
Union of Soviet Socialist Republics	"	January 7, 1977
Gabon	ratification,	September 19, 1977

2. ICCAT Meetings

a) *Location of the 1977 Commission Meeting*

At its last meeting (Madrid, November 1976), the Council authorized the Executive Secretary to study the possibility of holding the next meeting of the Commission in Las Palmas (Canary Islands, Spain), provided that such a change in location would not affect the 1977 Budget. The Executive Secretary, in consultation with the Chairman of the Standing Committee on Finance and Administration (STACFAD), studied this matter in detail. The results of the study have shown that holding the meeting in a location other than Madrid would involve substantial financial implications, for which no provisions had been made previously in the Budget.

Consequently, it was decided to hold the Fifth Regular Meeting of the Commission in Madrid on the dates agreed by the Commission and ratified by the Council at its last meeting. This decision was included in our *Newsletter* (Vol. 7 — No 1, March 1977). Official written notification of the decision was given on May 27, 1977, to all interested persons.

b) *1976 Council Meeting*

The Council held its Fourth Regular Meeting at the Hotel Luz Palacio, Madrid. The session was chaired by the Second Vice-Chairman, Mr. E. B. Young (Canada), in the absence of the Chairman, Dr. I. Malick Dia (Senegal) and the First Vice-Chairman Mr. Y. S. Kang (Korea). Dr. Malick Dia sent his regrets for not being able to attend and chair the meeting, which were transmitted to the Council.

Also meeting at that time were Panels 1, 2, 3, 4 and the Working Group on International Inspection. Preceding the Council meetings, the Standing Committee on Research and Statistics (SCRS) met from November 10, 1976. The proceedings and reports of the meetings are included in the Biennial Report, 1976-1977, Part I.

c) *Working Group on International Skipjack Year Program*

In order to accelerate the progress of the planning of the skipjack program, the Chairman of the SCRS requested to hold a meeting of the scientists concerned in the summer of 1977. Accordingly, the meeting was held in Madrid on August 9-11. Seven scientists and the Secretariat attended the meeting. A plan was developed for the skipjack program. The report of this group (COM-SCRS/77/21) was circulated among the Commissioners and the SCRS scientists in September 1977, for their review and consideration (for further details, see Chapter I, Secretariat Report on Statistics).

3. Training Course on Statistics and Sampling

At the Fourth Regular Meeting (Madrid, November 1975), the Commission decided to hold two training courses in 1976, one on Statistics and Sampling and one on Population Dynamics. However, the Training Course on Statistics and Sampling was postponed due to the limited number of applicants while the Population Dynamics course was held in 1976. The Council reallocated the corresponding funds from the 1976 budget to 1977, in the hope that the postponed course would be held in the near future.

Following the Council's intentions, the Secretariat widely circulated a questionnaire in order to identify the needs among member and non-member countries for training experts in statistics. Twenty countries responded to our questionnaire. Since ICCAT funds are limited, the Secretariat contacted various international organizations inviting them to hold the course jointly. In response to this request, the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF) and the International Commission for the Southeast Atlantic Fisheries (ICSEAF) expressed their willingness to cooperate.

In March 1977, the ICCAT Secretariat held a joint preparatory meeting at its headquarters with the Secretariats of these two organizations. During this meeting, "The Coordinating Group for the Joint CECAF/ICCAT/ICSEAF Training Course on Statistics and Sampling" was established, and ICCAT was requested to serve as the Joint Secretary for the program. It was also agreed that the Course would be held for 20 working days, from April 24 to May 16, 1978. By invitation of the Spanish Oceanographic Institute, the course will be held in Tenerife, Canary Islands. At least one participant from each developing member country will receive financial assistance from the joint fund of these Commissions.

Advance announcement of the training course was distributed on May 2, 1977. As Notice-2, an invitation for the course together with a detailed program and curriculum was widely distributed in September, 1977 (COM-SCRS/77/23). The deadline for application is December 31, 1977.

4. Meetings at which ICCAT was represented

a) *International Commission for the Southeast Atlantic Fisheries (ICSEAF)*

The Executive and Assistant Executive Secretaries, respectively, represented ICCAT at the Plenary and Scientific sessions of the ICSEAF meeting, held in Malaga, Spain, in December, 1976.

b) *International Commission for the Northwest Atlantic Fisheries (ICNAF)*

The Executive Secretary attended the Ninth Special Meeting of ICNAF, held in Tenerife, in December, 1976. He took advantage of his visit to the Canary Islands to study hotel accommodations and the facilities available in the event that the Fifth ICCAT Meeting would be held in Las Palmas.

c) *FAO Committee for the Eastern Central Atlantic Fisheries (CECAF)*

The Executive Secretary attended the CECAF meeting held at Lomé, Togo, in March, 1977. He participated actively in discussions concerning the need to train national experts at various levels.

d) *FAO Fisheries Committee (COFI)*

The Executive Secretary represented ICCAT at the XIth meeting of the FAO Fishery Committee (COFI), held in Rome in April, 1977. During his stay in Rome, the Executive Secretary held discussions with the delegations of various countries including the majority of the ICCAT member countries. He also participated in the discussion of the SPC/IPFC Skipjack Tagging Program.

e) *Coordinating Working Party on Atlantic Fisheries Statistics (CWP)*

CWP, of which ICCAT is a member, held its Eighth Session at the ICNAF headquarters, in Dartmouth, Canada, in August, 1977. The Assistant Executive Secretary represented ICCAT. The purpose of the meeting was to achieve co-ordination among the regional fishery bodies existing in the Atlantic area for collection of statistics and the standardization of the criteria. The report of the meeting is presented to the SCRS as document SCRS/77/14.

5. Cooperation with other Organizations

a) *FAO*

As in the past, excellent working cooperation has been maintained with the Fisheries Department of FAO. Officers of FAO have made valuable contributions during ICCAT meetings (planning the Training Course on Statistics and Sampling, the Atlantic-wide skipjack program, etc.). Close cooperation between FAO and ICCAT has been maintained in the collection of Atlantic-wide tuna statistics.

b) *Inter-American Tropical Tuna Commission (IATTC)*

The exchange of scientific information has been maintained. Also, IATTC's accumulated experience on skipjack research was made available by their scientists to the ICCAT scientists, when the latter planned its Atlantic-wide skipjack program.

c) *Committee for the Eastern Central Atlantic Fisheries (CECAF)*

Cooperation has been maintained with this organization in formulating the Training Course on Statistics and Sampling (see Section 5).

d) *Other organizations*

ICCAT has maintained close working relationships with various other international regional bodies, such as the Indo-Pacific Fisheries Council (IPFC), the

Indian Ocean Fishery Commission (IOFC), the General Fisheries Council for the Mediterranean (GFCM), the International Council for the Exploration of the Sea (ICES), the International Commission for the Northwest Atlantic Fisheries (ICNAF).

6. Coordination of research

a) *Collection of Statistics*

Secretariat activities on this subject are reported in detail in Chapter I, Secretariat Report on Statistics and Coordination of Research.

b) *Data bank*

According to the decision made by the SCRS and the Council (Madrid, November 1976), after a comparative study of various systems available in Madrid, the ICCAT Secretariat made a formal contract with ENTEL/IBERMATICA, S. A., to use the INFONET system. A terminal was obtained and delivered to the Secretariat in June. A systems analyst was added to the Secretariat staff and is working on the data base management system.

We would like to express our appreciation to NMFS (La Jolla) who kindly provided the ICCAT Secretariat with all the data bases they have established with the INFONET system in Los Angeles, as well as loaning a computer expert to explain the system and train the ICCAT personnel.

More details are reported in COM-SCRS/77/12 (attached as an Appendix to the Secretariat Report on Statistics and Coordination of Research) and SCRS/77/16.

c) *Creating the position of biostatistician*

The Council recommended that the Commission should create a permanent position for a biostatistician at the Secretariat who would engage in long-term studies based on sampling theory. In January, the Secretariat announced the vacancy of the position and requested recommendations of personnel from many scientists and laboratories. Unfortunately, the Secretariat has received only a few applications.

On the other hand, the important difficulties we experienced in the past biostatistical studies relate to the lack of detailed data and data management systems at the Secretariat. For these reasons, the Secretariat gave first priority to the creation of the data bank system which would solve these fundamental problems and hired a systems analyst as mentioned above (see Section 6-b). As very good progress has been made in this area, future biostatistical studies will be very well facilitated by this system.

d) *Field Manual*

The Secretariat was asked to revise the present Field Manual with detailed sampling instructions for each landing port. The draft is submitted to this meeting as SCRS/77/15.

e) *Port Sampling Program*

In 1976, the Council verified that the Secretariat should continue and intensify the present sampling program from longliners transshipping their catches at foreign ports. In 1976, logbooks were extracted for 404 trips out of a total of approximately 490 trips made by the fleet, i. e. over 80 % of the trips have been covered by our sampling scheme. More than half of the entire catch was subject to biological sampling, 744 samples were taken and 38,000 fish were measured.

f) *Training Course on Statistics and Sampling*

See Section 3.

g) *International Skipjack Year Program*

See Section 2-c).

h) *International joint tagging project for young bluefin tuna*

According to the decision of the Commission in 1975 and with the confirmation of the Council in 1976, the Secretariat contacted the governments of France, Morocco and Spain in order to activate the young bluefin tuna tagging project in the waters off the coast of Morocco. As was reported in 1976, the United States deposited $ 2,000 in a trust fund established at the Secretariat to execute this tagging project. Using this fund, as well as additional funds from the Commission's budget (Chapter 8), joint tagging cruises were carried out from Casablanca. The Moroccan government contributed a research boat for this purpose and scientists from Morocco, Spain and the United States participated in the cruises. A detailed report of the cruises is submitted to this meeting as COM-SCRS/77/22.

i) *Tagging lottery*

This year the Secretariat again held a lottery to encourage the recovery of tagged tunas. Two $ 300 awards were given, one for tropical tuna and one for temperate tuna tags returned.

7. Publications

a) *Biennial Report*

Part I of the Biennial Report "for biennial period 1976-1977" was printed in the three official languages of the Commission. The English version was distributed

in July, the French version in August and the Spanish version in September, 1977. The Report covers Commission activities during the first half of the biennial period.

b) *Statistical Bulletin*

In early April 1977, the Secretariat issued the first 1976 preliminary estimates of catches of the major species of tuna in the Atlantic. The formal version of Volume 7 (which covers the data up to and including 1976) was completed and mailed in September, 1977, and revised in January, 1978.

c) *Collective Volume of Scientific Papers*

Volume VI, which includes selected papers presented at the 1976 SCRS Meeting, was prepared and distributed in March, 1977. Volume VI was again divided into two books.

d) *Data Record*

The Secretariat prepared the Data Record, Volume 8 in February, 1977. This volume covers all the catch and effort and biological data (unpublished) submitted to the Commission by the end of 1976.

Volume 9 was issued in September 1977, and covers the data submitted between January 1 and August 31, 1977.

e) *Statistical Series*

Volume 2 which contains complete catch and effort and size frequency data collected at ports by the Secretariat from the 1975 catch was issued in April, 1977. Volume 3, including similar data for 1976, was issued in September, 1977. The delay in completing this series is due to the fact that some part of the catches made in 1976 were not unloaded until May or June 1977 as a longliner trip extends four to six months.

f) *Newsletter*

Newsletters relating general information on Commission activities were sent out at intervals of approximately three months. During 1977, four issues were mailed.

g) *Basic Texts*

The original Basic Texts was prepared and issued in 1972. As it has been four years since its publication, the volume was updated, incorporating all the changes which have occurred. The revised version was issued in January, 1977.

h) *Materials used for the ICCAT Training Course on Population Dynamics*

The texts used and the reports presented at said course which was held in La Coruña, Spain, from September 20 to 30, 1976, were issued in one volume. This volume, prepared in type-offset, is an informal publication and was distributed among the scientists concerned in June, 1977.

8. Secretariat and Administration

a) *Staff*

In 1977, Ms. Sherry Reiss, U. S. nationality, was hired by the Secretariat as a temporary systems analyst in order to handle the establishment of the ICCAT data bank. Since establishing, updating and utilizing the data bank in Madrid is a very large job, Ms. Sherry Reiss and Mr. Arnaud de Boisset (statistical expert) were engaged in this project full time and Ms. Joan M. Manning assisted them.

In December, 1977, the contract of A. de Boisset (statistical expert) with the Commission was terminated.

Duringt 1977, Dr. P. Miyake took a two months' leave of absence (without pay) from the Commission due to a personal conflict with his duties.

The Secretariat staff during 1977 was made up of the following persons:

		Date of employment
OLEGARIO RODRÍGUEZ-MARTÍN Executive Secretary	(P-5)	July 1, 1970
P. MAKOTO MIYAKE Assistant Executive Secretary	(P-4)	November 1, 1970
ARNAUD DE BOISSET Statistical Expert	(P-1)	October 1, 1972 (to Dec., 1977)
MARIE-ELISABETH CAREL Multilingual Secretary	(G-4)	April 1, 1972
PHILOMENA M. SEIDITA Multilingual Secretary	(G-4)	April 1, 1975
MARÍA ANA FERNÁNDEZ DE BOBADILLA Multilingual Secretary	(G-4)	March 1, 1976
JOAN M. MANNING Statistical Assistant	(G-4)	September 10, 1973
SHERRY REISS Systems Analyst		February 15, 1977
GINETTE TURPEAU Assistant Secretary		November 1, 1974
JUAN ANTONIO MORENO		January 6, 1975

b) *Travel*

Members of the Secretariat staff undertook several trips in order to attend the various meetings previously mentioned, as well as the following trips: Mr. Arnaud de Boisset, statistical expert, visited the Canary Islands, Freetown/Sierra Leone, Dakar/Senegal, Abidjan/Ivory Coast, Tema/Ghana in association with the improvement of statistics. He also obtained data from various laboratories to enter in our data base in Madrid.

The Assistant Executive Secretary visited Casablanca, Morocco, to make joint arrangements for the bluefin tuna tagging program off the Moroccan coast, in March, 1977.

c) *Office space for the ICCAT Secretariat Headquarters*

As is known, the Secretariat has its offices at General Mola, no. 17. This is a rented, private apartment with an area of about 250 m^2. The annual rent of approximately US $ 7,500 is paid by the Spanish Government.

In 1970, when we started, seven member countries formed the Commission and there were only four people on the Secretariat staff. Since then, our activities and our services have increased and the Commission now consists of seventeen member countries and there are ten people on the staff. In the near future, more personnel will be added.

Consequently, our present office is not adequate. In order to be able to better perform the tasks assigned to the Secretariat, more office space would be necessary.

We are submitting this problem to the Commission for its consideration.

O. RODRÍGUEZ-MARTÍN
Executive Secretary

FINANCIAL REPORT 1977

COM/77/16 (Amended) *

1. Auditor's Report for the 1976 Fiscal Year

The Auditor designated by the "Instituto de Censores de Cuentas de España" has examined the accounts and balance sheet of the Commission up to December 31, 1976. In compliance with Regulations 9-3 and 12-7 of the Financial Regulations and in accordance with the recommendation of the Council at its Second Regular Meeting, the Secretariat sent a copy of the Auditor's Report to all member country governments in May, 1977. An abstract of the same has been included in the Biennial Report, 1976-77, Part I.

2. 1977 Budget

The 1977 budget for U.S. $ 300,000 had been approved by the Commission at its Fourth Regular Meeting (November 1975). At the Council Meeting (November 1976) the budget was revised, increasing it to U.S. $ 320,000 — the added $ 20,000 pertain to the unused balance of the previous year's budget. (See Biennial Report, 1976-77, Part I, page 53.)

3. Current status of Commission accounts

Statement 1 shows the financial situation at the end of fiscal year 1976.

In *Statement 2* the status of each member country's contribution is shown. Pending contributions corresponding to previous years amount to U.S. $ 8,096.06. Also, there is a positive balance of $ 496.79 in favor of Cuba.

Statement 3 shows the budget and expenditures up to the end of fiscal year 1977. There is a positive balance of U.S. $ 13,022.33 which, according to a decision of the Commission, will be allocated as follows:

a) To the 1978 Budget . . . . . U.S. $ 13,000.00
b) To the Working Capital Fund . . . U.S. $ 22.33

This Statement also includes an expense of $ 2,000 used for the ICCAT-Morocco Bluefin Tuna Tagging Program. This expense is covered by a voluntary contribution previously made by the United States.

* Updated to the end of Fiscal Year 1977. Modifications approved by the Commission have been included.

Also, $ 9,600 were paid to Mr. A. de Boisset as a settlement for termination of employment with the Commission. This amount is to be applied to fiscal year 1978, as indicated in Statement 5.

Statement 4 gives the total of income and expenditures and the balance in Cash and Bank at the end of the fiscal year. This includes the deposit of Canada's contribution corresponding to 1978.

Statement 5 shows the state of accounts at the end of fiscal year 1977.

Statement 6 shows the status of the Working Capital Fund, which amounted to U.S. $ 47,978.55 at the close of fiscal year 1976. After adding the non-budgeted income corresponding to 1977, the Fund shows a balance of $ 64,393.50. In accordance with an agreement made by the Commission, U.S. $ 10,000 of this Fund was allocated to the 1978 Budget. Therefore, the actual balance of the Working Capital Fund is $ 54,393.50. This Fund is very useful as it serves to cover the possibility of delays in payment of the contributions, as well as to meet Commission expenses during the early months of the year until the early country contributions are received.

4. General comments

Chapter 4 — PUBLICATIONS

The preparation of the following publications has been charged to this chapter:

a) Biennial Report, 1976-77 — Part I.
b) Statistical Bulletin, Vol. 7 (1976).
c) Collective Volume of Scientific Papers, Vol. VI (1) and Vol. VI (2).
d) Data Record, Vol. 9 and Vol. 10.
e) Statistical Series — Vols. 2 and 3.
f) Proceedings of the Fourth Regular Meeting of the Council
g) Newsletter.
h) Basic Texts.

Chapter 6 — OPERATING EXPENSES

At the end of the fiscal year there was a positive balance of U.S. $ 2,146.47, which is due to the devaluation of the peseta in July, 1977.

Chapter 8 — COORDINATION OF RESEARCH

The first seven chapters of the budget include routine expenses which change from year to year only as costs increase. However, Chapter 8 fluctuates from one year to another, according to the development of the research programs and changes in activities.

Of the $ 102,000 allocated to this chapter, a total of $ 92,581.56 was spent. Expenses have been broken down by the various sub-chapters as exactly as possible, and are shown in the following table:

	Amount Budgeted	*Amount Spent*	*Balance*
a) Salaries	$ 47,000	$ 40,000	$ + 7,000
b) Travel	16,000	5,000	+ 11,000
c) Equipment	6,000	1,581	+ 4,419
d) Data processing . . .	23,000	44,000	— 21,000
e) Miscellaneous	3,000	2,000	+ 1,000
f) Training course . . .	7,000	0	+ 7,000
	$ 102,000	$ 92,581	$ + 9,419

Salaries — The salaries of the following people are included in this sub-chapter:

Statistical Expert (A. de Boisset) . .	$ 17,000
Systems analyst (S. Reiss)	11,000
Administrative Assistant (A. Rick) . .	3,500
Samplers (in Canary Islands, Abidjan, South Africa, St. Maarten) . . .	8,500
	$ 40,000

Travel — A budget of $ 16,000 was allocated to this sub-chapter to cover the various trips anticipated for the Biostatistician and the statistical staff. However, the Biostatistician was not contracted during fiscal year 1977 and the Statistical Expert remained at the Secretariat where he worked intensively in the processing of data. As a result, only $ 5,000 were spent and of that amount only $ 2,464 were used by the Secretariat personnel. The remainder, up to $ 5,000 was spent on inviting scientists to the Secretariat for various reasons: A. L. Coan (U.S.A.), E. L. Cadima (Portugal), F. Barbe (France), A. Fonteneau (France) and J. Campos Rosado (Portugal).

Data Processing — In the original budget approved by the Commission (November 1975), only $ 6,000 were allocated for this purpose. At the Council Meeting (November 1976) the budget was revised and the allocation to this sub-chapter was increased to $ 23,000. The expenses were more than were forecasted, since during 1977 the data bank was put into operation. We are confident, however, that we will be able to reduce costs for data processing in the future.

Training Course — As the course was not held, the $ 7,000 allocated was not used.

5. Auditor's Report for Fiscal Year 1977

The Balance Sheet at the close of Fiscal Year 1977 has been extracted from the Auditor's Report (for 1977) and is given as *Statement 7*.

STATEMENT 1

Statement at Close of Fiscal Year 1976

ASSETS	$	LIABILITIES	$
Cash and Bank	45,977.44	To the 1977 Budget . . .	20,000.00
Outstanding Contributions .	22,001.11	Working Capital Fund . .	47,978.55
TOTAL	67,978.55	TOTAL	67,978.55

Statement of Member Country Contributions in 1977

	1976 Balance	*Contributions for 1977 Budget, approved by the Commission*	*Contributions paid for the 1977 Budget*	*Other Contributions*	*1977 Balance*
Brazil	—	12,093	12,093 (31/III)	—	—
Canada	—	12,585	12,585 (14/II)	—	—
Cuba	−6,805.02	13,415	13,415 (19/VII)	7,301.81	+ 496.79
France	—	39,941	39,941 (30/IV)	—	—
Ghana	−6,113.70	6,442	6,442 (7/V) (13/IX)	6,113.70	—
Ivory Coast	−8,096.06	8,574	8,574 (23/XII)	—	−8,096.06
Japan	—	41,393	41,393 (17/II)	—	—
Korea	—	28,429	28,429 (25/II)	—	—
Morocco	—	10,345	10,345 (30/IV)	—	—
Portugal	—	16,551	16,551 (13/V)	—	—
Senegal	−986.33	8,147	8,147 (14/XI)	986.33	—
South Africa	—	5,674	5,674 (23/III)	—	—
Spain	—	57,534	57,534 (1/VI)	—	—
United States	—	38,877	38,877 (17/II)	—	—
	22,001.11	300,000	300,000	14,401.84	+ 496.79 −8,096.06

STATEMENT 3

Fiscal Year 1977. Budget, Expenditures and Balance (S)

	I	II	III
	1977 Budget	*Total expenditures fiscal year 1977*	*Balance*
1. Salaries	130,000	126,675.63	+ 3,324.37
2. Travel	10,000	10,112.32	— 112.32
3. Meetings	26,000	27,235.91	— 1,235.91
4. Publications	20,000	20,452.68	— 452.68
5. Office Equipment	2,000	2,045.42	— 45.42
6. Operating Expenses	26,000	23,853.53	+ 2,146.47
7. Miscellaneous	4,000	4,020.62	— 20.62
8. Coordination of Research	102,000	92,581.56	+ 9,418.44
	320,000	306,977.67	+ 14,889.28
			— 1,866.95
			+ 13,022.33 *
9. Special fund for bluefin tagging — USA contribution		2,000.00	
10. Settlement A. de Boisset-termination of employment with the Commission Appliable to 1978 Budget		9,600.00	
		318,557.67	

* $ 13,000 to the 1978 Budget.
$ 22.33 to the Working Capital Fund.

STATEMENT 4

Income and Expenditures ($)

INCOME	$	EXPENDITURES	$
Cash and Bank at end of fiscal year 1976	45,977.44	Budget 1977	306,977.67
Income corresponding to 1977 Budget	300,000.00	USA contribution, tagging	2,000.00
Other contributions	14,401.84 *	Settlement in advance A. de Boisset	9,600.00
USA contribution for tagging program	2,000.00		318,577.67
Bank interest	5,011.83 **	Cash and Bank	72,449.23
Sale of Field Manuals	31.79 **		
Non-budgeted contributions:			
a) Angola	5,380.31 **		
b) USSR	5,629.00 **		
Contribution Canada 1978	12,255.00		
Difference in currency exchange	339.69 **		
TOTAL	391,026.90		391.026,90

* Including contribution overpayment — in favor of Cuba: $ 496.79.
** To the Working Capital Fund.

STATEMENT 5

Balance Sheet at Close of Fiscal Year 1977

ASSETS		$	LIABILITIES	$
1. *Banco Exterior de España*			1. *To the 1978 Budget*	
a) Time deposit account . . .		50,000.00	*a*) From positive balance 1977 . .	13,000.00
b) Checking account		17,602.00	*b*) From the Working Capital Fund . .	10,000.00
c) c/a domestic Ptas. 308,654.89				
c/a convert. Ptas. 71,597.69				
2. *Cash on hand* Ptas. 17,220.51			2. Status of Working Capital Fund . . .	54,393.50
	Ptas. 397,473.09	4,847.23	3. In Cuba's favor 1978	496.79
		72,449.23	4. In Canada's favor 1978	12,255.00
(1 US $ = 82.00 Ptas.)				
3. Settlement - A. de Boisset (termination of employment) Appliable to 1978 Budget . . .		9,600.00		
		82,049.23		
4. Contributions pending payment .		8,096.06		
TOTAL		90,145.29		90,145.29

STATEMENT 6

Breakdown of the Working Capital Fund

	$
At the end of fiscal year 1976	47,978.55
Bank interest (1977)	5,011.83
Sale of Field Manuals	31.79
Non-budgeted contributions:	
a) Angola	5,380.31
b) USSR	5,629.00
From positive balance 1977	22.33
Difference in currency exchange	339.69
	64,393.50
TO THE 1978 BUDGET	10,000.00
BALANCE	54,393.50

International Commission for the Conservation of Atlantic Tunas — Balance Sheet at Close of Fiscal Year 1977

ASSETS			LIABILITIES		
Available:			*Acquired holdings*:		
BANCO EXTERIOR DE ESPAÑA			From previous fiscal years	$ 35,363.93	
C/A 30-31279Q		$ 17,602.00	During Fiscal Year 1977	$ 2,518.12	$ 37,882.05
In 1 month time deposit account		$ 50,000.00			
C/A 30-17329F in convertible ptas.	71,597.69				
C/A 30-17672A in pesetas	308,654.89				
Cash on hand ptas.	17,220.50				
TOTAL ptas.	397,473.08		*Working Capital Fund*:		
At 82 Ptas. per $ 1		$ 4,847.23	As shown in attachment		$ 54,393.50
TOTAL		$ 72,449.23			
Receivables:			*1978 Budget*:		
IVORY COAST		$ 8,096.06	From positive balance in 1977	$ 13,000.00	
			From the Working Capital Fund	$ 10,000.00	$ 23,000.00
Expenses paid in advance:					
Settlement — A. de Boisset (1978 Budget)		$ 9,600.00			
Equipment:			*Income received in advance*:		
Before 1977	$ 35,212.37		Contribution overpaymen by Cuba in 1977	$ 496.79	
During 1977	$ 2,400.48		1978 Canadian contribution deposited in Dec. 1977	$ 12,255.00	$ 12,751.79
TOTAL	$ 37,612.85				
Deposits up to 1977	$ 151.56				
Increase in postage meter deposit in 1977	$ 117.64				
TOTAL ASSETS		$ 128,027.34	TOTAL LIABILITIES		$ 128,027.34
Furniture ceded by Undersecretariat of Merchant Marine of Spain		$ 3,365.38	Undersecretariat of Merchant Marine of Spain, furniture ceded		$ 3,365.38

Madrid, May 5, 1978

The Executive Secretary:
O. RODRÍGUEZ-MARTÍN

Certified:
A. OLIVER Y TRUJILLO

SECRETARIAT REPORT ON STATISTICS AND COORDINATION OF RESEARCH

COM-SCRS/77/11 (Amended)

I. Statistics and Sampling

1. COLLECTION OF 1976 STATISTICS THROUGH THE NATIONAL OFFICES

The request for statistics was sent to all member countries on January 27, 1977 (Circular 1977/02). At the same time, cooperation was solicited from non-member countries which fish tunas in the Atlantic. In June, July and August progress reports and reminders in the form of letters and cables were sent to the countries which had not yet forwarded the requested data. The progress made by the national offices is shown in Tables 1, 2 and 3 (now contained in Appendix 4 to Annex 9 of the Proceedings), for Task I, Task II catch and effort and biological statistics, respectively.

a) *Task I — Statistics*

In Table 1, it is noted that the progress made during 1977 in collecting Task I data for 1976 was at approximately the same level as the previous year. It was not until mid-July that we achieved a good coverage of the total annual nominal catches for the countries making significant catches in the Atlantic Ocean. Again, this year, we experienced some delay in receiving those data collected through the Secretary of the Coordinating Working Party on Atlantic Fisheries (CWP). The solution for this problem was looked into at the Eight Session of the CWP (see section III-9).

All the Task I data collected by the Secretariat are immediately entered into the TASKI data base established in Madrid and all the data compilation is done by the computer system.

b) *Task II — Catch and effort statistics*

As observed in Table 2, for some fisheries, the reporting of 1976 Task II statistics was achieved much more rapidly in 1977, while at the time of writing this report, for many major fisheries, those data have not yet become available.

Major improvements for this year are: for the first time, catch and effort statistics are available for the sampled vessels of Ghanaian flag baitboats; Korean catch and effort statistics improved their coverage rate for their longline fisheries; Japanese baitboat data for 1970 through 1972 (which were the only missing segments of the Japanese statistics) were made available.

c) *Task II — Biological data*

The situation of the biological data is very similar to the catch and effort data. Selected countries improved in their timeliness in reporting and in the quality of their data. However, data for many major fisheries still did not become available in 1977 (see Table 3).

2. COLLECTION OF 1977 CATCH ESTIMATES

Following the decisions made at the 1976 SCRS meeting concerning preliminary estimates of catches and size samplings for the current year (Item 10, paragraph 4, Appendix 6 to Annex 8 of the 1976 Council Proceedings), on August 5, 1977, the Secretariat circulated a request for such information (Circular 1977/12). The progress made on this program is shown in Table 4. All the data, together with some data which had been collected at ports by the Secretariat as of June 30, were circulated in late September among the scientists concerned (SCRS/77/19), and the rest was presented at the SCRS meeting, November, 1977.

3. STATISTICAL WORKS IN WHICH THE SECRETARIAT HAS BEEN DIRECTLY INVOLVED DURING 1977

Following the instructions given by the Council in 1976, the Secretariat intensified its port sampling program. This has been carried out since 1974 to cover the catch and effort data and the size frequencies of the fish unloaded in the Atlantic ports by oriental longliners. The data for the catches (not landings) made in 1976 were presented in the "Statistical Series - 3" (SCRS/77/8). An explanatory note of the volume states the development of the program for 1976.

In Table 5, a summary of the program is compared for 1975 and 1976. At Las Palmas, Tenerife and St. Maarten, one local employee at each of these ports has been employed by the Secretariat as a part-time coordinator. He abstracts logbooks and effects the biological measurements of fish unloaded. In Abidjan, in 1976, sampling was conducted by a local technician paid by ICCAT and supervised by CRO. However, there was some difficulty in obtaining logbook abstracts. ICCAT depended on data provided mostly by Mr. J. H. Kim, the Korean Fisheries Attaché stationed in Abidjan. In 1977, a part-time scientist was hired to work for ICCAT on abstracting these logbooks. In Cape Town, sampling work has been conducted through a contract with the Sea Fisheries Department of South Africa.

The Secretariat has been monitoring the movement of these fleets. The catches unloaded in ports other than the above five selected ones are at present of minor quantity. However, the Secretariat is ready to move into other ports if the transshipments at these become important.

4. BIOSTATISTICAL WORK DONE BY THE SECRETARIAT

When a biostatistician was employed by the Secretariat in 1975-1976, considerable difficulty was experienced in achieving the assignments due to the following two major reasons: (1) Basic detailed data were not available at the Secretariat

for many major fisheries, and (2) the retrieval and processing system available at the Secretariat was not adequate.

While the Secretariat was establishing the data management system which was proposed by the SCRS and the Council, these two points have been well taken into consideration. Since the system is essential for further biostatistical work, a systems analyst was first hired on a temporary basis. The details of the development of the system are discussed in Sect. II of this document.

Data bases are established on two levels: one at a summarized level, and the other in detail such as by day and by actual location of the catch. The latter was prepared primarily for the biostatistical work. However, partly due to the little time available and the technical difficulties, and largely due to the shortage of funds set for 1977 for the computer work, priority was given to the summary data base.

5. SECRETARIAT'S EVALUATION OF THE PRESENT DATA COVERAGE

Table 6 summarizes the Secretariat's view on the adequacy of the data coverage, based on Sections 1 through 3 of this report and the data base established at the Secretariat. In the table, "catch per effort" refers to the catch per effort data by $5° \times 5°$ and quarterly for the longline fleets and $1° \times 1°$ and monthly for the surface fleet. "Size frequency data" refers to either actual size frequency, weighted size frequency or the catch by age groups. The total catch in the Atlantic Ocean, the catch covered by relatively adequate sampling and that covered by at least partial sampling are compared at the bottom of the table. Since the biostatistical work is not yet completed, the evaluation of biological sampling for each fleet is arbitrary. "Adequate" does not necessarily mean that the sampling is unbiased and represents all the sampling, but only refers to a substantial number of fish sampled relative to the total catch of that particular species by that fleet.

II. Processing and Dissemination of Statistical Information

1. PROCESSING DATA

Since the Secretariat established the data bases with the INFONET system (for details see COM-SCRS/77/12 —which is attached herewith as an Appendix— and SCRS/77/16), we intend to process all the data through this system. However, in 1977, data collected at the ports by the Secretariat were processed at CIBERNOS by an IBM computer. This is due to the lower cost of processing at CIBERNOS for a simple job with a large volume of data, and programs had been already written for this computer.

On the other hand, the "Statistical Bulletin", Vol. 7 (Task I data) was prepared through the INFONET system.

The catch size compositions were the first major outputs of the new data management system. This year, a pilot plan consisting only of yellowfin data for 1975 was executed. The results are reported in SCRS/77/18 together with an explanation on processing procedures.

2. DISSEMINATION OF THE INFORMATION AND PUBLICATIONS

a) *Quick estimates*

With assistance from the national scientists, in April the Secretariat was able to issue the estimates of tuna catches made in 1976 by major fisheries. Reference should be made to Section I-2 of this report for the 1977 estimates.

b) *Statistical Bulletin*

The first formal issue of the Statistical Bulletin (Vol. 7) was circulated in September 1977, and the final version in February, 1978. The circulation of the first issue was one month earlier than in 1976.

Some slight changes were adopted in the format of the tables in this year's edition, with the intention of making the Bulletin more convenient for the users. These include: adding annual sub-totals in Part IV, and some other minor changes. Part V, containing billfish statistics by species is added. Previously those were reported together as "billfishes", due to the very limited space available in the table, and to the inadequate availability of information on billfishes. However, the recent increasing interest in billfish stocks warranted the reporting of the figures by species, even if incomplete.

c) *Data Record*

Volume 9 which contains all Task II data presented at the 1976 SCRS meeting and the information received immediately afterwards was issued in February, 1977. Volume 10, containing all such statistics received from January 1 through August 31, 1977 was issued in October, 1977.

Since the data bank is being completed, the Secretariat is considering changing the format in which the Data Record is issued. Starting with the second issue in 1978 (i.e. Volume 12), this series will include processed summary data, instead of all the data as received from various countries in various formats. For further details see SCRS/77/17.

d) *Collective Volume of Scientific Papers*

Volume VI (1 and 2) consisting of all the papers submitted at the 1976 SCRS meeting and whose inclusion was approved by the authors was issued in March 1977.

e) *Statistical Series*

Volume 1 of the series (June 1976) contained the catch and effort and size frequency data which were collected by the Secretariat at transshipping ports from oriental longliners in 1974 and 1975. The data were processed by the year of landing rather than by the year of catches. Consequently, Volume 1 did not include the data on the catches made toward the end of 1975 (since those were

unloaded in 1976). The Secretariat modified the computer program accordingly and reprocessed the entire data which correspond to the catches made during 1975. Those were issued as Volume 2 of the Statistical Series in April 1977.

Volume 3 of the series was issued in September 1977 and contains similar information for the catches made in 1976. The data could not be published earlier since many boats which made the catches in 1976 did not return to the ports until May or June 1977. Therefore, the 1976 data did not become complete until August 1977.

Volume 3 includes an important new improvement — i.e. the addition of a table containing catch and effort data by *sampling area*. In past issues, catch and effort data were presented only by $5° \times 5°$ and by monthly period. This time-area stratification does not correspond to that for size frequency data (tabulated by sampling area and quarterly period). In the new table, however, the catch and effort data are compiled in the same time-area strata as the biological data so that the users can correlate the two without much difficulty.

III. Progress made by the Secretariat as to the other Assignments of the 1976 SCRS Meeting

1. ESTABLISHMENT OF A COMPUTERIZED DATA CENTER

See reports COM-SCRS/77/12 (Appendix), SCRS/77/16, 17 and 18.

2. SAMPLING MANUAL FOR EACH SAMPLING PORT

The requirements and criteria for the collection of statistics and biological sampling have changed considerably since the first edition of the Field Manual was issued in 1972. This is due to the following reasons: the scientists' requirements for data have changed; the stock assessment techniques have been improved and more detailed data required; as a result of biostatistical studies, we are in a better position to evaluate the techniques and criteria for sampling; the Secretariat has adopted the ADP system; etc.

Accordingly, the corresponding sections of the Field Manual were redrafted and are presented as SCRS/77/15.

3. ADVICE ON THE ADEQUACY OF SAMPLING FOR EACH FISHERY/SPECIES/GEAR/PORT/FLAG

See section I-5 of this report and Draft Field Manual (SCRS/77/15).

4. PLANNING FOR THE INTERNATIONAL SKIPJACK YEAR PROGRAM

At the 1976 meeting, the SCRS recommended that the Commissioners hire a program planner to draw up a fundamental research plan for the proposed International Skipjack Year Program. However, no financial arrangements were made for such and instead, the Secretariat was asked to serve as Program Planner.

In early 1977, French-ORSTOM scientists offered to collaborate with the Secretariat, in drafting a part of the basic plan. Besides, the SCRS Chairman, called a meeting of scientists in August, in order to accelerate the drawing up of a final draft plan for the program.

In the meantime, the Secretariat tabulated a matrix which lists objectives and possible techniques to be considered for the skipjack program. Then many specialists were asked for their advice on the possibility of applying these techniques to the research of Atlantic skipjack. Those specialists included scientists working in the Pacific or even with species other than tuna who have good knowledge and experience in those subjects and/or techniques. Their views were also requested concerning the magnitude of research needed in order to obtain meaningful results, and how much time-vessels-men-funds would be required.

Fortunately, many experts responded to these requests and at the time of the August meeting much material was available for the participants to consider. Two general documents, one prepared by ORSTOM scientists and the other by U.S. NMFS scientists, were used as a basis for the draft. This (COM-SCRS/77/21 — Appendix 6 to Annex 9 of the Proceedings) was circulated in September, with a letter from the SCRS Chairman, among the Commissioners and scientists for their consideration.

5. IMPROVEMENT OF CATCH STATISTICS BY MINOR TUNA FISHING COUNTRIES

See Section I-1-a and Section III-9.

6. STUDY OF A SYSTEM TO ESTIMATE REJECTS BY FISHING BOATS

Although this subject was not directly assigned to the Secretariat, we requested countries and scientists concerned to take the proper actions to obtain discard statistics. Ghana responded that a Government Order was issued to all the tuna fleets fishing from Tema to keep discard statistics.

7. TRAINING COURSE ON STATISTICS AND SAMPLING

See Administrative Report and COM-SCRS/77/23.

8. YOUNG BLUEFIN TUNA TAGGING

See Section IV of this report.

9. COORDINATING WORKING PARTY FOR ATLANTIC FISHERIES STATISTICS

The CWP, of which ICCAT is a member, held its Eighth Session at ICNAF Headquarters, Dartmouth, Canada on August 17-24, 1977. The Assistant Executive Secretary represented ICCAT. The Report is presented as SCRS/77/14.

During the Session, the discussions were centered around the ways of coordinating and standardizing criteria concerning the collection of Atlantic fisheries statistics among the existing regional fishery agencies.

ICCAT has been dependent on the CWP Secretary for collecting statistics from minor tuna fishing countries, and there have been some problems in obtaining those data on a timely basis. A considerable discussion took place on this point and a new procedure was established between FAO and ICCAT so that ICCAT can receive the data more promptly through FAO.

The following section of the report well deserves to be quoted here (SCRS/77/14):

> "11.1.2. It was agreed, however, that there was a need for a worldwide coordination of agencies responsible for tuna fisheries, having regard to the very high mobility of both the fleets and the resource. The CWP suggested, therefore, that a Coordinating Working Party on tuna statistics should be set up on a world basis, and noted that the achievement and experience of ICCAT would provide a valuable foundation for the new body."

ICCAT, jointly with ICSEAF, invited the next session of CWP to be held in Madrid, in June-July, 1979.

IV. Tagging programs

1. YOUNG BLUEFIN TUNA TAGGING PROGRAM

In 1975, the SCRS and the Commission established a trust fund at the Secretariat to activate a joint international tagging plan for young bluefin tuna. It was recommended to start the plan in the Bay of Biscay. The U.S. contributed $ 2,000 to the fund during 1976. Accordingly, the Secretariat invited concerned countries to formulate a joint tagging plan in this area, but no progress was made in 1976.

At the 1976 meeting, the SCRS recommended that the Secretariat contact the Moroccan Government and various Mediterranean countries to organize a joint tagging cruise in Moroccan waters and/or in the Mediterranean. Consequently, a meeting was held at Casablanca, Morocco, in which Moroccan officials and scientists, Spanish scientists and the Assistant Executive Secretary participated to generate a plan. A contract was made between the Moroccan Government and ICCAT through which the former provided a research vessel and the latter provided the operating funds and the scientists.

The tagging was conducted throughout July and 121 bluefin (age 1) were released. Scientists from the U.S., Spain and Morocco participated in the cruises at their own expense. The cruise report is presented as COM-SCRS/77/22.

2. TAGGING LOTTERY

This year, the lottery was held at the Fundación General Mediterránea, Madrid, on March 17. Two $ 300 prizes were awarded to the captain (believed to be Japanese) of a Panamanian longliner, and the captain and crew of a U.S. purse seiner.

3. TAGGING MATERIALS PROVIDED BY THE SECRETARIAT

The Secretariat has provided the countries which started tagging on a small scale with the materials needed. During 1977, we sent tags and needles to Brazil, Morocco and Spain.

As the present stock of plastic dart tags is getting low, ordering a new shipment is being considered. Since some new materials resistant to storage under extremely cold temperature have recently been developed, those would be chosen for the next order.

(Tables 1-3 are included in Appendix 4 to Annex 9 of the Proceedings.)

Table 4. Progress made in the collection of data for the first 6 months of 1977 (as of Sept. 30, 1977).

	Total catch (Task I)	*Catch & Effort (Task II)*	*Biological data*
Angola			
Brazil	LL	LL	
Canada		Reported no Fisheries	
China (Taiwan)	LL *		
Cuba			
France			
FIS			
Ghana	BB	BB	BB - YF, BE, SJ
Italy			
Japan	All		
Korea	LL, BB	LL	LL - YF, BE, ALB
Morocco	All	Catch by 1°×1°, month	
Norway		Reported no Fisheries	
Portugal	All	Catch by 1°×1°, month	
South Africa	All	All	PS - YF, SJ
Spain			
U.S.A.	All		
U.S.S.R.			
Venezuela			

* Secretariat estimates based on port sampling program.

Table 5. Summary of Secretariat port sampling Program — 1975 - 1976

	KOREA & PANAMA		TAIWAN		TOTAL	
	1975	1976	1975	1976	1975	1976
I. No. of valid logs abstracted/ Estimated no. of trips	196/220 (89 %)	214/220 (97 %)	115/230 (50 %)	190/270 (70 %)	311/450 (69 %)	404/490 (82 %)
II. Logged Catch/ Official Statistics - 1000 MT (Coverage in %)						
YF	13.3/15.3 (87)	11.1/11.2 (99)	1.0/2.4 (43)	.7/1.7 (42)	14.3/17.7 (81)	11.8/12.9 (91)
BE	9.4/10.2 (92)	5.9/6.7 (88)	1.8/4.0 (47)	2.0/3.3 (61)	11.2/14.2 (79)	7.9/10.0 (79)
ALB	2.4/6.1 (39)	8.6/8.7 (99)	10.3/21.5 (48)	20.4/29.4 (69)	12.7/27.6 (46)	29.0/38.1 (76)
TOTAL *	28.5/33.2 (86)	30.7/29.2 (105)	14.0/29.4 (48)	24.8/36.6 (68)	42.5/62.6 (68)	55.5/65.8 (84)
III. No. of samples						
YF	90	183	13	19	103	202
BE	76	139	10	22	86	161
ALB	45	140	89	241	134	381
TOTAL	211	462	112	282	323	744
IV. No. of fish measured						
YF					5 201	9 926
BE					4 137	8 232
ALB					7 177	19 829
TOTAL					16 515	37 987

* Includes other species.

Table 6. Review of data availability for major fisheries 1975-1976 (as of Dec. 1977)

(1) Adequate coverage (2) Partial coverage (3) No coverage

Species / Area	Gear	Country	1976 Catch (MT)	1976 Catch %	Catch/Effort [1] 1976 Rating	Catch/Effort [1] Coverage %	Biological [2] No. fish measured	Biological [2] Rating 76	Biological [2] Rating 75	Sources and Remarks
Bluefin tuna										
ATLANTIC										
	LL.									
		Japan	4 200	42	(1)	90	4 838 **	(3)	(1)	FSFRL
		U.S.S.R.	?		(3)		—	(3)		
	Surf. (incl. sports)									
		U.S.A.	1 876	19	(2)		3 705	(1)		NMFS
		Spain	1 341	13	(2)		—	(3)		
		Canada	846	8	(1)	100	1 987	(1)		National scientists
		Portugal	628	6	(2)	100	—	(3)		Nat. sci. — No effort data
		Norway	413	4	(3)		—	(3)		
		Morocco	331	3	(2)		—	(3)		Nat. sci. — No effort data
		France	267	3	(3)	90	—	(3)		
		Others	102	1	(3)		—	(3)		
	TOTAL CATCH		10 004		10 004	100 %	10 004	100 %		
	SUM (1)				5 046	50	6 922	69		
	SUM (2)				4 176	42	0	—		
	SUM (3)				782	8	3 082	31		
MEDITERRANEAN										
	LL.									
		Japan	1 000	7	(1)	90		(3)	(1)	FSFRL
	Surface									
		Italy	9 672	67	(3)		573 **	(3)	(2)	National scientists
		France	3 086	22	(2)		—	(3)		

	Spain	?		(3)		—	(3)	
	Yugoslavia	562	4	(3)		—	(3)	
	Others	26	+			—	(3)	
TOTAL CATCH		14 346		14 346	100 %	14 346	100 %	
SUM (1)				1 000	7	1 000	7	
SUM (2)				3 086	22	9 672	67	
SUM (3)				10 260	72	3 674	26	
Albacore								
LL.								
	China (Taiwan)	29 437	40	(1)	40** - 80*	12 050 *	(1)	T.U., *Secretariat
	Korea & Panama	8 755	12	(1)	50 - 100*	131+7000 *	(1)	Nat. sci., *Secretariat
	Japan	1 500	2	(1)	90	9 669 **	(3) (1)	FSFRL
	Brazil	407		(1)	100	7 868	(1)	I. P. Sao Paulo
	U.S.S.R.	?		(3)	0	0	(3)	
Surface								
	Spain	26 860	36	(1)	0	168 **	(1) [3]	
	France	5 958	8	(1)	Adeq.	?	(1) [3]	CNEXO
	Italy	560	1	(3)	0	0	(3)	
	Portugal	504	1	(2)	100	0	(3)	Nat. sci. — No effort data
	Others	134		(3)				
TOTAL CATCH		74 115	100	74 115	100 %	74 115	100 %	
SUM (1)				73 447	99	72 917	98	
SUM (2)				638	1	0	—	
SUM (3)				560	1	1 198	2	

* By an organization other than the flag country.
** 1975 data.
[1] Sums of (1), (2), (3) are based on 1976 data adequacy.
[2] Sums of (1), (2), (3) are based on 1975 data adequacy.
[3] Age composition of Franco-Spanish catch available for 1975.
SUM (1) = Catches adequately covered: in MT and its percentage to the total catch.
SUM (2) = Catches partially covered: in MT and its percentage to the total catch.
SUM (3) = Catches not covered: in MT and its percentage to the total catch.

Table 6 (continued) For footnotes, see preceding page

Species / Area	Gear	Country	1976 Catch (MT)	1976 Catch %	Catch/Effort [1] 1976 Rating	Catch/Effort [1] Coverage %	Biological [2] No. fish measured	Biological [2] Rating 76	Biological [2] Rating 75	Sources and Remarks
Yellowfin										
	LL.									
		Korea & Panama	11 211	10	(1)	50 - 100*	1668+9100 *		(1)	Nat. sci., *Secretariat
		Japan	4 000	4	(1)	90	11 047 **	(3)	(1)	FSFRL
		Cuba	3 000	3	(1)	100	7 109 **	(3)	(1)	National scientists
		China (Taiwan)	1 736	2	(1)	40** - 80*	940 *		(1)	T.U., *Secretariat
		Brazil	578	1	(1)	100	16 756		(1)	I. P. Sao Paulo
		U.S.S.R.	?		(3)	0	—		(3)	
	Surface									
		FIS	47 989	43	(1)	100	? **	(3)	(1)	ORSTOM, Brest
		Spain	35 173	32	(3)	0	—		(3)	
		U.S.A.	2 300	2	(1)	100	327		(1)	NMFS
		Japan	2 225	2	(1)	100	350* - 292**	(3)	(1)	FSFRL, *FRU
		Morocco	1 656	1	(1)	100 *	—		(3)	*ORSTOM, Brest
		Cuba	600	1	(3)	0	—		(3)	National scientists
		Ghana	453	+	(2)	0	200		(1)	FRU
		Korea & Panama	365	+	(1)	60	299 *		(1)	Nat. sci., *FRU
		Portugal	313	+	(2)	100	—		(3)	Nat. sci. — No effort data
		Others	445	+	(3)	0	—		(3)	
	TOTAL CATCH		112 044	100	112 044	100 %	112 044		100 %	
	SUM (1)				75 060	67	73 857		66	
	SUM (2)				766	1	0		—	
	SUM (3)				36 218	32	38 187		34	
Skipjack										
	Surface									
		Spain	18 472	26	(3)	0	—		(3)	
		FIS	18 393	26	(1)	100	?		(1)	ORSTOM, Brest, Dakar

	Japan	15 042	21	(1)	100	527** - ?*	(1)	FSFRL, *FRU
	Ghana	8 167	12	(2)	30	?	(1)	FRU
	Cuba	3 000	4	(3)	0	—	(3)	
	U.S.A.	2 422	3	(1)	100	321	(1)	NMFS
	Portugal	2 223	3	(2)	100	—	(3)	Nat. sci. — No effort data
	Korea & Panama	1 974	3	(1)	100	350 - ?*	(1)	Nat. sci., *FRU
	Morocco	889	1	(1)	100 *	—	(3)	*ORSTOM, Brest
	Others	281	+					
	TOTAL CATCH	70 863	100	70 863	100 %	70 863	100 %	
	SUM (1)			38 720	55	45 998	65	
	SUM (2)			10 390	15	—	—	
	SUM (3)			21 753	31	24 865	35	
Bigeye								
	LL.							
	Japan	9 500	27	(1)	90	49 232 **	(3) (1)	FSFRL
	Korea & Panama	6 747	19	(1)	50 - 100*	486 - 6950 *	(1)	Nat. sci., *Secretariat
	China (Taiwan)	3 274	9	(1)	40** - 80*	1 100 *	(1)	T.U., *Secretariat
	Cuba	1 300	4	(1)	100	—	(3)	National scientists
	Brazil	162	+	(1)	100	1 957	(1)	I. P. Sao Paulo
	U.S.S.R.	?		(3)	0	—	(3)	
	Surface							
	Spain	5 740	16	(3) **	0	—	(3)	Canaries, no area
	Japan	3 588	10	(1)	100	44** - 1250*	(1)	FSFRL, *FRU
	Portugal	2 107	6	(2)	100	—	(3)	Nat. sci. — No effort data
	FIS	1 030	3	(3)	0	—	(3)	
	Korea & Panama	810	2	(1)	60	450 *	(1)	Nat. sci., *FRU
	Ghana	664	2	(2)	30	130	(1)	FRU
	Others	200	1				(3)	
	TOTAL CATCH	35 122	100	35 122	100 %	35 122	100 %	
	SUM (1)			25 381	72	24 745	70	
	SUM (2)			2 771	8	—	—	
	SUM (3)			6 970	20	10 377	30	

Appendix

PROGRESS MADE ON THE CREATION OF AN AUTOMATIC DATA MANAGEMENT SYSTEM (DATA BANK) AT ICCAT HEADQUARTERS

COM-SCRS/77/12

I. Selection of system

At the 1976 ICCAT meetings, the SCRS recommended and the Council concurred that an automatic data management system should be created at the Secretariat for Atlantic tuna statistics. In early 1977, the Secretariat contacted a few commercial computer firms in Madrid to compare the systems offered. After a careful study of the facilities, the characteristics of the systems, the costs of running the computer, etc., the INFONET system of ENTEL/Ibermatica was chosen. A formal contract between ICCAT and ENTEL was signed in early February.

II. Description of the system

The INFONET system is facilitated with a UNIVAC 1108 computer. The terminal machine (Texas Instruments 742 "Programmable") was purchased from the U.S. and delivered to the Secretariat in June. Also, a telephone line was obtained for the terminal. Details of the hardware of the system are described in SCRS/77/16.

The computer is located at the INFONET data processing center to which the terminal, established at ICCAT headquarters, is connected via a regular telephone circuit. All the data bases are stored on tapes at the computer center which can be brought up to a disk when someone wishes to use them. Through our terminal, we can input, update, and drop data; retrieve desired information easily and promptly; write programs; let the computer process the data; and receive the output. The system is very flexible.

Data entry and updating can be done:

i) directly by using the terminal keyboard;
ii) first by entering them into cassette tape at the terminal; and then by sending them to the computer through telephone line;
iii) by computer cards prepared by an outside contract; or,
iv) directly from a loaded magnetic tape.

Reporting of a large amount of data is generally done by the high speed printer located at the computer center, rather than at our terminal at ICCAT Headquarters. Presently, no plotter is available.

III. Creation of data bases

The INFONET system had already been in use by NMFS, La Jolla, for Atlantic tuna statistics. The Secretariat invited Mr. A. L. Coan from the above-mentioned laboratory to Madrid for a one week period in late February, 1977. At the same time NMFS generously provided us with their data bases. Mr. Coan brought these bases to Madrid and assisted us in duplicating them at INFONET Madrid. In addition, Mr. Coan gave full instructions to the INFONET and ICCAT staff on their usage. The Commission is very grateful for the assistance given by NMFS, which saved the Commission considerable time and expense during the initial period of development.

Afterwards, many corrections and modifications were made on these data bases in order to adjust them to our needs. For example, a few key elements were added; data bases were transformed into ALADIN language from DML; two data bases for size frequencies were combined into one; etc.

Also, the Secretariat received much additional data from various laboratories which were added to the data bases. Those laboratories include: CRO/Abidjan, CRO/Dakar, CNEXO/Brest, FSFRL/Shimizu, NMFS/La Jolla. We are very grateful for all the assistance given to us while creating the data bases.

At the time of writing this report, most of the summarized data (processed catch/effort and biological information) are loaded in the bases, except for some 1976 data and all the 1977 data.

On the other hand, much of the detailed data (raw data or data at a lower level of processing) are still not entered in the base. This work would not require much time but a great expense due to the huge amount of data involved. For this reason, we gave first priority to the processed data which are essential for reporting summarized catch compositions as required by the SCRS.

IV. Description of data bases

All data bases are created in ALADIN language which was developed by the INFONET system. The flexible and simple language facilitates inputting, updating and retrieving the data.

The following four data bases have been created:

1. TASKI Data Base — containing all Task I nominal catch statistics.
2. CATEFF Data Base — containing all Task II catch and effort by area-time strata.
3. SIZE Data Base — containing size frequencies.
4. ACCTDB Data Base — containing inventory of all the data in the CATEFF and SIZE data bases.

All the data are keyed by country, year, gear, area, time, species, etc., for easy retrieval by a combination of key elements.

More detailed technical aspects of the data bases and the system are presented in SCRS/77/16.

V. Use of the data bases by other organizations

The data bases can be reached by a telephone line, inside or outside Spain. Anyone who has a proper modem and terminal, the correct telephone number and the ICCAT users identification codes can use the bases. However, the following provisions have to be considered:

1. *Who pays the bill for the computer time and the cost of having data bases on line?*

If the users are supposed to pay these costs, proper billing procedure should be established with the system — each user having his own identification code.

2. *Protection of data.*

Some data might have to be bound to protect their privacy.

3. *Updating and loading data.*

In order to avoid confusion, the general users should be entitled to only reading data. Changes and updating of data should only be performed by the Secretariat.

4. *Phone/connection costs*

The countries near Spain have much more advantage since the unit-price for telephone calls is much cheaper for them. The users have to pay at least the telephone connection time which is generally high. Therefore, unless a small amount of work is requested promptly, it would be more economical and easier for national scientists to write, cable or even call the Secretariat to run certain jobs for them, rather than work directly on the data bases themselves.

VI. Reporting and future plans

The first reporting was made on yellowfin for 1975. The results are submitted in SCRS/77/18. If the reporting format adopted is acceptable, the Secretariat intends to extend this to: yellowfin data for previous years, skipjack data, albacore data, bluefin data, bigeye data, in that order.

Also the creation of the data bases certainly facilitates the biostatistical work being assigned to the Secretariat, assuming that the funds available for data processing are sufficient for both objectives.

The new data management system has added much data maneuverability to the Secretariat. Very careful planning for data management procedure (collection, exchange, processing, archive and dissemination of data) would be essential for the success of ICCAT work. In light of this new development at the Secretariat, we presented in SCRS/77/17 a proposal on the new data management procedure which can be employed by ICCAT in the future.

by *Assistant Executive Secretary*

CHAPTER II
Records of Meetings

PROCEEDINGS OF THE FIFTH REGULAR MEETING OF THE COMMISSION

Madrid, Spain, November 16-22, 1977

Table of Contents

Opening Plenary Session — November 16, 1977

Item 1. OPENING OF THE MEETING

1.1. The Commission held its Fifth Regular Meeting at the Hotel Luz Palacio, Madrid, under the chairmanship of Dr. I. Malick Dia (Senegal). He introduced Mr. F. Bragado (Spain), Director General of Sea Fisheries.

1.2. Mr. F. Bragado welcomed all the delegates and scientists from member and observer countries. A special welcome was extended to the U.S.S.R. and the Republic of Gabon, which became members during the inter-sessional period. He reviewed the progress made by the Commission in respect to the conservation of Atlantic tunas, since it became active in 1970. He noted that a special program for the International Skipjack Year would be proposed at this meeting and ex-

pressed his strong interest in the development of this very important research program.

1.3. The Chairman, Dr. I. Malick Dia, formally opened the meeting and welcomed all the delegates. He extended a particularly warm welcome to the U.S.S.R. and the Republic of Gabon. He observed that the entrance of these two new member countries symbolizes the characteristic of the Commission, whereby a country with a highly industrialized fishing fleet and a coastal country developing new fisheries are able to co-exist.

The Chairman expressed his regret at not being able to chair the Fourth Regular Meeting of the Council (Madrid, 1976). He also expressed his regret that Mr. K. Yonezawa, the present Chairman of the Standing Committee on Finance and Administration (STACFAD) was unable to attend this session. He commended Mr. Yonezawa's excellent chairmanship shown in the past years.

He also highly commended the work achieved by the scientists and the Chairman of the SCRS, Dr. B. J. Rothschild (U.S.A.), in conducting studies on tuna. He expressed his satisfaction concerning the results of the election of the new SCRS Chairman, Mr. A. Fonteneau (France).

1.4. The delegate from the U.S.S.R. stated, on behalf of his country, his appreciation for the kind welcome extended by the Commission and also his pleasure at the Soviet Union's becoming a member of the Commission. He indicated that the U.S.S.R. is confident that the Commission is able to develop general management policies. His statement is herewith attached as Annex 3.

1.5. The delegate from France welcomed the new members and expressed his satisfaction that a French scientist was elected Chairman of the SCRS. He also highly commended the achievement made by the SCRS in scientific research under the chairmanship of Dr. B. J. Rothschild (U.S.A.).

1.6. The observer countries present at the opening ceremony — Argentina, Colombia, Lybia, Mexico, Nigeria, Panama, Poland, Taiwan and Zaire — were requested to make a few comments. The international organizations attending as observers (EEC, ICSEAF, IOFC, IPFC, GFCM, IWC, IATTC) expressed their appreciation at being invited to the meeting and wished to maintain a close relationship with ICCAT, as has been done in the past.

The observer from the European Economic Community (EEC) stated that his organization wished to apply for membership to ICCAT in the near future; and the Chairman considered that the legal points concerning this matter could be studied.

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

2.1. The Commission adopted the Tentative Agenda, which was circulated 90 days before the meeting, without any changes (herewith attached as Annex 1).

2.2. The Commission noted that the SCRS met during the preceding week and that the Standing Committee on Finance and Administration (STACFAD), the four Panels, and the Working Group on International Inspection are scheduled to meet during this week.

2.3. Japan regretfully reported that Mr. K. Yonezawa (Japan), the Chairman of the Standing Committee on Finance and Administration, was unable to attend the meeting this year, and asked that a qualified person substitute for him during the session. The Chairman requested Mr. C. J. Blondin (U.S.A.) to act as the Chairman of the Committee during the session and Mr. Blondin accepted the task.

2.4. The Commission decided that Agenda Items 4 to 12, 22, 27, 28 and 29 should be referred to the Standing Committee on Finance and Administration.

Item 3. ADMISSION OF OBSERVERS

3.1. The Chairman reviewed the policy by which invitations to observers have been sent. The Commission felt that this policy is satisfactory and *recommended* that the Secretariat follow the same criteria as other years, until otherwise decided by the Commission.

3.2. All observers attending the meeting were admitted and welcomed. (See Annex 2, List of Participants.)

Item 13. REPORT OF THE FOURTH REGULAR MEETING OF THE COUNCIL

13.1. The Executive Secretary stated that the Report of the Meeting of the Council (Biennial Report, 1976-77, Part I) was circulated in the three official languages of the Commission. Among the recommendations made by the Council, he specifically listed the following:

a) Progress made on the study of "International Inspection".
b) Financial modifications made.
c) Various recommendations made concerning research and statistics; the data bank project, the revision of the Field Manual, the port-sampling program, Training Course, the International Skipjack Year Program.

Second Plenary Session — November 16, 1977

Item 14. REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)

14.1. Dr. B. J. Rothschild (U.S.A.), Chairman of the SCRS, presented the Report of the Standing Committee on Research and Statistics (Annex 9) and summarized the scientific findings. He reviewed the satisfactory development in statistics and the understanding of the status of the stocks achieved by the scientists, the Secretariat and the Commission during the past years. Attention was drawn to various studies made on stock conditions and possible management methods. The importance of the International Skipjack Year Program, as proposed by the SCRS, was also emphasized by him.

14.2. Dr. Rothschild drew the attention of the Panels to Sections 6, 7 and 8 of the SCRS Report, where various recommendations can be found. Particular

mention was made of the problem of correctly reporting the quantity of small yellowfin and small bigeye tunas caught, and of the complexity of the problems concerning bluefin tuna.

14.3. The Chairman of the Commission, Dr. I. Malick Dia (Senegal) noted the major achievements made by the SCRS and thanked the Committee members for the hard work done under Dr. Rothschild's excellent chairmanship.

14.4. The delegate from Ivory Coast expressed concern about the difficulties which certain countries have been experiencing in implementing the yellowfin size limitation effectively.

14.5. The delegate from France indicated that a 3.2 kg size limit should be extended to bigeye in order not to nullify the effects of the size limit for albacore.

14.6. The Chairman also expressed his concern on the problems of the effective implementation of the yellowfin regulation. Japan, U.S.A., Spain and Korea reported some improvement in the implementation of the regulations and wished to hold more detailed discussions when the pertinent Panels met.

14.7. Many countries noted the excellent work achieved by the scientists and emphasized the importance of the proposed International Skipjack Year Program.

14.8. The Commission formally accepted and adopted the Report of the Standing Committee on Research and Statistics and emphasized the importance of maintaining a high level of studies. The Report is attached to the Proceedings as Annex 9.

Third Plenary Session — November 21, 1977

The Executive Secretary announced that Dr. Malick Dia, the Commission Chairman, had to leave due to urgent business in Senegal. He left a message thanking all the Commission members for the cooperation given to him during his two biennial terms in office. The delegate of Senegal also presented Dr. Dia's regrets for not being able to attend the last part of the Commission meeting, and his promise of full support to the Commission in the future.

The Second Vice-Chairman, Mr. E. B. Young (Canada) presided over the rest of the plenary sessions.

Item 17. REPORTS OF PANELS 1-4

17.1. The reports of the meetings of Panels 1, 2, 3 and 4 were presented. All the reports (herewith attached as Annex 4) and the pertinent recommendations were carefully reviewed and adopted by the Commission.

Item 20. OTHER POSSIBLE REGULATORY MEASURES TO BE CONSIDERED

20.1. The report of the special Joint Meeting of Panels 1 and 4, which was held during the past days to discuss the possibility of adopting a size limitation for bigeye tuna, was presented. The Commission reviewed the report and accepted it.

20.2. The U.S. delegate observed that there had been considerable discussions during the Panel meetings concerning the matter of adopting a bigeye minimum size regulation. He believed that extensive studies can be made on the economical aspects of this problem and its relationship to the biological facet by scientists and that at next year's meeting, very serious consideration should be given to the matter in question.

20.3. The U.S. proposal was unanimously supported by the Commission members.

20.4. France, while supporting the proposal, hoped that a definite decision can be reached at next year's meeting on this point and stated that the study on the economical impact should not only be on a unilateral basis but encompass the whole fishery community including the yellowfin fishery. This view was strongly supported by Senegal and Ivory Coast. They felt that such economic studies should not be for the interest of a particular country but for the whole Atlantic fishing society.

20.5. Japan supported the U.S. proposal and showed their interest in economic studies on the impact of such regulation on the skipjack fishery.

20.6. Responding to Portugal's proposal to authorize the next Council meeting to make decisions on the bigeye regulatory measures, the U.S. suggested the possibility of holding a Special Meeting of the Commission in 1978. The Chairman postponed further deliberation on this matter to Agenda Items 27 and 29.

20.7. After these deliberations, the Commission adopted the Report of the Joint Meeting of Panels 1 and 4 and *recommended* that the SCRS pay attention to those studies proposed and that the Commission give serious consideration to this matter next year.

20.8. Among the recommendations made by Panels 1 through 4, the Commission concurred, in particular, with the recommendation made by Panel 2 that the current bluefin tuna conservation measures be extended for an additional two-year period (i.e. up to August 10, 1980), and to maintain the present 6.4 kg size limit on bluefin tuna .

20.9. Dr. Gulland, as the observer from the Indian Ocean Fishery Commission (IOFC) stated that at a recent meeting of IOFC, a question was raised as to how overall fishing efforts of the tuna fisheries in the Indian Ocean can be controlled while protecting the small scale fishery of the coastal countries and allowing for its development. Presently, the major part of the tuna fishing effort in the Indian Ocean is that of the longline fleet from non-coastal countries. He sought advice in the meeting or elsewhere and the Commission noted this problem.

Item 22. INTERNATIONAL SKIPJACK YEAR PROGRAM

22.1. Dr. G. Sakagawa (U.S.A.), the Convener of the Sub-Committee on the Skipjack Program explained the proposal of the International Skipjack Year Program. He referred to Item 11 of the 1977 SCRS Report (Annex 9) and its Appendix 5, as well as to document COM/77/21.

22.2. The Commission member countries unanimously supported the Program. Many countries have indicated their willingness to contribute to the program by sending some research boats and scientists. However, France indicated that it had some reservations regarding the financial aspects of the program and preferred to discuss this matter at the STACFAD meeting. This view was shared by a few other countries.

Item 23. OTHER ACTIVITIES IN RESEARCH AND STATISTICS

23.1. All the recommendations made by the SCRS and Panels regarding future activities in research and statistics were studied and confirmed by the Commission.

Ivory Coast stated with regret that the Ivorian delegation had to leave before the close of the meeting and asked the Commission that should any vote be taken during the remainder of the Session, Ivory Coast's should be counted with the majority.

Final Plenary Session — November 22, 1977

Item 16. REPORT OF THE WORKING GROUP ON INTERNATIONAL INSPECTION

16.1. The Report of the Working Group was presented by its Chairman, Mr. R. Garcés Velazco (Cuba). After a careful review, the Commission adopted the Report and *concurred* with all recommendations made by the Group in the Report. The Report is attached as Annex 5.

Item 19. STATUS OF THE PROPOSALS ADOPTED BY THE COMMISSION REGARDING: a) YELLOWFIN, b) BLUEFIN

19.1. The Commission noted that this agenda item was considered in detail by the Working Group on International Inspection during its deliberation and the results are presented in its Report (Annex 5). No further comments were made.

Item 21. WAYS TO RENDER EFFECTIVE THE PROPOSALS ADOPTED: INTERNATIONAL INSPECTION

21.1. The Report of the Working Group on International Inspection was studied in relation to this agenda item. The Commission expressed satisfaction on the progress made by the Working Group regarding this matter.

21.2. The Cuban delegate stated that he believed that port inspection is the most effective scheme. His statement to this effect is included in the Proceedings (Annex 7).

Item 15. REPORT OF THE STANDING COMMITTEE ON FINANCE AND ADMINISTRATION (STACFAD)

15.1. The STACFAD Report was presented. The Commission reviewed the Report with particular attention to the following items on the Commission Agenda:

Item 4. *Panel membership*
" 5. *Administrative Report*
" 6. *Relations with other organizations*
" 7. *Commission publications*
" 8. *Auditor's Report 1976*
" 9. *Financial status 1977*
" 10. *Working Capital Fund*
" 11. *Estimated Budget 1978-1979*
" 12. *Member country contributions 1978-1979*
" 22. *International Skipjack Year Program*
" 27. *Date and place of the next meeting of the Council*
" 28. *Items to be considered by the Council at its next meeting*
" 29. *Date and place of the next meeting of the Commission*

15.2. The Report, together with all the pertinent recommendations it contained concerning the aforementioned items was adopted. The Report is attached to the Proceedings as Annex 6.

Item 29. DATE AND PLACE OF THE NEXT MEETING OF THE COMMISSION

29.1. While reviewing the STACFAD Report, the Commission recognized that a special Commission meeting was proposed by the Committee for 1978. Consequently, the place and time of the regular meeting of the Commission scheduled in 1979 was not discussed by the Committee at this time.

29.2. The Commission *decided* that, in principle, the Sixth Regular Meeting of the Commission will be held during one week starting on November 14, 1979, and the scientific session during the preceding week. However, the Commission *agreed* that the decision on the place and final date of the meeting be made at the Special Meeting of the Commission scheduled in 1978.

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

18.1. Since no subsidiary bodies had been appointed by the Commission, no reports were presented.

Item 24. ELECTION OF THE CHAIRMAN OF THE COMMISSION

24.1. The United States nominated Mr. E. B. Young (Canada) as the Chairman of the Comission. It was seconded by Brazil and Mr. Young was unanimously elected Chairman for the 1978-1979 biennial period.

Item 25. ELECTION OF THE VICE-CHAIRMEN OF THE COMMISSION

25.1. France nominated Dr. L. Koffi (Ivory Coast) as the First Vice-Chairman and the nomination was seconded by Senegal. Dr. Koffi was unanimously elected the First Vice-Chairman for the coming biennial period.

25.2. Senegal proposed Mr. H. Rosa (Brazil) as the Second Vice-Chairman. After being seconded by Portugal, Mr. Rosa was unanimously elected Second Vice-Chairman for the biennial period.

Item 26. ELECTION OF COUNCIL MEMBERS

26.1. Since a Special Meeting of the Commission is going to be held in 1978, the Commission felt that it would not be necessary to elect members of the Council for the next biennial period.

Item 30. OTHER MATTERS

30.1. The United States explained their own plan for implementing the bluefin tuna regulations recommended by the Commission. The new plan may involve the introduction of "limiting entry". The U.S. statement is attached herewith to the Proceedings as Annex 8.

Item 31. ADOPTION OF REPORT

31.1. The Commission adopted the Proceedings of the Opening, Second and Third Plenary Sessions.

31.2. The Commission *decided* that the Proceedings of the Final Plenary Session, as well as the Commission Report in its entirety, should be approved at a later date by mail.

Item 32. ADJOURNMENT

32.1. At the adjournment, the acting Chairman, Mr. E. B. Young (Canada) introduced Mr. Carlos Barreda, the Under-Secretary of the Spanish Merchant Marine.

32.2. Mr. Barreda stressed the importance of the conservation of food resources in the sea, and congratulated the work achieved by the Commission along this line. He stated that Spain has supported and will continue to support the Commission and respect its recommendations. He hoped that attendants had a pleasant stay in Spain.

32.3. After his address, the Chairman thanked all the attendants for their collaboration and hard work, commended the Secretariat staff and the interpreters for their efficiency and excellent work. The attendants applauded the Chairmen, Dr. I. Malick Dia (Senegal) and Mr. E. B. Young (Canada), for very skillful chairmanship.

32.4. The meeting was formally adjourned.

Annex I

AGENDA

Procedure of the meeting

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

Administration

4. Panel membership
5. Administrative Report
6. Relations with other organizations
7. Commission publications

Finance

8. Auditor's Report 1976
9. Financial status 1977
10. Working Capital Fund
11. Estimated Budget 1978-1979
12. Member country contributions 1978-1979

Reports to the Commission

13. Report of the Fourth Regular Meeting of the Council
14. Report of the Standing Committee on Research and Statistics (SCRS)
15. Report of the Standing Committee on Finance and Administration (STACFAD)
16. Report of the Working Group on International Inspection
17. Reports of Panels 1-4
18. Reports of subsidiary bodies appointed by the Commission for the meeting

Measures for the conservation of stocks

19. Status of the proposals adopted by the Commission regarding:
    a) Yellowfin
    b) Bluefin

20. Other possible regulatory measures to be considered
21. Ways to render effective the proposals adopted: International Inspection

Research

22. International Skipjack Year Program
23. Other activities in research and statistics

Other matters

24. Election of the Chairman of the Comission
25. Election of the Vice-Chairmen of the Commission
26. Election of Council members
27. Date and place of the next meeting of the Council
28. Items to be considered by the Council at its next meeting
29. Date and place of the next meeting of the Commission
30. Other matters
31. Adoption of Report

Adjournment

32. Adjournment

Annex 2

LIST OF PARTICIPANTS

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Annex 3

STATEMENT MADE BY THE U.S.S.R. DELEGATE AT THE OPENING PLENARY SESSION OF THE COMMISSION MEETING

"Distinguished Mr. Chairman:

Distinguished Ladies and Gentlemen:

"I would like to make a short statement concerning the U.S.S.R. joining the International Commission for the Conservation of Atlantic Tunas (ICCAT).

"The instrument of adherence to the Convention was worked out and formalized with the active participation of the U.S.S.R. representatives.

"The U.S.S.R., in joining the Commission, could be considered a confirmation of its aspiration to participate actively in the investigation and exploitation of natural resources of the world's oceans on an agreed international basis. We have always welcomed and continue to welcome the wish of countries to discuss on equal terms the mutually interesting problems including those of the important area of fisheries economics during the meetings of highly representative and competitive fora, one of which is ICCAT.

"During the United Nations Law of the Sea Conference, the U.S.S.R. delegation repeatedly expressed its view on the necessity to develop and intensify the regional Conventions and International Fisheries Organizations with the object of wisely utilizing and conserving living resources as well as improving marine law.

"Taking into account all of the above, I would like to assure you that our participation in the International Commission for the Conservation of Atlantic Tunas will serve in the development and strengthening of mutually profitable contacts within the sphere of fisheries among ICCAT member countries in which we pledge unanimous interest in conserving all living resources in the oceans throughout the world."

Annex 4

REPORTS OF THE MEETINGS OF PANELS 1-4 AND JOINT MEETING OF PANELS 1 AND 4

Report of the Meeting of Panel 1

Madrid, November, 1977

1. OPENING

The meeting was opened by the Chairman, Mr. C. J. Blondin (U.S.A.), who welcomed the U.S.S.R. as a new member of the Panel.

2. ADOPTION OF AGENDA

The Tentative Agenda which had been circulated in advance was adopted without change; the Agenda is attached as Appendix 1.

3. ELECTION OF RAPPORTEUR

On the proposal of the U.S.A., Mr. J. S. Beckett (Canada) was appointed Rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

All panel members (Angola, Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Korea, Morocco, Portugal, Senegal, Spain, U.S.A. and U.S.S.R.) were represented with the exception of Portugal.

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

and

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

a) *Yellowfin*

Dr. J. Gulland (FAO) as Rapporteur for the SCRS summarized the Report in the absence of the Chairman, Dr. B. J. Rothschild (U.S.A.). He noted that earlier SCRS concern over the level of yellowfin catches from the eastern Atlantic was

still valid despite increased total Atlantic catches, since these increases were being taken from offshore areas that had not previously been fished.

With regard to the 3.2 kg size limit, the SCRS had considered the effects of such a limit and reaffirmed their opinion that avoiding the capture of smaller yellowfin would improve the yield per recruit. At the present time, however, the limit has not been enforced effectively due to confusion with small bigeye or misreporting of yellowfin as bigeye. The Committee urged that the limit be more effectively enforced, or dropped, since that would eliminate much of the confusion in the statistics due to misreporting. One possible approach to better enforcement would be to apply to bigeye a similar size limit which would improve the yield from that species, although this may cause difficulties in some fisheries.

Ivory Coast expressed grave concern over the small yellowfin/bigeye problem and supported the adoption of a minimum size limit for bigeye, in order to obtain the optimum yield from the yellowfin stocks. They considered it a fantasy to believe that the size limit could be enforced for yellowfin alone. France believed that ICCAT should take positive action rather than consider the complications which would result from dropping the yellowfin regulation; the same recommendation for yellowfin should be adopted for bigeye. Senegal, supported by Ivory Coast, proposed that Panel 1 should make a formal recommendation to Panel 4 concerning a bigeye size limit, while France suggested a joint meeting of Panels 1 and 4.

Japan noted that great efforts had been made by the Government of Japan to reduce the take of both small bigeye and yellowfin by the 18 boats flying the Japanese flag. This had involved operating the baitboats further offshore and had resulted in reducing the catch of such fish to 11.5 % of the total catch in comparison to 30 % in 1974-1976. The proportion of undersized yellowfin, relative to total yellowfin catches, had been reduced to less than 40 % following a reduction to 55 % in 1976 from 80 % in 1974-1975. In addition, the Japanese Government had taken necessary administrative measures towards the pertinent fishermen in the fishing ground, and scientists were working with these fishermen so that further reductions in the proportion of small yellowfin could be expected, particularly with the cooperation of the port state. Japan requested information relevant to this problem from other fishing areas and methods.

Korea noted that their yellowfin catch in 1976 amounted to 11,000 MT mostly by longline, with only 365 TM taken in the skipjack pole-and-line fishery. Consequently, the undersized yellowfin problem was not significant for Korea. However, the fishermen had been advised of a legal ban on such fish in June 1973 and each year fishery officers were sent to the area. The result was that the proportion of undersized fish had been cut from 31 % to 25 %.

Despite not fishing recently in the eastern Atlantic, Canada noted that legislation and administrative procedures were in place to enforce the limit. Spain reported that the application of the regulation had resulted in catches of undersized yellowfin dropping to below the tolerance permitted. Cuba also reported firm application of the size limit. Senegal noted that the minimum size was incorporated in their fishing regulations.

There was considerable support by most members of Panel 1 to recommend to Panel 4 that favorable consideration be given to recommend to the Commission

the establishment of a minimum size limit for bigeye tuna of 3.2 kg. It was further *agreed* that should Panel 4 not endorse this proposal, a joint meeting of Panels be requested to examine the question. Panel 1 also *recommended* that member states be urged to do everything possible to ensure effective enforcement of the yellowfin tuna size limit.

b) *Skipjack*

Dr. J. Gulland reported that SCRS considered the skipjack resource not fully utilized and not in need of regulations. Much was not known, however, about the species, and an intensive program of research, to be funded by a special budget, was being proposed. This program would help provide answers to such questions as: 1) Whether catches could be increased by fishing previously unfished areas, especially in the western Atlantic; 2) Whether catches could be increased by fishing other elements of currently exploited stocks, especially fish over 5 kg; 3) What effects any such action would have on existing fisheries; and 4) How to better assess existing fisheries, particularly with regard to increased effort. Ivory Coast, France and Senegal expressed strong support for the program of intensive skipjack research proposed by SCRS. France, however, noted that their approval of the program would be subject to discussion of its financial implications.

7. RESEARCH NEEDED TO BE CARRIED OUT

Panel 1 expressed full support for the recommendation on research needs made by SCRS for both yellowfin and skipjack and in particular endorsed the International Skipjack Year Program.

8. DATE AND PLACE OF NEXT PANEL MEETING

It was *agreed* that the Panel should meet at the time of the next ICCAT meeting and in the same place.

9. OTHER MATTERS

Canada was elected Chairman for the next biennial term on a motion by the U.S.A. and seconded by France.

10. ADOPTION OF REPORT

The Report was adopted with certain modifications.

11. ADJOURNMENT

The Panel adjourned.

Report of the Meeting of Panel 2
Madrid, November, 1977

1. OPENING

The meeting was called to order by the Chairman, Mr. H. Zouitni (Morocco).

2. ADOPTION OF AGENDA

The Tentative Agenda was approved and is attached as Appendix 1.

3. ELECTION OF RAPPORTEUR

Mr. M. Hunter (Canada) was elected Rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

The Chairman presented the list of member countries: Canada, France, Japan, Korea, Morocco, Portugal, Spain, U.S.A., U.S.S.R., and noted the absence of a delegate from Portugal.

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

In the absence of the Committee's Chairman, Dr. J. Gulland (FAO) summarized the sections of the Committee's report relevant to northern bluefin and albacore.

With respect to bluefin, he drew attention to the Committee's statement that it was probable that the results of management action will be most clearly felt among the fisheries on the same side of the Atlantic as the action is taken, but will also affect to some extent and possibly at irregular intervals, the fisheries on the other side of the Atlantic as well as in the Mediterranean Sea.

While no new calculations of yield per recruit had been made, the Committee concluded that there would be advantages in eliminating the catch of small fish and releasing fish less than 7 years old. A progressive increase in age at first capture to this optimum level would be advantageous.

The Committee had noted, following the Commission's regulations with respect to fishing mortality, that more 4-year-old fish were passing through the fishery and should contribute to the now small spawning stocks. The expected increase in spawning stock size may not occur if there are no controls on the capture of 4-8-year-old fish.

The present size limit was considered to be of benefit and should be continued. An increase in size limit, while creating practical difficulties, would increase the yield per recruit. The present controls on fishing mortality should be maintained until the strong 1973 year class reaches the spawning stock in order to minimize the risk of recruitment failure by increasing the size of that stock.

The Committee had made a plea for better statistics for the Mediterranean Sea, especially from non-ICCAT members and had stressed the value of a bluefin tagging program in the Mediterranean Sea and the Ibero-Moroccan Gulf.

With respect to albacore, the Committee had noted that recruitment is declining, and that it is possible that the present stock was reduced to a level which was affecting recruitment to the spawning stock.

Because of the apparent vulnerable status of the stocks, consideration should be given to preventing increases in total fishing effort, since such increases would not result in a gain in the total catch.

The Committee further *recommended*, in view of possible vulnerability of the stock, that a study should be undertaken on fishing patterns that might increase stock size and a determination should be made of what management measures could achieve such patterns if action were needed to be taken quickly in the event of a collapse of the stock.

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

a) *Bluefin*

The delegate from the U.S.A. recalled the steps taken in 1974 when agreement was reached to limit the fishing mortality to recent levels. The agreement on bluefin conservation measures, renewed for two years, expires on August 10, 1978. He noted the measures are general and provide flexibility in interpretation but have provided some degree of protection. He made reference to the uncertainties surrounding the status of bluefin stocks, but expressed the view that continuing protection for bluefin, throughout its range, is necessary. He referred to the indication from SCRS that the continuation of conservation measures was desirable.

While all parties must act together to ensure the continuation of a bluefin fishery, he stated that the current measures in the U.S.'s view, did not provide the degree of protection needed. He noted that although all member countries had limited their bluefin fishing activities, there had been in some cases a shift in fishing effort over several thousand miles.

The U.S.A. felt that an amendment to the current measures to prevent such shifts in effort, together with a definition of recent years, would make the measures more effective. The delegate from the U.S.A. then circulated a draft resolution, attached as Appendix 2, which embodied such ideas.

The French delegation drew attention to the inaccuracy of scientific data concerning bluefin tuna. According to the SCRS Report, the stock of young recruits and the spawning stock appear to be in good condition. Under these circumstances, the French delegate stated that he could not see the need for new measures such as quotas. He recalled the previous discussions and the socio-economic difficulties, caused by previously taken measures, of the small scale local fishery of the Bay of Biscay and the Mediterranean. On the other hand, the French delegate supported the maintenance of the size limit regulation while doubting the necessity of maintaining measures which tend to reduce mortality. He stated that the new measure proposed by the U.S.A. is not feasible.

The delegate of Spain reiterated the doubts expressed on the structure of the stock, and supported the views expressed by the delegate of France.

The delegate of Japan stated that bluefin tuna migrate through an extensive range of waters as a unit stock. In addition, this distribution pattern and status of stock change from year to year and Japan urged flexibility in establishing conservation guidelines. He agreed with the delegate of France regarding the problems in establishing quotas based on inaccurate statistics. The Japanese interpretation of "recent years" was that it meant "latest years", and the delegate expressed the view that to use a 1970-74 base period was not appropriate for such a changeable stock condition.

The delegate of Korea remarked that Korean fishermen were prohibited from taking undersized bluefin, and supported a continuation of the present size limit.

The delegate of the U.S.A. pointed out that all countries experience economic and political problems in restricting fishing activities for the best long-term interests of fishermen. He felt that, over the last few years SCRS had been warning about bluefin stocks, particularly with the problem of maintaining a spawning stock large enough to provide adequate recruitment to the fishery. He feared that the point might already have been reached where the spawning stock was too small to provide adequate recruitment. He referred to the desire of SCRS to see a continuation of controls on fishing to protect the escapement of the 1973 year class to the spawning stock.

The delegate of Canada expressed concern about the apparent low level of abundance of the spawning stock in the western Atlantic, but was encouraged by the potential for the 1973 year class to contribute to this stock if fishing mortality could be kept sufficiently low. He felt that, while the present measures were useful, the lack of definition of a base period and the flexibility for interpretation to permit shifts in areas of fishing were shortcomings. He supported more stringent conservation measures in the western Atlantic, which might provide benefits on both sides of the ocean. He suggested increasing the size limit to increase age at first capture and expressed support for the U.S. draft resolution.

The delegate of Morocco noted the small size of his country's catch in small scale local fisheries. He shared the viewpoints expressed by the delegates of Spain and France.

The delegate of the U.S.A. noted the expressions of opinion of other delegates and proposed, as a compromise, that fishing mortality be limited to levels existing in the years immediately prior to 1975.

In response, the delegate of Spain reiterated his opposition to the establishment of a quota and the delegate of Japan expressed his opposition to regulation by area of fishing.

The delegate of the U.S.S.R. noted that, while his country at present did not take bluefin, he could not support a conservation measure which would limit the future U.S.S.R. catches.

Following this lengthy discussion, the Panel agreed that it would be appropriate to *recommend* to the Commission that the current bluefin conservation measures be extended to August 10, 1980, and to maintain the present 6.4 kg size limit. The French delegation agreed to this recommendation, especially concerning mortality,

while noting the flexibility of interpreting "maintaining the present level" by France, taking into account the inaccuracy of the previous statistics, especially in the Mediterranean.

The delegate of Morocco agreed and noted that Morocco considered itself a special case. The delegate of Japan, in agreeing to the recommendation, reaffirmed his opposition to the separation of bluefin stocks into eastern and western areas for management purposes.

b) *Albacore*

The delegate of the U.S.A. noted his concern over the report of the SCRS on the status of albacore stocks. While the U.S.A. was not in a position to propose specific measures, it hoped the Panel and Commission would be prepared to take the necessary measures as soon as possible in view of the scientific evidence. He hoped that countries actively fishing albacore might have some positive recommendations.

7. RESEARCH NEEDED TO BE CARRIED OUT

The delegate of Canada noted his support for the research program set forth in the SCRS Report particularly with respect to the bluefin tagging proposal off Morocco.

The delegate of the U.S.A. also noted similar support and recommended the establishment of a separate fund to finance the proposed bluefin tagging program. In support of this view, Mr. F. J. Mather (U.S.A.) briefly summarized the report of the Working Group on the Tagging of Buefin Tuna (SCRS Report, Appendix 7).

Discussion took place as to whether the funding for the proposed tagging program might be from the ICCAT budget or on a voluntary basis. The delegates of Canada and the U.S.A. supported the idea of financing the program from the Commission budget but drew attention to the budgetary problems raised in STACFAD. The delegate of France noted that his country would be happy to participate in a practical way in a tagging program.

The delegate of Japan noted his country's support for the proposed tagging program to be financed through the Commission budget.

Dr. Gulland reminded the Panel that SCRS had made a large number of research proposals of which the bluefin tagging program was one. He pointed out the SCRS felt that such a program would be a "best bet" but that the Committee had attached no special priority to this program, and he hoped that the discussion of the tagging program would not cause other recommendations to be ignored.

8. DATE AND PLACE OF THE NEXT PANEL MEETING

The Panel *agreed* to hold its next meeting at the same time and place as that of the forthcoming ICCAT meeting.

9. OTHER MATTERS

The Panel re-elected Morocco as Chairman for the biennial term on a motion from France which was seconded by the U.S.A.

10. ADOPTION OF REPORT

The Report was adopted on November 21, 1977.

11. ADJOURNMENT

The meeting was adjourned.

Report of the Meeting of Panel 3

Madrid, November 1977

1. OPENING

The meeting was called to order by the Chairman, Dr. A. Suda (Japan). He welcomed the U.S.S.R. as a new member of the Panel.

2. ADOPTION OF AGENDA

The Tentative Agenda was adopted without change (Appendix 1).

3. ELECTION OF RAPPORTEUR

Dr. P. Miyake (Secretariat) was designated Rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

The following member countries were present: Brazil, Japan, Korea, U.S.A. and the U.S.S.R. Also, Angola, Canada, Spain and some observers attended the Panel meeting in an observer capacity.

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

The general rapporteur of the SCRS, Dr. J. Gulland (FAO) reviewed relevant parts of the SCRS Report for the Panel.

a) *Bluefin, South (Southern bluefin — Thunnus maccoyii)*

The species consists of a single stock which has been exploited extensively in the Atlantic as well as in the Indian Ocean. It would appear prudent to prevent

further expansion of fisheries on the stock until the population parameters are better understood. Increased contact with scientists of other areas (e.g. IOFC, IPFC) in order to exchange information would be necessary.

b) *Albacore*

Catches of albacore are nearing the calculated maximum level of the yield curve but have not exceeded it, and show no apparent danger of overfishing. If effort increases and if there is any development of new surface fisheries, this should be closely monitored.

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

a) *Bluefin — South (Southern bluefin)*

The Panel was informed that Japan has been observing voluntary regulatory measures on southern bluefin tuna since 1971 and of its intention to continue the measures in the future.

The U.S.A. supported all the recommendations made by the SCRS regarding this stock and also supported its careful monitoring and a halt in the further expansion of effort.

b) *Albacore — South*

No comments were made.

7. RESEARCH NEEDED TO BE CARRIED OUT

The Panel confirmed all the recommendations made by the SCRS concerning research needed on the stocks in question.

8. DATE AND PLACE OF NEXT PANEL MEETING

The Panel *agreed* to hold its next meeting at the same time and place as the 1978 ICCAT meeting.

9. OTHER MATTERS

The Panel re-elected Japan as Chairman for the next biennial period.

10. ADOPTION OF REPORT

The Report was adopted on November 21, 1977.

11. ADJOURNMENT

The meeting was adjourned.

Report of the Meeting of Panel 4
Madrid, November 1977

1. OPENING

The meeting was called to order by the Chairman, Mr. E. de Salas (Spain).

2. ADOPTION OF AGENDA

The Agenda was adopted (Appendix 1).

3. ELECTION OF RAPPORTEUR

Dr. G. Beardsley (U.S.A.) was elected Rapporteur.

4. REVIEW OF PANEL MEMBERSHIP

The Chairman reviewed the membership of Panel 4: Angola, Canada, Cuba, Japan, Korea, Portugal (not present), Spain, U.S.A. and the U.S.S.R.

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

Dr. J. Gulland (FAO) summarized the relevant section of the SCRS Report.

a) *Bigeye*

It was noted that one of the major problems was the continued misidentification of bigeye and yellowfin. The bigeye stocks apparently are being fished at a fairly high level and further increases in effort would not likely result in a significant increase in yield. Yield per recruit calculations suggested that a size limit would generally result in an increase in yield for the fishery in general. However, some fisheries, i.e. the baitboat fishery for small bigeye, might be negatively affected unless they could shift this effort to older bigeye.

It was recommended that a minimum size for bigeye should be seriously considered.

It was noted that continued efforts should be made to obtain better information on the degree of mixing of small bigeye and yellowfin in the reported landings.

b) *Billfishes*

No new pertinent information was presented. A request was made for better statistics on billfishes, particularly regarding species separation.

6. REVIEW OF POSSIBLE MEASURES FOR THE CONSERVATION OF STOCKS

a) *Bigeye*

The U.S.A. asked Dr. Gulland if any economic effects on the various fisheries were evaluated as to the possible effects of a minimum size limit on bigeye. Dr. Gulland replied that no such analysis had been made. The Ghanaian delegate also commented on the proposed minimum size limit and expressed concern over the validity of scientific justifications for the proposal.

The Japanese delegate opposed the minimum size regulation and suggested that more intensive investigation at landing ports would alleviate the yellowfin-bigeye undersize problem. He also suggested that the amount of small bigeye caught mixed with skipjack fishing, which is allowed and expected to develop further, should be examined and that the bigeye size limit should be evaluated after these studies are made. Mr. C. J. Blondin (U.S.A.), as Chairman of Panel 1, noted that many members of his Panel supported a proposal to recommend that Panel 4 give serious consideration to a minimum size limit for bigeye and that a possible joint meeting of Panels 1 and 4 might be productive. He also expressed a need for further investigations before adopting a minimum size limit on bigeye.

Panel 4 was adjourned temporarily and a joint meeting of Panels 1 and 4 was called.

b) *Atlantic bonito*

No remarks were made.

c) *Billfishes*

The U.S. delegate noted with pleasure that SCRS was conducting scientific investigations on billfishes and expressed their concern over the relatively high levels of harvest presently being made.

d) *Other species*

No remarks were made.

7. RESEARCH NEEDED TO BE CARRIED OUT

No remarks were made.

8. DATE AND PLACE OF NEXT PANEL MEETING

The Panel agreed that the next meeting be held at the same time and place as the next ICCAT meeting.

9. OTHER MATTERS

Spain was re-elected Chairman for the next biennial period.

10. ADOPTION OF REPORT

The Report was adopted.

11. ADJOURNMENT

The meeting was adjourned.

Report of the Joint Meeting of Panels 1 and 4
Madrid, November 1977

1. OPENING

Mr. E. de Salas (Spain), Chairman of Panel 4, was elected Chairman of the Joint Group and opened the meeting.

2. ELECTION OF RAPPORTEUR

Dr. G. L. Beardsley (U.S.A.) was elected Rapporteur.

3. REVIEW OF PANEL MEMBERSHIP

The Chairman reviewed the membership of the two Panels: Angola, Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Korea, Morocco, Portugal (not present), Senegal, Spain, U.S.A. and the U.S.S.R.

4. DISCUSSION OF MINIMUM SIZE LIMIT FOR BIGEYE

Mr. C. J. Blondin (U.S.A.), Chairman of Panel 1, reviewed the discussion held during the meeting of Panel 1 and the reasons for requesting a joing meeting of the two panels. Japan repeatedly emphasized the need for further scientific evaluation before a bigeye size limit is imposed. Ivory Coast supported the minimum size proposal, pointing out the recommendations by SCRS to establish a 3.2 kg minimum size for bigeye. Senegal supported the view of Ivory Coast.

France supported the above-mentioned proposals and requested that a recommendation be made concerning minimum size for taking bigeye, identical to that of yellowfin.

Dr. Gulland noted that SCRS merely recommended that serious consideration be given to the establishment of a minimum size. He also noted that there may be practical problems that would affect this decision. In addition to France, Cuba, Spain and Senegal supported the establishment of a minimum size. The delegate from Korea stated that they were in agreement with the position of Japan, i. e. that more research should be done before a size limit is imposed. The Soviet delegation would like to study more deeply the documents of SCRS in order to determine its position on this question.

The U.S. felt that it was premature to establish a minimum size without an evaluation of the economic difficulties associated with it, and suggested that three questions needed to be answered:

1) Can the fisheries now catching small bigeye successfully shift this effort to older age groups?
2) Would there be any effect on recruitment?
3) Would it result in substantial wastage through dumping?

The Chairman of the joint panel meeting suggested that a report be sent to the Commission, stating that all delegations agree to support the recommendation by SCRS to the effect "that serious consideration be given to the establishment of the minimum size limit of 3.2 kg on bigeye". With this in mind, some delegations expressed concern over the practical problems of applying the minimum size, the economic repercussions associated with it, the necessity for further scientific as well as economic research and stated that it was premature to establish a minimum size limit at the present moment.

The delegates of France, Ivory Coast and Senegal felt that there is no need of further research on adopting a 3.2 kg minimum size for bigeye before taking the regulatory measure. Japan and Korea, while supporting in principle the above-mentioned recommendation by SCRS, expressed some doubt as to whether the 3.2 kg should be the appropriate minimum size to be applied for bigeye.

The members of the Joint Meeting accepted the proposal of the Chairman to submit this report to the Commission.

The Chairman then adjourned the meeting.

Appendix 1 to Annex 4

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

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

Panel 1	*Panel 2*	*Panel 3*	*Panel 4*
a) Yellowfin	a) Bluefin	a) Bluefin	a) Bigeye
b) Skipjack	b) Albacore	b) Albacore	b) Atlantic bonito
			c) Billfishes
			d) Other species

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

Appendix 2 to Annex 4

U.S. Draft Resolution — Bluefin

A. That the Contracting Parties that are actively fishing for bluefin tuna (*Thunnus thynnus thynnus*) or those that incidentally catch it in significant quantities shall take the necessary measures to limit the fishing mortality of bluefin tuna (*Thunnus thynnus thynnus*), in each of the areas of each of the Contracting Party's fishing operations, to the average mortality occurring in such areas during 1970 to 1974.

Annex 5

REPORT OF THE WORKING GROUP ON INTERNATIONAL INSPECTION

Madrid, November 1977

1. OPENING

The meeting of the Working Group on International Inspection was opened by Mr. R. Garcés Velazco (Cuba) in the absence of the current Chairman, Mr. E. Oltuski (Cuba).

2. ADOPTION OF AGENDA

The Tentative Agenda was adopted (Appendix 1).

3. ELECTION OF RAPPORTEUR

Ms. B. Keith (U.S.A.) was elected Rapporteur.

4. STATUS OF PROPOSALS ADOPTED BY THE COMMISSION REGARDING YELLOWFIN AND BLUEFIN

Document COM/77/18, which includes the conservation recommendations approved by the Commission and the dates which the member governments notified the Secretariat of promulgation, was reviewed by the Executive Secretary. The French delegate noted that measures on bluefin tuna can be applied until they are revoked.

5. WAYS TO RENDER EFFECTIVE THE PROPOSALS ADOPTED: INTERNATIONAL INSPECTION AT THE PORT

The Chair reviewed the progress to date by the Working Group on the ICCAT Scheme of Joint International Inspection which is presented as Appendix VII of the Basic Text of the Convention (1977, 1st revision), whose date of entry into effect was left in abeyance until otherwise decided by the Commission, as the Commission has not taken any decision in this connection. The following comments were offered by members of the Working Group on both the inspection scheme previously developed by ICCAT and the draft document (COM/77/19 and Annex 1) prepared by the Secretariat on an ICCAT International Inspection Scheme at the Port.

The Soviet Union noted that some tuna fishing nations fully process their catch at sea. Since the most effective control of such tuna fishing could occur at sea and since inspection in port alone could not be considered effective, it was suggested that the appropriate provisions be taken from the draft scheme of inspection in port and added to the inspection scheme already approved for high seas inspection, thereby providing for the application of both systems.

The U.S.A., noting its approval of an inspection in port scheme, also voiced support for the proposal of the Soviet Union if it would add to the efficacy of the inspection system.

Japan noted that port states are currently authorized to carry out inspections without a covering international agreement. Japan also expressed the view that Article IX, paragraph 3, of the ICCAT Convention does not authorize the Commission to adopt a scheme of port inspection which is mandatory or binding on the Contracting Parties as a part of a system of international inspection described in Article IX, paragraph 3. (The U.S.A. subsequently voiced a different interpretation of this Article, believing that it does not preclule establishing such a system if the Contracting Parties agree to do so and suggested that, as a result of a difference in interpretation as to whether the Convention presently allows a scheme of in-port inspection, any study should contain a legal analysis of the question. Brazil supported this proposal.) Realizing, however, the necessity of effectively enforcing the approved ICCAT conservation recommendations on size limits and the need to collect accurate statistics, Japan viewed a scheme in which the port state carries out inspection as meaningful, and felt ICCAT could provide a policy guideline which would be beneficial for the Contracting Parties to follow. Japan voiced its view that the Commission is authorized to adopt such a policy guideline under Article III, paragraph 1, of the ICCAT Convention. In this regard, Japan called attention to its proposal of an ICCAT Guideline of Port Inspection circulated among the member countries.

Senegal emphasized the importance of an inspection scheme and its view (mentioned also by Japan) that inspections lie within the control of the coastal or port state. Noting that high seas inspections have certain limitations and that some countries lack even the means to carry them out, Senegal voiced strong opposition to a high seas inspection scheme and stated that the text adopted for port inspection should be a framework showing a general consensus of the Contracting Parties which could be used to strengthen the implementation of national legislation. Morocco supported these comments.

Brazil voiced support for a port inspection scheme and opposition to one developed for implementation on the high seas.

France approved the concepts contained in both schemes and indicated its legislation authorized approval of either scheme although noting there appeared to be a few minor problems of style and form in the current port inspection draft. France also stated that in the case of tuna, inspection in the port would yield better results than inspection at sea.

The U.S.A. and Spain also voiced approval of the draft document on port inspection prepared by the Secretariat.

The Soviet Union emphasized its view that Article IX, paragraph 3, provided for *international* inspection. Morocco suggested keeping the word "international" in the title of any scheme because determining an ICCAT infringement is of an international nature since the national legislations refer to measures taken internationally at ICCAT.

In response to a query from Brazil regarding the failure to include one of its comments in the Secretariat's revised draft scheme of international inspection at the ports, the Executive Secretary noted his reluctance to authorize ICCAT personnel to give advice in the port state on inspections because such a procedure might interfere with ICCAT's good relationships with the tuna fishermen who provide logbooks to the Secretariat.

Korea indicated there were legal problems regarding a port inspection scheme.

Morocco proposed that member governments be given an additional period of time (approximately six months) in which to further study the proposed system of port inspection and suggested that the draft document circulated by the Secretariat in June 1977 serve as the basis for this review rather than the revised document (COM/77/19, Annex 1) circulated at the current Commission meeting.

After some discussion of this proposal, it was agreed (1) that a consensus existed regarding port inspection, but a number of countries saw a necessity for further study on the draft document on international port inspections, (2) that the Secretariat would, in December, circulate with an explanatory note the original text of the draft ICCAT Scheme of International Inspection at the Port. Three months would be allowed for comments by the Contracting Parties. Upon receipt of the responses and six months prior to the 1978 ICCAT meeting, the Secretariat would circulate a new draft of the proposed text for a system of international inspection and any comments on the original text received from member governments.

France noted that any comments by member governments and the new draft should be circulated in the form of a legal text so as not to delay further implementation of the inspection system.

6. DATE OF ENTRY INTO EFFECT OF THE INTERNATIONAL INSPECTION SYSTEM

It was *agreed* to set aside discussion of this topic pending further action on the development of an international inspection system.

7. DATE AND PLACE OF NEXT MEETING

It was *agreed* that the next meeting would be held at the same time and in the same place as the next ICCAT meeting.

8. OTHER MATTERS

Mr. R. Garcés Velazco (Cuba) was elected Chairman of the Working Group on International Inspection for the biennial period 1978-1979.

9. ADOPTION OF REPORT

The Report was adopted on November 21, 1977.

10. ADJOURNMENT

The meeting was adjourned on November 21, 1977.

Appendix 1 to Annex 5

Agenda for the Working Group on International Inspection

1. Opening
2. Adoption of Agenda
3. Election of Rapporteur
4. Status of the proposals adopted by the Commission regarding yellowfin and bluefin
5. Ways to render effective the proposals adopted: International Inspection at the Port
6. Date of entry into effect of the international inspection system
7. Date and place of next meeting
8. Other matters
9. Adoption of Report
10. Adjournment

Annex 6

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

Madrid, November 1977

Table of Contents

Item 1. OPENING OF THE MEETING

1.1. The Committee met at the Hotel Luz Palacio (Madrid, Spain) on November 17, 1977, and subsequent days. The meeting was opened by Mr. C. J. Blondin (U.S.A.), nominated by the Commission to substitute for the Chairman of the Committee, Mr. K. Yonezawa (Japan), who was unable to attend the meeting. Mr. Blondin welcomed the new members of the Committee, the U.S.S.R. and the Republic of Gabon.

Item 2. ADOPTION OF AGENDA

2.1. The Tentative Agenda, circulated 90 days prior to the meeting, was reviewed and adopted by the Committee (Appendix 1).

Item 3. ELECTION OF RAPPORTEUR

3.1. The Secretariat was designated Rapporteur.

Item 4. PANEL MEMBERSHIP

4.1. The Committee reviewed COM/77/14 which provided information on the background of the Panels, and confirmed the present rules concerning panel membership.

4.2. The Committee confirmed the present membership of Panels 1 through 4.

4.3. The U.S.S.R. informed the Committee of its intention to participate in Panels 1, 2, 3 and 4.

4.4. A table showing the present membership of the four panels, including the addition of the U.S.S.R., is herewith attached as Appendix 2.

Item 5. ADMINISTRATIVE REPORT

5.1. The Administrative Report (COM/77/15) was presented and fully explained by the Executive Secretary. He noted that the U.S.S.R. and the Republic of Gabon became new members of the Commission during 1977. Thus, the Commission now consists of 17 member countries.

5.2. The Executive Secretary listed the various activities of the Secretariat and noted the international meetings at which ICCAT was represented, its cooperation with other organizations, and trips made by the staff members during 1977.

5.3. Special mention was made in reference to the recommendation made at the last Council meeting to hold the 1977 Commission meeting at Las Palmas, Canary Islands, if possible. A study showed that such a change of the meeting place would have affected the Commission's budget considerably.

5.4. Concerning the coordination of research effected by the Secretariat, the Executive Secretary outlined various activities regarding the collection of statistics, the data bank, a biostatistician, the Field Manual, the port sampling program, the CECAF/ICCAT/ICSEAF Joint Training Course on Statistics and Sampling, the International Skipjack Year Program, the international joint tagging program on young bluefin tuna and the ICCAT tagging lottery.

5.5. Special mention was made concerning the insufficient office space for the ICCAT Headquarters, in relation to the expanding activities and staff of the Secretariat. The Committee observed that the space is restricted for the present level of activity.

It *recommended* that the Executive Secretary look into the problem and seek some alternative solutions in cooperation with the Spanish Government, which hosts the Commission.

5.6. The Committee reviewed the Administrative Report and recognized the extensive work completed by the Secretariat during the year. After some points were clarified, it was *recommended* that the Commission approve the Report.

Item 6. RELATIONS WITH OTHER ORGANIZATIONS

6.1. The Committee studied the relationships the Commission had maintained with various international organizations (COM/77/15) and found them to be satisfactory.

Item 7. COMMISSION PUBLICATIONS

7.1. The Commission's policy regarding publications was explained by the Executive Secretary (COM/77/15). The Committee noted that during 1977, editions of the Biennial Report, the Statistical Bulletin, the Collective Volume, the Data Record, the Statistical Series, the Basic Texts, etc., were issued.

7.2. The Committee *recommended* that the Commission approve the continuation of the present publication policy.

7.3. The proposal made by the SCRS concerning changing the nature of the Data Record to include data processed by the ICCAT data bank was studied and the Committee *recommended* that the Commission approve such a change.

Item 8. AUDITOR'S REPORT 1976

8.1. It was noted that the Auditor's Report (original in Spanish) with summary translations in English and French, was circulated to the head of each delegation in early 1977. The Report was reviewed and adopted by the Committee and then *recommended* to the Commission for adoption.

Item 9. FINANCIAL STATUS 1977

9.1. The Financial Report (COM/77/16) was presented and fully explained by the Executive Secretary. He referred to the fact that the Republic of Gabon became a member of the Commission towards the end of the year and suggsted that they be exempt from making any contribution for the 1977 fiscal year.

9.2. The Committee reviewed the financial status of the Commission and considered it satisfactory. The Committee *recommended* that the Commission adopt the Financial Report (COM/77/16). It also *recommended* that Gabon's contributions to ICCAT should be initiated from 1978 on.

9.3. The Committee noted that there is an unused balance of US $ 13,000 in the 1977 Budget, $ 7,000 of which correspond to the budget set aside for holding a training course. Since the course is now scheduled for April 1978, the Committee *recommended* that this budget of $ 7,000 be reallocated for the same purpose in 1978, while the decision on the remainder of the unused budget ($ 6,000) should be considered under the Agenda item 11 "Estimated Budget 1978-1979".

Item 10. WORKING CAPITAL FUND

10.1. The Committee reviewed Statement 7 of the Financial Report (COM/77/16), and found it to be satisfactory. It *recommended* that all the unbudgeted income, including contributions of the new member countries (Angola and the U.S.S.R.) would go into the Working Capital Fund.

Item 11. ESTIMATED BUDGET 1978-1979

11.1. The Executive Secretary outlined the history of the financial aspects of the Commission since it started operation (COM/77/INF-1). He then presented the Estimated Budget 1978-1979 (COM/77/17). The Committee recognized that the preliminary estimates of the country contributions were also circulated by the Secretariat, together with the Estimated Budget, 60 days prior to the Commission meeting.

11.2. The special budget for the International Skipjack Year Program (1978-1981) which had also been presented in COM/77/17 was explained. The Executive Secretary commented that this special budget was first estimated based on the program formulated by the *ad hoc* Working Group on the Skipjack Program, which met in Madrid, in August 1977. However, the Working Group on Skipjack which met during this SCRS session presented an austerity budget for the Commission's expenditure for the skipjack program. The Committee *decided* that the financial aspect of this program should be discussed on a separate occasion.

11.3. Although noting a significant increase in the budget, Japan supported the budget, particularly since the increase concerns mainly Chapter 8 "Coordination of Research". The U.S.S.R. also shared this view.

11.4. The delegate of France, while admitting the importance of research activities, observed that the 1978 and 1979 budgets were substantially increased with respect to the 1977 budget, and that, under the circumstances, he could not approve the budget. He explained his reason in detail. The delegate of France hoped that the 1978-1979 budgets would be maintained at the same level as that of 1977.

11.5. The delegate of Spain expressed opposition to the 1978-1979 budget presented since it was significantly increased as compared to the 1977 budget. The Spanish delegate noted the difficult economic situation Spain is going through and emphasized that because of the austerity measures his country has recently adopted, the proposed increase (in dollars) in Spain's contribution is unacceptable.

11.6. Senegal noted that the budget of the Commission as presented by the Executive Secretariat could be reduced and its various chapters readjusted. He observed that the reduction is necessary because of the international economic situation.

11.7. The Chairman suggested that the Secretariat review the budget carefully, bearing in mind those views expressed by various delegates for any possible reduction of the budget. The SCRS Chairman was asked to collaborate with the Secretariat in reviewing Chapter 8 of the budget.

11.8. The Executive Secretary presented a new Austerity Budget for 1978-79 (Appendix 3). He explained that in the new table, the increases in the budget due to foreseen inflation and the new added activities of the Commission are shown separately.

11.9. He proposed a reduction of a total of $ 30,000 for the 1978 budget, while a reduction of $ 38,000 is shown for the 1979 budget. He explained in detail a breakdown of the reduction by budget chapters.

11.10. He also proposed to reallocate to the 1978 budget the unused balance of the 1977 budget ($ 13,000), $ 7,000 of which correspond to the budget set aside for the Training Course. Besides, he reviewed the Working Capital Fund and proposed to remove $ 10,000 from that Fund to be allocated to the 1978 budget. He stressed that this budget is the absolute minimum level necessary to execute the work assigned to the Secretariat.

11.11. The newly elected SCRS Chairman, Mr. Fonteneau, insisted that special consideration should be given by the Committee to the Commission's increasing work on statistics and coordination of research. Such work is to be carried out by the Secretariat and is essential for the success of the SCRS work. The delegate of Senegal asked Mr. Fonteneau if the proposed Austerity Budget would permit scientists to carry out research as required. Mr. Fonteneau responded that, with the revised budget proposed by the Executive Secretary, the SCRS would be able to fulfill additional research requested by experts. He noted that the Secretariat would also be able to carry out the additional work assigned to it by the scientists. In view of this response, the delegate of Senegal approved the revised budget as proposed by the Executive Secretary.

11.12. The delegate of Spain recognized the work accomplished by STACFAD to reduce the 1978 budget, but still could not accept, in principle, this increase in the budget. However, he stated that if the majority of the member countries present would accept the revised budget, and keeping in mind that Spain is the host country, he would notify his Government of the corresponding contribution so that it could take the necessary action.

11.13. The French delegate recognized the Secretariat's efforts to reduce the 1978-1979 budgets. However, bearing in mind the comments made during the previous meeting, he did not consider the reduction to be substantial enough. Therefore, France was not in a position to approve the revised budget. He stated that if the other delegations would accept this budget, it would be submitted to the French authorities with the necessary explanations and a decision would be made accordingly.

11.14. Senegal, Japan and the U.S.A. expressed support for the new budget, assuming that such a reduction would not greatly hamper the research activities of the Secretariat.

11.15. The Committee approved the Austerity Budget, 1978-1979 and *recommended* that the Commission adopt this budget which is attached herewith as Appendix 3.

Item 12. MEMBER COUNTRY CONTRIBUTIONS 1978-1979

12.1. The Committee *agreed* to calculate the country contributions based on the catch and canning figures for 1975, since these statistics are the most recent and adequate ones available to the Commission at present.

12.2. The member country contributions for 1978 and 1979, calculated according to the formula established by the Convention, are attached herewith as Appendix 4. The Committee *recommended* that the Commission adopt this table.

Item 13. INTERNATIONAL SKIPJACK YEAR PROGRAM

13.1. The Convener of the Sub-Committee on Skipjack, Dr. G. Sakagawa (U.S.A.) explained the Austerity Budget proposed by the SCRS to initiate and execute the program. He explained that even within the Austerity Budget, three alternatives were offered depending on how the position for the Program Coordinator is funded (see Appendix 5). He added that this Austerity Budget is the minimum level to realize the program, assuming that there would be no contingency case due to inflation or overlooking of some items requiring funding, etc., and assuming that the increase in the regular budget proposed by the Secretariat is accepted by the Commission. He further stated that taking alternative 1 of the budget would seriously interfere with the Commission's biostatistical activities and the SCRS strongly recommended to choose alternative 3.

13.2. Japan, the U.S.A., Canada, Brazil, Spain and the U.S.S.R. supported alternative 3 of the Austerity Budget. However, the U.S.S.R. and some other countries voiced reservations on this budget stating that it is subject to final approval by their respective governments at a later date. Also, it was mentioned that most of the governments can make a commitment only for 1978 with the hope that their countries approve the budgets for subsequent years on a year-to-year basis.

13.3. The delegate of France stated that he would have difficulties in getting conformity to this program. He indicated that it would be difficult for France to make any financial commitment at the present time. However, he proposed that the Secretariat initiate the program with the present funding by hiring the proposed biostatistician, which is covered by the budget. When the program has developed further, a report should be circulated within three months and then the countries would be able to decide whether or not they would accept the program.

13.4. Senegal and Cuba also mentioned some difficulties in making commitments at this time.

13.5. After prolonged deliberation, the Committee *recommended* that initiation of the skipjack program should be delayed by one year during which time each member country should study the possibility of their governments making a firm commitment at the time of the 1978 meeting. In order to facilitate such studies, the tables of contributions by member countries were calculated assuming that the

alternative 3 of the Austerity Budget would be approved. These tables are attached as Appendix 6.

13.6. The Committee *recommended* that the Commission instruct the SCRS scientists to refine the present skipjack program and to draft a program in as much detail as possible. The results should be reported by next year's meeting.

Item 14. DATE AND PLACE OF THE NEXT MEETING OF THE COUNCIL
Item 15. ITEMS TO BE CONSIDERED BY THE COUNCIL AT ITS NEXT MEETING
Item 16. DATE AND PLACE OF THE NEXT MEETING OF THE COMMISSION

16.1. These three agenda items were considered together. Senegal proposed that the Commission hold a special meeting in 1978 instead of the Fifth Regular Meeting of the Council, since there is considerable important business such as the Skipjack Program, bigeye and bluefin regulation, which are to be deliberated next year.

16.2. Ivory Coast suported this proposal and there was unanimous support from the other delegations.

16.3. The Committee *recommended* to the Commission that the First Special Meeting of the Commission should be held for a one-week period begining Wednesday, November 15, 1978, and that the SCRS should meet during the week preceding this Commission meeting.

16.4. Senegal proposed to hold the next Commission meeting in the Canary Islands. There was a general consensus on this point only if no increase in the 1978 budget is involved.

16.5. The Committee, while considering the present financial difficulties of holding the meeting outside Madrid, *recommended* that the Executive Secretary study the possibility of holding the 1978 meeting in the Canary Islands. He should notify the Commissioners on his decision of the meeting place well in advance of the meeting.

Item 17. OTHER MATTERS

17.1. Mr. F. J. Mather (U.S.A.) presented the plan for tagging of young bluefin tuna in the eastern Atlantic as proposed by SCRS and reiterated by Panel 2. He stated that $ 5,000 would be necessary to dispatch the pilot program in 1978.

17.2. Senegal and Ivory Coast suggested that funds should come out of a trust fund established at the Secretariat to which voluntary contributions can be made.

17.3. Japan and Canada stated that it would be difficult to persuade their governments to contribute to a voluntary fund and that some kind of "semi-obligational" funding arrangement would help them in obtaining the funds.

17.4. The Committee *recommended* to the Commission that the special fund which had been established at the Secretariat should be maintained and that the

monetary contributions should be made, in principle, on a voluntary basis through this fund. However, the Committee also noted that some minor supplementary financing might become necessary from the regular Commission budget to this project, assuming that this can be done without hindering other Commission activities.

Item 18. ELECTION OF COMMITTEE CHAIRMAN

18.1. Mr. C. J. Blondin (U.S.A.) was unanimously elected Chairman of the Committee for the 1978-1979 biennial period, after being nominated by Japan and seconded by Cuba.

Item 19. ADOPTION OF REPORT

The Report was adopted.

Item 20. ADJOURNMENT

The meeting was adjourned.

Appendix 1 to Annex 6

Agenda for the Standing Committee on Finance and Administration (STACFAD)

1. Opening of the meeting
2. Adoption of Agenda
3. Election of Rapporteur
4. Panel Membership
5. Administrative Report
6. Relations with other organizations
7. Commission publications
8. Auditor's Report 1976
9. Financial status 1977
10. Working Capital Fund
11. Estimated Budget 1978-1979
12. Member country contributions 1978-1979
13. International Skipjack Year Program
14. Date and place of the next meeting of the Council
15. Items to be considered by the Council at its next meeting
16. Date and place of the next meeting of the Commission
17. Other matters
18. Election of Committee Chairman
19. Adoption of Report
20. Adjournment

Appendix 2 to Annex 6

Panel Membership (as of November, 1977)

Countries	*Panel 1*	*Panel 2*	*Panel 3*	*Panel 4*	*Total*
Angola	×	—	—	×	2
Brazil	×	—	×	—	2
Canada	×	×	—	×	3
Cuba	×	—	—	×	2
France	×	×	—	—	2
Ghana	×	—	—	—	1
Gabon	—	—	—	—	0
Ivory Coast	×	—	—	—	1
Japan	×	×	× [1]	×	4
Korea	×	×	×	×	4
Morocco	×	× [1]	—	—	2
Portugal	×	×	—	×	3
Senegal	×	—	—	—	1
South Africa	—	—	×	—	1
Spain	×	×	—	× [1]	3
U.S.A.	× [1]	×	×	×	4
U.S.S.R.	×	×	×	×	4
	15	9	6	9	39

[1] Chairman of Panel as of 1977 session.

Appendix 3 to Annex 6

Austerity Budget 1978-1979 (USA $)

	1977 Budget (Approved by the Commission in 1975 and revised by the Council in 1976)	*1978 Budget*	*1979 Budget*
TOTAL	320,000	408,000 (+27 %)	429,000 (+5 %)
Contributions from member countries	*300,000*	*385,000*	*429,000*
Unused balance from previous fiscal year reallocated	20,000	13,000	
From Working Capital Fund		10,000	

		Activities			
		Conventional	*Added*	TOTAL	
Chapter					
1.	Salaries	130,000	143,000	9,000	152,000	167,000
2.	Travel	10,000	10,000		10,000	12,000
3.	Meetings	26,000	28,000		28,000	30,000
4.	Publications	20,000	22,000	6,000	28,000	25,000
5.	Office Equipment	2,000	3,000	1,000	4,000	4,000
6.	Gen. Operating Expenses	26,000	28,000		28,000	30,000
7.	Miscellaneous Expenses	4,000	4,000		4,000	4,000
		218,000	238,000	16,000	254,000	272,000
8.	Coordination of Research					
	a) Personnel	47,000	51,000	20,000	71,000	85,000
	b) Travel	16,000	10,000		10,000	11,000
	c) Equipment	6,000	6,000		6,000	6,000
	d) Data Processing	23,000	23,000	17,000	40,000	40,000
	e) Miscellaneous	3,000	5,000		5,000	5,000
	f) Training Course on Statistics & Sampling	7,000		12,000	12,000	
		102,000	95,000	49,000	144,000	147,000
Sub-Total		320,000	333,000	65,000	398,000	419,000
9.	Contingencies				10,000	10,000
	TOTAL	320,000			408,000	429,000

Table of Contributions by Member Countries

Year 1978 — Total Budget (K) 385,000 $

Country	A N.°	B %	C	D (1,000 MT)	E	F %	G $	H $	I $	J $	K $
Angola	2	5.36	1.73	0	1.73	0.41	1,000	2,000	5,875	889	9,764
Brazil	2	5.36	1.27	0	1.27	0.30	1,000	2,000	5,875	652	9,527
Canada	3	7.14	0.66	0.16	0.82	0.19	1,000	3,000	7,833	421	12,255
Cuba	2	5.36	10.20	0.56	10.76	2.52	1,000	2,000	5,875	5,528	14,403
France	2	5.36	57.86	35.02	92.88	21.76	1,000	2,000	5,875	47,717	56,592
Gabon	0	1.79	0	0	0	0	1,000	0	1,958	0	2,958
Ghana	1	3.57	13.42	0	13.42	3.14	1,000	1,000	3,917	6,894	12,811
Ivory Coast	1	3.57	8.34 *	5.34 *	13.68	3.20	1,000	1,000	3,917	7,028	12,945
Japan	4	8.93	42.02	0	42.02	9.84	1,000	4,000	9,792	21,588	36,379
Korea	4	8.93	46.47	0 *	46.47	10.88	1,000	4,000	9,792	23,874	38,665
Morocco	2	5.36	4.76	1.02	5.78	1.35	1,000	2,000	5,875	2,969	11,844
Portugal	3	7.14	6.73	7.69	14.42	3.38	1,000	3,000	7,833	7,408	19,242
Senegal	1	3.57	5.53	3.06	8.59	2.01	1,000	1,000	3,917	4,413	10,330
South Africa	1	3.57	0.18	0.11	0.29	0.07	1,000	1,000	3,917	149	6,066
Spain	3	7.14	83.87 *	26.37 *	110.24	25.82	1,000	3,000	7,833	56,635	68,469
USA	4	8.93	33.38	21.03	54.41	12.74	1,000	4,000	9,792	27,953	42,745
USSR	4	8.93	8.08	2.07	10.15	2.38	1,000	4,000	9,792	5,215	20,008
TOTAL	39	100.00	324.50	102.43	426.93	100.00	17,000	39,000	109,667	219,333	385,000

A = Panel membership.
B = Percentage of payments for annual membership and panel membership (G + H).
C = 1975 catch (live weight).
D = 1975 canned production (net product weight).
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 $ 329,000 = ($ 385,000 — $ 56,000 (G + H)) distributed percentagewise according to column B.
J = 2/3 of $ 329,000 = ($ 385,000 — $ 56,000 (G + H)) distributed percentagewise according to column F.
K = Total G + H + I + J.

* No reporting received by the Secretariat. Estimates by the Secretariat based on Statistical Bulletin Vol. 7 and other sources.

Table of Contributions by Member Countries

Year 1979 — Total Budget (K) 429,000 $

Country	A N.°	B %	C	D (1,000 MT)	E	F %	G $	H $	I $	J $	K $
Angola	2	5.36	1.73	0	1.73	0.41	1,000	2,000	6,661	1,008	10,668
Brazil	2	5.36	1.27	0	1.27	0.30	1,000	2,000	6,661	740	10,400
Canada	3	7.14	0.66	0.16	0.82	0.19	1,000	3,000	8,881	478	13,359
Cuba	2	5.36	10.20	0.56	10.76	2.52	1,000	2,000	6,661	6,267	15,928
France	2	5.36	57.86	35.02	92.88	21.76	1,000	2,000	6,661	54,098	63,759
Gabon	0	1.79	0	0	0	0	1,000	0	2,220	0	3,220
Ghana	1	3.57	13.42	0	13.42	3.14	1,000	1,000	4,440	7,817	14,257
Ivory Coast	1	3.57	8.34 *	5.34 *	13.68	3.20	1,000	1,000	4,440	7,968	14,408
Japan	4	8.93	42.02	0	42.02	9.84	1,000	4,000	11,101	24,475	40,576
Korea	4	8.93	46.47	0 *	46.47	10.88	1,000	4,000	11,101	27,067	43,168
Morocco	2	5.36	4.76	1.02	5.78	1.35	1,000	2,000	6,661	3,367	13,027
Portugal	3	7.14	6.73	7.69	14.42	3.38	1,000	3,000	8,881	8,399	21,280
Senegal	1	3.57	5.53	3.06	8.59	2.01	1,000	1,000	4,440	5,003	11,444
South Africa	1	3.57	0.18	0.11	0.29	0.07	1,000	1,000	4,440	169	6,609
Spain	3	7.14	83.87 *	26.37 *	110.24	25.82	1,000	3,000	8,881	64,210	77,091
USA	4	8.93	33.38	21.03	54.41	12.74	1,000	4,000	11,101	31,691	47,792
USSR	4	8.93	8.08	2.07	10.15	2.38	1,000	4,000	11,101	5,912	22,013
TOTAL	39	100.00	324.50	102.43	426.93	100.00	17,000	39,000	124,333	248,667	429,000

A = Panel membership.
B = Percentage of payments for annual membership and panel membership (G + H).
C = 1975 catch (live weight).
D = 1975 canned production (net product weight).
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.
J = 2/3 of $ 373,000 = ($ 429,000 — $ 56,000 (G + H)) distributed percentagewise according to column B.
I = 1/3 of $ 373,000 = ($ 429,000 — $ 56,000 (G + H)) distributed percentagewise according to column F.
K = Total G + H + I + J.

* No reporting received by the Secretariat. Estimates by the Secretariat based on Statistical Bulletin Vol. 7 and other sources.

Appendix 5 to Annex 6

Table 1. The Commission's Austerity Budget for the International Skipjack Year Program

Activities	*Budget in U.S. dollars* 1978	1979	1980	1981
Tagging with dart tags	0	30,000	45,000	10,000
Improved fishery statistics	0	0	35,000	10,000
Super-sampling	0	15,000	20,000	10,000
Maturity and fecundity	0	0	0	0
Larval survey	0	0	*	0
Physical oceanography	0	0	0	0
Aircraft survey	0	0	*	0
Genetics	0	5,000	5,000	0
Otolith ageing	0	0	0	0
Tagging with sonic tags	0	0	0	0
Stomach contents	0	0	0	0
Exploratory fishing	0	*	*	0
Administration [1]				
ICCAT Coordination services	42,000	57,000	73,000	68,000
TOTAL	42,000	107,000	178,000	98,000

* Funding arrangements for these activities are not yet clear. The Secretariat may require funds to administer the arrangement that is adopted.

[1] Estimated expenses for ICCAT coordination services are shown in Table 2. In this Table, alternative 3 of Table 2 is adopted.

Table 2. Alternative Austerity Budget — Administration

Estimates of expenses at the Coordinator's* office (U.S. dollars)

Years	Coordinator Alternatives 1	2	3	Assistants (Secretaries and Technicians)	Office equipment and materials	Trip expenses	Computer services	Office rent & contract services	Other exp.	Totals Alternatives 1	2	3
1978	0	0	25,000	5,000	0	5,000	2,000	—	5,000	17,000	17,000	42,000
1979	3,000	3,000	30,000	8,000	2,000	5,000	2,000	—	10,000	30,000	30,000	57,000
1980	3,000	30,000	30,000	13,000	5,000	10,000	5,000	—	10,000	46,000	73,000	73,000
1981	3,000	30,000	30,000	13,000	5,000	5,000	5,000	—	10,000	41,000	68,000	68,000
TOTAL	9,000	63,000	115,000	39,000	12,000	25,000	14,000	—	35,000	134,000	188,000	240,000

* The table does not include estimated Commission's expenditure for each research activity.

Table of Contributions by Member Countries

Country	A N.°	B %	C ..... (1,000 MT)	D	E	F %	G $	H $	I $	J $	K $
			Year 1978 — Total Budget (K) 42,000 $								
Angola	2	5.36	1.73	0	1.73	0.41			750	113	863
Brazil	2	5.36	1.27	0	1.27	0.30			750	83	833
Canada	3	7.14	0.66	0.16	0.82	0.19			1,000	54	1,054
Cuba	2	5.36	10.20	0.56	10.76	2.52			750	706	1,456
France	2	5.36	57.86	35.02	92.88	21.76			750	6,091	6,841
Gabon	0	1.79	0	0	0	0			250	0	250
Ghana	1	3.57	13.42	0	13.42	3.14			500	880	1,380
Ivory Coast	1	3.57	8.34 *	5.34 *	13.68	3.20			500	897	1,397
Japan	4	8.93	42.02	0	42.02	9.84			1,250	2,756	4,006
Korea	4	8.93	46.47	0 *	46.47	10.88			1,250	3,048	4,298
Morocco	2	5.36	4.76	1.02	5.78	1.35			750	379	1,129
Portugal	3	7.14	6.73	7.69	14.42	3.38			1,000	946	1,946
Senegal	1	3.57	5.53	3.06	8.59	2.01			500	563	1,063
South Africa	1	3.57	0.18	0.11	0.29	0.07			500	19	519
Spain	3	7.14	83.87 *	26.37 *	110.24	25.82			1,000	7,230	8,230
USA	4	8.93	33.38	21.03	54.41	12.74			1,250	3,568	4,818
USSR	4	8.93	8.08	2.07	10.15	2.38			1,250	666	1,916
TOTAL	39	100.00	324.50	102.43	426.93	100.00			14,000	28,000	42,000

A = Panel membership.
B = Percentage of payments for annual membership and panel membership (G + H).
C = 1975 catch (live weight).
D = 1975 canned production (net product weight).
E = Total C + D.
F = Percentage distribution of E.
G = Not applicable.
H = Not applicable.
I = 1/3 of $ 42,000 distributed percentagewise according to column B.
J = 2/3 of $ 42,000 distributed percentagewise according to column F.
K = Total I + J.

* No reporting received by the Secretariat. Estimates by the Secretariat based on Statistical Bulletin Vol. 7 and other sources.

Table of Contributions by Member Countries

Year 1979 — Total Budget (K) 107,000 $

Country	A N.°	B %	C	D (1,000 MT)	E	F %	G $	H $	I $	J $	K $
Angola	2	5.36	1.73	0	1.73	0.41			1,911	289	2,200
Brazil	2	5.36	1.27	0	1.27	0.30			1,911	212	2,123
Canada	3	7.14	0.66	0.16	0.82	0.19			2,548	137	2,685
Cuba	2	5.36	10.20	0.56	10.76	2.52			1,911	1,798	3,709
France	2	5.36	57.86	35.02	92.88	21.76			1,911	15,519	17,430
Gabon	0	1.79	0	0	0	0			637	0	637
Ghana	1	3.57	13.42	0	13.42	3.14			1,274	2,242	3,516
Ivory Coast	1	3.57	8.34 *	5.34 *	13.68	3.20			1,274	2,286	3,560
Japan	4	8.93	42.02	0	42.02	9.84			3,185	7,021	10,205
Korea	4	8.93	46.47	0 *	46.47	10.88			3,185	7,764	10,949
Morocco	2	5.36	4.76	1.02	5.78	1.35			1,911	966	2,876
Portugal	3	7.14	6.73	7.69	14.42	3.38			2,548	2,409	4,957
Senegal	1	3.57	5.53	3.06	8.59	2.01			1,274	1,435	2,709
South Africa	1	3.57	0.18	0.11	0.29	0.07			1,274	48	1,322
Spain	3	7.14	83.87 *	26.37 *	110.24	25.82			2,548	18,419	20,967
USA	4	8.93	33.38	21.03	54.41	12.74			3,185	9,091	12,276
USSR	4	8.93	8.08	2.07	10.15	2.38			3,185	1,696	4,880
TOTAL	39	100.00	324.50	102.43	426.93	100.00			35,667	71,333	107,000

A = Panel membership.
B = Percentage of payments for annual membership and panel membership (G + H).
C = 1975 catch (live weight).
D = 1975 canned production (net product weight).
E = Total C + D.
F = Percentage distribution of E.
G = Not applicable.
H = Not applicable.
I = 1/3 of $ 107,000 distributed percentagewise according to column B.
J = 2/3 of $ 107,000 distributed percentagewise according to column F.
K = Total I + J.

* No reporting received by the Secretariat. Estimates by the Secretariat based on Statistical Bulletin Vol. 7 and other sources.

Table of Contributions by Member Countries

Country	A N.°	B %	C	D	E	F %	G $	H $	I $	J $	K $
	Year 1980 — Total Budget (K) 178,000 $										
			..... (1,000 MT)								
Angola	2	5.36	1.73	0	1.73	0.41			3,179	481	3,659
Brazil	2	5.36	1.27	0	1.27	0.30			3,179	353	3,532
Canada	3	7.14	0.66	0.16	0.82	0.19			4,238	228	4,466
Cuba	2	5.36	10.20	0.56	10.76	2.52			3,179	2,991	6,169
France	2	5.36	57.86	35.02	92.88	21.76			3,179	25,816	28,995
Gabon	0	1.79	0	0	0	0			1,060	0	1,060
Ghana	1	3.57	13.42	0	13.42	3.14			2,119	3,730	5,849
Ivory Coast	1	3.57	8.34 *	5.34 *	13.68	3.20			2,119	3,802	5,921
Japan	4	8.93	42.02	0	42.02	9.84			5,298	11,680	16,977
Korea	4	8.93	46.47	0 *	46.47	10.88			5,298	12,917	18,214
Morocco	2	5.36	4.76	1.02	5.78	1.35			3,179	1,607	4,785
Portugal	3	7.14	6.73	7.69	14.42	3.38			4,238	4,008	8,246
Senegal	1	3.57	5.53	3.06	8.59	2.01			2,119	2,388	4,507
South Africa	1	3.57	0.18	0.11	0.29	0.07			2,119	81	2,200
Spain	3	7.14	83.87 *	26.37 *	110.24	25.82			4,238	30,642	34,880
USA	4	8.93	33.38	21.03	54.41	12.74			5,298	15,123	20,421
USSR	4	8.93	8.08	2.07	10.15	2.38			5,298	2,821	8,119
TOTAL	39	100.00	324.50	102.43	426.93	100.00			59,333	118,667	178,000

A = Panel membership.
B = Percentage of payments for annual membership and panel membership (G + H).
C = 1975 catch (live weight).
D = 1975 canned production (net product weight).
E = Total C + D.
F = Percentage distribution of E.
G = Not applicable.
H = Not applicable.
J = 2/3 of $ 178,000 distributed percentagewise according to column B.
I = 1/3 of $ 178,000 distributed percentagewise according to column F.
K = Total I + J.

* No reporting received by the Secretariat. Estimates by the Secretariat based on Statistical Bulletin Vol. 7 and other sources.

Table of Contributions by Member Countries

Year 1981 — Total Budget (K) 98,000 $

Country	A N.°	B %	C	D	E	F %	G $	H $	I $	J $	K $
			..... (1,000 MT)								
Angola	2	5.36	1.73	0	1.73	0.41			1,750	265	2,015
Brazil	2	5.36	1.27	0	1.27	0.30			1,750	194	1,944
Canada	3	7.14	0.66	0.16	0.82	0.19			2,333	125	2,459
Cuba	2	5.36	10.20	0.56	10.76	2.52			1,750	1,647	3,397
France	2	5.36	57.86	35.02	92.88	21.76			1,750	14,213	15,963
Gabon	0	1.79	0	0	0	0			583	0	583
Ghana	1	3.57	13.42	0	13.42	3.14			1,167	2,054	3,220
Ivory Coast	1	3.57	8.34 *	5.34 *	13.68	3.20			1,167	2,093	3,260
Japan	4	8.93	42.02	0	42.02	9.84			2,917	6,430	9,347
Korea	4	8.93	46.47	0 *	46.47	10.88			2,917	7,111	10,028
Morocco	2	5.36	4.76	1.02	5.78	1.35			1,750	885	2,635
Portugal	3	7.14	6.73	7.69	14.42	3.38			2,333	2,207	4,540
Senegal	1	3.57	5.53	3.06	8.59	2.01			1,167	1,315	2,481
South Africa	1	3.57	0.18	0.11	0.29	0.07			1,167	44	1,211
Spain	3	7.14	83.87 *	26.37 *	110.24	25.82			2,333	16,870	19,203
USA	4	8.93	33.38	21.03	54.41	12.74			2,917	8,326	11,243
USSR	4	8.93	8.08	2.07	10.15	2.38			2,917	1,553	4,470
TOTAL	39	100.00	324.50	102.43	426.93	100.00			32,667	65,333	98,000

A = Panel membership.
B = Percentage of payments for annual membership and panel membership (G + H).
C = 1975 catch (live weight).
D = 1975 canned production (net product weight).
E = Total C + D.
F = Percentage distribution of E.
G = Not applicable.
H = Not applicable.
I = 1/3 of $ 98,000 distributed percentagewise according to column B.
J = 2/3 of $ 98,000 distributed percentagewise according to column F.
K = Total I + J.

* No reporting received by the Secretariat. Estimates by the Secretariat based on Statistical Bulletin Vol. 7 and other sources.

Annex 7

Cuban Statement on International Inspection

(Text not available at time of printing)

Annex 8

U. S. STATEMENT CONCERNING ATLANTIC BLUEFIN TUNA REGULATIONS

"The ICCAT Council held its Third Regular Meeting in Madrid, November 20-26, 1974. Based on the report of the Standing Committee on Research and Statistics, the United States introduced regulatory proposals for bluefin tuna through Panel 2. Upon the recommendation of Panel 2, the Council adopted two regulatory measures for Atlantic bluefin tuna based on the U.S. proposals which included a 6.4 kg minimum size regulation and a limit on the fishing mortality of bluefin tuna to recent levels for a period of 1 year. The Council's recommendation entered into effect on August 10, 1975, after formal approval by the Commission and was subsequently extended until August 10, 1978.

As observed by the United States delegation in its last year's views concerning Atlantic Bluefin Tuna:

"The discussions held in 1974 in Panel 2 which ultimately led to the recommendation of the Commission stressed that the interpretation of 'recent levels' of fishing mortality of bluefin tuna be left to each member state. It was further emphasized that each country should choose whether to limit catch or effort."

In keeping with this interpretation and a cooperative spirit to do what it could to help the Atlantic bluefin stocks within the range of its fisheries, the United States promulgated regulations to carry out the recommendations of the Commission. To date, the United States has sought to implement the ICCAT recommendations primarily through limiting catch. The U.S. regulations placed a ceiling or quota by method of fishing on the number of bluefin that might be taken during specifically established fishing seasons. In addition, quotas have been allocated among weight classes of fish, one class for fish weighing between 14 and 115 pounds and another class for fish weighing 300 pounds or more. The taking of bluefin weighing between 115 and 300 pounds was prohibited (as was the taking of bluefin weighing less than 14 pounds) except for a one-fish incidental catch tolerance. Additionally, a fishing certificate requirement was imposed. An important recent regulatory measure was a gear restriction limiting the kind of purse seine net allowed in the fishery.

It was long ago realized that reduction in the seine catch quota for Atlantic bluefin tuna weighing between 14 and 115 pounds is essential to allow larger number of young fish to survive to spawn and to contribute to fisheries conducted on older members of the stock. Today the potential participating fleet capacity exceeds the allowable level of catch by a multiplier of 20 to 30, and is expected to increase. The 1976 seine quota was taken in 4 days after fishing commenced.

The 1977 seine quota was taken in 2 days of actual fishing. The 1977 catch exceeded the quota by approximately 25 per-cent, even though the participants were attempting to comply fully with the regulations.

The combination of these factors along with a continued small quota and potentially increasing fleet size and capacity create the need to limit participation in this fishery. The U.S. delegation feels that it is no longer possible to effectively implement the ICCAT recommendation to 'limit the fishing mortality of bluefin tuna to recent levels', by resorting solely to gear restrictions and limited catch restrictions. Therefore, like our neighbor, Canada, we choose to impose a limited entry scheme within the range of our fishery. This choice is made in accordance with Panel 2's interpretation that 'the recent levels' referred to in what is presently ICCAT recommendation no. 2 should be left to the determination of each member state and the suggestion that 'each country should be free to choose whether to limit catch or effort'.

Several methods of limiting participation (entry) have been used or considered for other fisheries. The exact method that we plan to implement is still under consideration. The method will probably give preference to individuals or vessels that had been active in this fishery in past years. The suitability of the vessel for this fishery and the availability of suitable alternative fisheries will also require consideration. Total closure of the fishery to all newcomers is undesirable and will be avoided if possible. Proposed regulations will be prepared and distributed later this year so that all concerned parties can provide advice and comments well in advance of the next fishing season."

Annex 9

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

Madrid, November 9-15, 1977

Table of Contents

Item 1. Opening of meeting

The Chairman, Dr. B. J. Rothschild (U.S.A.), opened the Eighth Regular Meeting of the Standing Committee on Research and Statistics (SCRS). He welcomed all the delegates and observers (see Annex 2 to the Proceedings of the Plenary Sessions), especially the new members of the Commission, the Republic of Gabon and the U.S.S.R.

The Chairman then reviewed the progress made by the SCRS scientists and the Secretariat in the last few years. He noted that many of the essential statistics which were not available a few years ago have now been made available and all the statistics are presently collected on a more timely basis. He mentioned that ICCAT has made progress in establishing special programs, including biostatistical studies by the Secretariat, revision of ICCAT's "Field Manual", establishment of a computer data management system at the ICCAT headquarters, and the Secretariat port sampling system. He made special note of the proposed International Skipjack Year Program which the SCRS will consider during the session. He reviewed the progress achieved in stock evaluation studies. The training courses

already held and those in preparation were commended as a good way to assure the scientists' involvement in the Commission's research work. The Chairman also praised the recent improvement in the meeting organization and procedure.

During the Opening Session, the Brazilian delegate presented a gavel to the Commission. This gavel was used in opening the Conference of Plenipotentiaries (Rio de Janeiro, May 1966) during which the "International Convention for the Cnoservations of Atlantic Tunas" was prepared and adopted. The gavel was made in Brazil especially for the Conference and preserved ever since. The SCRS *recommended* that a small plaque be placed on the gavel in commemoration of the establishment of ICCAT and that it should be kept at the Secretariat for use at all future meetings.

Item 2. **Adoption of the Agenda and arrangements for the meeting**

The Tentative Agenda was adopted without changes and is herewith attached to this report as Appendix 1.

It was confirmed that several working groups were created by the Chairman to review and evaluate analyses on the status of Atlantic tunas and tuna-like species. The following people had been assigned as rapporteurs for the status of stocks sections of the SCRS Report.

Yellowfin tuna	A. Fonteneau (France), W. W. Fox (U.S.A.)
Skipjack tuna	W. W. Fox (U.S.A.), A. Fonteneau (France)
Bluefin tuna	G. Sakagawa (U.S.A.), J. Beckett (Canada), S. Kume (Japan)
Albacore	J. Y. Le Gall (France), N. Bartoo (U.S.A.)
Bigeye	G. Beardsley (U.S.A.), S. Kume (Japan)
Southern bluefin	J. Beckett (Canada)
Billfishes and others	S. Ueyanagi (Japan), G. Beardsley (U.S.A.)

Dr. P. M. Miyake (Secretariat) was nominated rapporteur for all other sections of the Agenda, and Dr. J. Gulland (FAO) was nominated as general rapporteur to coordinate the activities of the rapporteurs.

An Ad Hoc Group on Admission of SCRS Documents was established and Mr. J. Y. Le Gall (France) was asked to chair the Group to review the qualification of submitted documents.

Item 3. **Admission of observers**

All the observers (listed in Annex 2 to the Proceedings) were admitted.

Item 4. **Admission of scientific papers**

Mr. J. Y. Le Gall (France) reported the results of the meeting of the Ad Hoc Group on Admission of SCRS Documents. The Report is herewith attached as Appendix 2.

The Group considered that the present document policy was well observed by scientists this year and served its purpose. It, therefore, *recommended* that the same policy be used for the 1978 SCRS meeting.

He pointed out, however, that SCRS Documents 18, 33, 89, 90, 91, 92, 93 and 110 were not received by the deadline. The Group *recommended* that while these documents could be distributed during the SCRS meeting, the rapporteurs of the working groups did not have to refer to them.

The SCRS concurred with these recommendations.

Item 5. **Review of national fisheries and research programs**

5.1. *Angola*

5.2. *Brazil*

In 1976, a program was started to develop the industrial tuna fisheries by chartering foreign vessels. Three chartered vessels initiated operations in the northeast of Brazil in 1976 and in that year landed a total of 446 MT, mainly yellowfin, bigeye, albacore and broadbill swordfish. From January to September 1977, the same vessels caught 1,710 MT of the same species as above.

The catch by local longliners in the southeastern to southern waters off Brazil was 1,276.1 MT in 1976.

Besides, the longline catches, 1,778 MT of tunas and related species were caught in 1976 along the whole coast of Brazil by various gears: troll lines, seines and others. The largest amount, about 1,500 MT, was caught in the northeast by small-scale local troll fishermen.

A national research and statistical program is being developed by the federal fisheries service, SUDEPE, in cooperation with state fishery institutions.

5.3. *Canada*

1976 catches amounted to 846 MT bluefin, 161 MT yellowfin, 181 MT skipjack, 23 MT bigeye and 15 MT swordfish, all from the western North Atlantic. Size data were collected from the bluefin catches, and otoliths were taken from 500 giant and 191 small bluefin. The average size of giant bluefin continued to increase as compared to previous years. Tagging activity was reduced, and 28 giant bluefin were released and 4 were recaptured. Early returns for 1977 include two recoveries from the Gulf of Mexico. The bluefin tuna impoundment program for fattening the fish was expanded in 1976 and 1977. This program provides a unique opportunity for biological and physiological experimentation.

5.4. *Cuba*

In 1976, Cuban tuna catches amounted to 10.2 thousand MT, of which more than 60 % correspond to longline and 40 % to the surface fishery (live bait and purse seine). The catch breakdown by species is as follows:

	Thousand MT
Yellowfin	3.6
Bigeye	1.3
Albacore	0.1
Skipjack	3.0
Swordfish	0.6
Billfishes	0.7
Others	0.9

The sampling program on-board commercial vessels is being continued. From these studies data on size, sex, and sexual maturity have been obtained.

This year the skipjack port sampling program has been intensified.

5.5. *France*

5.6. *Gabon*

5.7. *Ghana*

In 1977, there has been increased activity in the tuna fishing industry due to the new participation of the Van Camp Co. (San Diego, USA) on a large scale. With the adjustments in alliances which this entry has produced, no less than 18 vessels were allowed to be added to the fleet. Direct Ghanaian involvement in this fishing industry has been strengthened during the year.

Landings during the year have been very satisfactory with a high daily average catch per boat between 4 to 9 MT.

5.8. *Ivory Coast*

The catches by the Ivorian fleet in 1975 increased to 10,847 MT (3,217 MT of skipjack and 7,720 MT of yellowfin). Research carried out by Ivory Coast is not limited to the national fleet.

In 1975, Abidjan became the major Atlantic tuna port, and in 1976, approximately 70,000 MT of tunas were landed or transshipped there. Data from the French-Ivorian-Senegalese and Moroccan fleets are centrally processed at the "Centre de Recherche Océanographique" of Abidjan. Task I, Task II and biological data are regularly submitted to ICCAT.

5.9. *Japan*

The 1976 total catch of Japanese tuna fisheries in the Atlantic amounted to about 45,000 MT, approximately the same level as that of the previous year. The Atlantic longline fleet was reduced and consequently the catch decreased to 23,000 MT — 35 % less than that of 1975. The longline catch was comprised mainly of bigeye and bluefin tunas.

The bluefin tuna longline fishery was under the ICCAT regulations. The pole-and-line fleet was increased to its previous level and as a result, the catch in 1976 reached 21,600 MT, almost equalling the longline catch. All the statistical Tasks

have been submitted to the ICCAT. Some improvements and progress were made in timeliness and quality of the data. The recent status of the stock of the major tuna and billfish species has been assessed continuously.

5.10. *Korea*

The Korean commercial catch of tuna and tuna-like fishes from the Atlantic Ocean declined in 1976 to 34,914 MT from a record high of 46,949 MT in 1975. This corresponds approximately to a 26 % decrease in the catches from the previous year. This catch was made by 117 longliners (31,575 MT) and 8 baitboats (3,339 MT).

In 1977, research activities continued as in the last two years. The Korean Government again dispatched one tuna scientist to Tema, Ghana, to conduct research on the proportion of undersized yellowfin in the catch. A document concerning this project was presented to SCRS.

5.11. *Morocco*

The 1976 landings were similar to those of 1975. Declines in the overall landings off Morocco, especially those of bluefin tuna, were compensated by the increase of catches in inter-tropical waters.

In 1977, the fishing trend in Moroccan waters shows a sharp gain since the landings during the first seven months are higher than those during the same period in 1976. This is due, on one hand, to the increase of bluefin tuna catches, and on the other, to a sharp gain in the catches of skipjack tuna.

Following an agreement made between the "Office National de Pêches" (Morocco) and ICCAT, a tagging cruise for young bluefin tuna was carried out in July 1977 (SCRS/77/22).

5.12. *Portugal*

5.13. *Senegal*

In 1976, 10,000 MT of tunas were landed at Dakar (8,000 MT from freezer baitboats and 2,000 MT from Senegalese purse seiners). 36,000 MT of tunas were transshipped (6,000 MT from FIS purse seiners, 30,000 MT from Spanish seiners). A preliminary estimate for 1977 based on results from the first three quarters indicates that more than 60,000 MT may be landed. Sampling and data collection activities were conducted on the FIS fleet as well as the Spanish fleet, following an agreement made between the "Centre de Recherche Océanographique" of Dakar-Thiaroye (CRODT) and the "Instituto Español de Oceanografía". Research activities were carried out as in the past, essentially on skipjack: active participation in the preparation of the FIS Project of Intensive Skipjack Research, tagging cruises which resulted in the tagging of approximately 120 tunas in the Cape Verde area, studies on skipjack fecundity, and an echo-integration cruise directed towards skipjack.

5.14. *South Africa*

5.15. *Spain*

Tropical tunas. — An observer was sent to the port of Dakar for the collection of data. Because of the reorganization of the administration, the data could not be compiled in final form on a timely basis. Although these data could not be processed in time for the Meeting, they are available.

Collection of Task I, Task II and biological data is continuing in this area.

Bluefin (*Thunnus thynnus t.*). — The following cruises were carried out:

a) An ichthyoplankton cruise in the western Atlantic was carried out in July, 1977, to study the spawning of bluefin, yellowfin and other species for an evaluation of stock reproduction.
b) A tagging cruise was carried out in the Bay of Biscay on August 15-31, 1977.
c) During October-November, 1977, a cruise was conducted to tag young bluefin tuna (Class 0) in the western Mediterranean. Another cruise, in collaboration with the N.O.A.A. (United States), was conducted to obtain 60 bluefin samples (Age 1) from the Bay of Biscay. In collaboration with CNEXO (France), bluefin research was carried out in the Atlantic and Mediterranean Sea.

Investigation on the catch was continued in the Mediterranean and sampling has begun.

Collection of Task I, Task II and biological data continued in the area of the Canary Islands.

Spain collaborated in the tagging cruises which took place off the coast of Casablanca in July, 1977.

Albacore (*Thunnus alalunga*). — Data collection has continued and there is now 100 % logbook coverage of the Spanish surface fishery.

Collaboration with CNEXO (France) is discussed in various documents which have been submitted to the SCRS.

Bigeye (*Thunnus obesus*). — Data collection has continued for Task I, Task II and biological data in the area of the Canary Islands (Spain) and the port of Algeciras (Spain).

Swordfish (*Xiphias gladius*). — Data have been collected for Task I, Task II and biological from the Atlantic and Mediterranean longline fleets; also, biological and biometric studies have been conducted on this species.

Small tunas. — During the tagging cruise which took place in the western Mediterranean in October-November, 1977, Atlantic bonito *(Sarda sarda)* were also released.

5.16. *U.S.A.*

The U.S. fisheries and research on tuna and tuna-like fishes for 1976-77 are detailed in SCRS/77/109. In 1976, the catch of tuna and tuna-like fishes totaled 17,085 MT, down from the 1975 total catch of 33,379 MT. 1976 catches of yellowfin and skipjack tunas were sharply lowered due to reduced participation

by the American tropical tuna fleet. Catches for this fleet are expected to be higher, near 15,000 MT in 1977 owing to increased participation. The 1976 catch of bluefin was down 34 % due, in part, to strict regulations in conformance with ICCAT guidelines.

Research activities in 1976-77 on tuna and tuna-like fishes were concentrated on yellowfin, bigeye, albacore and bluefin tuna stocks, as well as billfish stocks. Research activities included sampling of U.S. tuna imports in Puerto Rico for species and size composition, the tagging of over 2,100 bluefin tuna in the northwestern Atlantic, data collection on swordfish taken by rod and reel in the newly developed fishery off the southeastern United States, and stock assessment analyses for yellowfin, bigeye, albacore, bluefin tuna and billfishes.

5.17. *U.S.S.R.*

The U.S.S.R. is interested in every possible way in keeping closer international cooperation for developing fisheries on the scientific basis that allows us to carry out the rational exploitation of living marine resources without endangering their stocks. The Soviet fishing industry has at its disposal scientific specialists and vessels and is ready to take active part in ICCAT research programs.

5.18. *Secretariat*

Details of the Secretariat's work in statistics and coordination of research are presented in SCRS/77/11, 12, 15, 16, 17, 18, 19 and 24. Considerable emphasis was still placed on collecting adequate statistics on a timely basis. In September, 1977, with the assistance of many national scientists, the Secretariat for the first time made catch estimates for the first six months of the year.

Among the special assignments given to the Secretariat at the 1976 SCRS meeting, the following were successfully completed: the establishment of the data management system, the revision of the "Field Manual", the preparation of the Training Course on Statistics and Sampling, intensification of the port sampling program, initiation of tagging on young bluefin tuna off Morocco, and organization of an intensified Atlantic-wide skipjack research program.

An assignment which was not completed was the establishment of a biostatistician's position at the Secretariat.

Items 6/7/8 **Brief presentation of major papers on stock conditions/Review of conditions of stocks/Reports of various working groups on species**

6-7-8.a. Yellowfin tuna

a-1 STATUS OF FISHERY

1.1. *Catch*

Yellowfin tuna are caught throughout the tropical and temperate waters of the Atlantic Ocean, Caribbean Sea and Gulf of Mexico. Catch statistics for the various fisheries are given by type of gear in Table 1. The total Atlantic (including the

adjacent seas and gulfs) catch has increased over the last twelve years from an average of 68,000 MT for 1964-66 to over 100,000 MT in recent years, 1974-76. The best estimate of the 1977 catch is 114,000 MT and appears to be the second highest recorded for the Atlantic yellowfin tuna fishery. (See Table 1.)

There are basically three fisheries in the Atlantic: the longline fishery throughout the distribution range of the yellowfin tuna population, the eastern Atlantic surface fishery, and a small western Atlantic surface fishery. Over the last decade the catch trend for the longline fishery has been relatively stable averaging about 26,000 MT (1966-1976), but fluctuating between 16,000 MT (1967) and 32,000 MT (1973). It is expected that the 1977 longline catch of yellowfin tuna will be about 22,000 MT.

The eastern Atlantic surface fishery which began as a baitboat fishery off the west African coast developed rapidly into primarily a purse seine fishery in the late 1960's. The eastern Atlantic surface catch has trended upwards over the past twelve years, surpassing the longline fishery in 1966, and reaching a record catch of about 91,000 MT in 1976. The 1977 catch is expected to be about 93,000 MT, a record catch. The baitboat catch has declined in the 1970's, and in recent years has represented less than 10 % of the eastern Atlantic surface catch. The purse seine catch has continued to increase and in recent years has represented over 90 % of the eastern Atlantic catch. Most of the recent increases (1974-77) in the surface catch, however, have been the result of the fishery developing further offshore rather than through increases in fishing effort in the traditional fishing areas. Depending on how to choose the limit line of the traditional fishing areas (Figure 1) the amount of catch taken from the offshore expansion of the fishery was about 18,000-36,000 MT in 1975 and 1976 or about 20-40 % of the eastern Atlantic surface catch in those years.

The western Atlantic surface fishery has been rather small with an average annual catch of about 2,000 MT (1972-1976).

Despite the minimum size regulation of 3.2 kg which entered into effect on July 1, 1973, on the recommendation of the SCRS to improve the yield of the Atlantic yellowfin fishery, the catch (in terms of number of fish) in the surface fishery continues to be mostly one-year old fish. According to preliminary age composition data from the fishery for 1976, which involved several assumptions, it is estimated that a record number of one-year old fish were taken, representing about 77 % (by number) of the fish caught. From 1974 through 1976, the average percentage of yellowfin caught below the minimum size limit of 3.2 kg (55 cm) has been in excess of 60 % for baitboats and in excess of 20 % for purse seiners.

Small bigeye tuna are still occasionally reported as yellowfin tuna. More seriously, however, significant and increasing quantities of small yellowfin tuna (i.e. below the size limit of 3.2 kg) are being reported as bigeye tuna. Samples at Puerto Rico suggested that some 7,000 TM of small yellowfin were landed there in 1976, many reported as bigeye tuna. The ability of the Committee to provide adequate scientific advice to the Commission on the status of both yellowfin and bigeye tuna stocks is significantly reduced by the consequent lack of reliability in the basic data.

1.2. *Effort*

The trend of fishing effort in the Atlantic longline fishery and eastern Atlantic surface fishery is shown in Table 2. Longline fishing effort declined 10 % between 1974 and 1975 while the effective surface effort declined 5 % between 1975 and 1976. The trend in surface fishing capacity continues to increase with an estimated increase of about 12 % from 1976 to 1977.

a-2 STATUS OF RESEARCH

The emphasis of research effort on yellowfin as reflected in the documents presented to SCRS has been in the field of statistics (SCRS/77/18, 54, 55, 64, 65, 77, 82, 100, 105, 107 and 108), or with the updating of previous quantitative analyses (SCRS/77/59, 62, 101). Little work dealing with qualitative aspects of biological research was reported. The Committee noted that the choice of the balance between different lines of research that was desirable if the Committee is to fulfill its responsibilities to the Commission was a problem common to all species, and should be discussed under another agenda item.

Document SCRS/77/102 compares sexual maturity (measured by gonad index) of yellowfin tuna taken by longline and surface fisheries in the Gulf of Guinea. This study indicates that the yellowfin between 90 and 140 cm fork length exploited by the longline fishery in that area is almost always immature while the fish captured by the purse seine fishery in the same area and time strata are all mature at the same size. It also indicates that spawning by large fish caught by longline takes place in the Gulf of Guinea mainly during the first quarter of the year (as in the purse seine fishery), but also takes place during the third quarter of the year when no surface fish are mature. This paper concludes that deep and surface medium-size yellowfin have a different biology and vertical mixing between the two groups of fish is at a low rate.

During discussion of this topic it was pointed out that there were other interpretations of the observations. For example, the longline will take only feeding fish, and therefore is likely to be selective: for example, fish in some maturity stages may be under-represented in the longline catches if they do not feed bait actively. Another possibility mentioned was that there could be a difference in the geographic location where the samples were collected even if both samples by longline and purse seine were taken within the general area of the Gulf of Guinea; i.e. that the separation could be a horizontal one, of a matter of hundreds of kilometers, rather than a vertical one of tens of meters.

It was, therefore, suggested that further examination should be made of this question, analyzing the results for male and female fish separately, and as far as possible, making direct comparison between samples taken in the same 1° or 5° square. At the same time the comparisons should not be limited to the Gulf of Guinea but be made on other areas of the Atlantic.

Document SCRS/77/97 analyzes the relationship between abundance of a stock and catch per unit of effort (CPUE) in a purse seine fishery based on computer simulation analyses. It showed that CPUE based on unit of effort of days at sea (as those which are presently used) are not always good direct in-

dicators of changes in abundance of tuna stock. It suggested that searching time (i.e. excluding time for setting the purse seine) should probably give a better index of abundance.

Document SCRS/77/98 analyzes the relationship between CPUE and abundance in longline fisheries. The proposed models conclude that variations in abundance can be estimated from changes in CPUE without serious bias.

a-3 STATUS OF STOCKS

3.1. Stock structure

As will be discussed later, an accurate appraisal of the stock conditions of yellowfin tuna strongly depends on the stock structure in the Atlantic. Two different questions must be answered:

1) The first question concerns the relationship between populations exploited by longliners and purse seiners, respectively. These two gears presently exploit the same size range of large yellowfin.

There is a good correlation between CPUE of these two gears (SCRS/77/62). However, some results based on gonad index show important differences between these two groups of fish (Section 2). If there is a single vertically mixing population, it can be expected that the large increase in surface catches of large fish during 1975, 1976 and 1977 will significantly decrease the longline fishing opportunities. The number (in thousands) of yellowfin greater than 120 cm taken by the surface fisheries in the eastern Atlantic and the total Atlantic longline fishery are shown below:

	1969	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Surface	741	472	334	399	527	650	1036	1104
Longline	398	404	407	440	475	450	403	443

If the two groups of fish are more or less independent, only a small decrease (or no decrease) in longline hook-rates would occur.

2) The second question concerns the relationship between populations from the eastern, central and western Atlantic. It is now well known from tagging results of small yellowfin that in the coastal areas of the Gulf of Guinea there is a population of young yellowfin which migrates along the shore during two or three years. The examination of CPUE from small areas (1° squares for purse seine and 5° squares for longline) suggests that these fish later migrate offshore and seasonably return to the coastal areas (fishing season of the Cape Lopez and Cape Three Points, São Tomé and Annobon areas). However, there is no direct evidence (for example, from tagging experiments) on the validity of that hypothesis or there are no estimates of the mixing rates between coastal and offshore populations. If the mixing rate between inshore and offshore populations is high, the change in the exploitation pattern corresponds more or less to an increase in the availability of the previously exploited large fish of the stock. If the mixing rate is low, the newly developed "offshore" fishery is more or less exploiting a new stock.

Consequently, the status of yellowfin stocks in the Atlantic has been analyzed separately assuming:

1) There is a single stock of yellowfin in the whole Atlantic Ocean. (See Section 3.2.)
2) There are two separate stocks, one in the eastern and one in the western Atlantic.
3) There is a more complex structure, with some degree of separation in the eastern Atlantic between the fish on the traditional grounds and those further offshore. The eastern Atlantic situation under either of these hypotheses is discussed in Section 3.3.

It is clear that a better understanding of the stock structure of yellowfin would be valuable, but it is much less clear what specific studies should be recommended that would add significantly to our understanding. It was suggested that information on the techniques used, and results achieved, by the Inter-American Tropical Tuna Commission (IATTC) in relation to the eastern Pacific yellowfin would be useful. It was also suggested that the increased research activities in the tropical Atlantic in connection with the proposed International Skipjack Year would provide an opportunity for collecting information relevant to the problem of yellowfin stock structure.

It was, therefore, *recommended* that the Committee should give particular attention to the problem at its next session, with particular reference to the strengths and weaknesses of different techniques, with a view to making specific proposals at that session.

3.2. Total Atlantic stock hypothesis

3.2.1. *Catch and effort trends*

The total Atlantic catch and effective effort have continued to increase over the years but with diminishing returns in increased catch for each increase in effective effort (SCRS/77/62). Catch has exceeded 100,000 MT in each of the past three years and is expected to reach 114,000 MT in 1977. Catch per unit effort (CPUE) is calculated from FIS CPUE for baitboats (Classes 2 and 3) and medium purse seiners (Classes 3 and 4) and from Japanese longline CPUE, all standardized to Class 3 purse seine units by the ratio of the 1969-1974 average CPUE for Class 3 purse seiners to those CPUE's of the other gear types (SCRS/77/62). The CPUE for 1976 is 8 % higher than that for 1975, but continues the general downward trend since 1964 to date (3.40 for 1964-67, 2.94 for 1968-1971, and 2.26 for 1972-75). The measure of effective effort is calculated by dividing catch by CPUE. Effective effort has exceeded 50,000 standard days at sea (in terms of Class 3/200-300 MT capacity FIS purse seiner units) in the past two years and is expected to stay at a similar level in 1977.

3.2.2. *Recruitment analysis*

The major fishery for small yellowfin tuna occurs in the eastern Atlantic surface fishery. Recruitment studies for the eastern Atlantic (Section 3.3.2) apply to

the total Atlantic stock. Based on the data and assumptions of the analyses, recruitment appears to be stable despite an estimated 50 ∽ 70 % reduction in total stock biomass due to fishing (SCRS/77/62).

3.2.3. *Yield-per-recruit analysis*

Studies of yield-per-recruit for the eastern Atlantic stock hypothesis (Section 3.3.3) apply also to the total Atlantic stock.

Theoretically, increases in yield-per-recruit could be gained from an increase in the size at first capture. However, because of problems in avoiding capture of certain sized fish, the Commission instituted a minimum size limit of 3.2 kg which would, on the average, increase yield-per-recruit marginally. Because yellowfin less than 3.2 kg (55 cm) continue to be caught in substantial and increasing numbers (SCRS/77/64 and SCRS/77/65), yield-per-recruit is expected to decline.

3.2.4. *Production model analysis*

Production model analysis on the total Atlantic yellowfin fishery (SCRS/77/62) was performed as in previous years. The results continue to support the conclusion that the curve relating average sustainable catch to effective fishing effort is broad and flat-topped, i.e. the curve labeled m = 0.0 in Figure 2. However, it must be noted that while the curve labeled m = 0.0 implies that sustainable catch never declines at high levels of fishing effort, this cannot be actually true.

At some level of fishing effort the stock will be so depressed as to result in a reduction of recruitment and the sustainable catch will decline. It is not known at what level of fishing effort this decline will occur.

The estimates of maximum sustainable yield from the total Atlantic fishery range from 100,000 to 138,000 MT depending on which of the curves in Fig. 2 actually describe the true relation between sustainable catch and fishing effort. These estimates are 4-19 % higher than those given is last year's SCRS Report due to the change in the constitution of the fishery (i.e. further offshore development of the eastern Atlantic surface fishery), particularly in 1975 and 1976.

3.2.5. *Current appraisal of total Atlantic stock*

Much of our assessment is based on CPUE data from the FIS fleet. Since CPUE does not always accurately reflect true changes in actual abundance, this should be weighed carefully and kept in mind.

If the constitution of the fishery does not change and if effort does not increase, then the production model analyses suggest that catches would be sustained on the average at about 10,000-15,000 MT less than the 1975-76 level. It is not known at this time whether further development of fishing in the eastern Atlantic offshore areas by expansion of the surface fishery will increase the maximum sustainable yield. It appears, however, that a simple increase in total effort will either yield the same catch (approximately equal to the 1975-76 level) or marginally increase it. On the other hand, continued large catches of small fish or especially further increases in the proportion of small fish in the catch will tend to decrease

future catches. This would also result in further declines in the spawning stock, which may cause a reduction in recruitment and substantial decreases in future catches.

From the currently available data and analyses, it appears that the total Atlantic yellowfin tuna stock is in a healthy state and should continue to support a viable fishery for the near future at least.

3.3. Eastern Atlantic stock

The eastern segment of the two-stock hypothesis is analyzed primarily through examination of the eastern Atlantic surface fishery. It is assumed that either the longline fishery is relatively stable in the eastern Atlantic or that the longliners exploit an essentially separate stock. In addition, there are difficulties in separating catch and effort data between the eastern and western Atlantic for a longlining country which currently comprises a majority of the longline-caught yellowfin tuna. However, because of the expansion of the surface fishery, the longline catch in the eastern Atlantic represents less than 20 % (probably near 10 %) of the total catch by weight.

3.3.1. *Catch and effort trends*

The eastern Atlantic surface catch continued to increase significantly until 1976 (90,500 MT) when it exceeded the 1975 catch by only 2,000 MT. For 1977, the catch is expected to increase further to 93,000 MT.

For studying this stock CPUE was standardized in two different fashions: (1) as in Section 3.2.1, but without the longline CPUE (SCRS/77/62) and called "Type 1", and (2) standardized to Class 5 FIS seiners (SCRS/77/101) and called "Type 2". For Type 1 CPUE, the 1976 point (2.25) is 6 % higher than for 1975, but continues the general downward trend for the period 1964 to date (3.46 for 1964-67, 3.08 for 1968-71, and 2.35 for 1972-75). For Type 2 CPUE the 1976 point (5.15) is 19 % higher than for 1975, but continues the general downward trend (5.86 for 1969-71 and 5.72 for 1972-74); the preliminary 1977 point (5.05) is 2 % lower than for 1976. Two sets of standardized effort were calculated by dividing the catch by Types 1 and 2 CPUE's. Nominal fishing effort in terms of effective carrying capacity continued to increase until 1976 when it dropped about 12 % due primarily to a reduction in the American fleet participation. Effective fishing effort also continued to increase until 1976 when it either dropped by about 16 % (Fig. 3) or increased by 16 % (SCRS/77/101) depending on the type of measure of catch per unit effort used. Two possible demarcation lines between "traditional" and "offshore" grounds were drawn (Fig. 1). The recent increases in catches were due to the development of a significant fishery offshore from the traditional fishing areas of the surface fleet. Depending on the demarcation lines chosen, the "offshore" catches for 1975 and 1976 ranged from 17,000 to 30,000 MT and from about 18,000 to 37,000 MT, respectively. Estimated catches in these "offshore" areas are shown in Table 3.

3.3.2. *Recruitment analysis*

One document (SCRS/77/101) presents a review of recruitment fluctuations from 1969 to 1976 based upon FIS CPUE. This type of estimate relies upon the validity of CPUE as a measure of abundance; also the recruitment into the FIS fishery does not directly measure the real biological recruitment because the Tema-based baitboat fleet is catching a large and variable amount of yellowfin before they recruit into the FIS fishery.

The 1974 year class which appeared to be very weak in 1975 (1976 SCRS Report) is now estimated to be of medium size. This is because during 1975 the fishery recorded low CPUE and poor catches from the 1974 year class. The year class, however, appears now to be in a relatively better condition after having a low fishing mortality during 1975. Data from the FIS fleet indicate that the 1975 year class appears to be a good one.

It is *recommended* that cohort analysis be conducted in order to verify these results independently of fishing effort data.

3.3.3. *Yield-per-recruit analysis*

An important characteristic of the yellowfin surface fishery in the Atlantic is the concentration of fishing effort on very small yellowfin (less than 55 cm or 3.2 kg) by purse seiners and Tema-based baitboats and on very large yellowfin (more than 140 cm or 50 kg) in recent years by purse seiners and a relatively small catch of medium sized fish. This fishing pattern is different from that of the surface fishery for yellowfin in the eastern Pacific.

In 1972, ICCAT adopted a minimum size regulation for yellowfin tuna of 3.2 kg. This regulation was based on yield-per-recruit analysis which indicates a long-term gain in yield if capture of small yellowfin is avoided. Potential benefits of this regulation were estimated to be greater if fishing mortality actually increased; the fishing effort has been obviously increasing since 1972 to the present for surface fisheries.

However, it must be recognized that catches of small yellowfin are obviously still very high. The actual amount unfortunately cannot be estimated precisely due to the following reasons:

1) Mis-identification of bigeye and yellowfin in the landings, mainly in Tema where catches of small-sized tunas are important.
2) Deficiencies in sampling of some major fleets; the number of samples is sometimes too small to estimate the catch of small fish (e.g. American fleet during 1976) or sampling data have been collected but have not been processed and are not presently available (Spanish fleet).
3) The amount of under-sized yellowfin dumped at sea, which is thought to have been occurring, is not reported.

Consequently, existing statistics do not accurately reflect the trends in the catches of small yellowfin and it is unfortunately impossible without some critical assumptions to estimate the present trend in yield-per-recruit. Notwithstanding the above difficulties in estimation and analysis, it is obvious that these large catches

of small yellowfin significantly decrease the yield-per-recruit of the present fishery. However, the increased number of large yellowfin taken by purse seiners in the offshore areas will, to the extent that these fish come from the same stock, probably increase the yield-per-recruit of the fishery, since these fish were not previously available to the fishery. If the "offshore" fishery is exploiting a separate stock, the development of the fishery increases the effective recruitment to the surface fishery.

3.3.4. *Production model analysis*

Two production model analyses were conducted on the eastern Atlantic yellowfin surface fishery data (SCRS/77/62 and SCRS/77/101); the former paper fits several forms of the production model (Figures 3 and 5) and the latter used only one model with m = 1.0 (Figures 4 and 6). Both papers examine models with and without data from the new offshore fishery, although different limits were chosen to define the traditional fishing area. Each paper standardized fishing effort in a different manner. Despite these differences, the conclusions presented in the two papers are essentially the same.

Estimates of maximum sustainable yield including the data of the offshore fishery range from 76,000 to 80,000 MT or up to 112,000 MT for the best fitting curve with m = 0.0. Caution must be taken, however, with predicting far beyond the level of data for the m = 0.0 curve as noted in Section 3.2.4. These estimates of maximum sustainable yield are greater than those for previous years. Both papers conclude that this is a result of the development of the offshore fishing areas (compare Figures 3 and 5). The increase in estimated maximum sustainable yield is from 12,000 to 23,000 MT depending on the model and demarcation of the traditional area.

3.3.5. *Current appraisal of eastern Atlantic stock*

As in the case of the total Atlantic stock analysis, most of our assessment is based on analyses of catch and effort data, primarily from the FIS fleet. CPUE does not always accurately reflect true changes in actual abundance and this may be especially true for tuna fisheries (SCRS/77/98). Therefore, this weighs heavily on our confidence in the present assessment and should be kept in mind.

Future levels of catch depend on the future trend in effort, its geographical distribution, the relationship between fish caught in the traditional and offshore fishing areas, and the proportion of small yellowfin taken. If effort remains constant, then future catches would average 10,000-15,000 MT less than the 1975-76 levels if the fish in the offshore areas are either a separate stock from or mix slowly with fish in the traditional fishing areas. If the fish in the offshore areas are fish that are mixing rapidly with those of the traditional areas, then future catches could decrease more significantly to an average of 25-000-33,000 MT less than the 1975-76 levels. This latter case seems unlikely.

If effort increases moderately and if the fish in the traditional and offshore areas are separate or mix slowly, then future catches may remain about the same or increase moderately. If effort increases moderately and if the fish mix rapidly,

then the future catches may remain about the same or decline significantly. Again, this latter case seems unlikely.

Finally, if substantial catches of small yellowfin continue, future yields will be reduced. If the proportion of small fish in the catches increases, then further and faster declines in the mature stock will result making it more likely that recruitment will not be maintained at a constant level and future yields could be substantially reduced.

Currently available data and analyses indicate that recruitment is relatively stable with some fluctuations and that the eastern Atlantic yellowfin stock appears healthy and should continue to support a viable fishery, at least for the near future. The medium and long-term future of the fishery will ultimately depend on the relationship between stock and recruitment and on controlling the catches of small fish.

3.4. Western Atlantic stock

The yellowfin tuna in the western Atlantic may be a separate stock from those exploited by the eastern Atlantic surface fishery. Very little is known about this stock.

3.4.1. *Catch and effort trends*

The surface catch has been very small, averaging about 2,000 MT from 1972-77. Roughly two-thirds of the Japanese longline catch by number in 1975 came from the western Atlantic (SCRS/77/59), but Japan caught only 22 % of the longline-caught yellowfin in that year.

3.4.2. *Recruitment analysis*

There is none for this stock. See Section 3.2.2 for discussion of the whole Atlantic stock.

3.4.3. *Yield-per-recruit analysis*

There is none for this stock. See Section 3.2.3 for discussion of the total Atlantic stock.

3.4.4. *Production model analysis*

There is none for this stock.

3.4.5. *Current appraisal of western Atlantic stock*

Only fragmentary information is available on this stock. The catches are small and, unless in very recent years the total longline catch has shifted very heavily to the western Atlantic, catches are stable at less than 16,000 MT, i.e. only about 15 % or less of the total Atlantic catch. Length frequency data from the Japanese longline fishery indicate that fish caught in the west are on the average smaller, have a wider range of sizes, and have a less steep descending right hand limb for the length frequency plot than do fish caught in the east (SCRS/77/59).

However, the spawning indices calculated from Japanese longline data for the west and the east show nearly identical decreasing trends from 1969 to 1975.

a-4 EFFECT OF REGULATIONS

While the exact trend in the landings of undersized yellowfin is impossible to determine because of species mis-identification and inadequate sampling, it appears that these catches have sharply increased since 1972 and are still high. Therefore, it is clear that the regulation has not had the desired effect of eliminating, or at least greatly reducing, the catches of small fish. However, it is uncertain what the trends in catches of small fish would have been if there had been no size limit. It might be that, in the absence of any regulations, these catches would have increased even faster than has actually occurred. In that case the regulation had some benefit in discouraging increased fishing on small fish, but the existence of this benefit, still less its magnitude, cannot be determined.

The major effect of the existing size limit is that is has become presently very difficult to obtain reliable statistics for catches of small yellowfin. This situation makes any stock assessment and management of the fishery difficult.

a-5 RECOMMENDATIONS

5.1. *Statistics*

1. Catch and effort statistics for the Spanish fleet, which contributed to 42 % of the surface catch of yellowfin in 1976, and corresponding size frequency data should be processed and made available as soon as possible.

2. The actual catches of small yellowfin and small bigeye must be estimated through:

   a) Increased species composition sampling in Puerto Rico of the American catch;
   b) Species composition sampling with use of diagnostic characters to identify species at landing sites where the small tunas are landed, e.g. Tema, Ghana; and
   c) Correction of reported landings through species composition sampling of the major purse seine fleets, e.g. FIS and Spanish fleets.

3. The amount of small yellowfin discarded at sea must be estimated through:

   a) Encouraging fishermen to record estimates in logbooks;
   b) Sending technicians to sea to estimate and record amounts of discards.

4. Logbooks should be modified to require catch by set for purse seiners rather than catch by day and should provide for entries involving running time (i.e. not searching for fish), time down for repairs (i.e. not searching for fish nor conducting any part of a set), duration of each set and total time at sea. These data are required for studies aimed at improving CPUE as a measure of relative population density and for actual use if the studies are successful in improving CPUE as a population density index.

5.2. *Research*

1. New research should be conducted in order to determine the relation between fish caught in inshore and offshore areas.

2. Further investigations of a quantitative nature should be conducted to examine the relation between surface-caught and longline-caught yellowfin tuna, e.g. maturity (gonad index) and CPUE over a wider area than the Gulf of Guinea, and on a finer scale than 5° × 5° areas if possible.

3. Measurements of year-class strength independent of CPUE, for instance using cohort analysis, should be made on a routine basis and compared to those from CPUE analysis.

4. Simulation studies should be undertaken to test the sensitivity of present analyses to differences in assumptions made about mixing rates and stock structure (both geographical and horizontal) and to errors in abundance estimates owing to inaccurate fishing statistics.

5. The effects of any further increase of fishing effort should be carefully monitored as long as the relation between offshore and inshore stocks is not known.

5.3. *Regulations*

Measures must be taken to apply effectively the size limit regulation for yellowfin tuna. As the mixing of small yellowfin and bigeye in the landings and the difficulties in distinguishing these two species produce false reporting of landings, and because a 3.2 kg size limit would be beneficial for bigeye (see Section 6/7/8-e-4), it is emphasized that a size regulation of 3.2 kg for both species would have great practical advantages. If no action can be taken to apply the size regulation, it is *recommended* that the regulation be cancelled so at least more accurate statistics of the landings by different species can be obtained.

6-7-8.b. Skipjack tuna

b-1 STATUS OF FISHERY

1.1. *Catch*

Skipjack tuna are caught in the western and eastern tropical Atlantic. Catch statistics are given in Table 4 for the years 1964-77. The skipjack catch increased markedly from the early 1960's to a record high of 115,000 MT in 1974. In 1975 and 1976 the catch dropped significantly to 62,000 and 71,000 MT, respectively. In 1977, the skipjack catch is expected to rise to between 80,000 and 100,000 MT (as of September, projected at 98,000 MT).

Most of the Atlantic skipjack catch is made in the eastern Atlantic. The western Atlantic catch has averaged only about 3,000 MT, 1973-76. Virtually all of the catch is by surface gear and until 1976 most of the catch was made by baitboats. Since 1970, most of the catch has been made by purse seiners.

1.2. *Fishing effort*

Skipjack tuna are taken by the same vessels which participate in the surface fishery for yellowfin tuna. Table 2 provides the estimated trend of nominal fishing effort in effective capacity tonnage. Nominal effort is increasing and is expected to increase about 12 % in 1977 from that of 1976.

b-2 STATUS OF RESEARCH

Rearch on Atlantic skipjack is presently relatively small. However, ICCAT's planned International Skipjack Year Program will, if implemented, rectify this problem. Documents SCRS/77/20 and 21 outline the activities of that program.

Several documents present new findings or update statistics (SCRS/77/19, 24, 57, 65, 77, 82, 88, 100, 103, 104, 106, 107, 108, 109). Two documents (SCRS/77/97 and 98) dealt with several theoretical aspects of CPUE as a measure of abundance and the findings are discussed under yellowfin tuna (Section a-2).

SCRS/77/26 discusses the results of fishing surveys in the northeastern Atlantic where skipjack were taken by trolling. The significant relation between temperature and length of captured fish showed fish size increased as the temperature of the water in which they were caught decreased. This result agrees with physiological studies of skipjack conducted by scientists of IATTC.

SCRS/77/63 presents preliminary results from attempts to age Atlantic skipjack by counting what are thought to be daily rings on otoliths. Eight specimens have been processed so far and the results suggest that skipjack grow faster than indicated by results of other ageing methods.

Estimated average length at age is 42 cm for 1-year-olds, and 68 cm for 2-year-olds. The von Bertalanffy growth curve fitted to the eight points is

$$L_t = 84.58\ (1 - \exp\ (-0.079\ (t - 3.463)))$$

where t is age in months and L_t is length in cm at age t. Rate of growth from tagging and other methods show 9-12 cm growth per year which is considerably slower than estimates from the otolith method. Method of injections of tetracycline to yellowfin to mark the otolith have been conducted by IATTC and preliminary results indicate that less than one ring is formed per day on the otolith. Therefore, the results of rapid growth must be considered as preliminary.

b-3 STATUS OF STOCKS

3.1. Stock structure

Document SCRS/77/106 suggests the existence of some skipjack tuna spawning along the southern coast of Brazil, based on observations of the existence of large skipjack with mature gonads and the presence of juveniles.

It was previously established that skipjack larvae are found throughout the tropical region of the Atlantic Ocean, but nothing is known about the stock migrations and structure. CPUE's by gears and sub-areas of the eastern Atlantic are well correlated during 1976 and 1977 as noted in the Dakar Working Group report (SCRS/76/89) for previous years. This result should suggest the existence

of a single population, at least in the Gulf of Guinea. Recent data (SCRS/77/110), however, indicate that CPUE at Cape Verde are not well correlated with other areas.

It is *recommended* that new research be conducted in order to provide better information on the skipjack tuna stock structure in the Atlantic.

3.2. Eastern Atlantic stock

3.2.1. *Catch and effort trends*

Since virtually all the Atlantic skipjack tuna catch comes from the eastern Atlantic, the general trends discussed under Section b-1 apply here too.

The large 1977 catch is expected to approach the 1974 record catch, but without concentrated fishing off Angola as occurred in 1974. In 1977, an appreciable amount of skipjack were caught in the new offshore areas unlike the situation in 1976, when large amounts of yellowfin, but very few skipjack were caught in the offshore areas. Catch-per-unit-effort for all coastal and offshore areas was low at the start of 1976, but in the latter half of 1976 and to date in 1977 the skipjack CPUE has risen sharply. The high 1977 catch will most likely be due to high catch rates rather than to a great increase in fishing effort.

3.2.2. *Recruitment analysis*

As only a small number of year classes are exploited by the existing fishery (only one year class if skipjack tuna grows from 42 to 68 cm during 1 year as indicated in SCRS/77/63) total skipjack catch is related to variability in recruitment and concentration of fishing effort. Changes in availability to the fisheries, related for instance to changes in oceanographic conditions, provide another source of variations of catches and CPUE. However, it can be reasonably assumed that the general trend in skipjack catch rates are mainly related to recruitment variability.

Under this assumption and according to the CPUE trend (Fig. 7), recruitments during the past years were:

- good during 1974
- weak during 1975
- good year during the second half of 1976 and is still providing high catches during 1977.

3.2.3. *Yield-per-recruit analysis*

Document SCRS/77/63 presents estimates of rapid growth of skipjack based on the so-called daily increments of otoliths for 8 specimens. (See Section b-2 of this report.)

Size frequency distribution of skipjack shows that there are only minor variations in size of skipjack tuna caught during the past years; consequently we can assume that yield-per-recruit has been fairly constant. Previous yield-per-recruit

analysis showed that no gain could be expected from a size regulation under the present pattern of exploitation. The main reasons are basically the moderate exploitation rate of skipjack, its limited potential growth in weight and its short period of availability in the present fisheries. This conclusion is still valid, even assuming that the fast growth curve presented in document SCRS/77/63 is the real growth curve.

3.2.4. *Production model analyses*

Production model analyses have been applied to the skipjack tuna fishery for the first time in 1976 (SCRS/77/89). A document was prepared this year by the rapporteurs. The Table showing relationship between catch and "skipjack effort" was updated by estimating the figures for 1976 and 1977 (illustrated in Figure 8). No precise conclusion can be drawn about the present status of the fishery. The poor relation observed between catch and effort may be explained by two major factors:

1) Large variability in apparent recruitment produces a large variability in the equilibrium yield of the present fisheries, since only a few year classes (1 or 2) are presently exploited.
2) It is difficult to estimate the fishing effort exerted towards skipjack for the multi-species fishery.

As in the 1976 report, it is *recommended* that research concentrate on developing better estimates of effective fishing effort on skipjack.

3.2.5. *Current appraisal*

All judgements on the status of the Atlantic skipjack tuna stocks are extremely limited by our poor knowledge on this species.

The status of skipjack stocks in the Atlantic superficially appears to be good, since this species is thought to be exploited at a moderate rate and during a brief period of its life. Fluctuations in skipjack catches are important but are thought to be related to year class variability and to the distribution of effective fishing effort rather than to a real reduction of the stock size due to intensive fishing.

The skipjack population it thought to be under-exploited at least on the Atlantic-wide basis and catches might be increased. However, existing knowledge does not allow us to be sure of this point nor allow scientists to estimate its true productivity if exploited further.

Consequently, the International Skipjack Year Program has been prepared which is discussed in another section.

3.3. Western Atlantic stock

Very little is known about this possible stock. The fishery for skipjack is very small at present. There have been no analyses and the status of this possible stock is unknown.

b-4 EFFECTS OF REGULATIONS

No ICCAT regulations are in force for skipjack tuna.

b-5 RECOMMENDATIONS

5.1. *Statistics*

Statistics (Task I, Task II and size frequency distributions) for the Spanish fleet should be processed and made available.

5.2. *Research*

An important research effort is necessary to provide the scientific knowledge which will allow full exploitation of the stocks. This research is outlined in the section on the International Skipjack Year Program (Item 11).

5.3. *Regulations*

At the present time, it does not seem necessary to apply any regulation to the skipjack fishery.

6-7-8.c. Bluefin tuna

c-1 STATUS OF FISHERY

1.1. *Catch*

Information on the bluefin tuna catches by individual fisheries is given in Table 6. The total catch of bluefin from the Atlantic Ocean and Mediterranean Sea in 1976 was essentially the same as in 1975 and has maintained the level attained in 1974 after a decade of much lower catches. There were, however, some significant changes in catches of individual fisheries.

In the western Atlantic, catches of small bluefin declined in 1976 from the year before by nearly 1,000 MT under a strict management regime, although the large fish catch increased by some 200 MT. The catch in 1977 is expected to be the same as in 1976.

The Atlantic-wide longline fishery took 200 MT less in 1976 than the year before, but continued the level of catch established in 1974, which was double that of the years immediately preceding. This fishery continued to show variation in landings by area of the ocean, with catches in the western areas increasing and those from the east being lower. Sharp declines (3,463 MT, 54 %) were noted in the catches from the eastern Atlantic fisheries in 1976, primarily because the Moroccan purse seine catches were more normal, at 330 MT compared to eight times that level in 1975. Other surface fisheries (France and Spain) also took somewhat less bluefin tuna in the Atlantic, while the Norwegian fishery which has been small since about 1962 was halved.

In the Mediterranean, the 1976 catch was the highest recorded for the period 1970-76 (15,833 MT) having increased by 4,000 MT (34 %) from that of 1975 due to substantial increases in seine catches (up 4,940 MT). The trend has been a continuous rise in reported purse seine catches in recent years, and the true trend may in fact be more marked as there is active development of the purse seine fleet in the Mediterranean and statistics may be incomplete for this fishery. Longline catches of the Mediterranean were down slightly in 1976, to 1,000 MT, continuing the decline from the peak catch of 1974.

Preliminary data for 1977 indicate that the total catch will be similar to that in 1976, and that the trends noted above will continue.

1.2. *Fishing effort*

Segments of the purse seine fishery in the Mediterranean continued to grow and it is noted with concern that the statistics from it may be substantially incomplete. The reported catch from the combined French and Italian purse seine fishery exceeded 12,000 MT in 1976, the Italian catches having increased substantially since 1973.

Detailed statistics from the longline fishery continued to show considerable changes in effort by area, in part due to changes in catch rate. The most marked changes in longline effort in 1976 were a decline from the peak of over 10 million hooks set in 1975 to about 3 million hooks off the Ibero-Moroccan Gulf, and a continued increase in effort, which began in 1973, in the Gulf of Mexico. Longline effort in other areas remained relatively constant.

In the western Atlantic, surface fishing effort decreased in 1976 as compared to 1975 owing to strict restrictions on the catch of large and small fish and a partial prohibition on the catch of medium-sized fish.

Fishing effort for the Bay of Biscay baitboat fishery remained at about the same level in 1976 as in 1975.

c-2 STATUS OF RESEARCH

The Committee reviewed the research recommendations of the last SCRS (SCRS/77/9). Recommendations included the monitoring of recruitment and exploitation, stock structure, age determination, and sensitivity analyses of estimation and assessment techniques.

Documents that contained data on recruitment strength are SCRS/77/33, 49, 68, 74 and 79. Documents SCRS/77/49 and 79 show that in the western Atlantic the 1973 year class is strong and has for the past three years been the dominant year class in the purse seine catches. This year class is beginning to appear in the longline catch. In contrast, the 1974 year class is judged to be poor but the 1975 year class appears to be much better than the 1974 year class, but may not be as strong as the 1973 year class.

In the eastern Atlantic, recruitment indices of age 2 fish show an upward trend since 1971 (SCRS/77/74). The 1973, 1974 and 1975 year classes appear strong. In the Mediterranean, the 1972 and 1973 year classes appear to be strong (SCRS/

77/68) and the spawning population appears to be high (SCRS/77/33). A more thorough review of recruitment is given in Section 3.2.2.

Exploitation of the bluefin tuna stocks is monitored by the major fishing countries. However, adequate data on catches and size composition of bluefin tuna caught particularly in the Mediterranean by non-member ICCAT countries, and fisheries conducted off Morocco continue to be lacking. The Committee noted that document SCRS/77/45 contains improved statistics on the United States sport catch of small bluefin tuna (<age 4) for 1975-77, and that document SCRS/77/94 contains total estimated age composition of 1960-75 bluefin tuna catches from eastern Atlantic fisheries and estimates for some Mediterranean fisheries.

Several documents (SCRS/77/22, 37, 40, 41, 42, 47, 50, 73 and 88) report on aspects that, in general, refer to stock structure. These documents are discussed in detail in Section 3.1. Particularly noteworthy is the cooperative tagging project off Morocco (SCRS/77/22), which the SCRS recommended (SCRS/77/9) that the ICCAT Secretariat execute in 1977.

The SCRS recognized (SCRS/77/9) that there are divergent views regarding the ageing of age 10^+ bluefin tuna and *recommended* that measures be taken to standardize ageing techniques. A workshop in the United States was held in March, 1977 (SCRS/77/49) to investigate the problem, but the proceedings of that workshop are not available. Document SCRS/77/46, however, outlines the general problem, and shows that size at age is rather variable for age 6^+ fish and that correct ageing is only possible by ageing each fish from hard parts. This study also suggested that growth in both length and weight in more recent years (from ca. 1970) is more rapid and thus, could lead to bias in ageing fish from a fixed age-size key.

An important recommendation of the 1976 SCRS (SCRS/77/9) was that sensitivity analysis be conducted with estimation and assessment techniques to determine the impact of uncertainties in age composition, stock structure and population parameters. Unfortunately no documents available to the Committee addressed this recommendation for bluefin tuna.

Research in the field of bluefin tuna physiology and oceanography was reported in documents SCRS/77/52 and 99. The authors show that the behavior and physiology of bluefin tuna are correlated with environmental factors.

c-3 STATUS OF STOCKS

3.1. Stock structure

There is still uncertainty about the degree of separation between bluefin tuna caught in the Mediterranean and eastern Atlantic and caught in the western Atlantic. Tagging studies have confirmed that transatlantic and trans-equatorial migration occurs and may be appreciable in some years. Tagging and other information have also confirmed that exchange of large bluefin tuna occurs between the Mediterranean Sea and the eastern Atlantic. Most tag returns, however, even for fish at liberty for several years, occur on the same side of the Atlantic as the location of tagging. Therefore, it is probable that the results of management action will be most clearly felt among the fisheries on the same side of the Atlantic as

the action is taken, but will also affect to some extent and possibly at irregular intervals, the fisheries on the other side as well as in the Mediterranean Sea. However, it may be convenient, and not incorrect, to treat the Atlantic bluefin tuna as a single stock.

The Committee reviewed several documents that presented new data or analysis of old data that were pertinent to determining stock structure of the bluefin tuna population. Documents SCRS/77/44, 47 and 48 reconfirmed previous findings (SCRS/75/90 and SCRS/75/97) that the Gulf of Mexico is an important spawning area for bluefin tuna and spawning occurs during May through June.

Document SCRS/77/33 presented data from an ichthyoplankton survey that showed bluefin tuna spawn in the western Mediterranean in July. The data also suggest that spawning was more intense in the western Mediterranean in July 1977 than in the Gulf of Mexico in May and June, 1977 (SCRS/77/47).

The Committee noted that spawning of bluefin tuna occurs primarily in the Mediterranean and Black Seas in the summer months and in the Gulf of Mexico and Straits of Florida in May and June. In other parts of the Atlantic, spawning apparently does not occur, judging from the absence of bluefin tuna larvae in plankton samples of several extensive surveys, e.g. EQUALANT and Japanese expeditions, or is sporadic such as in the Gulf of Guinea. However, this conclusion is based on qualitative analyses, rather than on information from a systematic and quantitative analysis. The Committee pointed out that such an analysis is desirable.

A document (SCRS/77/40) containing preliminary results on biochemical analysis of enzymes in bluefin tuna tissues was reviewed by the Committee. The authors of the document showed that 4 out of 23 enzyme systems that were investigated appear to be promising for possible use in stock identification. Considerably more effort, however, in both analysis of larger samples and evaluation of the technique appears to be required before the technique can be judged to be useful for stock identification of bluefin tuna.

Results of incidence and intensity of parasites in bluefin tuna from the western Atlantic were presented in document SCRS/77/50. The study is a survey of the parasitic fauna of fish from the western Atlantic, and an attempt to use parasites as biological tags in analysis of migrations and stock structure of bluefin tuna. The document suggests that the technique is useful for stock identification but the procedure requires more analysis of the life history and distribution of the parasites, analysis of variability within and between samples and development of statistical procedures for testing the results.

Several documents were reviewed that contained tagging data. Documents SCRS/77/22 and 37 reported on the tagging of small bluefin tuna off Morocco and in the Bay of Biscay, respectively, in 1977. Ten age 1 and 2 fish were tagged in the Bay of Biscay and 121 age 1 fish were tagged off Morocco, as a result of ICCAT's cooperative tagging project (SCRS/77/22). Documents SCRS/77/42 and 88 reported on the tagging of more than 2,000 bluefin tuna in 1977 in the western Atlantic and on recent tag returns from releases in that area. Tag recoveries in 1976 and 1977 were made in the western Atlantic, and they continue to support the hypothesis that fish caught in the Gulf of Mexico and the Bahamas

belong to the same stock of fish caught off the mid-Atlantic coast of the United States. Results also suggest that substantial recruitment of bluefin tuna from the western Atlantic into the eastern Atlantic fisheries does not regularly occur.

A document (SCRS/77/41) that describes in detail the seasonal migration of bluefin in the Atlantic and Mediterranean was reviewed. The document in general reviews available data and speculates on the migration patterns of bluefin tuna under the one stock hypothesis.

Although there has been some progress made in the past three years to better define the stock structure of bluefin tuna in the Atlantic and Mediterranean, the Committee noted with some disappointment that progress has not been made in areas that require attention or areas that have a relatively high probability of producing conclusive results. For example, tagging of bluefin tuna in the eastern Atlantic has amounted to a trifle (less than 300 releases for 1975-77), although there has been a good start with the 1977 tagging project off Morocco, compared to the amount of releases in the western Atlantic (4,865 releases for 1975-76), in spite of the annual plea by the SCRS that concentrated tagging of fish in the eastern Atlantic be undertaken because it is a key to determining the degree of exchange of bluefin tuna between the eastern Atlantic and Mediterranean and western Atlantic. This activity perhaps is more cost-effective and would produce more timely definitive results than many current research activities that are being carried out for stock identification purposes. Another example is the lack of any activity to determine whether significat spawning of bluefin tuna occurs in areas other than in the western Mediterranean and Gulf of Mexico - Straits of Florida. By comparison, there is increasing research activity in defining the spawning season and extent of spawning in the better-known bluefin tuna spawning areas of the Gulf of Mexico and the Mediterranean.

The Committee, therefore, concludes that in general there is still speculation on the stock structure of the bluefin tuna population and that required information to define the stock structure is not in hand. It is also noted that unless there is a drastic change in research priorities, required information will not be in hand for at least the next few years.

3.2. Atlantic and Mediterranean stocks

3.2.1. *Catch and effort trends*

In the Bay of Biscay surface fisheries, there is considerable annual variation in the catch-per-unit-of-effort (CPUE) but the general trend appears to have been constant in the 1970's following a decline in the late 1950's and early 1960's, to perhaps half current levels, and a recovery that began in 1963-64. The recent catch rate is being maintained despite a change in the size composition of the catches, with less medium-sized fish being taken.

Catch rates from the longline fishery indicate a declining trend off the Bay of Biscay and in the Mediterranean since 1974. Fishing effort during the same period declined off the Bay of Biscay and remained steady in the Mediterranean. At the same time, catch rates and fishing effort off the United States east coast have apparently increased. It is not clear to what extent these changes may reflect

changes in target species for longliners in the relevant areas rather than changes in abundance.

Despite the improvements that have been achieved in collecting and compiling catch and effort statistics by the Secretariat and member countries, two major problems remain: (a) most available indices of CPUE provide poor measures of the real abundance of the population (or even of particular age or size segments of the population), and (b) the available indices, even where they appear to be reliable, cover only a short period of years. There is no good series of data that can be used to determine, in a quantitative manner, the long-term trends in abundance. This absence is particularly serious as regards the size of the spawning stock, in relation to determining the effect of abundance of spawners on subsequent recruitment (see Section 3.2.5). The Committee believed it is important that (i) studies should be made to determine what CPUE measures (e.g. catch per searching hour by purse seiners, or hook rate by longliners in particular groups of 5° squares) should be used to monitor changes in abundance of different size or age groups of bluefin tuna, and (ii) in the light of the studies made under (i), historic data should be re-analyzed to determine the long-term trends in abundance, particularly of the spawning stock.

3.2.2. *Recruitment analysis*

Young bluefin tuna are caught by fisheries in three areas: (a) off the United States in the northwestern Atlantic, (b) in the Bay of Biscay and Ibero-Moroccan Gulf in the northeastern Atlantic, and (c) off France and Italy in the Mediterranean. Catch rates of the fisheries for young fish, although dependent to some extent on availability of fish, can be considered rough indices of recruitment.

For the eastern Atlantic, the catch rates (Figure 9) of baitboats in the Bay of Biscay indicate that recruitment of age 2 bluefin tuna has fluctuated but the recent trend is upward. The 1975 year class appears to be much stronger than previous year classes.

In the Mediterranean, crude catch rates (catch per boat) for French purse seiners were computed, in part from data in SCRS/76/84. The rates indicate that recruitment of age 3 fish is increasing (Figure 9).

Catch rates of age 2 fish for United States and Canadian purse seiners were computed from data in SCRS/77/9, SCRS/77/49, and the ICCAT Data Record, Vol. 3. The indices for the 1973, 1974 and 1975 year classes are not comparable to those of earlier year classes because the operation of the fishery changed markedly in 1975 in response to management regulations.

However, the catch rates (Figure 9) indicate that recruitment is variable and the 1973 year class is strong. This year class does not appear to be exceptional in the fisheries statistics from the eastern Atlantic and Mediterranean Sea.

A document (SCRS/77/33) provided estimates of the spawning stock in the Mediterranean based on larval surveys and assumptions on larval mortality. The results suggest that continued studies of larval abundance could be useful in estimation of the general level of spawning biomass, and in its year to year changes.

3.2.3. *Yield-per-recruit analysis*

Yield-per-recruit of bluefin tuna was extensively discussed by SCRS at its 1976 session (see SCRS/77/9). An updated analysis was presented in document SCRS/77/79, which though not detailed, confirmed previous analyses.

The Committee, however, noted that there have been changes that may require modifications in the yield-per-recruit calculations of previous years, which were based on fishing mortality for 1970-73.

First, the fisheries have changed considerably in recent years (1975-77) owing to adoption of the bluefin tuna regulations in 1974 by ICCAT and to changes in the abundance of certain age groups in the population. The changes primarily have occurred for western Atlantic fisheries where the purse seine fishery is no longer allowed to freely catch ages 0 and 1 and ages 5-8 fish (SCRS/77/109), and the fishing mortality exerted by it has fallen and the longline fishery is catching larger numbers of younger age fish (age 3-8 SCRS/77/79). Consequently, age-specific fishing mortality by fishery is different now than it was in 1970-73.

Second, the growth rate appears to have increased. As a result, the percentage gains in yield-per-recruit previously estimated to result from changes in age-at-first-capture may not be appropriate for evaluating recent conditions.

However, while the quantitative calculations have yet to be made, the nature of the effects of the changes can be predicted from the general pattern of yield-per-recruit calculations. The reduced fishing on very young (ages 1 and 2) fish means that fewer fish would be affected by a change in age-at-first-capture, and the magnitude of the changes in yield-per-recruit would be less.

On the other hand, if the fishing mortality on older (age 5^+) fish is at least as high as it was, the benefit per small fish released and the optimum size at first capture would be unaltered or increased. That is, we can still say with confidence that (on the basis of the old growth pattern) there would be large benefits from increasing the size at first capture to 3 years, possibly even larger from increasing it from 3 to 4 years, and smaller incremental benefits up to an age-at-first-capture of around 7 years, which would provide the greater yield-per-recruit with the estimated pattern of fishing mortalities among the older fish. The effects of growth changes are not so easy to determine, but since the effects of a change in the age-at-first-capture are largely determined by the trade-off between numerous small fish, and bigger but fewer fish, the conclusions would probably be invariant with respect to size, i.e. the effects would be the same as regards a given size at first capture, but would refer to a slightly lower age at first capture if growth has increased.

It should be noted that the practical value of these conclusions, in terms of a possible increase in age (or size) at first capture, will depend on the ability of the fisheries to operate in such a way as to avoid fish below the specified age (or size).

3.2.4. *Production model analysis*

No production model analysis is available for the bluefin tuna fisheries. Because of the long life span (age 24^+), marked variation in recruitment and drastic

changes in exploitation of the various age groups, production model analysis appears inappropriate for the Atlantic and Mediterranean bluefin tuna fisheries.

3.2.5. *Current appraisal*

Over the past few years, since ICCAT began to express concern about the status of the bluefin tuna, increased information on the fisheries and the stocks that support them has become available. This information, and the changes in the fisheries, particularly those brought about through the regulations, enable some revisions to be made in the appraisal of the current status of the stocks.

The basic facts, which gave rise to the Commission's concern were as follows:

a) The catches in several fisheries, based on very large fish, had declined over a long period, and by the late 1960's were only a small percentage of the catches of the 1950's.

b) Recruitment into these fisheries, as judged by the changes in average size, was small.

c) There was no longer direct evidence of the presence, anywhere in the Atlantic, of substantial numbers of medium-sized fish.

d) Fishing mortality on young fish (1-4 years old) in the western Atlantic was, as deduced from tagging data, very high, and was also believed to be high in the eastern Atlantic.

These facts gave rise to two concerns: first, that because of the high fishing mortality on small fish, the yield actually being obtained from a given number of recruits, at say 1-year-old, was less than could be obtained from some other patterns of fishing, and second, that the size of the spawning stock had been, or might soon be, reduced to the level at which recruitment could be seriously affected.

As regards the yield-per-recruit, subsequent analyses have indeed confirmed that yield-per-recruit could be substantially increased above that obtained with the pattern of fishing mortality at different ages estimated to be occurring with the 1970 pattern of fishing, if the fishing mortality on the younger ages were reduced. An improvement has in fact been achieved as a result of the ICCAT regulations, in respect to both the size at first capture and the fishing mortality (as estimated from tagging) in the young fish (SCRS/77/42, Table 2) in the western Atlantic. Although minor amendments to the yield-per-recruit calculations may be needed to take account of the observed changes in growth, it is clear that some further increase in yield-per-recruit could be achieved if the age at first capture could be increased.

As regards the stock and recruitment question, data on recruitment at age 1 (see Figure 9) suggest that the apparent trend in decreasing recruitment up to 1972 has not been confirmed by later data, and there certainly has not been any recruitment failure. That is, we can conclude with some confidence that at least up to 1974 or 1975 (the last years for which we have reasonable estimates of relative year-class strength), the spawning stock was big enough. Detailed quantitative analysis of the stock-recruitment relation is at present impossible because of the absence of any long series of data on either recruitment, or the size of the spawning

stock. Estimates of the latter, taking into account the contribution to the spawning of fish smaller than the so-called giants, are particularly needed. However, it is clear that the present spawning stock is small, and there is a possibility, the magnitude of which is unknown, that further reductions would soon bring the spawning stock to a level at which recruitment would be affected. As discussed in more detail in relation to albacore (for which the stock and recruitment relation is slightly better established) this would have serious consequences to the fishery.

The Committee, therefore, considered the trends in spawning stocks that are likely to occur in the near future. As regards to the "giant" fish (age 9+), no series of good measures of abundance exist, but the evidence from average size suggests that their abundance continues to decrease in the western Atlantic. The medium-sized fish are poorly sampled by the fisheries, particularly in the western Atlantic where some fisheries are prohibited from landing these fish, so that information from catches of these sizes cannot easily be used to predict future spawning, in particular the lack of evidence about the presence of these fish, noted with concern by the Commission in previous years (see "c" on previous page) may be an artifact of the pattern of fishing. More positively it is clear that more fish are passing through the surface fisheries, i.e. reaching 4 or 5 years of age, as a result of regulations particularly in the western Atlantic. These fish, especially the strong 1973 year class, can be expected to make a big contribution to the spawning stock in a few years' time and bring it back to a level at which the risk of recruitment failure is minimal, provided that they are not too heavily exploited in the meantime. It was, however, noted that because of the localized distribution of bluefin of different sizes, some of the more efficient and mobile fleets can at times concentrate on particular size or age-groups of bluefin and exert a high fishing mortality. The expected increase of the spawning stock may, therefore, not occur if there are no controls on fishing on the 4 to 8-year-old bluefin tuna.

c-4 EFFECTS OF REGULATIONS

No specific studies on the effects of regulations were available to the Committee, although catch, effort and size frequency data relevant to the consideration of bluefin tuna regulations of minimum size limit of 6.4 kg (approximately 0 and 1 age groups) and limiting fishing mortality were available in many of the documents.

Available age compositions of catches of major fisheries that exploit small bluefin tuna are shown in Figure 10. Since 1975, a few undersized bluefin tuna were taken by the purse seine fishery in the western Atlantic, about 1 % of undersized fish were caught each year by the baitboat fishery of the Bay of Biscay, and about 1 % of undesized fish were caught in 1976 by the French purse seine fishery in the Mediterranean Sea. Other fisheries that catch undersized bluefin tuna are the U.S. sport fishery in the western Atlantic, the Moroccan purse seine fishery in the eastern Atlantic and the Italian, Spanish and Moroccan surface gears fisheries in the Mediterranean Sea. Adequate size composition data of fish caught by those fisheries are lacking for an analysis of the amount of undersized fish caught by the fisheries.

ICCAT's regulation of limiting fishing mortality on bluefin tuna to recent levels has been in force for at least two years (1976 and 1977). The regulation is implemented by adjusting catch, fishing effort, or both. Although analyses of the effectiveness of this regulation are unavailable, a qualitative assessment can be made with catch and effort statistics.

In the western Atlantic the limiting catch has been used to implement the regulation. Total catch for the fisheries in both 1976 and 1977 was maintained at about the average level for 1968-74 and about 10-17 % higher than the average level for 1973-74 (Table 6). The strong 1973 year class contributed significantly to the fisheries in 1975, 1976 and 1977, implying that fishing mortality either declined or remained relatively constant in those years compared to levels in 1968-74 or 1973-74. However, in terms of the individual fisheries of the western Atlantic, the young fish fishery (ages 1-4) reduced its catch from average catch levels of 1968-74 or 1973-74 and exploited the abundant 1973 year class; consequently, fishing mortality for this fishery decreased.

On the other hand, catches of the large fish fishery were higher than the average levels recorded for 1968-74 or 1973-74 and recruitment of middle-sized fish into the fishery appeared to be poor. Fishing mortality for this fishery has therefore increased. The 1973 year class, which for the most part, has passed through the young fish fishery, is estimated in terms of abundance at age 1 to have been approximately three times or more as large as earlier year classes that entered the fishery since the late 1960's. Strict catch limitations on the fishery in 1976 and 1977 allowed a fair number of individuals of this year class to escape into the middle-sized group. The escapement is estimated to be approximately six times the level experienced by the 1971 year class. Provided fishing mortality on this year class continues to be maintained at a low level, this year class should contribute significantly to the spawning stock. The Committee noted, however, that this year class is now (1977) appearing in longline catches, as a major age group, from the western Atantic where longliners had not caught significant numbers of 4-year-olds in past years.

In the eastern Atlantic (excluding the Mediterranean) the total catch in 1976 and 1977 was 23-55 % lower than the average catch levels of 1968-74 and 1973-74 (Table 6). Recruitment appears to be increasing in the Bay of Biscay fishery (Section 3.2.2) and fishing effort in the Bay of Biscay fishery has declined. This implies that overall fishing mortality has declined from levels in 1968-74 or 1973-74. However, the Committee is not confident of this assessment because data from the important fisheries in the Ibero-Moroccan Gulf to determine long-term trends in abundance (Section 3.2.1) is lacking.

In the North Atlantic longline fishery, the catch of bluefin tuna has remained fairly constant since 1974 at about 4,500 MT, but has been about 83-93 % higher than the average catch for 1973-74 and 173-188 % higher than the average catch for 1968-74. The location of the main concentrations of fishing has changed, and there are different trends in catch rates in different areas (Section 2.1.1). If fishing mortality had remained constant in this fishery, abundance would have had to increase.

Information on the fisheries in the Mediterranean is limited, particularly for the non-ICCAT member countries. In 1976 and 1977, the total catch has been high, more than 25 % above average catch levels for 1968-74 and 1973-74 (Table 6). Longline CPUE was at about the same level in 1974 and 1975 but decreased by about 33 % in 1976. Between 1975 and 1976, total catch by all gears increased by about 34 % and since there is no evidence that abundance has increased, this implies that fishing mortality increased.

The Committee's assessment of fishing mortality for 1976 and 1977 relative to the average levels of 1973-74 and 1968-74 is summarized below:

	1973-1974	*1968-1974*
Western Atlantic		
Large fish	Increased	Increased
Small fish	Decreased	Decreased
Eastern Atlantic		
Bay of Biscay	Decreased	Decreased
Ibero-Moroccan Gulf	Decreased [1]	Decreased [1]
Mid-Atlantic	Increased [1]	Increased [1]
Mediterranean	Increased [1]	Increased [1]

[1] Preliminary assessments.

c-5 RECOMMENDATIONS

5.1. *Statistics*

A general overview of the bluefin tuna fishery statistics show some major deficiencies in catch, effort and age composition statistics.

Catches of some non-ICCAT member countries are substantially underestimated, especially for fisheries in the Mediterranean Sea. Moreover, it seems that catches of such countries are increasing, and catches of poorly known minor fisheries, which appear to land small tonnages, consist of large numbers of small fish (Figure 10).

Adequate statistics of nominal fishing effort are lacking for many of the fisheries in the Mediterranean Sea, and for some fisheries in the eastern and western Atlantic, and where available the effort units are not always closely related to fishing mortality. This lack of adequate statistics has hampered development of abundance indices for the entire stock.

Biological sampling is also inadequate, in several areas. As the fisheries catch the full range of bluefin sizes, it seems highly desirable that the ICCAT Secretariat continue to seek the data from the countries that participate in the fisheries. For Mediterranean statistics in particular, where several fishing countries are not members of ICCAT, the Committee *recommended* that ICCAT consult with GFCM on procedures for collection and exchange of bluefin tuna statistics and biological data. It is also *recommended* that, using the contacts established in ICCAT and

GFCM, the informal interchange of information between scientists should be encouraged.

Some difficulties arose in the comparison of age structure tables produced for the catch of different fisheries because of the use of somewhat different age, length and weight keys by different scientists. Although it is possible that the growth rate could differ in the different areas, i.e. west Atlantic, east Atlantic and Mediterranean Sea, if there are separate stocks, some agreement in age structure tables is needed. The use of different age composition of catch tables for different analyses has created problems in interpretation and consistency in results from one analysis to another. Therefore, the Committee *recommended* that concerned scientists examine the possibility of producing standard age tables, giving the conversion from size (lenth or weight) to age, for use in studies of stock assessments. It is also *recommended* that in view of differences in year-class strength, growth, and fishing mortality of bluefin tuna, separate tables should be prepared for different areas, and different periods.

Different terminologies are used by researchers to categorize bluefin tuna into size or age groups. For example, "large" bluefin tuna refer to age 9^+ fish by some researchers, whereas it refers to age 6^+ fish by others. To eliminate confusion and misunderstanding in terminology, the Committee *recommended* that a standard set of terms be developed.

5.2. *Research*

With regard to future research, the Committee *recommended* several research activities. Recruitment monitoring continues to be vitally important because it can provide an early warning when the size of the spawning stock reaches a critical level, and information can also be used in predicting population conditions to be expected in the future. Therefore, the Committee *recommended* that recruitment monitoring be continued and extended to all fisheries that are exploiting small bluefin tuna.

Substantially more tagging is needed especially in the eastern Atlantic Ocean, if tagging is to provide a mean for determining the stock structure of the population. However, before the Committee would endorse an execution of an increased eastern Atlantic tagging project, it would first like to see an evaluation of the utility of tagging at the level likely to be achieved in practice in solving the stock structure problem and a plan, with cost and funding analysis.

As indicated in Section c-2, there are divergent views regarding the ageing of age 10^+ bluefin tuna, and it appears that the views will not be resolved in the near future. Therefore, the Committee thought it prudent to (a) continue development of a practical method for accurately determining the age of bluefin tuna, and (b) begin to develop standard age composition of catch tables from temporary age size keys.

The Committee recognized that current stock assessment techniques are affected by the choice of population parameter estimates, stock structure hypothesis and age composition of the catch required by the techniques. Because all current choices are to a degree based on untested assumptions, the Committee *recom-*

mended that sensitivity analyses be used to investigate the impact of choices of population parameter estimates, stock structure hypothesis and age composition of the catch.

It has been noted that increases in the size-at-first-capture would increase the yield-per-recruit. However, there are difficulties in achieving such an increase in practice. The present Atlantic-wide minimum size limit of 6.4 kg is being observed in some fisheries only with difficulty, since fish of different sizes are often mixed. The limit was chosen based on the observed schooling behavior by size, and was selected at a point that would minimize difficulties caused by fish of sizes above and below the limit occurring in the same school.

The practical difficulties would probably be increased with a larger size limit. One paper (SCRS/77/39) reported on the frequency of occurrence of bluefin schools of mixed ages during 3 tagging cruises in the northwest Atlantic. Although these observations may be biased by an interest in schools containing particular sizes for tagging purposes, they do indicate a rate of mixing that would cause difficulties, with a higher size limit.

The Committee, therefore, *recommended* that further studies of the occurence and mixing of young fish of different sizes be carried out with a view to determining the practicality of an increase in the bluefin size limit.

The Committee also *recommended* that further yield-per-recruit analyses be conducted, using revised estimates of the growth rate, and of the fishing mortality now occurring for different ages.

Fishery independent methods for assessing bluefin tuna abundance have not been adequately tested, although reports on use of some techniques were submitted to the SCRS (SCRS/77/33 and 48). Larval surveys might be useful particularly for determining spawning biomass, and aerial surveys might be useful for particularly determining relative abundance of young bluefin tuna. The more intense use of these methods for these purposes should be encouraged, particularly when they can be combined with other work, and their usefulness estimated, including an estimation of the precision that can be attained with them.

5.3. *Regulations*

1. Size limits

The present size limit of 6.4 kg is benefitting the fisheries by increasing the yield-per-recruit. A further increase in the yield-per-recruit would result if the sizes at first capture were further increased, but in view of practical difficulties of implementation, the Committee has no specific proposal to put forward for the Commission's consideration.

2. Controls on the amount of fishing

In view of the uncertainty about the stock/recruitment relation, and the apparently low level of the present spawning stock, there are definite but unquantifiable risks associated with allowing the spawning stock to fall below its present level. To prevent this would require, at least until the increased numbers of fish (and especially the strong 1973 year-class) now reaching 4 or 5 years of age con-

tribute significantly to the spawning stock, the maintainance of controls on the amount of fishing with approximately the present pattern.

Regardless of the strength of recruitment, the yield-per-recruit has been increased by the current controls on the amount of fishing in the fisheries on young fish (i.e. those taking predominately fish less than 4 years old), particularly in the western Atlantic fisheries and would be decreased if they were relaxed or cancelled.

6-7-8.d. Albacore

d-1 STATUS OF FISHERIES

Atlantic albacore fisheries are usually broken down into the North and South Atlantic fisheries. In the North Atlantic, the surface fisheries are primarily baitboats and trollers of France and Spain and, more recently, trollers of Portugal. The longline fishery is composed primarily of Taiwanese (which takes 69 % of the longline catch), Korean (28 %) and Japanese (2 %). For many years, the surface fisheries have operated exclusively in the Bay of Biscay. Since 1973, however, a new surface fishery has been developing: the Spanish baitboat fleet has fished in an area between the Azores-Madeira Islands and Portugal (Figure 11). This fishery catches adult fish of about the same size as those caught by longliners during the summer (Figure 12). In 1976, this new surface fishery caught approximately 5,000 MT.

In the South Atlantic, albacore are exclusively caught by longliners, primarily by the Taiwanese fleet (80 %) and the Korean fleet (15 %); the Japanese fleet catch is smaller, near 5 %.

1.1. *Catch*

The annual total catch of albacore by country for 1965-76 is shown in Table 7. Due to the problems confronting the northern stock, a historical series of total catch of the surface fishery (SCRS/77/75) was estimated, by country (France and Spain) from 1940 to 1976 and by gear (trollers and live baitboats) from 1957 to 1976.

For the longline fishery in the North and South Atlantic, document SCRS/77/84 gives an account of the albacore catch in number and weight, CPUE, effective and relative effort and the fishing intensity by young and old, by season and by approximate ICCAT albacore sampling areas. An effort was made to estimate the catch and effort of the Taiwanese and Korean fleets, based on data surveys by ICCAT. The Secretariat monitored the catch and effort of those fisheries (with 49 % coverage rate for 1976) and the data are available by quarter and statistical areas for 1974-75. These efforts should be maintained. The historical composition of the catches by country is shown in Figure 18.

Catches by the French-Spanish surface fishery were apportioned according to ages for the last twenty years (1957-76); for trollers into ages 2 to 5 and for baitboats into ages 2 to 7 (SCRS/77/75).

The age structures of the albacore caught by the Korean, Taiwanese and Japanese longliners are estimated for the North Atlantic (1956-75) and for the South

Atlantic (1965-75) (SCRS/77/56). The biological sampling effected by the ICCAT Secretariat on albacore landed by the Taiwanese and Korean-Panamanian fleets, should be continued. Document SCRS/77/56 used the results of this sampling for determining catch by age for those fisheries in 1974 and 1975. In order to execute cohort analysis on the southern albacore stock, the catch was broken down by cohorts for 1956-74 (SCRS/77/67). However, the document does not include basic data used in the analyses.

1.2. *Effort*

Figure 17.2 shows annual total fishing effort (in number of days fishing) for the surface albacore fishery for 1957-76 (SCRS/77/75). Longline effort on young and old adult albacore tunas (in effective effort or fishing intensity) is presented in SCRS/77/84. Document SCRS/77/56 provides estimates of nominal effort (in thousands of hooks) by quarter and by ICCAT albacore statistical area for the Japanese, Taiwanese and Korean fleets for 1974-75.

Two complete sets of longline effort data are compiled in terms of nominal effort (number of hooks) for the northern stock, 1956-74 (SCRS/77/95, Table 1) and for the southern stock, 1969-73 (SCRS/77/67). (See Sections 3.2 - 3.3.)

d-2 STATUS OF RESEARCH

The research on albacore presented at the meeting can be classified in the following four topics:

1) Information on research and projects in progress. Document SCRS/77/27 reported the results of exploratory cruises in offshore fishing areas. Document SCRS/77/37 reported dates and locations for 38 albacore tagged in the Bay of Biscay region. Document SCRS/77/34 presented sex ratios by size groups of fish caught off Brazil. A morphometric study of pectoral fin length of fish from the Atlantic and the Mediterranean was presented in document SCRS/77/96.

2) Improving and updating fishery data. Catch and effort data were presented for surface fisheries (SCRS/77/75) and for longline fisheries (SCRS/77/84).

3) Response to research recommendations of the 1976 SCRS (SCRS/77/9). The possible mixing of stocks between the Atlantic and Indian Oceans is discussed in document SCRS/77/85, and a general review of problems on stock structure was presented (SCRS/77/96).

4) Evaluation of stock conditions with existing data using analytical methods. Cohort analysis with data for the North Atlantic fisheries and with data for the South Atlantic fisheries is presented in SCRS/77/95 and SCRS/77/67, respectively. General production models were used with the assumption of northern-southern stocks (SCRS/77/29, 67 and 95). Attention is drawn to document SCRS/77/95 which uses a computer "simulation model" to evaluate a stock-recruitment relation for the northern albacore stock and the future of this stock under different fishing regimes.

d-3 STATUS OF STOCKS

3.1. Stock structure

The general view of scientists over the past 10 years has been that there are two separate albacore stocks, northern and southern, in the Atlantic, based on information from longline catches. This hypothesis has so far not been proved by solid evidence.

An exploratory cruise in the North Atlantic in June caught the same size albacore as those caught in the Azores during the same period (SCRS/77/27). In October, this cruise caught albacore of approximately the same size as the longline fisheries. The above suggests that within the northern stock there may be sub-stocks. A newly developed "Azorian" baitboat fishery catches adult albacore of about the same size, or even larger than, fish caught by the summer longline fishery (Fig. 12). This again suggests the possible existence of a northeast Atlantic sub-stock. A possibility that this sub-stock is a part of the Mediterranean stock also exists.

Following the recommendations made by the SCRS in 1976, a specific study was conducted to determine whether mixing occurs between albacore in the South Atlantic and the Indian Ocean (SCRS/77/85). Age compositions of albacore caught off the east and west coast of South Africa during the winter quarters suggest that mixing between the Atlantic and the Indian Ocean stocks may exist during the months of June through August. However, the results could be interpreted that there are independent stocks in the Atlantic and Indian Oceans with little mixing which have a similar manner of behavior. More definitive work is required before this question is answered.

No research report was presented concerning the hypothesis of possible mixing between north and south stocks, and particularly recruitment of albacore from the South Atlantic to the northern Atlantic longline fishery. Is should be noted that the "simulation model analysis" in document SCRS/77/95 indicated observed longline catches for the northern stock to be consistently higher than the simulated catches for both constant recruitment and variable recruitment.

It should be noted as well that the fine structure of the northern stock should be totally reviewed in terms of the interrelationship between the surface and longline fisheries and between the baitboat fishery of the Azorian and Madeira Islands and Bay of Biscay.

3.2. South Atlantic stock

3.2.1. *Catch and effort trends*

Catches from the South Atlantic stock (Table 7) were relatively stable from 1965 through 1972, averaging 30,000 MT per year. After a peak catch of 42,000 MT in 1974, catches declined in 1973 and remained near a mean catch level of 20,000 MT through 1976 (Figure 13).

Effort has shown an increasing trend from 63.4×10^6 hooks in 1965 to a maximum of 93.3×10^6 hooks in 1972. In 1973 and 1974, effort declined to approximately 50×10^6 hooks. Estimates for 1975 and 1976 indicate increasing

effort levels of approximately 60×10^6 hooks and 80×10^6 hooks for the two respective years (Figure 13).

Catch-per-effort of both young and adult albacore has shown a general decline of 30-40 % (SCRS/77/84) from 1965 to 1973, leveling off in 1973-75 (Figure 14). However, as suggested in documents SCRS/77/56 and SCRS/77/67, the modal age in the catch has remained at approximately age 5 or 6 for the last 10 fishing years.

3.2.2. *Recruitment analysis*

Estimates of the recruitment at age 3 of the 1960 to 1966 cohorts were presented in document SCRS/77/67. Results show minor fluctuations in recruitment at age 3, with recruitment averaging 3.6×10^6 fish per year. Recruitment at age 3 for the 1964 year class was approximately 35 % lower than the mean recruitment level.

These estimates are different from those used last year by the SCRS. This may be attributed to the different growth equations used in the various analyses. An effort to obtain an acceptable age-growth equation for the southern stock should be made.

The possibility of mixing of fish between Indian Ocean and South Atlantic albacore stocks during winter months was raised in document SCRS/77/85. If this is true, it would have an effect on recruitment to the southern stock.

3.2.3. *Yield-per-recruit analysis*

No yield-per-recruit study for the south stock was presented to the SCRS.

3.2.4. *Production model analysis*

Production model analysis for the longline fisheries (SCRS/77/84 and SCRS/77/67) indicated that the expected maximum sustainable average yield (MSAY) from the southern stock, assuming no change in the present — wholly longline — fishery takes place, was approximately 29,000-32,000 MT. This would be expected at the nominal fishing effort level of approximately 80×10^6 hooks (Figure 15).

3.2.5. *Current appraisal*

Indications from analyses presented to the SCRS suggest that the South Atlantic albacore stock is in no apparent danger from overfishing at current catch and effort levels. As effort increases, and especially if a significant surface fishery develops in the South Atlantic, the stock should be monitored closely.

3.3. NORTHERN STOCK

3.3.1. *Trend of catch and effort*

The albacore catch (Table 7) from the North Atlantic was maintained between 40,000 and 60,000 MT from 1957 to 1975. In 1975, the catch declined to 39,500 MT, then increased to 54,500 MT in 1976. The estimated catch for 1977

is 62,000 MT. Fluctuations in catch which occurred in the last few years have been caused mostly by changes in the longline catch (Figure 17-1).

Fishing effort during the period 1965-1977 is basically stable. However, there was a noticeable decrease in surface effort, particularly for trollers during the same time period (Figure 17-2).

Following the establishment of the longline fishery for albacore in 1962, longline effort increased rapidly until 1964 but since then has fluctuated between 20×10^6 and 40×10^6 hooks (Figure 16-2).

Catch-per-unit-effort estimates are available for trollers, baitboats (Figure 19-1) and longliners (Figure 19-2) for 1956 through 1975. The longline CPUE shows a distinct increase at the beginning of the fishery, then decreases smoothly. However, this decrease is less pronounced from 1960 to 1975. Catch-per-unit-effort for the surface fishery (both gears) also shows a decrease from 1957 to 1970, as calculated for the total of 4 to 5 age classes present in the fishery.

3.3.2. *Recruitment analysis*

The number of age 2 recruits for 1954 to 1974 was estimated by cohort analysis (SCRS/77/95 and SCRS/76/56). Complete cohorts for 1954 to 1965 were used to estimate recruitment and q for each age. These q values were then used to calculate initial F values for the analysis of incomplete cohorts of 1966 to 1974. The results showed an apparent trend of diminishing recruitment since 1960, with sharp increases in variability for cohorts after 1965 (Figure 20). The 1973 and 1974 cohorts appear to be somewhat stronger than those of 1970 and 1971, which is confirmed by the good yields observed in 2-year-old fish in 1975 and 1976. The average recruitment for 1954-74 of 2-year-olds is 13.2×10^6 (SCRS/77/95). This average is approximately the same as the average, 12 to 13×10^6 recruits, estimated in SCRS/77/86.

The Ricker model of the relation between recruitment of age 2 fish and index of spawning stock abundance based on CPUE of longliners (SCRS/77/30) is shown in Figure 21 (SCRS/77/95). According to this figure, points of cohorts originating in years after 1960 are on the ascending left limb of the curve. The current stock levels are approximately 10 % to 20 % of the virgin stock size. There is also a great increase in the annual variability of recruitment, when the adult stock is reduced. The lowest recruitment occurred in 1972, apparently due to a combination of the low adult stock, and an unusually large negative deviation from the average recruitment from an adult stock of that size.

It seems advisable that the stock should be maintained at a level not substantially less than that corresponding to the top of the dome-shaped curve in order to avoid the ascending left limb, which seems to have the dangerous combination of lower average recruitment and increased variability. However, these conclusions and the ensuing recommendations are based on the hypothesis of a single autonomous North Atlantic stock with a close relationship between the surface and longline fisheries.

It would be useful to estimate spawning stock abundance indices for longline fisheries by geographical areas in order to study the possibility of the existence of adult sub-stocks in the eastern Atlantic as mentioned in Section 3.1.

3.3.3. *Yield-per-recruit analysis*

No new data were presented to estimate more accurately natural mortalities (M) by age. For the northern stock, quarterly F-vectors were estimated for 1954-1965 cohorts, for trollers and baitboats. Using these quarterly effort values by gear, the quarterly q vectors are determined (SCRS/77/95). The values of q were then used in simulation analyses. It is interesting to note that the estimated values of Z for the 3 and 4-year-old fish ($Z = 0.76$, $M = 0.20$) are in general agreement with the value of Z which is an independent estimate from tagging data (SCRS/77/20).

Estimates of yield-per-recruit resulting from a synthetic cohort (1960-62 year class) were presented (SCRS/77/86). The results of the analysis were similar to those obtained in other studies (SCRS/74/34) which were reviewed by the SCRS in 1976. With the current pattern of exploitation, the analyses show that approximately 4 kg/recruit of 0.42 kg (1-year-old) can be expected. The yield-per-recruit would increase by 8 to 13 % if age-at-first-capture was increased from age 2 to 3 or 4-year-old fish (SCRS/77/9, p. 87).

Simulation analyses were made using the quarterly q estimates for the three gear types (trollers, baitboats and longliners) (SCRS/77/95). The following four different scenarios were evaluated:

1) Maintaining effort of each fishery at present levels;
2) Decreasing surface effort by trollers while maintaining longline effort constant;
3) Increasing surface effort, while maintaining longline effort constant;
4) Maintaining surface effort constant and increasing longline effort.

Due to the uncertainty of the stock-recruitment relation, the simulation model chosen was *non*-auto-regenerating. Recruitment of 2-year-old fish was assumed to be constant, averaging 13.2×10^6. For all scenarios, total production from constant stock recruitment stabilized at approximately 60,000-68,000 TM/year. These estimates are in excess of estimates of maximum sustainable average yield (MSAY) resulting from the production model analyses (see Section 3.3.4), but are close to total catches for 1962-1965 (58,000-68,000 MT/year).

3.3.4. *Production model analysis*

Results of production model analysis for the northern stock are presented in SCRS/77/29 and 84. In addition, the Committee fitted a production model to the troller, baitboat and longline data which correspond to the total of the surface (France and Spain) and longline catches for 1957-74 (Figure 22). The fishing effort was standardized by gear, but not according to the nationality of the boat.

Estimates of maximum sustainable yield (MSY) from the Committee's analysis (Figure 22) are:

m	*MSY (in MT)*	*Optimum fishing effort (thousand standard days)*
1.0	51.4×10^3	40.6
2.0	51.4×10^3	46.2

The estimates fall within the MSY range of 50,000-55,000 MT/year which was reported by the SCRS in 1976. The reported catch in 1976 was slightly above the MSY estimate of 51.4×10^3 MT.

The data points in Figure 21 cluster about the MSY value which is consistent with the stock-recruitment relation, discussed before (Section 3.3.3). It was noted that the production model analysis assumes an immediate response between production and recruitment.

3.3.5. *Current appraisal*

Although the quality of the albacore data for both the longline and surface fisheries needs further improvement, there are sufficient good data to base a preliminary assessment of the status of the North Atlantic stock. However, it should be noted that all the analyses (cohort analysis, Y/R, stock/recruitment relationship and production models) used in the evaluation are based on the assumption of a single northern stock. This means that the interrelationships between surface and longline fisheries have been calculated on the basis that they exploit the same, uniform stock. Possibly the real situation is much more complicated with substocks and possible mixing of stocks between the South and North Atlantic.

The clearest conclusion, which emerges from the production model analysis and from the yield-per-recruit analysis, is that, with the present age-at-first-capture and pattern of exploitation, fishing effort has reached a level beyond which increased fishing will produce no sustained increase in yield.

In addition, results of the study of stock and recruitment (Figure 21) indicate that the stock, and the fishery based on it, could be in a vulnerable situation. There are some disturbing similarities between the apparent pattern of recruitment of albacore — increased variability and declining average value — and that in some fisheries that have collapsed. Admittedly, the latter fisheries have mostly been on small pelagic fish (sardines, herring or anchovy) and there is no comparable history of the collapse of a tuna stock. On the other hand, the relative decrease of the spawning stock of North Atlantic albacore (to perhaps 10-20 % of the original unexploited level) is probably greater than that of any other tuna stock, except southern bluefin.

There is, therefore, a possibility that at some time in the future there could be a recruitment failure and a collapse of the stock. The rebuilding of the stock would then require very low catches (reduced fishing mortality on a small stock) for perhaps one of two generations, i.e. ten to fifteen years. It should be noted that the long period of recovery is matched by a long period before the effect of heavy fishing is fully apparent, through its impact on the adult stock and subsequent recruitment. For this reason the production models, as generally applied, may not represent the long-term equilibrium position, and may overestimate the stock size and yield that would be taken at high levels of effort, if these levels were maintained over several generations.

It must be stressed that the stock-recruitment relation for albacore is far from being properly understood, and the situation may well not be as serious as suggested above; the poor recruitment in 1972 may be due entirely to environmental factors, and the present adult stock may well produce recruitment that on the

average is as high as that from larger adult stocks. However, it seems only prudent to discourage any expansion of fishing effort until the stock-recruit relation is better understood. Secondly, if there were a recruitment failure that might lead to a stock collapse, the quicker measures are taken (e.g. to reduce the fishing effort) the less drastic are the measures that would be required, and the earlier the time at which the stock would be rebuilt. Consideration should, therefore, be given now to the type of measures that would be needed, and how they should be applied, so that if signs of an impending collapse appear, early and effective action can be taken.

d-4 EFFECTS OF REGULATIONS

No ICCAT regulations are in force for albacore.

d-5 RECOMMENDATIONS

5.1. *Statistics*

It is *recommended* that efforts be made to secure additional information on the past longline fishery, particularly on its geographic distribution, so that better estimates can be made of the catches and effort in early years by ICCAT albacore areas. The ICCAT Secretariat is encouraged to continue catch sampling already underway and to obtain member countries' catch sample data.

5.2. *Research*

There are major uncertainties about the stock structure of albacore. The separation between fish in the North and South Atlantic needs to be better established. In addition, the possible existence of separate stocks or sub-stocks in the North Atlantic needs to be actively investigated. Apart from the methods already used to study stock structure — tagging, blood typing, examination of detailed catch and effort data — other methods should be considered. However, it is not known which, if any, can be most usefully applied to the albacore. It is therefore *recommended*:

1) That a detailed review of the methods that could be applied to albacore be made and reported to the 1978 SCRS so that a decision can be made on possible lines of further study.
2) That a study be made, possibly by using simulation methods, of the impact on the assessment of the state of the stocks, under different hypotheses concerning stock structure.

In view of the uncertainty about the relation of adult stock to recruitment, and the important effects that different hypotheses concerning this relation have on the assessment of the stock and the advice provided to the Commission, it is strongly *recommended* that:

3) Research be undertaken to determine more precisely the relation of the size of the spawning stock to recruitment and, in particular, to determine the

minimum level at which the spawning stock should be kept; this would require *inter alia* collection of data on sex ratios and fecundity of albacore taken by each gear.

It is also *recommended*:

4) That estimates be made to determine the actual age classes exploited by each gear.
5) That the effects of different effort standardization techniques be examined.

5.3. *Regulations*

The Committee has difficulty in giving advice to the Commission on the need for, and possible effect of regulations because of the uncertainty about the stock-recruitment relation; if the hypothesis is correct, as is suggested by the data presented to the 1977 SCRS meeting, that the abundance of the spawning stock in the North Atlantic has been reduced to a level at which recruitment is affected, then the Commission may soon need to introduce controls, possibly severe, to rebuild the stock. The Committee therefore *recommended*:

1) That research be undertaken to study the fishing patterns (e.g. a shift from trollers to baitboats, thus increasing the effective size at first capture) that could be used to increase the spawning stock and their resulting immediate and long-term effects.
2) To determine the practical fishery management decision that would correspond to those various fishing patterns so that these decisions could be applied quickly and efficiently, in case it would appear necessary in the future.

In any case, even if recruitment has not been affected, it is clear from the production model and yield-per-recruit analyses that the fishing effort in the North Atlantic has reached a level where further increases might decrease the sustained catch, and would certainly, with the present pattern of fishing, not give any significant increase in total catch. The Committee, therefore, *recommended* that:

3) Consideration be given to measures that would discourage or present further increases in the total amount of fishing on the North Atlantic albacore stock.

6-7-8.e. Bigeye

e-1 STATUS OF FISHERY

1.1. *Catch*

Reported catches of bigeye tuna in 1976 totaled 35,900 MT, substantially below levels in 1974 and 1975 (52,400 MT and 51,000 MT, respectively, Table 8). Provisional estimates for 1977 indicate that catches are likely to decline still further. Most of this decrease was recorded in the longline fishery where the reported catch

in 1976 was 21,000 MT after having been maintained at about 35,000 MT during the period 1971-75. The catch in the surface fishery declined slightly from 17,000 MT in 1975 to 14,800 MT in 1976. Estimates for 1977 indicate an increase to 16,000 MT for the surface fishery.

There continues to be a problem with the mixing of small yellowfin tuna and bigeye tuna in the catch. SCRS/77/65 reported that in 1976 sampling data from catches imported to Puerto Rico, primarily from the surface fishery in the eastern Atlantic, showed that an estimated 21 % of the sampled landings of yellowfin tuna were actually bigeye tuna. In 1976, for example, 10,816 MT of yellowfin were imported, of which 9,826 MT were below 55 cm in length. According to the estimate derived from sampling, 2,271 MT were actually small bigeye.

1.2. *Effort*

Document SCRS/77/58 presented an analysis of fishing intensity on bigeye tuna by the Atlantic longline fleet. Effort increased sharply in 1971, and remained relatively constant until 1975 when another sharp rise was recorded. In 1976, however, the total effort by the Japanese longline fleet declined by one third from the level of 1975.

e-2 STATUS OF RESEARCH

In response to recommendations by the Committee in 1976, an analysis of the effect of a multi-gear fishery on yield-per-recruit was presented (SCRS/77/81). Additional refinements to the assignment of effective effort in the longline fishery for bigeye tuna were also presented (SCRS/77/58). Three documents (SCRS/77/65, SCRS/77/66, and SCRS/77/105) presented data on the size distribution of bigeye tuna in the surface fishery and evaluated the percentage of small (less than 55 cm) bigeye tuna in the landings. These studies are necessary for any realistic evaluation of the effects of the yellowfin tuna minimum size limit on the catches of bigeye tuna. SCRS/77/66 indicated that the baitboat fleet tends to retain a higher percentage of small bigeye tuna than yellowfin tuna, while just the opposite situation occurs in the combined purse seine fleet. The analyses do not indicate whether the proportion of small bigeye in the baitboat catch is a result of the yellowfin regulation or whether differences in schooling behaviour and availability are responsible. A combination of these factors is probably the most likely.

SCRS/77/25 reported on the results of tagging experiments conducted near the Azores over a period of 6 years. Two recoveries have been recorded from a total of 93 releases. One bigeye tuna was at large for almost 2 years and increased in length from 55 cm to 121 cm. The second recovery was made one year after the release. Size at release was 75 cm and although no length information was available at recovery, the fish weighed 22 kg. It was also reported to the Committee that a further 100 fish were tagged in 1977.

SCRS/77/35 and SCRS/77/106 presented size and sex-ratio data from bigeye tuna captured off Brazil. SCRS/77/83 presented an analysis of the age composition of bigeye in the North, South and entire Atlantic, utilizing size data from the Japanese longline fishery. The status of Atlantic bigeye stocks was evaluated in

SCRS/77/60 and SCRS/77/81 utilizing production model analyses and various assumptions of stock structure. Document SCRS/77/77 provided size frequency data for bigeye caught off the Canary Islands.

e-3 STATUS OF STOCKS

3.1. Stock structure

No new information was presented that provided any new insight into the stock structure of bigeye tuna of the Atlantic. Several papers (SCRS/77/58, SCRS/77/60, SCRS/77/81) dealt with the problems by presenting analyses based on a single Atlantic-wide stock and by also treating the North and South Atlantic as containing separate stocks.

3.2. Total Atlantic stock

3.2.1. *Catch and effort trends*

Figure 23 (SCRS/77/58) shows trends in hook rate of bigeye tuna by the Japanese and Taiwanese longline fleets in the entire Atlantic Ocean. Except for minor fluctuations, the trend has been steadily downward since 1961. Effective effort targeted on bigeye during the same period, for the Japanese fleet at least, maintained a relatively constant level up until 1971 when the index increased dramatically. This is reflected by a substantial increase in total landings from an average of 21,600 MT in the period 1964-70 to over 45,000 MT from 1971-75. Associated with this increase is the substantial expansion of the surface fishery beginning in 1974.

3.2.2. *Recruitment analysis*

SCRS/77/81 provided an estimate of recruitment at age 1 with cohort analysis utilizing different values of M and initial F (Table 8) (SCRS/77/81) for the total Atlantic stock. There has been no independent assessment to evaluate whether the initial F's used are correct, but the annual recruitment estimates from the analyses appear to vary.

3.2.3. *Yield-per-recruit analysis*

SCRS/77/81 presented an analysis of the effects of catches among gears in a multi-gear fishery on yield-per-recruit (Y/R). The three participants in the Atlantic fishery for bigeye tuna are assumed as follows: Gear-1 (longline fishery) catching mostly fish of age 3 and older; Gear-2 (Tema-based baitboat fleet) catching mainly 1-year-olds; and Gear-3 (Canary Islands baitboat fleet) catching fish from 1.5 to 4 years old.

The changes in yield-per-recruit of each gear with increasing F for Gear-2 and constant F's for the other two gears showed that an increase in the catches by Gear-2 reduces the total catch by an approximately equal amount, the losses being almost equally shared by the other two fisheries. However, the validity of this conclusion is dependent upon the assumptions made on input parameters especially

fishing mortalities of each gear. In the above analysis, particularly regarding Gear-2, there exists uncertainty on the catch because of misreporting of small yellowfin as bigeye (SCRS/77/65). This generates uncertainty in estimating F's of Gear-2 as well as Gear-3. Further analyses of this type need to be performed to evaluate various ranges of F for all three gears.

3.2.4. *Production model analysis*

An equilibrium yield curve for the entire Atlantic bigeye tuna fishery was presented in Figure 24 (SCRS/77/81). The best estimate of maximum sustainable yield was 41,800 MT (M = 2). The substantial deviation of the points for 1974 and 1975 above the yield curve for M = 2.0 is the result of a large increase in the recorded catches of the eastern Atlantic surface fishery (1974) and a large increase in fishing effort by the longline fleet (1975). The curves represent equilibrium conditions, and the displacement of the points above the equilibrium yield curve in response to increased effort is to be expected, and is taken into account in determining that the curve for M = 2 gives a better fit to the equilibrium conditions than M = 0 or M = 1.001. Total catch in 1975 was 51,000 MT but declined substantially in 1976 to 35,100 MT, although the exact corresponding effort is still unknown.

3.2.5. *Current appraisal*

The catch of bigeye tuna in the Atlantic has averaged 43,700 MT during the period 1971-76. These years encompass the rapid increase of effective longline effort directed toward bigeye tuna as well as the substantial increase in the surface fishery for bigeye. This average yield is slightly above the calculated maximum sustainable yield for the entire Atlantic. In view of the analyses presented above and the levels of catch in recent years, it appears that regardless of the type of stock structure assumed, the bigeye tuna resource in the Atlantic is at a high level of utilization and any increased expansion of either the surface or longline fisheries should be done with caution realizing that significant increases in yield will not likely be available. This interpretation, however, is very preliminary and the effects of the significant increase in the surface fishery in recent years on the models used to estimate maximum equilibrium yield should be evaluated.

3.3. South Atlantic stock

3.3.1. *Catch and effort trends*

CPUE for bigeye tuna by the Japanese and Taiwanese longline fleets in the North and South Atlantic are shown in Figure 23. Hook rate in the South Atlantic, following a marked decline from 1961-64 has been relatively stable except for a period of three years in the late 1960's, when CPUE increased.

Effective effort has fluctuated over the five-year period 1970-1975, from 29.1 million hooks (1970) to 61.6 million hooks (1973). Since 1972, the CPUE has remained almost stable. It should be noted that recent catches from the South Atlantic are very near the maximum equilibrium yields (Y-max) estimated by two analyses (SCRS/77/60, SCRS/77/81 (see Section 3.4.1).

3.3.2. *Recruitment analysis*

There is no study made for this stock.

3.3.3. *Yield-per-recruit analysis*

There is no analysis presented for this stock.

3.3.4. *Production model analysis*

Production model analysis for the South Atlantic stock was presented in two documents, SCRS/77/60 and 81. Results of both analyses suggested about the same equilibrium maximum surplus yields (Y-max) of 16,000-17,000 MT (Figures 25 and 26). However, the shapes of the two yield curves are significantly different due to the differences in the technique used to estimate overall fishing effort. The analyses showed that the resource was previously exploited at a low level but reached the level of maximum sustainable yield in 1975.

3.3.5. *Current appraisal*

Given the above estimates of MSY and reviewing recent catch data from the South Atlantic, it appears that the bigeye tuna resource is fully exploited and further expansion does not appear to be warranted.

3.4. North Atlantic stock

3.4.1. *Catch and effort trends*

The decline in CPUE by the Japanese and Taiwanese longline fleets in the North Atlantic has followed a trend similar to that shown for the South Atlantic (Figure 23). However, the decline has been at a steadier rate (except for 1973 and 1974). Effort by the entire longline fleet in 1975 was at the highest level since the inception of the fishery and almost double the average effort expanded during the 5-year period, 1970-74.

3.4.2. *Recruitment analysis*

There is none for this stock.

3.4.3. *Yield-per-recruit analysis*

No studies are presented for this stock.

3.4.4. *Production model analysis*

Equilibrium yield curves for the North Atlantic bigeye tuna stock were presented in Figure 27 (SCRS/77/81). The calculated maximum sustainable yields under three cases (M=0, 1.001, and 2) ranged from 27,800 MT to 65,600 MT with the lower value providing the best estimate. SCRS/77/60 also attempted to provide an equilibrium yield curve for the North Atlantic stock. However, the model did not fit the data and no estimate of maximum sustainable yield was given. The dif-

ference in results between the two documents is due to difference in methods of estimating effective effort. It should also be noted that all the analyses of bigeye stocks using production models are based mainly on longline data. The conclusions on estimates of maximum sustainable yield, and the level of fishing effort at which it occurs might well be modified if there is a major change in the fishing pattern, particularly with expansion of surface fishing.

3.4.5. *Current appraisal*

Recent trends in catch combined with new estimates of maximum equilibrium yield do not suggest that the North Atlantic stock is capable of providing a substantial increase in yield with increase in effort. The effects of the recent increase in the eastern Atlantic surface fishery on the overall yield and yield-per-recruit should be monitored carefully.

e-4 EFFECTS OF REGULATIONS

No regulations are in force for bigeye tuna. Some discussions made on effects of the yellowfin tuna minimum size regulation on the bigeye tuna fishery or at least on bigeye statistics are presented in Section a-4.

e-5 RECOMMENDATIONS

5.1. *Statistics*

It is noted that the Committee recommended in 1975 that efforts be made to obtain statistics on the tuna catch of the USSR broken down by species. These data are not as yet available and efforts should be continued to obtain these data. Continued emphasis should be placed on obtaining detailed catch, effort and size data from the surface fishery for bigeye since this fishery has begun to play a major part in the total Atlantic fishery in recent years.

The Committee *recommended* that the level of sampling of landings of bigeye and yellowfin tuna imports to Puerto Rico be increased in order to provide better estimates of the magnitude of misreporting of yellowfin as bigeye and vice versa.

5.2. *Research*

The Committee *recommended* that continued emphasis be placed on evaluating the effects of misreporting of yellowfin tuna as bigeye tuna and vice versa as this information is important for stock assessments of both species.

The Committee in 1976 raised several questions regarding the effects of establishing a common size limit for both yellowfin and bigeye. These questions are still mostly unanswered and the Committee again emphasized the importance of evaluating the quantitative effects of this proposal on the fisheries for yellowfin and bigeye tunas.

5.3. *Regulations*

To get a rough estimate whether or not the introduction of a size limit of 3.2 kg would benefit the bigeye fishery as a whole, the simple analysis of K. R. Allen was used. This method simply compares the proposed size limit with the product of the exploitation rate and the average size in the catch after the limit has been applied. It was assumed that if the limit of 3.2 kg was enforced the catches by the Tema-based baitboat fishery would become negligible (although a small proportion of the bigeye taken in that fishery are larger than 3.2 kg), and that the current data for the Atlantic longline and Canary Islands baitboat fishery could be used to provide estimates of the exploitation rate and average weight following regulation.

The average weight for the longline and Canary Islands baitboat fisheries are 59 and 34 kg with an overall average of 49 kg based on 1975-76 data. The exploitation rate for these fisheries was obtained using cohort analysis estimates from SCRS/77/81 of between 2.6×10^6 and 12×10^6 fish of age 1 for the 1965-67 cohorts and an estimate of the total catch of bigeye for the two fisheries of 8.9×10^5 in 1975. These correspond to a range for exploitation rates of 0.074 to 0.34, and a corresponding range for the product of exploitation rates and average weight of 4.4 to 20 kg, and thus it seems likely that a size limit of 3.2 kg would benefit the fishery as a whole. This method does not allow separate estimates to be made on the catches by different gears. In qualitative terms it is clear that the fisheries on large fish (longline and Canary Islands baitboat) would benefit, and that the Tema-based baitboat fishery which catches very small fish is likely to be eliminated. However, it was noted that in 1977, catches by this fleet were small. It was also noted that small bigeye (like small yellowfin) can be mixed with skipjack, and that the size regulation could affect the fishery on the latter species which is believed to be under-utilized.

In view of these calculations, and the considerations in relation to the yellowfin size limit (see Section 5.3 of yellowfin), the Committee *recommended* that serious consideration be given to the establishment of a minimum size of 3.2 kg on bigeye tuna.

6-7-8.f. Billfishes (including swordfish)

f-1 STATUS OF THE FISHERY

1.1. *Catch*

The total reported catch of all species of billfishes in 1976 was 4,231 MT, similar to that in 1975 and in 1972-73, but well below the 6,000 MT caught in 1974 and in the years before 1972 (Table 10). The historical catch broken down by species was compiled for population analysis purposes (ICCAT Statistical Bulletin, Vol. 7 - 1976), but is incomplete because the catches by some of the main longline fleets, which account in recent years for over half the total catch, is "unclassified", with no details of species composition.

Reported landings of swordfish in 1976 (9,226 MT) were slightly below those for 1975 (9,777 MT) continuing a downward trend begun in 1973 (Table 11). However, there has been a resurgence of the U.S. and Canadian swordfish fishery in recent years, but catches for the most part are unrecorded (SCRS/77/70). In addition, a sport fishery for swordfish has developed at a rapid rate off the eastern coast of the U.S. and the catches are also unreported. It is likely, therefore, that the actual total catch of swordfish in the Atlantic in 1976 is substantially above the reported catch.

1.2. *Effort*

The fishing intensity (number of hooks per 5 degree area) of the longline fishery since 1970 for white marlin and blue marlin in the North Atlantic was estimated as $800 \backsim 900 \times 10^3$ hooks and $1{,}000 \backsim 1{,}500 \times 10^3$ hooks, respectively (SCRS/77/87).

Document SCRS/77/71 gave the estimated number of "substantial" anglers in the U.S. potentially fishing for billfishes as 3.8 million for 1960, 6.4 million for 1965, and 7.5 million for 1970.

f-2 STATUS OF RESEARCH

Approximately 1,500 billfishes were tagged and released along the U.S. coast from October 1976 through September 1977, and 31 tagged billfishes were recaptured (SCRS/77/72).

There is relatively little research being conducted on swordfish. SCRS/77/70 presented a summary of current knowledge; however, most of the information is from reports published some years ago.

f-3 STATUS OF STOCKS

3.1. Stock structure

Tag recovery data added some new information on the stock structure of billfishes. Document SCRS/77/72 indicated that recoveries of white marlin in the western North Atlantic tend to support migration patterns previously hypothesized (Mather, et al, 1972). Tag returns of sailfish suggest north-south movements along the eastern coast of the U.S. in response to seasonal weather patterns. One recovery, however, suggests that some sailfish move from the Florida coast to the northern Gulf of Mexico in summer.

The first transatlantic migration of a billfish was recorded in 1977 when a blue marlin tagged off the Virgin Islands in the western Atlantic was recovered off Ivory Coast six months later. There are, however, too few tag returns from blue marlin to hypothesize any consistent pattern of movement.

Document SCRS/77/78 gives monthly length frequency distributions as well as length/weight relationships for sailfish in the southeastern waters of Brazil. This area is suggested to be spawning grounds for this species from gonad examinations.

3.2. Atlantic stocks

3.2.1. *Catch and effort trends*

There has been an increase in catch associated with increase in fishing intensity (SCRS/77/87) for white marlin taken by the longline fishery in the North Atlantic. The fishing intensity in recent years (1970-1975) approximately doubled that in the years from 1965 to 1969, and catches increased by approximately 30 %. Catch and effort trends for blue marlin are different from those of white marlin (SCRS/77/87). Catches of blue marlin increased sharply with the expansion in fishing intensity, and while fishing intensity remains high, catches have rapidly dropped. These phenomena were repeated and fluctuation of catches in recent years tends to be small.

For the recreational fishery, billfish catch and effort was estimated as having a consistent upward trend from 1960 through 1975 (SCRS/77/71).

3.2.2. *Recruitment analysis*

No studies were presented for billfish.

3.2.3. *Yield-per-recruit analysis*

Document SCRS/77/70 indicated that for swordfish in the western North Atlantic, size at first capture is approximately 36 kg in the harpoon fishery and 4.5 kg in the longline fishery. Yield-per-recruit at these entry values and under varying values of L_∞, K and M reveal that in the harpoon fishery, the maximum yield-per-recruit curve occurs at a reasonable level of fishing effort, if L_∞ is large. However, if L_∞ is relatively small, as estimates in the Pacific suggest, the maximum occurs only at a very high level of fishing effort.

3.2.4. *Production model analysis*

Document SCRS/77/71 estimated maximum sustainable yield (MSY) for blue marlin, white marlin and sailfish stocks in the northwestern Atlantic using longline data alone, longline data plus a high estimated recreational catch, and longline data plus a low recreational catch. MSY estimates for the latter case were considered to be most reasonable. They are 4,000 MT, 1,900 MT and 960 MT for blue marlin, white marlin and sailfish, respectively. The results of analysis indicate that the fishing level in recent years is below that corresponding to the MSY for blue marlin and sailfish, and at or near MSY level for white marlin.

It is pointed out, however, that the data do not fit the production model very well owing possibly to that the "Index Area" selected for the analysis was not necessarily appropriate. In the case of white marlin especially, the assigned "Index Area" must have amplified an artifact in the relation between catch and effort for some specific years.

Another calculation of MSY was made for white marlin in the North Atlantic based on only longline fishery data (SCRS/77/87). The estimate is 1,800 MT and the recent fishing effort for white marlin appears to be near but below the level of effort that corresponds to MSY. This MSY is similar to the value presented

in SCRS/77/21, although there are basic differences in data used, area covered, and methodology adopted for calculaing effective effort between two analyses.

3.2.5. *Current appraisal*

Because of the provisional nature of data used in production model analyses (SCRS/77/71 and 87), the following comments on status of stocks should be considered preliminary.

It does not appear that any of the billfish stocks of the North Atlantic are currently being fished at levels beyond maximum sustainable yield. Further increases in the level of effort would not, however, result in substantial increases of catch in many of the stocks.

f-4 EFFECT OF REGULATIONS

No regulations are in force for billfishes.

f-5 RECOMMENDATIONS

5.1. *Statistics*

There have been improvements in the catch statistics of billfishes provided by countries over the past few years, but there are a number of aspects for which further improvements are needed. In particular, it is *recommended* that:

1) Improved estimates be made of the magnitude and species composition of the catches and fishing effort of the increasingly important recreational fisheries;
2) Attemps should be made to obtain better catch statistics in the Canadian and U.S. fisheries for swordfish, though it is recognized that there may be difficulties in doing this so long as the ban on the sale of swordfish containing high levels of mercury remains in effect;
3) Data on species composition are needed for fisheries presently reporting "unclassified" catches of billfish.

5.2. *Research*

The lack of basic data on growth, mortality rates, and stock structure severely hampers many of the standard analyses used in population dynamics. It is strongly *recommended* that research efforts be made to correct these deficiencies.

6-7-8.g. Other species

g-1 SMALL TUNAS AND TUNA-LIKE SPECIES

The catches of small tunas decreased from 55,607 MT in 1975 to 31,471 MT in 1976 (Table 12). Most of this decline was in Atlantic bonito (*Sarda sarda*), frigate tuna (*Auxis thazard*), and in the general category of "others". The 1976

total represents the lowest catch in the previous 11 years and is substantially below the peak year of 1969 when 129,732 MT were landed. The catch decrease may be attributable at least in part to better identification of species in national statistics as suggested at last year's SCRS meeting, which resulted in more accurate reporting of catches by species.

Very little information was presented on small tunas. Document SCRS/77/36 provided a summary of the knowledge on the biology and resource of the blackfin tuna (*Thunnus atlanticus*). This species is believed to be restricted to the western Atlantic and catches have historically been low, fluctuating between 62 MT and 496 MT from 1965 to 1976. Exploratory fishing in 1965-1971 by UNDP/FAO Project, failed to indicate any potential commercial concentrations of blackfin available to troll, live bait or longline methods. Document SCRS/77/31 provided information on size and seasonal abundance of blackfin tuna, little tuna (*Euthynnus alletteratus*), king mackerel (*Scomberomorus cavalla*), spotted Spanish mackerel (*Scomberomorus maculatus*), and some other scombrids taken off the east coast of Florida. Estimates of growth based on size frequencies were slightly less than 1.0 cm per month for blackfin tuna.

g-2 SOUTHERN BLUEFIN TUNA

Catches of this almost circum-global species from the Atlantic have declined rapidly since the peak year of 1972 when 10,775 MT were reported, being only 800 MT by longline in 1976. The major part of the world catch is taken by longline in the Pacific and Indian Oceans or by surface fisheries around Australia.

Effort in the longline fishery has recently remained relatively constant at 90-100 million hooks annually throughout the range of the species, but mainly south of 40° S latitude. Catch per unit effort has, however, declined, particularly in 1975, to some 25 % of early values. The surface fishery (mainly pole and line) has been increasing slightly.

The Japanese longline fishery has been operating since 1971 under a self-imposed regulatory scheme to avoid smaller fish and hence maintain or increase the size-at-first-capture (to about age 7) and hence the yield-per-recruit.

Recruitment appears to have been maintained to the surface fisheries, but to have been reduced to the longline fishery which harvests fish of 4 years or older.

The species has been heavily fished in the past years and the spawning stock may have been reduced to 10-20 % of the earlier levels. It would appear prudent to prevent further expansion of fisheries on the stock until the population parameters are better understood, and in particular the interrelation between the surface fisheries for younger fish and the longline fishery. It would be informative to examine some population analyses, particularly with regard to the declining catch rate in the longline fishery. While such studies may be presented in other fora (e.g. IOFC or IPFC), they would be of value to ICCAT scientists not only when considering southern bluefin, but also other tuna stocks. The Committee therefore hoped that there would be a full exchange of information regarding southern bluefin between ICCAT and these bodies.

Item 9. Report of the Sub-Committee on Statistics

Item 10. Review of the progress made in statistics by the national offices and the Secretariat

The Sub-Committee Report was submitted and explained by the Convener, Mr. A. Fonteneau (France). The Committee reviewed and approved the report (Appendix 4) and *concurred* with all the recommendations made by the Sub-Committee. The major points of the recommendations concern:

a) Recruitment of a biostatistician as soon as possible
b) Approval of a new system for data submission and dissemination
c) Preparation of a compendium of codings and specifications of computer magnetic tapes used by each laboratory *
d) Approval of proposed new sampling areas *
e) Processing to be done by the ICCAT data bank
f) Printout format and substitution procedures in combining size/catch-effort data *
g) Change in the nature of the Data Record
h) Manuscript of the revised ICCAT Field Manual *
i) Timely reporting of quick estimates of catch
j) Improvement of statistics for bluefin, yellowfin, skipjack, etc.
k) Correct identification of species and reporting of catch by species (yellowfin vs. bigeye and billfishes)
l) Establishment of a tagging data base at the Secretariat
m) Comparative studies of computer systems

The work achieved by the Sub-Committee and its Convener, as well as tasks completed by the Secretariat, were highly commended.

Item 11. International Skipjack Year Program

At its 1976 session, the Committee had discussed the need for increased research on skipjack, and had made proposals for the planning and execution of an International Skipjack Year Program. As a result of these proposals, detailed suggestions for research activities were put forward by a number of scientists, including scientists working on tunas in other oceans. A particularly valuable and detailed proposal was prepared by French scientists. All the proposals were reviewed by an *ad hoc* working group that met in Madrid in August, 1977, under the chairmanship of A. Fonteneau (France), at which a detailed proposal for a skipjack research program was prepared (Appendix 6, SCRS/77/21).

This proposed program was examined by the Committee. All delegations indicated that the skipjack program was a most valuable and important activity of ICCAT and should have the full support of the Committee. Though most countries

* Comments and/or suggestions to the Secretariat are due by March 1, 1978.

were not yet in a position to give specific commitments, in terms of research vessel time, etc., in support of the project, all countries (except one or two with no direct interest in skipjack) stated that they expected to give concrete support in some form or another. In view of the importance of the program, the Committee established a small working group, under the co-chairmanship of Mr. R. Letaconnoux (France) and Dr. W. W. Fox (U.S.A.) to examine the program in detail, with particular reference to the mechanics of planning and execution, and relationship to the Secretariat. The report of this working group is given in Appendix 5.

In connection with the proposed austerity budgets, the Committee noted that these had been prepared on the assumption that the existing Secretariat staff would be able to provide considerable support to the program, and on this basis, the Committee accepted the proposed austerity budget. As regards the choice of budgets, the Committee noted that its earlier conclusions concerning the need for a biostatistician were unchanged, and indeed that certain activities (e.g. super-sampling) would increase the need for a biostatistician. The recruitment of a biostatistician should, therefore, not be postponed, and the Committee *recommended* that the third alternative given in the austerity budget should be considered by the Commission. This gives a total budget of US $ 425,000, broken down as follows:

Activities	*Budget in U.S. dollars*			
	1978	*1979*	*1980*	*1981*
Tagging with dart tags	0	30,000	45,000	10,000
Improved fishery stat.	0	0	35,000	10,000
Super-sampling	0	15,000	20,000	10,000
Maturity and fecundity	0	0	0	0
Larval survey	0	0	*	0
Physical oceanography	0	0	0	0
Aircraft survey	0	0	*	0
Genetics	0	5,000	5,000	0
Otolith ageing	0	0	0	0
Tagging with sonic tags	0	0	0	0
Stomach contents	0	0	0	0
Exploratory fishing	0	*	*	0
Administration				
ICCAT coordination services	42,000	57,000	73,000	68,000
TOTAL	42,000	107,000	178,000	98,000

* Funding arrangements for these activities are not yet clear. The Secretariat may require funds to administer the arrangement that is adopted.

With these comments, the Committee fully endorsed the recommendations of the group.

Item 12. Review of SCRS research programs and consideration of future plans

The Chairman raised the question of discussions by SCRS of scientific problems being more in-depth, and with a wider scope than was done when reviewing the status of individual species. He believed that the sessions of SCRS, in bringing together the active tuna countries, provided an opportunity for fundamental review of research activities, which was an essential element in the Committee's responsibilities, and could be of particular value to countries with limited research budgets.

A number of areas in which similar problems were met in relation to different species were identified, as follows:

1. *Basic catch and effort data*: In its Sub-Committee on Statistics, the Committee had a mechanism for keeping this problem under review. This had proved effective, and considerable progress had been achieved, but the work needed to be continued.

2. *Abundance and catch-per-unit-effort (CPUE)*: Indices of CPUE from the fisheries are the only measures available for up-to-date monitoring of most tuna stocks, though cohort analyses can be used for historic data, and larval surveys may be useful for spawning populations. Nevertheless, considerable doubts surround most of the CPUE used, particularly in relation to the surface fisheries. Careful examination of improved measures, e.g. taking account of searching time, speed of vessel, etc., is needed, and to this end the use of log books in which more detailed information could be recorded should be encouraged.

3. *Stock structure*: Despite lengthy discussions on this problem, and extensive research, the incremental understanding of the stock structure of most Atlantic tuna species has recently been small. Much of the new information, including that from the Pacific, suggests that stock structure is complex — in the extreme, separate stocks for each school have been suggested — and this structure, and the mixing between stocks, may be variable. It is questionable whether our data collection and methods of analysis are sufficient to incorporate stock structures of this complexity into the present stock evaluation models. While work on stock structures should be continued, attention should also be given to study the effects of uncertainties concerning structure on stock assessments, and determining the degree to which the assessments of the state of different fisheries can be made without complete information on stock structure.

4. *Recruitment analysis*: This had two aspects — better information on the strength of recruitment, for which better measures of CPUE, as well as improved biological sampling are needed, and the study of the stock/recruitment relation. As regards the latter, the critical period appears to be during the larval stages. Also, experience with species other than tunas suggests that comparative studies between similar species is likely to be as fruitful as examination of the data for a particular stock. Therefore, it would be desirable for the Committee to establish contacts with other groups of scientists studying: a) the stock recruitment problem

in general, and in other tuna stocks (e.g. in the Pacific) in particular, and b) making quantitative studies of fish larvae, and especially tuna larvae. In this connection, mention was made of the ILLS program being conducted by Dr. D. H. Cushing and J. Horwood, in Lowestoft, England.

5. *Production model analyses*: In their simplest forms, these models raise questions of their applicability to tuna fisheries because of the complex structure of these fisheries, in which standardization of fishing effort for a variety of gears can raise major problems, and many of the effects of changes in population size (e.g. on recruitment) only become apparent after a lag period. These models have proved invaluable in the analysis of fisheries with limited data, but it has not always been easy to modify them to take account of additional information. It was noted that recently models have been developed (to a large extent outside the fishery literature) that incorporate lag effects and the usefulness of these models to tuna should be examined. It was also pointed out that there could be changes in environmental conditions over periods of various durations, and that in this respect the most valid production model analyses were those that considered only a short period of data, although this consideration was in conflict with the need to consider data over as wide a range of fishing efforts as possible.

6. *Regulation theory*: Regulation in this content was considered in a wide sense, covering both the natural regulation of animal populations and the regulation of fisheries; some consideration of the similarity of the processes involved was believed to be useful. As regards the latter, it was suggested that the Committee should consider practical aspects of the fisheries other than the magnitude of the total catch (e.g. the costs of fishing, and the year-to-year variance in the catch). This might enable definite advice to be given to the Commission even when the yield-effort curve is very flat-topped, and the position of the "maximum sustainable yield" poorly defined.

7. *Yield-per-recruit*: Calculations of yield-per-recruit have been made for several Atlantic tuna stocks, but depend critically on the assumptions made about the parameters. Estimates of the value of natural mortality (M) in particular are scarce. The values used need to be critically reexamined and new evidence produced; estimates from other areas could be useful.

The Committee discussed the criteria that could be used to determine what lines of research were particularly important. Such an establishment of priorities was particularly important for small laboratories with limited staff and facilities. It was stressed that any country with significant tuna fisheries had a responsibility for a minimum collection of basic data (catch and effort statistics, biological sampling, etc.), and should also be able to carry out some routine analyses (e.g. production model studies). However, these studies should not become too abstract, and it was most important that the research scientists keep in close contact with fisheries.

The identification and to some extent the resolution of important questions could be achieved by at least three distinct mechanisms: workshops independent of annual Commission meetings, special discussions of particular themes during annual meetings, and a broad critique of SCRS research. It was felt that work-

shops, such as the Nantes meeting, were of value, but should only be used when a specific need and topic had been identified. There was general support for the discussion of a specific theme during the annual meeting, when a day or so would be set aside and particular themes deserving of early discussion were (a) CPUE as a measure of abundance, and (b) stock structure. Critical review of SCRS procedure should be held at moderately regular intervals, say every 3-4 years.

The Committee discussed how its meeting procedures could be made more efficient. It was felt that the preparation of up-dated versions of the species synopses, originally prepared for the FAO Tuna Conference would be useful in incorporating all the relevant basic biology; these synopses would need major updating only at moderately lengthy intervals. The annual reviews prepared by SCRS for each species could then concentrate on such matters as trends in catch, effort, and CPUE. It was felt that collaboration in the preparation of revised species synopses with tuna scientists working in other oceans could be useful, but the risk of ICCAT spreading its activities too widely and too thinly should be recognized.

Other steps to improve the work of SCRS were examined; these include:

a) Early appointment of rapporteurs, possibly at a previous annual meeting
b) Early compilation of data, and preparation of papers
c) Direct distribution of papers from authors to rapporteurs
d) Earlier meetings of rapporteurs, and earlier distribution of draft reports (not necessarily with firm conclusions) by rapporteurs to the Committee
e) Longer meetings of SCRS.

It was pointed out that most of these ideas involved practical difficulties and regardless of how long the meeting might be, the business of SCRS would expand to fill it; therefore, the Committee made no specific proposals, other than to encourage the exchange of ideas between members of SCRS during the inter-sessional period.

It was stressed that the success of the work of SCRS depended critically on the papers submitted to it; in general the Committee had been fortunate in the number and quality of these papers, but there were a few papers submitted to the Committee that were not of direct help to the Committee, being irrelevant to its immediate work or lacking in clarity. Others could be most usefully incorporated in national reports. In practice it would be impossible for SCRS or the Secretariat to screen papers in advance of the annual meeting, but countries were urged to be more critical in submitting papers. It was also suggested that papers could be screened, possibly by the *ad hoc* Group on Admission of SCRS Documents prior to their incorporation in the Collective Volume of Scientific Papers.

Item 13. **Cooperation with other organizations**

The Assistant Executive Secretary reported on the cooperation between ICCAT and various international fishery organizations. Special mention was made of ICCAT's coordination with CECAF and ICSEAF in organizing the Joint Training Course on Statistics and Sampling.

The Committee expressed its appreciation for the valuable contributions made by the FAO officers during the SCRS meetings as well as during the inter-sessional period.

On behalf of FAO, IOFC, IPFC and GFCM, the FAO representative noted with great satisfaction the continuing cooperation between these organizations and ICCAT. The observer from the ICCAT also expressed satisfaction on the close cooperation maintained between his organization and ICCAT.

Item 14. **Scientific publications**

The Committee reviewed the present publication policies with respect to the "Statistical Bulletin", "Data Record", "Collective Volume" and "Statistical Series". It was noted that some improvements were made by the addition of new tables in the "Statistical Bulletin" as well as in the "Statistical Series".

The Committee also recognized the Secretariat's proposal to change the nature of the "Data Record". This change involves issuing data processed by the ICCAT data bank instead of publishing the data in various forms submitted by national correspondents. This change will be made after the publication of the next two or three issues.

The Committee noted that this proposal was approved by the Sub-Committee on Statistics and *concurred* with it.

The Committee also noted that a draft of the revised version of the "Field Manual" was presented. The Sub-Committee on Statistics accepted the revised version with the condition that comments from scientists should be incorporated early next year. The Committee *recommended* that the Manual be published at the earliest opportunity in a format similar to the previous edition.

The Committee noted that presently papers of various natures are contained in the "Collective Volume of Scientific Papers". It *recommended* that a Sub-Committee for Publications be organized within the scheme of the SCRS with the following terms of appointment:

i) To review the quality of scientific papers submitted to the SCRS meeting, and decide which papers are pertinent and are to be included in the "Collective Volume".

ii) To review the publication policies maintained by the Commission.

iii) To devise an improved system to facilitate the availability of scientific documents to the rapporteurs so as to expedite their work during the session.

Item 15. **Other matters**

15.1. *Training Course*

The Assistant Executive Secretary presented a report on progress made in organizing the Training Course on Statistics and Sampling (SCRS/77/23). The Course is scheduled to be held in April-May, 1978, at Tenerife, Canary Islands,

Spain. Invitations have been sent out previously. At least one scientist from each member country which is listed under the category of economically developing status in the United Nations classification is invited at the Commission's expense to participate, as was decided at the last SCRS and Council meeting (Madrid, November 1976).

The Committee considered that the arrangements for the course were satisfactory. On the other hand, it *recommended* that this training course be slightly expanded to include instruction on the usage of the ICCAT data bank.

15.2. *Proposal of studies on thermal dome in the Gulf of Guinea.*

Studies on thermal domes were proposed by Dr. I. Malick Dia (Senegal) (SCRS/77/32). The Committee considered that it is a problem relevant to the studies on tropical tunas and that it can be very well incorporated in the proposed International Skipjack Year Program. The Committee *recommended* that the Skipjack Sub-Committee and its Program Coordinator give some consideration to Dr. Dia's proposal when planning the skipjack program.

15.3. *Bluefin tuna tagging in the eastern Atlantic*

A small group met to evaluate the needs and feasibility of continuing tagging of young bluefin tuna in the eastern Atlantic. Mr. O. Cendrero (Spain), who chaired the group, reported (Appendix 7) that a study be initiated to estimate costs and evaluate the minimal number of tags necessary to produce any meaningful results. Part of the data for the study would be generated from a pilot tagging project in the eastern Atlantic in 1978. The ICCAT biostatistician would also cooperate in this project. The Committee felt that tagging is valuable and should be attempted.

The Group *recommended* that rewards for tag returns should be increased to US $ 4.00. This should apply as well to the tag returns of all other species of tunas and tuna-like fishes.

The Group also *recommended* that the trust fund for bluefin tagging, which was established at ICCAT in 1975, should be continued.

Item 16. **Recommendations**

16.1. The attention of Panels 1, 2, 3 and 4 was drawn to the pertinent sections of various species in the reports (under Items 6-7-8). The view of the Committee concerning the status of the fishery, stocks, and research, effect of regulations and any recommendations concerning statistics, research and management are stated for each major species.

16.2. Numerous recommendations to the Commission were presented in this Report. Special attention should be given to Item 11, in which the proposed International Skipjack Year Program was reviewed and presented by the Committee.

16.3. Appendix 8 presents an evaluation of the progress made regarding the assignments made at the 1976 SCRS meeting.

16.4. Appendix 9 lists all the assignments and recommendations made by the Committee at this time.

Item 17. **Election of Chairman**

The SCRS Chairman, Dr. B. J. Rothschild (U.S.A.), requested Mr. O. Cendrero (Spain) and Mr. R. Letaconnoux (France) to review the procedures of election for the next SCRS Chairman. Procedures adopted for the election were: 1) one vote per delegation, 2) the first round involving secret nomination of a candidate by each delegation, 3) the second round involving secret balloting for a candidate on the slate, and 4) the candidate receiving a simple majority of the votes of delegations present would be elected Chairman.

Fourteen member countries were present for the voting, which satisfied the requirements of a two-thirds majority to constitute a quorum for voting.

Mr. A. Fonteneau (France), Mr. S. Kume (Japan) and Dr. G. Sakagawa (U.S.A.) were nominated as candidates for Chairman of the SCRS. After two ballots, Mr. A. Fonteneau (France) was elected Chairman of the SCRS for the coming biennial period.

Dr. B. J. Rothschild, the present Chairman, congratulated the newly elected Chairman. Mr. Fonteneau assured the Committee that he would carry out his duties to the best of his ability, and he requested the full cooperation of the Committee members. Drs. S. Kume (Japan) and G. Sakagawa (U.S.A.) were nominated as conveners of the Sub-Committee on Statistics and the Sub-Committee on Skipjack Program, respectively.

Item 18. **Date and place of next meeting**

The Committee *decided* that the 1978 meeting would be held at the same time and at the same place and one week before the 1978 ICCAT meeting.

Item 19. **Adoption of Report**

The Report was adopted by the SCRS.

Item 20. **Adjournment**

20.1. All the members of the Committee expressed special thanks to Dr. J. A. Gulland for his invaluable contribution to the SCRS while he served as General Rapporteur for the Committee. The Committee *recommended* that the Commission should send a special formal letter to the Director General of FAO in appreciation for his services. The efficient hard work demonstrated by the Secretariat staff and the interpreters was highly commended.

20.2. The Committee congratulated the newly elected Chairman of the SCRS, Mr. A. Fonteneau, and wished him success in the future. There was a round of applause for Dr. B. J. Rothschild, the outgoing SCRS Chairman, for the excellent leadership he demonstrated during his two biennial terms in office.

20.3. The meeting was adjourned.

Table 1. Atlantic yellowfin catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*[1]
TOTAL	69.0	61.8	56.8	81.0	91.7	75.8	71.6	95.4	93.7	108.1	120.1	116.4	114.5
Longline	37.2	23.5	15.5	24.1	26.8	27.2	27.4	29.6	32.0	30.3	29.5	23.5	21.5
China (Taiwan)	.2	1.1	2.7	7.9	10.8	7.1	4.4	4.7	2.7	2.3	2.4	1.7	1.0
Japan	36.9	22.4	12.8	13.9	10.0	6.8	11.0	7.5	4.2	4.3	6.0	3.4	1.6
Korea+Panama	0.	0.	0.	2.3	6.0	13.3	9.9	11.2	18.4	18.7	17.7	14.1	15.6
Others	.1	0.	0.	.1	.1	0.	2.1	6.2	6.7	4.9	3.4	4.3	—
Surface - East Atlantic	28.2	34.7	35.0	52.8	60.9	44.5	42.2	62.4	58.9	75.8	88.6	91.9	93.0
—Purse seine	7.6	13.9	17.9	29.2	44.7	34.3	31.1	47.2	42.8	54.4	81.5	83.1	83.5
FIS	5.4	7.5	8.9	12.6	14.7	18.0	18.0	24.6	25.0	32.8	42.9	44.0	46.5
Japan	1.1	4.8	5.2	7.5	5.8	1.3	2.2	2.8	1.5	.9	.1	0.	—
Spain	1.0	1.0	2.0	2.6	4.5	5.8	7.0	7.6	12.8	14.4	23.0	34.9	30.0
USA	0.	0.	1.1	5.9	18.8	9.0	3.8	12.0	3.0	5.6	14.0	1.7	7.0
Others	.0	.6	.7	.7	.9	.2	.0	.0	.4	.7	1.4	2.4	3.0
—Baitboat	20.6	20.7	17.1	23.5	16.2	10.1	11.2	15.2	16.1	20.6	7.1	8.8	6.5
Angola	1.9	1.3	.9	1.1	.4	.3	.5	.6	.6	.8	.1	1.0	0.1
FIS	14.7	15.9	14.9	19.9	14.2	8.1	7.8	8.4	5.6	6.4	2.8	4.0	4.1
Ghana	0.	0.	0.	0.	0.	0.	0.	.0	.1	.3	.5	.3	1.2 *
Japan	1.3	.5	1.3	2.2	.9	1.0	2.5	4.4	8.0	8.3	1.0	2.2	0.8
Korea+Panama	0.	0.	0.	0.	0.	0.	0.	0.	.9	2.2	1.7	.7	
Spain	2.7	3.1	0.	.4	.6	.7	.4	1.8	.3	2.0	1.0	.2	0.3
Others	0.	0.	0.	0.	0.	0.	0.	0.	0.	.5	.1	.3	—
—Other gears	0.	.0	.0	0.	.0	0.	.0	.0	.0	.8	.0	.0	—
Surface - West Atlantic	0.	0.	0.	0.	0.	0.	0.	2.9	2.3	1.6	2.0	.7	2.0
Surface - Uncl. region	0.	0.	0.	0.	0.	0.	.4	.4	.5	.4	0.	0.	—
Uncl. gears	3.6	3.7	6.2	4.1	3.9	4.1	1.5	.0	0.	.0	.0	.3	—

* Includes Korea+Panama.
[1] Provisional estimates.

Table 2. Estimated carrying capacity (thousands of metric tons) and fishing effort for yellowfin tuna of the eastern Atlantic Ocean

	1967[1]	*1968*[1]	*1969*[2]	*1970*[2]	*1971*[2]	*1972*[2]	*1973*[2]	*1974*[2]	*1975*[2]	*1976*	*1977*
Surface estimated effort[5] ($\times 10^3$ standard days at sea)	9.24	11.43	20.03	19.69	23.30	24.30	29.38	31.67	42.55	40.53	—
Longline estimated effort ($\times 10^3$ hooks by 5° × 5° square)	516	673	799	938	1542	1247	1670	1359	1225		
Carrying capacity											
BB — Ivory Coast - Senegal[7]	3.7	3.9	3.0	2.9	2.5	2.4	1.8	1.7	1.5	1.0	1.0
BB — Tema-based[4]	1.2	1.2	0.9	0.9	1.2	2.6	4.0	5.4	3.6[6]	5.4	5.4
Total BB	4.9	5.1	3.9	3.8	3.7	5.0	5.8	7.1	5.1	6.4	6.4
PS — FIS[7]	1.5	1.6	4.9	5.9	7.3	11.4	14.1	16.1	19.3	18.5	18.6
PS — Spain	0.6	1.0	2.1	2.1	4.5	7.5	7.9	10.5	17.1	20.1	23.3
PS — U.S.A.[3]	0.3	0.6	4.4	5.4	3.8	7.9	2.9	5.5	10.4	1.7	4.2
Total PS	2.4	3.2	11.4	13.4	15.6	26.8	24.9	22.1	46.8	40.3	46.1
TOTAL BB - PS	7.3	8.3	15.3	17.2	19.3	31.8	30.7	29.2	51.9	46.7	52.5

1 Estimates from ICCAT Biennial Report, 1974-75, Part II (1975).
2 Estimates for 1969-1975 from Peter Miyake (SCRS/76/13) (except FIS).
3 U.S.A. estimate weighted by the number of months on the spot.
4 Includes Japan, Korea, Panama and Ghana.
5 Estimates from Coan and Fox (SCRS/77/62). (Eastern Tropical Atlantic only.)
6 Japanese estimate weighted by the number of months on the spot (SCRS/77/37).
7 New FIS estimate for 1969-76 (SCRS/77/100).
8 Data from Honma and Suzuki (SCRS/77/59, Total Atlantic).

Table 3. Estimates of yellowfin catches in the eastern Atlantic surface fisheries inside the inshore and offshore areas according to the two limits of Figure 1

	Limit 1		*Limit 2*		*Total Eastern Atlantic*
	Inshore	*Offshore*	*Inshore*	*Offshore*	
1969	61.3	1.0	58.6	3.7	62.3
1970	44.7	0.4	41.6	3.5	45.1
1971	50.6	0.2	48.8	2.0	50.8
1972	62.4	0.9	61.4	1.9	63.3
1973	59.2	0.4	58.1	1.5	59.6
1974	75.0	0.9	66.9	9.0	75.9
1975	70.8	17.5	58.0	30.3	88.3
1976	72.5	18.0	53.8	36.7	90.5
1977 *	—	—	55.0 *	38.0 *	93.0 *

* Best provisional estimate.

Table 4. Atlantic skipjack catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*[1]
TOTAL	28.0	36.4	31.2	55.7	41.7	62.8	84.6	77.5	77.1	116.6	62.2	74.8	98.0
Surface - East Atlantic	26.4	34.6	28.4	53.1	40.0	60.4	82.2	75.3	74.0	112.0	58.5	71.0	95.0
—Purse seine	3.6	5.3	7.1	22.7	14.4	30.8	49.6	51.6	50.7	76.9	38.8	37.3	67.0
FIS	.7	1.9	1.6	5.1	3.8	9.2	13.8	16.7	8.7	24.8	13.9	16.6	32.0
Japan	1.8	1.4	2.2	6.3	.7	3.5	6.2	3.4	1.5	.9	.1	0.	—
Spain	1.0	1.9	2.3	7.1	5.0	5.7	12.1	19.3	17.8	31.1	16.9	17.8	29.0
USA	.1	.0	.5	3.3	4.8	11.8	16.2	12.2	21.2	20.0	7.4	1.8	6.0
Others	.0	0.	.6	.9	.1	.6	1.2	.1	1.3	.1	.5	1.2	3.0
—Baitboat	22.8	29.3	21.3	30.5	25.5	29.6	32.5	23.6	23.3	35.1	15.2	27.1	25.0
Angola	1.3	2.8	2.0	4.2	1.8	.9	1.9	1.5	1.3	3.4	.6	1.5	—
FIS	3.5	4.5	3.9	7.9	4.6	4.8	5.7	3.8	3.7	4.7	1.8	1.8	3.0
Ghana	0.	0.	0.	0.	0.	0.	0.	0.	.1	.7	1.3	2.1	8.0 *
Japan	6.3	4.4	3.7	7.3	4.9	7.5	11.7	10.1	13.0	18.7	3.7	15.0	13.0
Korea+Panama	0.	0.	0.	0.	0.	0.	0.	0.	.9	2.1	6.3	4.4	
Spain	8.5	16.2	10.7	10.2	14.0	15.3	13.0	8.2	4.3	5.4	.8	.6	1.0
Others	3.2	1.5	.9	.8	.1	1.1	.1	.0	.1	.1	.7	1.6	—
—Other gears	.1	0.	0.	.0	.1	0.	.1	.1	.0	.1	4.5	6.6	—
Surface - West Atlantic	0.	0.	0.	0.	0.	0.	1.6	1.1	2.5	3.1	3.2	3.6	3.0
Surface - Uncl. region	0.	0.	0.	0.	0.	0.	.2	.7	.2	1.0	0.	0.	—
Uncl. gears[2]	1.5	1.8	2.7	2.5	1.7	2.4	.7	.3	.4	.5	.5	.2	—

* Includes Korea+Panama.
[1] Provisional estimates.
[2] Includes longline.

Table 5. Estimated carrying capacity (thousands of metric tons) and standardized fishing effort (thousands of days fished) for skipjack tuna in the eastern tropical Atlantic

	1967[1]	*1968*[1]	*1969*[2]	*1970*[2]	*1971*[2]	*1972*[2]	*1973*[2]	*1974*[2]	*1975*[2]	*1976*	*1977*
Surface estimated effort[5] ($\times 10^3$ standard days at sea)	9.24	11.43	20.03	19.69	23.30	24.30	29.38	31.67	42.55	40.53	—
Carrying capacity											
BB — Ivory Coast - Senegal[7]	3.7	3.9	3.0	2.9	2.5	2.4	1.8	1.7	1.5	1.0	1.0
BB — Tema-based[4]	1.2	1.2	0.9	0.9	1.2	2.6	4.0	5.4	3.6[6]	5.4	5.4
Total BB	4.9	5.1	3.9	3.8	3.7	5.0	5.8	7.1	5.1	6.4	6.4
PS — FIS[7]	1.5	1.6	4.9	5.9	7.3	11.4	14.1	16.1	19.3	18.5	18.6
PS — Spain	0.6	1.0	2.1	2.1	4.5	7.5	7.9	10.5	17.1	20.1	23.3
PS — U.S.A.[3]	0.3	0.6	4.4	5.4	3.8	7.9	2.9	5.5	10.4	1.7	4.2
Total PS	2.4	3.2	11.4	13.4	15.6	26.8	24.9	22.1	46.8	40.3	46.1
TOTAL BB - PS	7.3	8.3	15.3	17.2	19.3	31.8	30.7	29.2	51.9	46.7	52.5

[1] Estimates from ICCAT Biennial Report, 1974-75, Part II (1975).
[2] Estimates for 1969-1975 from Peter Miyake (SCRS/76/13) (except FIS).
[3] U.S.A. estimate weighted by the number of months on the spot.
[4] Includes Japan, Korea, Panama and Ghana.
[5] Estimates from Coan and Fox (SCRS/77/62) (Eastern Tropical Atlantic only).
[6] Japanese estimates weighted by the number of months on the spot.
[7] New FIS estimate for 1969-76 (SCRS/77/100).

Table 6. Bluefin catches (MT) by country, gear, and area, 1970-77 with 1973-74 average, and 1968-74 average. Where these figures differ from the Statistical Bulletin Vol. 7, they are based on estimates by the scientific staff

Fishery		*1977*[1]	*1976*	*1975*	*1974*	*1973*	*1972*	*1971*	*1970*	*1973-74 (average)*	*1968-74 (average)*
WESTERN ATLANTIC											
Subtotal		2,858	2,713	3,464	2,624	2,274	2,626	4,310	4,914	2,448	2,831
Canada	Large	644	514	350	664	367	228	206	426	515	415
	Small (PS)	298	332	291	103	635	260	935	1,161	369	442
U.S.A.	Large	802	769	715	731	199	516	518	829	465	
	Small (PS)	1,058	1,069	1,986	804	970	1,622	2,651	2,498	887	1,974[4]
	Sport (small)	56	29	122	322	103				212	
TOTAL NORTH ATLANTIC											
Subtotal		4,500	4,266	4,468	3,292	1,379	676	4,690	196	2,335	1,561
Taiwan	LL	—	56	32	136	172	84	119	109	154	130
Japan	LL	4,500	4,200	4,413	3,100	1,141	562	1,532	87	2,120	975
Korea	LL	—	10	23	56	66	30	3,039	—	61	456
EAST ATLANTIC											
Subtotal		3,105	2,986	6,449	3,516	4,576	4,204	6,973	6,692	4,045	6,700
France	Surf	400	267	778	550	532	900	800	800	541	685
Morocco	PS	600	331	2,624	590	512	531	30	406	551	457
	Trap	223	0	0	7	1	122	63	286	4	196
Norway	UNCL	—	413	900	800	100	100	600	400	450	400
Portugal	BB	2	628	321	1	21	1	1	—	11	46

Spain	BB — Can.	1,200	754	932	546	906	—	1,682	—	726	4,121
	BB — NE	680	587	891	1,009	2,000	2,300	3,197	3,300	1,504	
	Trap	—	3	—	13	504	250	600	1,500	258	795
	UNCL	—	3	3	—						
MEDITERRANEAN											
Subtotal		12,947	15,833	11,832	13,515	6,018	5,841	5,440	3,966	9,766	6,797
France	PS [2]	2,500	3,800	1,600	1,800	1,400	1,100	2,200	1,100	1,600	1,311
Italy	Trap	650	650	713	1,000	317	667	746	677	658	1,330
	PS	9,010	9,010	6,270	6,000	2,200	2,300	—[3]	—[3]	4,100	1,500
	UNCL	12	12	500	500	500	500	500	500	500	357
Japan	LL	600	1,000	1,260	2,195	246	112	—	—	1,221	365
Libya			...	—	500	400	300	600	500	450	757
Malta		25	25	37	21	1	1	1	1	11	18
Morocco	Trap		222	—	14	1	36	37	—	8	12
	BB		332	264	590	—	1	42	—	295	6
Spain	UNCL	—	—	800	300	500	200	370	700	400	268
Tunisia		—	220	167	245	227	400	496	266	236	455
Yugoslavia		150	562	155	317	224	200	326	90	270	230
Algeria	Trap	—	—	66	33	1	1	100	1	17	62
Turkey		—	—	—	—	1	23	22	133	—	126
TOTAL OF ABOVE		23,210	25,798	26,213	22,947	14,247	13,347	21,413	15,770	18,594	17,889

[1] Estimate.
[2] Source SCRS/76/84.
[3] Quantity unknown, but low.
[4] Includes some large fish.

Table 7. Atlantic albacore catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*[1]
TOTAL	88.3	75.0	74.9	72.1	76.2	70.5	85.3	85.2	74.5	72.4	61.9	76.8	76.9
North Atlantic	57.7	47.8	54.5	43.0	40.0	39.5	52.1	41.3	47.1	51.6	39.8	54.8	61.9
—Surface	43.4	39.8	49.0	38.5	32.2	30.1	41.4	35.8	27.2	37.2	31.0	34.0	
Baitboat	0.	16.4	17.6	13.7	13.8	14.2	16.9	9.3	9.2	15.6	21.1	20.3	19.9
France	0.	3.7	4.2	2.4	1.8	2.0	1.6	1.1	1.0	.5	.7	1.1	1.1
Spain	0.	12.7	13.4	11.3	12.0	12.2	15.3	8.2	8.2	13.8	19.4	18.8	18.8
Others	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.2	1.0	.4	—
Trolling	0.	23.4	31.4	24.9	18.4	15.9	24.5	26.5	18.0	8.5	9.9	13.7	13.7
France	0.	10.6	12.4	11.9	8.2	4.6	8.2	8.7	5.1	8.5	5.4	5.6	5.8
Spain	0.	12.8	19.0	13.0	10.2	11.3	16.3	17.8	12.9	0.	4.5	8.1	8.1
Others	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	—
Other gears	43.4	0.	0.	0.	0.	0.	0.	0.	0.	13.1	.0	.1	—
—Longline	14.3	8.0	5.5	4.5	7.8	9.4	10.6	5.5	19.9	14.4	8.8	20.8	28.3
China (Taiwan)	0.	.1	.1	1.1	1.5	2.2	2.7	4.1	10.0	8.2	5.4	14.0	19.4
Japan	14.3	5.9	4.8	3.3	4.7	5.9	6.5	1.3	1.5	2.1	1.3	1.3	1.0
Korea+Panama	0.	2.0	.6	.1	1.6	1.3	1.5	.1	8.5	4.1	1.9	5.3	7.8
Others	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	.1	.1	—
South Atlantic	30.0	26.7	19.8	27.8	34.6	29.8	31.9	41.7	22.6	19.8	21.0	19.3	14.5
—Surface	0.	0.	0.	0.	0.	0.	0.	.1	.1	.1	.2	.0	—
—Longline	30.0	26.7	19.8	27.8	34.6	29.8	31.9	41.6	22.5	19.7	20.9	19.2	14.5
China (Taiwan)	.1	.1	1.7	7.6	13.4	14.7	17.7	25.3	21.7	18.0	16.1	15.4	11.6
Japan	28.3	21.0	7.7	11.9	6.3	5.9	3.6	2.6	.7	.4	.4	.1	0.6
Korea+Panama	.5	4.7	9.7	7.2	14.4	8.7	10.0	13.5	.0	1.1	4.2	3.4	2.1
Others	1.1	.8	.7	1.2	.4	.5	.5	.2	.1	.2	.2	.3	—
Mediterranean	.5	.5	.5	.5	.7	.6	.5	.7	.5	.5	.5	.6	0.5
Uncl. region	0.	0.	0.	.0	0.	0.	0.	1.4	4.2	.4	.5	2.0	—
—Surface	0.	0.	0.	.0	0.	0.	0.	.1	.0	0.	.0	0.	—
—Longline	0.	0.	0.	0.	0.	0.	0.	1.3	4.2	.4	.5	2.0	—
Uncl. gears	.1	.1	.1	.7	.9	.0	.9	.1	.1	.1	.1	.1	—

[1] Provisional estimates.

Table 8. Atlantic bigeye catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*[1]
TOTAL	29.2	19.0	12.0	18.2	24.1	28.2	45.1	35.2	42.5	52.4	52.4	35.8	33.6
Longline	28.9	18.7	11.2	16.2	19.8	21.4	36.8	31.3	35.3	36.2	35.9	20.9	17.6
Argentina	.4	.2	.1	.3	.2	.1	0.	0.	.0	.0	.1	.2	.1
Brazil	0.	0.	0.	0.	0.	0.	0.	0.	.1	.2	.1	.2	.1
China (Taiwan)	0.	.6	2.2	5.3	7.5	7.6	5.5	5.0	3.8	3.1	4.0	3.3	2.8
Cuba	0.	0.	0.	0.	0.	0.	3.2	2.0	2.6	2.4	1.9	1.3	1.3
Japan	28.5	17.6	8.5	10.3	10.3	9.0	20.8	18.6	22.9	23.1	19.7	9.2	8.0
Korea+Panama	0.	.3	.3	.3	1.9	4.7	7.4	5.7	5.8	7.4	10.2	6.7	7.3
Others	0.	0.	0.	0.	0.	0.	0.	0.	.0	0.	0.	.0	—
Surface	.1	.0	.5	1.1	1.7	1.5	7.8	3.9	7.2	16.1	15.0	13.3	15.6
—East Atlantic	.1	.0	.5	1.1	1.7	1.5	7.8	3.9	7.2	15.2	15.0	13.3	—
FIS	0.	0.	0.	0.	0.	0.	0.	.3	2.5	1.3	1.4	1.0	2.5
Ghana	0.	0.	0.	0.	0.	0.	0.	0.	.0	.0	.3	.7	.1
Japan	.1	.0	.5	1.1	.5	.1	.2	.3	.2	.7	.3	3.6	.9
Korea+Panama	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.2	1.7	.9
Portugal	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.1	4.9	2.1	5.6
South Africa	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	—
Spain	0.	0.	0.	0.	1.1	1.2	7.0	3.1	4.4	3.2	5.7	4.2	6.0
USA	0.	0.	0.	.0	.1	.2	.5	.2	.1	.9	.1	.0	—
Others	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0	0.	—
—West Atlantic	0.	0.	0.	0.	0.	0.	0.	0.	.0	0.	0.	.0	—
—Uncl. region	0.	0.	0.	0.	0.	0.	0.	.0	0.	1.0	0.	0.	—
Uncl. gears	.1	.3	.3	.9	2.6	5.3	.5	0.	0.	0.	1.5	1.7	—

[1] Provisional estimates.

Table 9. Estimated number of fish at age 1.0 (N_1) for the years 1965-1967 by cohort analysis

Initial		N_1 *(in 10^3 fish)*		
M	*F*	*1965*	*1966*	*1967*
0.45	0.1	3,067	3,935	6,258
	0.3	2,746	3,335	4,447
	0.5	2,681	3,213	4,088
	0.7	2,653	3,162	3,933
0.55	0.1	5,539	7,401	12,189
	0.3	4,717	5,863	8,002
	0.5	4,549	5,549	7,161
	0.7	4,478	5,414	6,802

Table 10. Atlantic billfish catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*	*1977*[1]
TOTAL	13.5	9.0	5.0	7.0	6.8	6.7	6.9	4.9	4.6	6.0	4.8	4.1	6.1
Argentina	0.	0.	0.	0.	0.	0.	0.	0.	.1	0.	0.	.0	—
Brazil	0.	0.	0.	.1	.1	.1	.1	.2	.1	.1	.1	.3	.3
China (Taiwan)	0.	.3	.9	2.2	3.4	3.2	2.8	2.4	1.8	1.3	.9	1.2	1.0
Cuba	.6	.5	1.7	1.3	.6	.6	.5	.3	1.0	2.3	1.4	.7	.7
Ghana	0.	0.	0.	0.	0.	0.	0.	0.	.0	.0	.0	.0	—
Japan	12.9	8.2	2.4	3.0	2.3	2.3	2.9	1.1	.9	.9	1.2	.9	1.2
Korea	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	.9	1.0	2.7
Panama	0.	0.	0.	0.	0.	0.	0.	0.	.7	0.			
Morocco	—	—	—	—	—	—	—	—	—	—	—	—	.1
USA	0.	0.	0.	0.	0.	0.	0.	.1	.1	.1	0.	0.	—
USSR	0.	0.	0.	0.	0.	0.	0.	.1	.1	1.2	.0	0.	.1
Venezuela	0.	0.	0.	.4	.5	.5	.6	.6	0.	.1	.1	0.	—
Species Breakdown													
Blue marlin	5.8	3.4	1.1	.9	1.0	1.0	1.4	.4	.4	.3	.4	.3	
Black marlin	0.	0.	0.	0.	0.	0.	.0	.0	0.	0.	.6	.0	
White marlin	4.6	3.0	.7	1.1	.8	.7	1.0	.6	.4	.5	.5	.6	
Sailfish	2.5	1.8	.7	1.0	.5	.6	.4	.3	.2	.2	.7	.3	
Uncl. Billfishes	.6	.8	2.6	4.0	4.6	4.4	4.0	3.5	3.7	5.0	2.5	2.9	

[1] Preliminary estimates.

Table 11. Atlantic swordfish catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
TOTAL	13.0	12.8	13.0	13.1	15.3	15.7	10.3	12.4	11.8	11.3	9.8	9.8
Algeria	0.	0.	0.	0.	0.	0.	0.	.0	.1	.2	.5	.4
Argentina	.4	.2	.1	.3	.5	.4	.1	.1	.0	0.	.0	.1
Brazil	.2	.2	.1	.1	.2	.1	0.	.1	.1	.3	.3	.3
Canada	4.7	4.4	4.8	4.4	4.3	4.8	0.	0.	0.	0.	.0	.0
China (Taiwan)	0.	0.	0.	0.	0.	0.	0.	.8	1.1	.8	.9	.9
Cuba	.1	.1	.2	0.	0.	0.	0.	0.	0.	0.	0.	.6
Cyprus	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0	.1
Italy	0.	0.	1.9	1.4	2.0	1.8	2.9	3.7	2.7	1.5	1.5	2.1
Japan	2.9	2.0	.8	1.1	2.3	3.2	1.7	2.0	1.2	1.5	1.6	.8
Korea	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	.5	1.1
Libya	.2	.2	.3	.5	0.	0.	.1	0.	0.	0.	0.	0.
Malta	0.	0.	0.	0.	0.	.1	.2	.2	.2	.2	.2	.2
Mexico	0.	0.	0.	0.	0.	0.	0.	.0	.0	.0	0.	0.
Morocco	.3	.3	.2	.2	.3	.2	.4	.3	.2	.2	.1	.2
Norway	0.	.3	.3	.2	.6	.4	.2	0.	0.	0.	0.	0.
Panama	0.	0.	0.	0.	0.	0.	0.	.2	.4	0.	0.	0.
Poland	0.	0.	0.	0.	0.	0.	0.	0.	.1	0.	0.	0.
Spain	2.6	4.0	3.4	4.6	4.6	4.1	4.5	4.5	4.9	3.6	3.8	2.9
Tunisia	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0	0.	0.
Turkey	.1	.3	.1	0.	.1	.1	.1	.1	0.	.0	0.	0.
USA	1.2	.6	.5	.3	.2	.3	.0	.2	.4	1.6	0.	0.
USSR	0.	0.	0.	0.	.1	.2	.2	.2	.2	1.4	.3	0.
Venezuela	.2	.2	.4	0.	.1	0.	0.	0.	0.	0.	0.	0.

Table 12. Atlantic small tuna catch (1000 MT)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Blackfin tuna (*T. atlanticus*)	.1	.1	.1	.2	.2	.2	.2	.4	.5	.3	.1	.2
Atlantic little tuna (*E. alletteratus*)	5.0	8.1	8.9	8.1	9.0	13.6	10.9	8.0	7.4	7.3	.9	.4
Atlantic bonito (*S. sarda*)	31.4	29.2	49.1	31.8	61.5	28.6	21.5	16.4	12.8	17.6	11.9	7.6
Frigate tuna (*A. thazard*)	9.4	7.2	9.3	9.5	11.0	12.6	10.9	13.5	9.7	11.9	9.1	5.0
King mackerel (*S. cavalla*)	10.6	11.4	12.4	12.4	12.4	11.9	11.9	13.0	16.5	16.8	14.8	12.2
Spotted spanish mackerel (*S. maculatus*)	6.3	7.0	6.4	7.9	9.0	10.7	6.0	11.3	14.0	6.6	7.9	9.4
Others	27.9	21.1	28.4	20.8	26.7	27.3	21.0	28.2	23.6	17.5	17.8	20.4
TOTAL	90.8	84.0	114.5	90.8	129.7	104.8	82.2	90.8	84.5	78.1	62.5	55.2

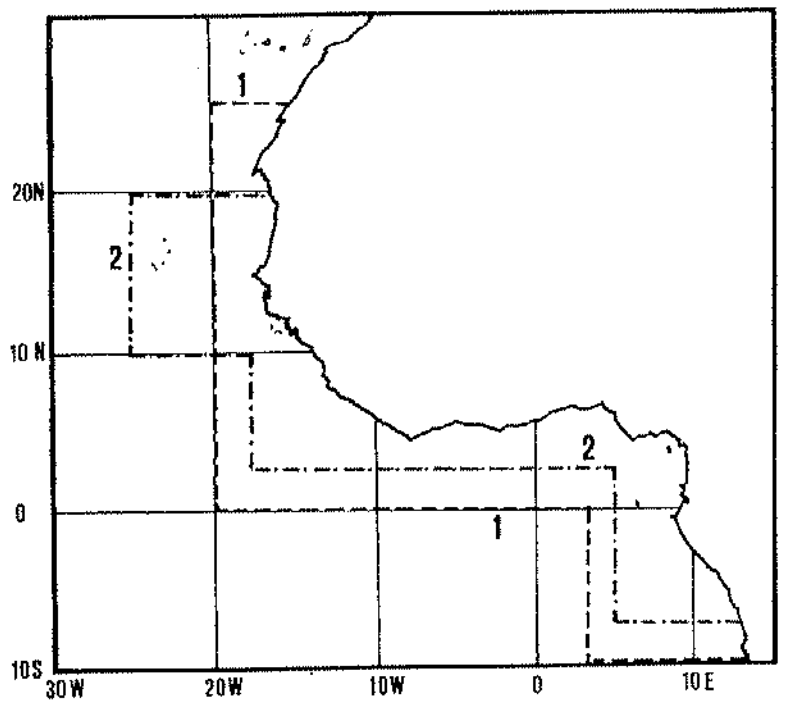


Fig. 1. Two possible limits between inshore and offshore yellowfin areas:
— limit 1 is limit between ICCAT sub-area (1 + 2 + 3) and 5
— limit 2 from SCRS/77/101.

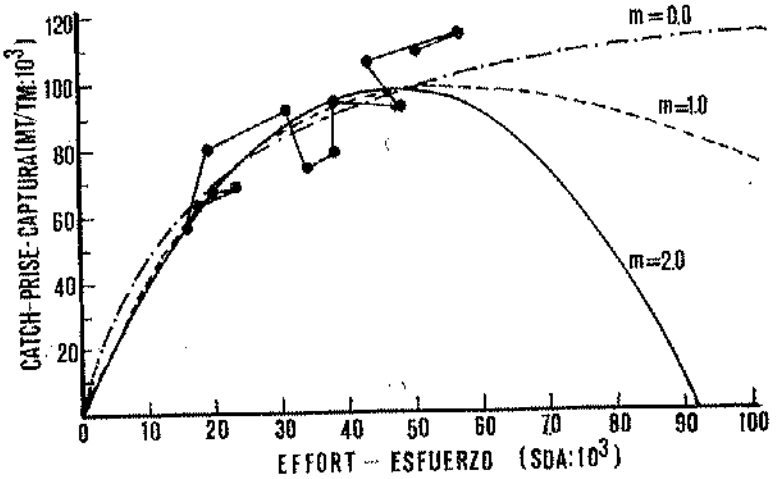


Fig. 2. Equilibrium yield curve and observed data, 1964-76, for the total Atlantic yellowfin longline and surface fishery.

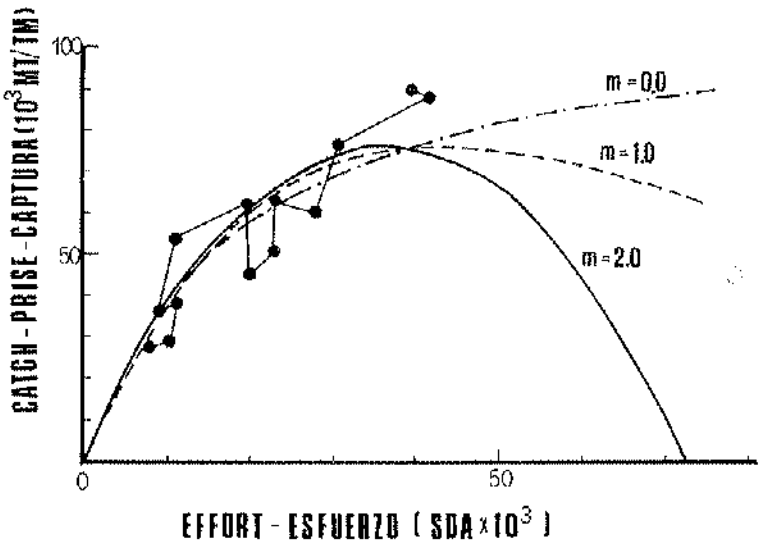


Fig. 3. Equilibrium yield curves, observed catch and type 1 effort data, 1964-76, for eastern Atlantic yellowfin surface fishery (SCRS/77/62).

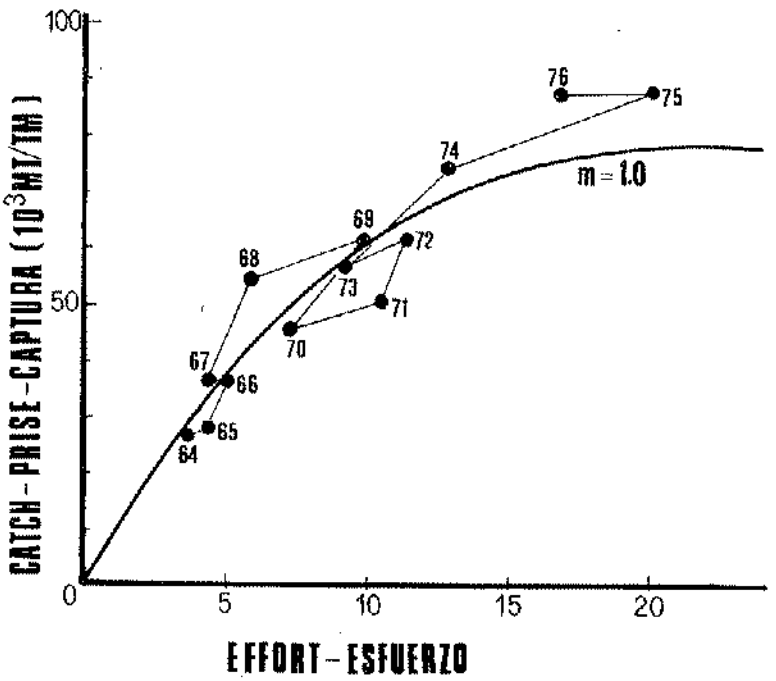


Fig. 4. Equilibrium yield curve, observed catch and type 2 effort data (SCRS/77/101), 1964-76, for eastern Atlantic yellowfin surface fishery.

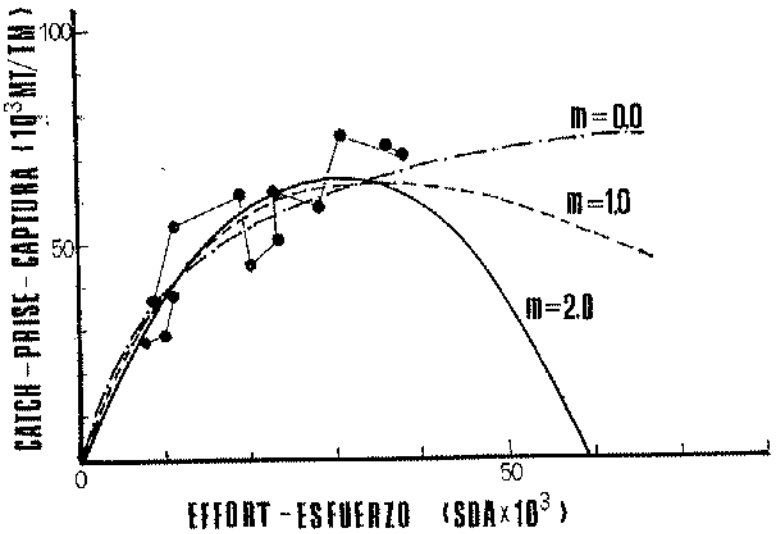


Fig. 5. Equilibrium yield curves, observed catch and type 1 effort, 1964-76, for yellowfin surface fishery in the traditional fishing area (defined as SCRS areas 1 + 2 + 3). SCRS/77/62.

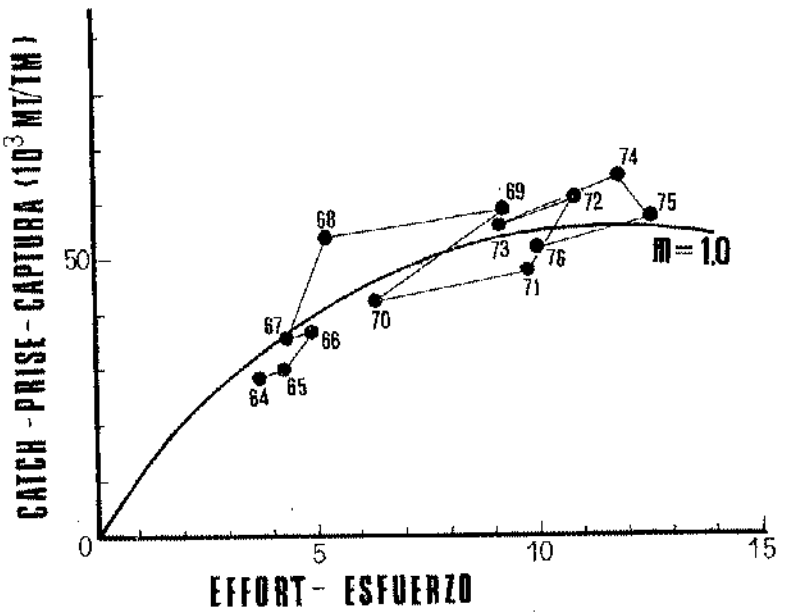


Fig. 6. Equilibrium yield curve, observed catch and type 2 effort (SCRS/77/101), 1964-76, for yellowfin surface fishery in the traditional fishing area (defined as limit 2 in Fig. 1).

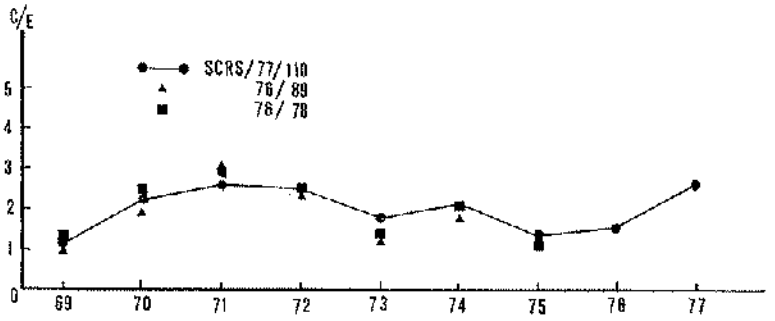


Fig. 7. Estimated annual average skipjack CPUE, 1969-77.

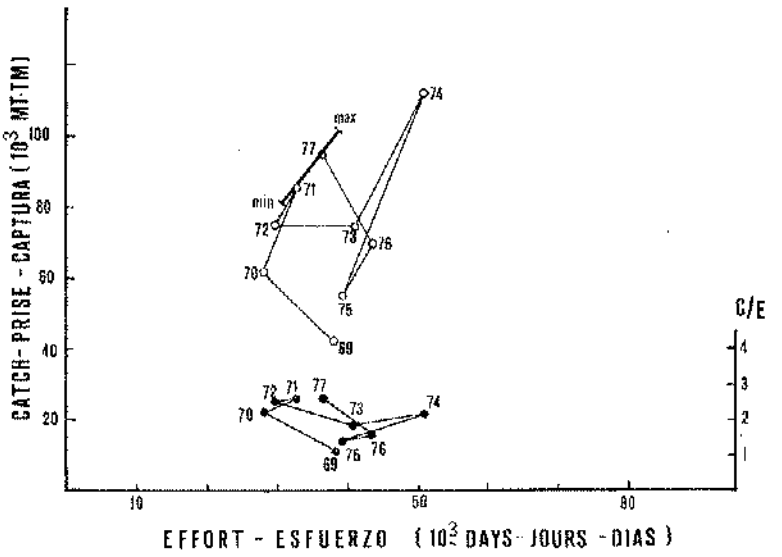


Fig. 8. Skipjack catch, effort and CPUE, 1969-1977.

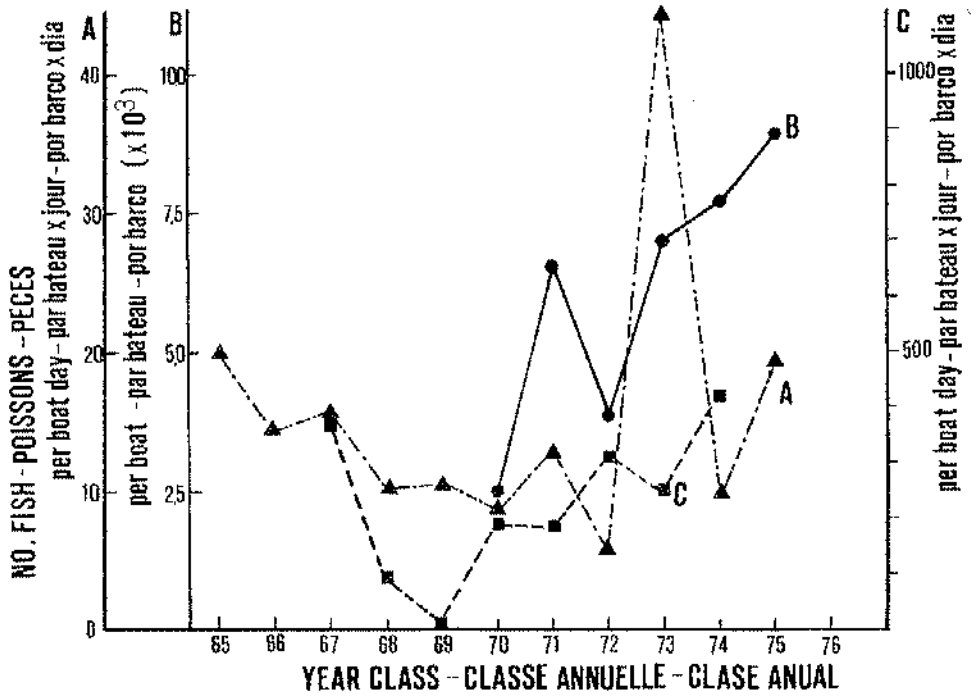


Fig. 9. Recruitment indices for bluefin tuna:
(A) Western Atlantic — CPUE of age 2 fish from U.S.-Canadian purse seiners
(B) Eastern Atlantic — CPUE of age 2 fish from Bay of Biscay baitboats; and
(C) Mediterranean CPUE of age 3 fish from purse seiners.

* Indices for 1973-75 year classes are not comparable to those for the earlier year classes.

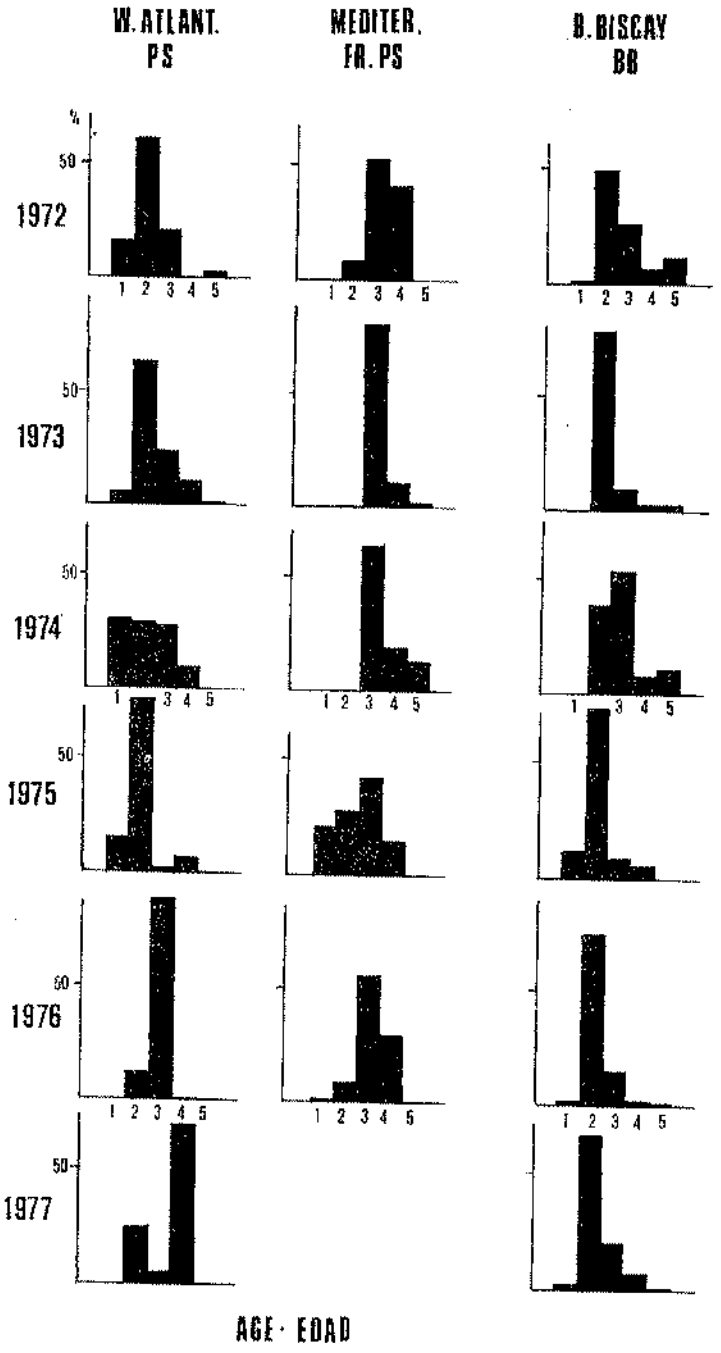


Fig. 10. Age compositions of bluefin tuna catches of major fisheries for young fish (West Atlantic purse seine, Mediterranean French purse seine, and Bay of Biscay baitboat).

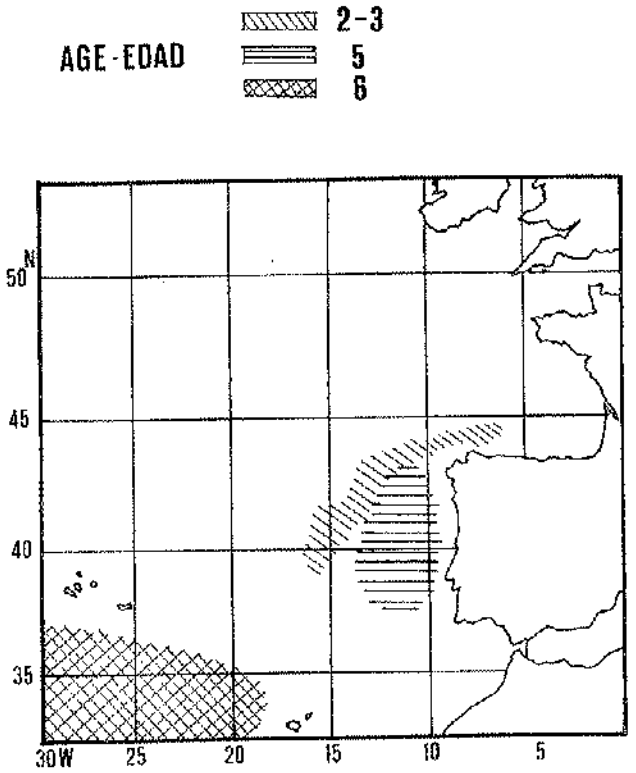


Fig. 11. Albacore fishing area by trollers and baitboats in October.

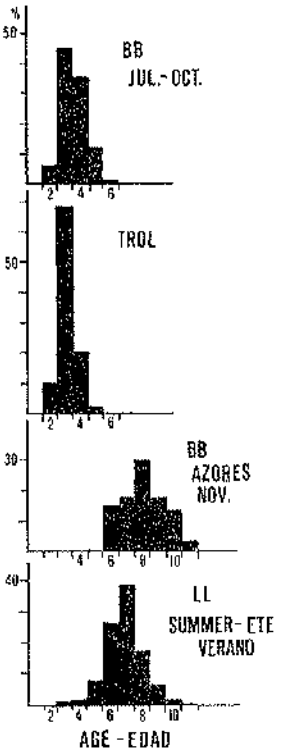


Fig. 12. Age compositions (%) of albacore catches.

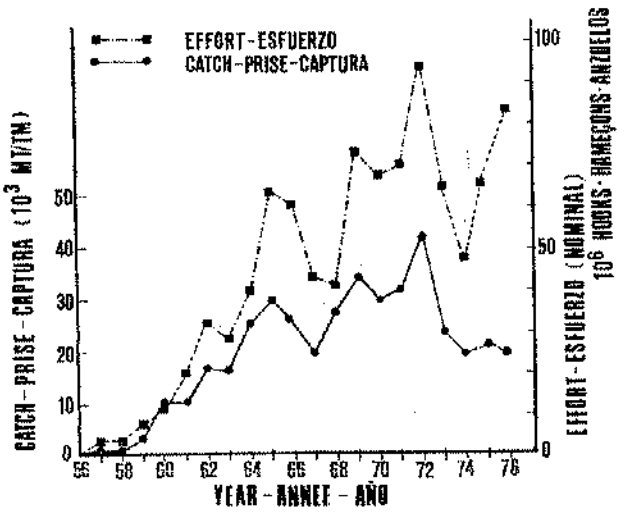


Fig. 13. Total longline albacore catches and nominal effort in the south Atlantic, 1958-1976 (values for 75 and 76 are preliminary).

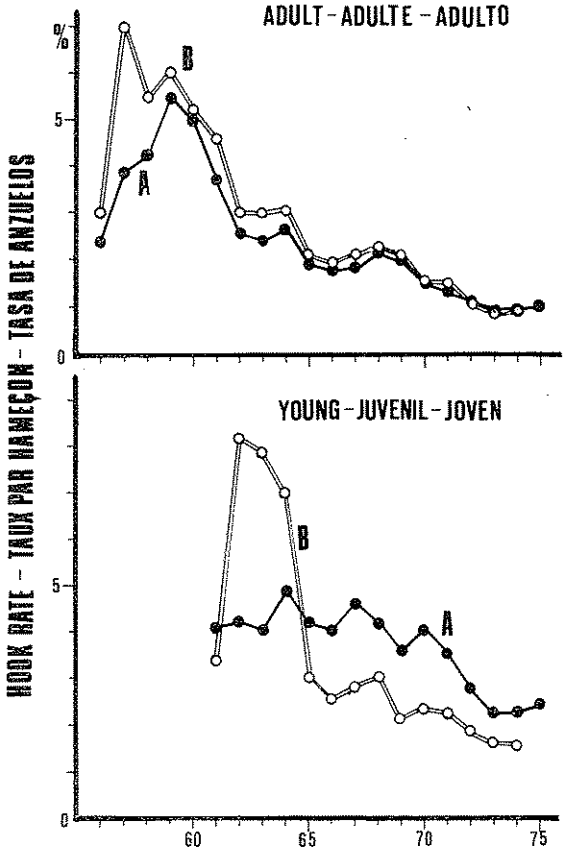


Fig. 14. Conventional CPUE (A) and calculated CPUE (B) (SCRS/76/31) for adult and young albacore by longline, South Atlantic.

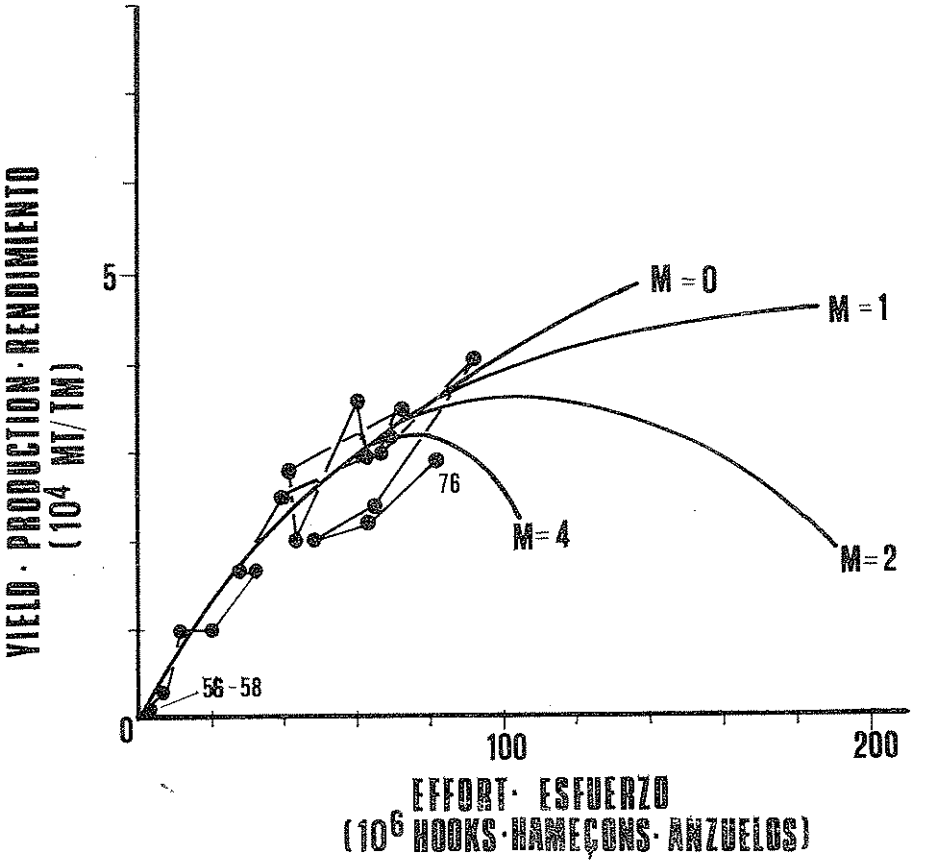


Fig. 15. Production model results for 4 different values of M, South Atlantic albacore (values for 1975 are preliminary and 1976 values are estimated using 1975 CPUE).

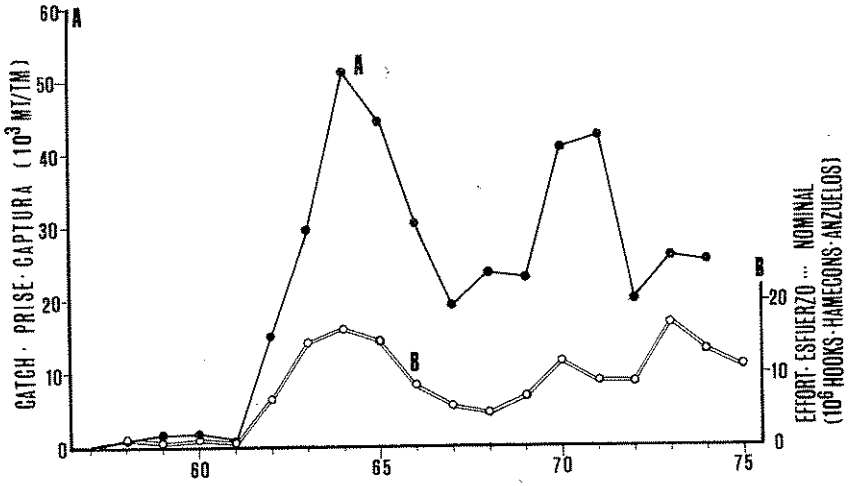


Fig. 16. Total longline albacore catch (A) and nominal effort (B), North Atlantic (SCRS/77/84 and 95, respectively).

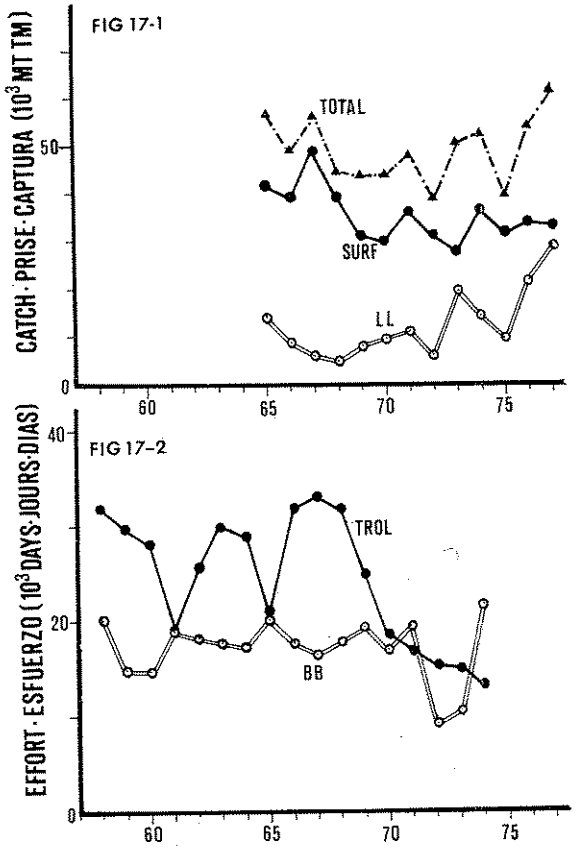


Fig. 17. North Atlantic albacore catches — total of surface and longline; surface (French and Spanish) and longline (Japanese, Korean and Taiwanese), and standard fishing effort (in number of fishing days) of French and Spanish trollers and baitboats.

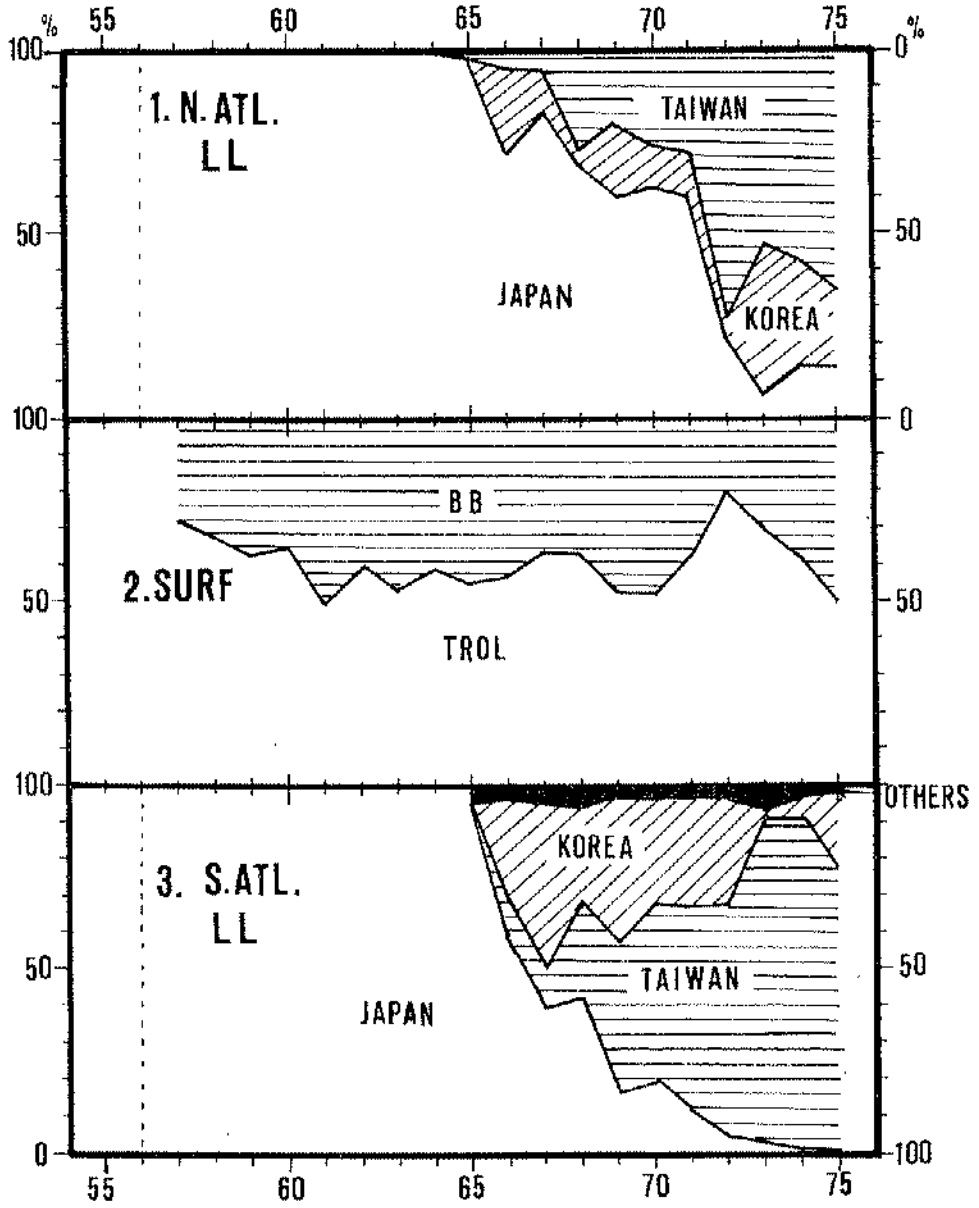


Fig. 18. Percent of total albacore catches (1956-75) by country or gear for:
1) North Atlantic longline fishery;
2) North Atlantic surface fishery, and
3) South Atlantic longline fishery.

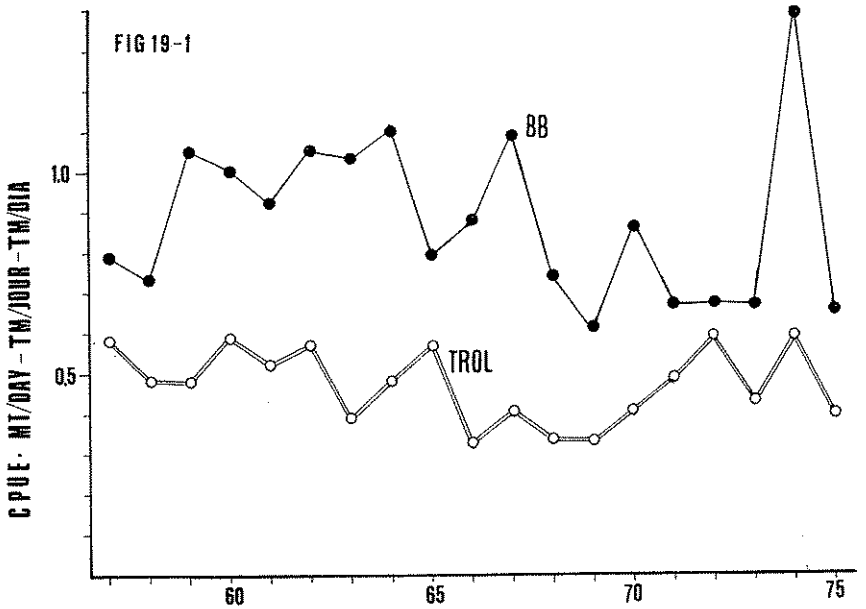
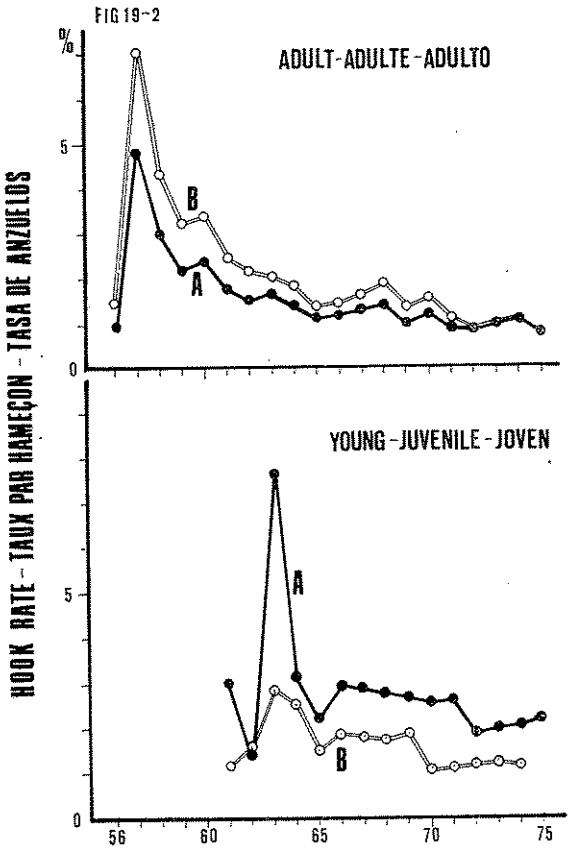


Fig. 19. 1) CPUE (MT/day) for trollers (boat below 50 tons) and baitboat (80-150 tons), 1957-75.

2) Conventional CPUE (A) and calculated CPUE (B) (SCRS/76/31) for adult and young albacore by longline, North Atlantic.



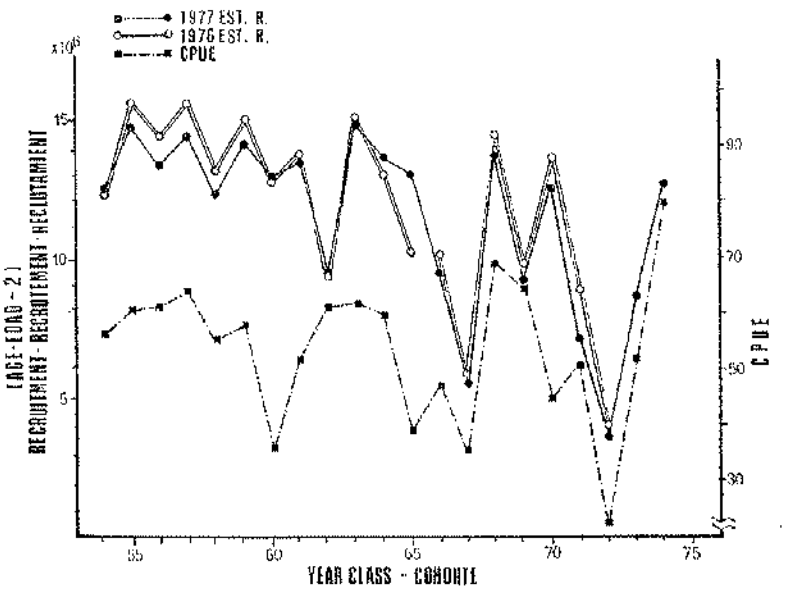


Fig. 20. Estimated North Atlantic albacore recruitment in number of 2-year-old fish and CPUE for age 3 fish for the French troller fishery, 1954-74 year classes.

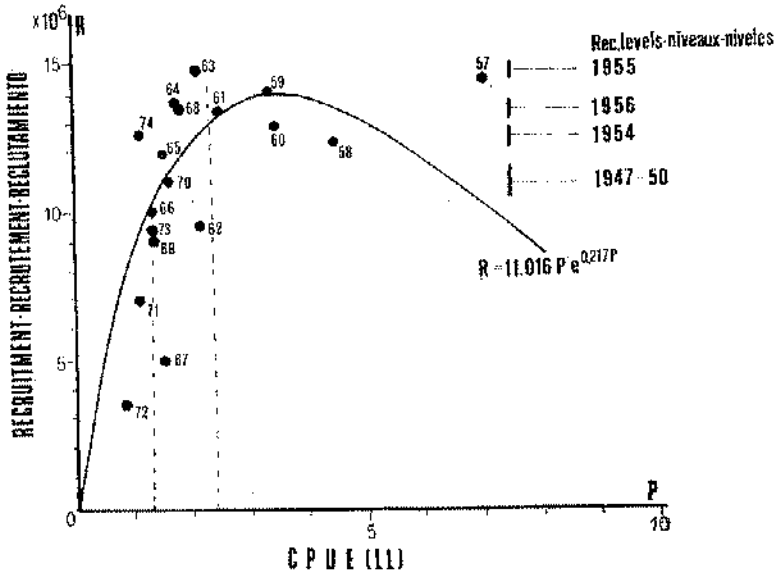


Fig. 21. Stock (longline CPUE by Shiohama) — recruitment (in millions of age 2 fish) relationship fitted for North Atlantic albacore data.

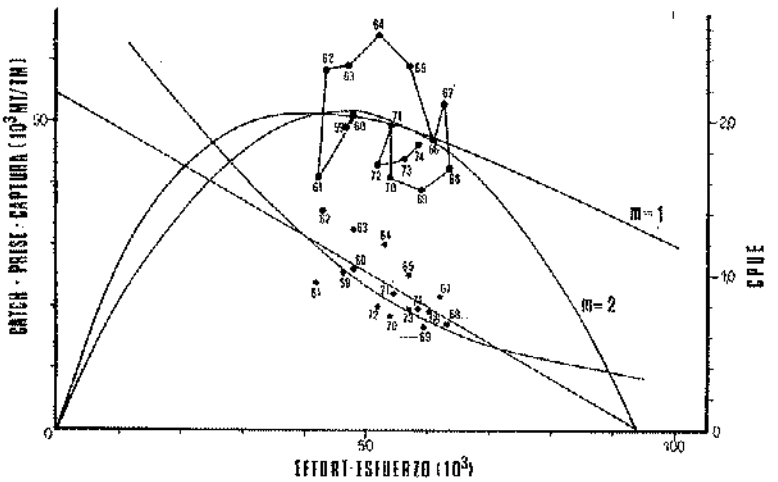


Fig. 22. Production model fitted to North Atlantic albacore fishery data (1959-74).

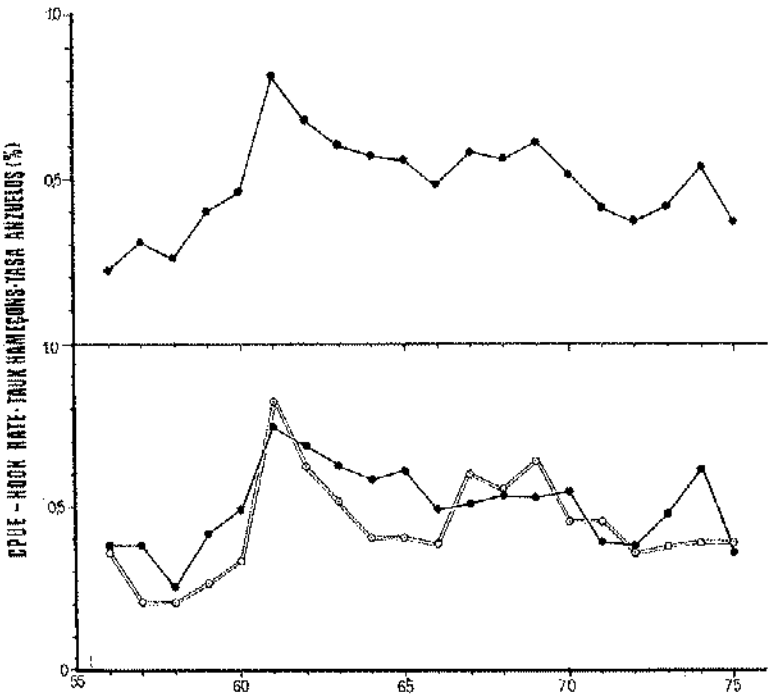


Fig. 23. Annual change in hook rate of bigeye tuna in the whole Atlantic (upper panel) and North and South Atlantic (lower panel), based on data of Japanese and Taiwanese longline fisheries combined.

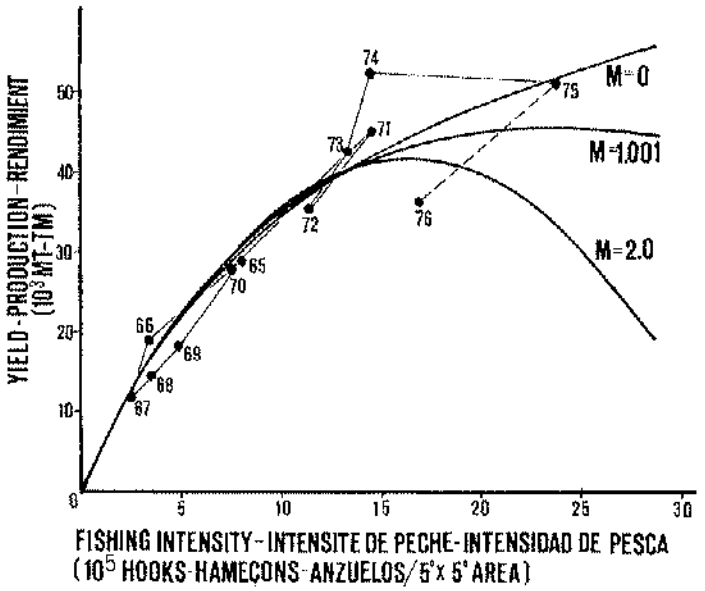


Fig. 24. Generalized production model fitted to catch and effort data, 1960-75 — whole Atlantic, bigeye tuna. (Observed values for the years 1965-75 are indicated in the figure. 1976 values are preliminary.)

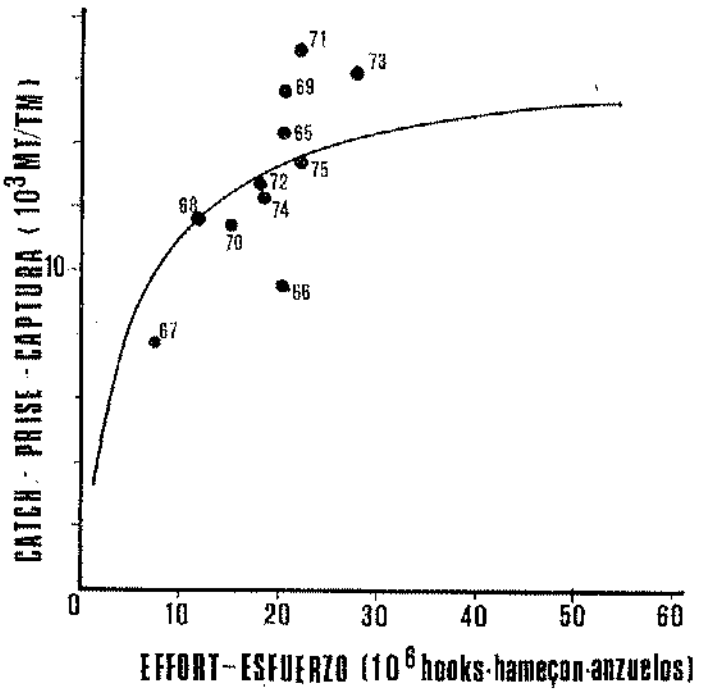


Fig. 25. Equilibrium yield curve and observed data for the South Atlantic bigeye tuna fishery, 1965-75.

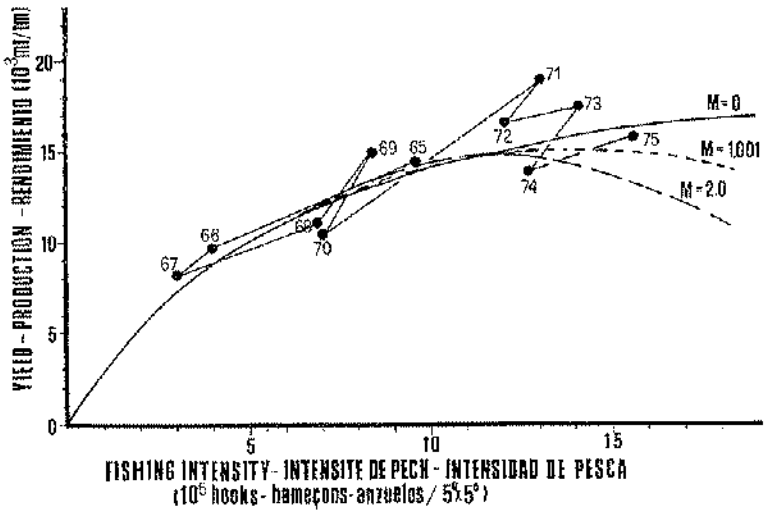


Fig. 26. Generalized production model fitted to catch and effort data, 1960-75 — South Atlantic bigeye tuna. (Observed values for 1965-75 are indicated in the figure.)

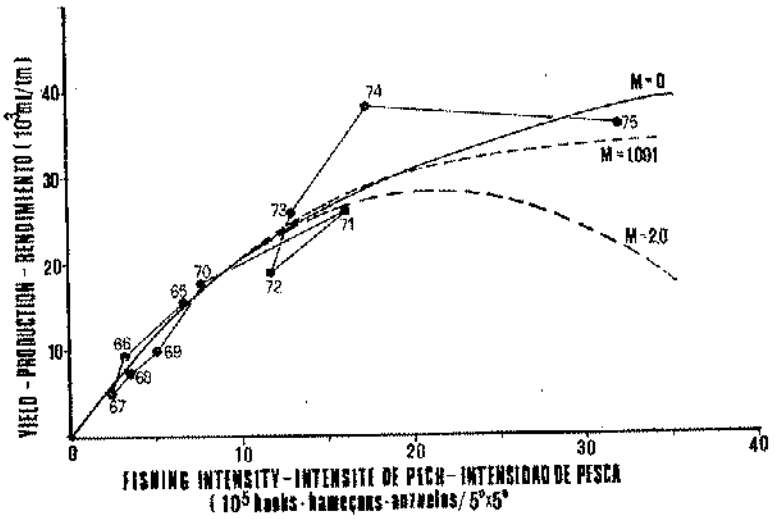


Fig. 27. Generalized production model fitted to catch and effort data, 1960-75 — North Atlantic bigeye tuna. (Observed values for 1965-75 are indicated in the figure.)

Appendix 1 to Annex 9

AGENDA FOR THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)

1. Opening of the meeting
2. Adoption of the Agenda and arrangements for the meeting
3. Admission of observers
4. Admission of scientific papers
5. Review of national fisheries and research programs
6. Brief presentation of major papers on stock conditions
7. Review of conditions of stocks (in the Plenary Session or in Working Groups)
   a) Yellowfin
   b) Skipjack
   c) Bluefin
   d) Albacore
   e) Bigeye
   f) Billfishes
   g) Small tunas, etc.
8. Reports of various working groups on species
9. Report of Sub-Committee on Statistics
10. Review of the progress made in statistics by the national offices and the Secretariat
11. Review of the International Skipjack Year Program
12. Review of SCRS research programs and consideration of future plans
13. Cooperation with other organizations
14. Scientific publications
15. Other matters
16. Recommendations
17. Election of Chairman
18. Date and place of next meeting
19. Adoption of Report
20. Adjournment

Appendix 2 to Annex 9

REPORT OF THE AD HOC GROUP ON THE ADMISSION OF SCRS DOCUMENTS

1. The *Ad Hoc* Group, chaired by Dr. J. Y. Le Gall (France) and attended by Mr. A. Dicenta (Spain), Dr. S. Ueyanagi (Japan) and Dr. P. M. Miyake (Secretariat), reviewed the procedures presently in force (Appendix 2 to Annex 8 of the Proceedings of the 1976 Council Meetings).

2. It was noted that the present policy had been well observed this year. This helped the rapporteurs to have prompt access to the documents for use in their initial deliberations.

The Group *recommended* that the present policy should be maintained and strictly observed for the 1978 SCRS meeting.

3. The Group recognized that:

— Documents SCRS/77/43, 51, 61 (previously assigned numbers) were withdrawn.

— Documents SCRS/77/18, 33, 89 to 93 and 110 were not received by the deadline.

Since all these documents were not available for the working groups of various species, the Group *recommended* that those could be distributed during the meeting, but rapporteurs did not have to refer to them.

Appendix 3 to Annex 9

LIST OF DOCUMENTS

SCRS/77/1 Tentative agenda of the SCRS / Ordre du jour provisoire du SCRS / Orden del día provisional del SCRS.

2 Tentative agenda of the Sub-Committee on Statistics / Ordre du jour provisoire du Sous-Comité des Statistiques / Orden del día provisional del Subcomité de Estadísticas.

3 Collective Volume of Scientific Papers, Vol. VI-1 / Recueil de Documents Scientifiques, Vol. VI-1 / Colección de Documentos Científicos, Vol. VI-1.

4 Collective Volume of Scientific Papers, Vol. VI-2 / Recueil de Documents Scientifiques, Vol. VI-2 / Colección de Documentos Científicos, Vol. VI-2.

5 Data Record, Vol. 9 / Recueil de Données, Vol. 9 / Colección de Datos, Vol. 9.

6 Data Record, Vol. 10 / Recueil de Données, Vol. 10 / Colección de Datos, Vol. 10.

7 Statistical Series - 2 / Séries Statistiques - 2 / Series Estadísticas - 2.

8 Statistical Series - 3 / Séries Statistiques - 3 / Series Estadísticas - 3.

9 Report of the 1976 meeting of the SCRS / Rapport de la réunion de 1976 du SCRS / Informe de la reunión de 1976 del SCRS (COM/77/9).

10 1977 SCRS Report / Rapport SCRS 1977 / Informe SCRS 1977 (COM/77/10).

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Appendix 4 to Annex 9

REPORT OF THE SUB-COMMITTEE ON STATISTICS

1. OPENING OF THE MEETING

The meeting was opened by the Convener, Mr. A. Fonteneau (France), who drew attention to improvements in statistics that had been achieved as a result of national efforts and international cooperation (e.g. Ghanaian, Japanese, Korean and Panamanian baitboats operating off west Africa, and longliners in general). He also referred to the Commission's Data Bank and suggested that since the problems of quantity and quality of data collected had been largely solved, it was now time to concentrate on the timeliness of reporting and processing.

2. ADOPTION OF AGENDA AND ARRANGEMENTS FOR THE MEETING

The Agenda (Addendum 1) was adopted without change, and Mr. J. S. Beckett (Canada) was appointed Rapporteur.

3. EXAMINATION OF PROGRESS MADE BY NATIONAL OFFICES (Tables 1, 2 and 3)

Angola: Catches by species for 1973, 1974 and 1975 were reported to have been received by the Secretariat during the year. Later those for 1976 and 1977 were also received during the meeting.

Brazil: Data on the fisheries were provided to the Commission, logbooks are being placed on the expanding longline fleet and measures are being taken to ensure their completion. A team of biologists has been formed to carry out on-board sampling, but Brazil would appreciate any assistance that might be available from ICCAT.

Canada: Data for all Tasks are collected routinely.

Cuba: Particular attention is being paid to the on-board sampling of yellowfin tuna, especially with respect to size.

France: Data collection generally meets the requirements, and improvement in the speed of reporting data for the tropical tuna fleet should result from an agreement reached with ORSTOM. A particular effort in 1977 had been made to obtain information on bluefin fisheries in the Mediterranean.

Ghana: Landings and biological data are being obtained in collaboration with the fishermen. Problems are still being experienced with the 3.2 kg yellowfin size limit and efforts are being made to educate fishermen to distinguish between bigeye and yellowfin, including the employment of an artist to illustrate the differences between fresh specimens.

Ivory Coast: All tasks are being completed with special effort being expended on the small bigeye/yellowfin problem.

Japan: The problem of on-board measurement and bio-sampling for the long-line fleet is progressing and Task II data for the pole-and-line fleet in 1970-72 have been compiled, thus completing the 1969-76 series. In general, there has been great improvement in the timeliness of reporting.

Korea: The logbook system and biological data collection have been improved considerably. Logbook coverage now extends to 50 % of the longline fleet and 56 % of the baitboats and completion is required by law. Administrative guide-lines on the yellowfin/bigeye problem were circulated in February and an expert visited the landing ports to instruct fishing captains in June. Further improvements in the data are expected.

Morocco: Although no great progress could be reported, tropical tuna catches have been sampled in cooperation with ORSTOM, and it is intended to improve fisheries statistics in general with special effort on tuna catches.

Senegal: Tasks have been fulfilled satisfactorily for all the fleets based in Dakar.

Spain: A general improvement in data and in the development of routine data collection could be reported. Particular progress has been made with tropical catches of yellowfin and skipjack although the information is not yet available to the Secretariat, and with catch and effort data for swordfish.

U.S.A.: The services of Mr. A. L. Coan (NMFS - La Jolla) and the U.S. data base had been lent to the Secretariat during the establishment of the Commission's data base. The work on the U.S. data base in La Jolla will continue as will the program of port sampling in Puerto Rico with particular attention to the yellow-fin/bigeye problem. The timeliness of final reporting is being improved and particular attention is being devoted to bluefin sports fisheries, bluefin purse seine catch per effort data and species identification. Work is progressing on historical series of billfish sports catches.

U.S.S.R.: As a new member of the Commission, the U.S.S.R. will endeavor to meet all ICCAT requirements.

Non-members

Italy: Official statistics of landings are received regularly but from a scientific viewpoint these are not fully adequate and attempts are being made to estimate total catches. The 1976 estimates, as contained in the ICCAT Statistical Bulletin, are considered accurate.

Taiwan: On-board biological sampling as initiated in 1977 is working well. The coverage of logbook statistics increased from 30 to 50 %. Fishing captains are being instructed in the collection of data.

4. EXAMINATION OF THE FIRST YEAR PROGRESS MADE IN THE ICCAT DATA BANK PROJECT

4.1. The Secretariat reported that the INFONET system as used by the U.S. National Marine Fisheries Service based on a UNIVAC 1108 computer, had been adopted. Because of their experience with the system, the U.S.A. had made A. Coan (NMFS - La Jolla) available to assist the Secretariat in establishing the data base. A systems analyst (Ms. Sherry Reiss) has been hired to assist the Secretariat in running the system.

4.2. Four bases have been established: nominal catch, catch and effort, size frequency, and accounting (inventory). The system is accessible using a highly specialized language (Aladin) which is simple and fast, but expensive to use, or by Fortran which is much cheaper but also much slower and more complicated since a full program must be written. Normally, the Secretariat employs Fortran except when the time requirement and a savings in programmer's time justifies the expense of Aladin.

The data bank is technically accessible from anywhere in the world using standard telephone service and a variety of terminals. There remains, however, the problem of formal contracts between the Spanish Telephone Company and the telephone companies in other countries. In the meantime, anyone requiring output from the bank could contact the Secretariat and obtain the information according to the specifications desired, either as a computer print-out or on magnetic tape.

The Sub-Committee discussed the implications of using the Aladin language at some length, particularly with reference to the reliance on one system and the cost, and the question of payment for use of the data bank by national scientists.

There was considerable support for a scheme whereby ICCAT would pay for normal tasks but that individual users would pay for special requests. SCRS would, according to this view, specify each year the nature of the tasks that the Secretariat would carry out on a "normal" basis, as had been the case in 1976 and which had resulted in the present trial print-out on yellowfin (SCRS/77/18). A small working group was established to consider both the use of Aladin and the payment question. The report by the group was later presented and adopted. It is attached herewith as Addendum 2.

4.3. The U.S. data bank and most national submissions had been entered in the ICCAT bank but there were certain problems remaining to be solved with some of the data. The submission of data on magnetic tape, provided it was in a compatible format (SCRS/77/16), was of great assistance to the Secretariat in entering the material. The document SCRS/77/16 also presented the codings in use by ICCAT Secretariat. The Sub-Committee *recommended* that such a report should be prepared by each laboratory with an automatic data processing system and that the Secretariat make a compendium for them.

4.4. Because of the establishment of a data management system, a new system of data dissemination is proposed by the Secretariat in SCRS/77/17. This is discussed in Section 5.1 in detail.

4.5. SCRS/77/18 presents a sample print-out of all 1975 data for yellowfin, although some problems remained with some of the tabulations. A summary of Task II data as such for all species was not available as the data base was not yet complete. The processing of the yellowfin data had demonstrated the problem of the incompatibility of the statistical areas established for longline and surface fishing when it was required to sum the two types of data. Basically, the boundaries of the areas for the two types of fisheries were not the same and in some cases a common boundary would defeat the purpose of statistical areas. This matter (SCRS/77/24) was also referred to a small study group. The result of the studies by the group is attached herewith as Addendum 3. It was *decided* that the suggested revisions to the statistical areas for the purpose of processing combined longline and surface fisheries data, should be examined by national scientists and their comments sent to the Secretariat by March 1, 1978. It was emphasized that irrespective of statistical areas, the basic data should be entered in the bank by minimum area unit.

With respect to the format of the 1975 yellowfin data print-out, and with respect to the question of substitution of other data for missing data, it was *agreed* that national scientists would review the yellowfin material provided (SCRS/77/18) and send comments to the Secretariat by March 1, following a reminder notice.

The initial results achieved in 1977 were quite satisfactory and processing should be extended to the other species and for all years for which data are available.

5. EXAMINATION OF THE SECRETARIAT'S STATISTICAL PROGRAM

5.1. The Statistical Bulletin, Vol. 7, and Data Record, Vols. 9 and 10, had been published and incorporated material provided by the member countries. The Secretariat suggested that the present format of the Data Record should be replaced by processed data summaries from the data bank once agreement had been reached on the format. This would mean that one or two further editions of the Data Record would contain unprocessed data and thereafter, only processed data would be routinely available, either as a print-out or on a magnetic tape. The Secretariat would circulate either annually or more frequently the lists of material entered into the bank. In case that a country wished to receive data from another country before they could be processed by the Secretariat, it could receive the material by direct exchange.

5.2. The statistics and sampling material collected by the Secretariat had been published in Statistical Series - 2 (for 1975) and -3 (for 1976) with new tables giving catch and effort data by sampling area and quarter of the year.

5.3. It had not proved possible for the Secretariat to hire a biostatistician during 1977. The Sub-Committee *recommended* that this be carried out as soon as practicable, particularly as there was a need for integration of field experience and the sampling requirements.

5.4. The Secretariat had prepared a draft revision of the Field Manual (SCRS/77/15) incorporating the various changes that have become necessary by the

passage of time or by decisions of the Commission. It was *agreed* that this draft document should be reviewed by national scientists by March 1, and that the Secretariat would send out a reminder notice on this. A preliminary reaction was that the revised Manual should be published following the format of the present edition.

5.5. Under other matters, the Secretariat reported on preparations for the Joint CECAF/ICCAT/ICSEAF Training Course on Statistics and Sampling due to be held April 24 - May 16, 1978, in Tenerife, Spain, by invitation of the Spanish Oceanographic Institute. Details are contained in SCRS/77/23, and it was emphasized that applications must be received by the end of December. While the course was intended to attract those actually working in the field of sampling and statistics, and preferably those in charge of promoting national programs, the feeling was expressed that there was a need for instruction of samplers in the field on the basis of local conditions. It was noted that this was one of the functions that could be performed by the Secretariat, particularly when the biostatistician was on the staff.

6. EXAMINATION OF THE MAJOR PROBLEMS REGARDING THE QUALITY OF STATISTICS

6.1. Attention was drawn to SCRS/77/11 and a table indicating deficiencies in national sampling and statistics. It was pointed out that the indication in the tables of deficiencies in Spanish sampling of tropical tunas did not take into account the great advances made in the collection of material since they had not yet been processed and submitted to ICCAT. Hence the Table should be updated before publication.

Examining those items identified by the Sub-Committee at its 1976 meeting as being problems requiring attention, the following comments were made:

i) Baitboats operating out of Tema — problems being pursued and solved, particularly through the activities of Ghanaian scientists.

ii) Spanish catches of tropical tunas — data now collected but not processed (see above).

iii) Mediterranean bluefin catches — France reported major improvement in statistics and sampling but pointed out that the diffuse nature of the fishery and landing points complicated data collection.

— Spain noted the development of a reporting network for catches in the Mediterranean traps and for the longline (mainly swordfish) fishery. Effort data for the latter fishery was scarce but biological sampling was carried out on 50 % of the landings. Attempts to take 0 age group bluefin had been frustrated by bad weather and only 3 bluefin and 40 bonitos had been marked.

iv) Angolan statistics — catch by species was now available for 1973-75 and a team of biologists was ready to start catch and effort and biological data collection. The Sub-Committee considered that this area should still consider this a problem until more complete data were in fact available.

v) Cape Verde — no information was available on the Cape Verde-based fleet, catches were in fact made by Dakar-based vessels and by large Spanish and French purse seiners so that statistics and other data were covered in these fisheries.

The Sub-Committee was unable to answer a query as to the initiation of a purse seine fishery by the Congo but did *recommend* that data should be sought for yellowfin and skipjack fisheries in the western Atlantic, particularly from the Venezuelan, Brazilian and Cuban surface fisheries. Cuba noted that data collection was being developed but that timing problems had prevented submission of data at the present time. Brazil noted that their surface fisheries were of an artisan nature. It was *recommended* that the Secretariat contact Venezuelan authorities to urge data collection, especially from the large purse seine fleet.

6.2. With regard to separation of small bigeye and yellowfin, it was noted that samples could be frozen whole for positive identification and that the question of misreporting, whether intentional or due to misidentification, could only be solved by sampling. The separation of billfishes was not, however, a matter of identification but of reporting and it was *recommended* that countries separate billfish catches by species and pay particular care to the confusion currently caused by the employment of the same vernacular name for different species in different areas and nations.

It was further hoped that the recent action by the U.S.S.R. in joining ICCAT would result in the reporting of their catches by species.

7. PROBLEMS OF QUICK COMPILATION AND DISSEMINATION OF STATISTICAL DATA IN A STANDARD FORMAT (RAPID ESTIMATES OF 1976 DATA AND THE FIRST THREE QUARTERS OF 1977)

The need for timely reporting was reiterated and particularly of final data for 1977 so that the Secretariat would be able to present fully processed data in time for the 1978 meeting of SCRS. It was *recommended* that the early reporting of preliminary catches for the first six months, nine months and year be continued. In response to a query with regard to the reporting by both Ghana and the flag states of catches landed in Ghana, the Secretariat reported that there had been no conflict in the data and the Sub-Committee noted its gratitude to Ghanaian scientists for their work in sampling the landings by vessels of all flags.

8. FUTURE PLANS TO IMPROVE THE STATISTICS AND RECOMMENDATIONS TO THE SCRS

The Sub-Committee thus *recommended* that in 1978 particular attention should be paid to the following:

i) that final data for 1977 be reported as quickly as possible and that quick estimates for 1978 catches as of June 30 and September 30, 1978, be reported without delay;

ii) that the Secretariat provide lists of data entered into the data bank;

iii) that national scientists review the draft format of the output from the data bank (SCRS/77/18) and provide their comments to the Secretariat by March 1, 1978, in response to a request to be circulated;

iv) that comments on the draft revision of the Field Manual be provided to the Secretariat by March 1, 1978;

v) that data on bluefin fisheries, including catch statistics and biological data, be encouraged from non-member countries;

vi) that similar data for yellowfin and skipjack surface fisheries in the western Atlantic be sought, particularly from non-member countries;

vii) that similar data be solicited from Angola for their tuna fisheries, recognizing that a start has been made in this direction;

viii) that better statistics and species discrimination be made available for catches of small tunas.

9. OTHER MATTERS

The Secretariat reported on a meeting of the CWP (Coordinating Working Party) (SCRS/77/14) held in Dartmouth, Canada, on August 17-23, 1977, at which it was suggested that a coordinating working party on tuna statistics be set up on a world-wide basis. It was *recommended* that the Secretariat keep in touch with the CWP and FAO with regard to this matter.

It was also *recommended* that the Secretariat establish a compendium of tagging release information, in addition to the recapture data collected as a result of the reward lottery. This would enable scientists to evaluate the results of tagging programs carried out by the different agencies in a given area.

10. ADOPTION OF REPORT

The report was adopted with slight modifications at a brief meeting on November 14.

11. ADJOURNMENT

Table 1. Progress made during 1977 in the collection of Task I data for 1976 (as of Dec. 1977)

Country	*Receipt of Data*	*Catch*	*Landings*	*Effort*	*By Gear*	*By Species*	*Preliminary*	*Final*	*Remarks*
Angola	XI	×			×	×	×		
Brazil	VIII-2 (V-3)	×		×	×	×		×	
Canada	II-1 (IV-2)	×		×	×	×		×	
China (Taiwan)	III-23 (IV-21)		×		×	×	×		
Cuba	VI-3 (VIII-25)	×		×	×	×		×	
France	II-16 (III-8)		×		×	×	×		BF and ALB only.
	V-23 (III-12)		×		×	×	×		Tropical fisheries only.
	IX-5		×	×	×	×		×	ALB.
	IX-26		×			×		×	BF, Mediterranean catch.
Ghana	V (III-11)		×		×	×	×		Only large commercial fisheries. Also reported foreign flag landings.
	VIII-22 (VI)		×	×	×	×		×	
Italy	III-7 (V-24)	×			×	×	×		
	VII-4			×	×				
Ivory Coast	V-23 (III-12)		×		×	×	×		Combined with Senegal and France.
Japan	IV-1			×	×				
	VII-1 (VI-22)	×			×	×	×	×	BB, final; LL, preliminary
Korea	VI-7 (V-25)		×		×	×		×	
Mexico	VI-6 (III-16)		×			×		×	
	IX-13		×			×		×	KM only
Morocco	V-19 (VI-30)		×		×	×		×	
Norway	VII-7 (VII-1)	×				×			
Portugal	VII-1 (IV-20)		×		×	×	×		
Senegal	V-23 (III-12)		×		×	×	×		Combined with Ivory Coast and France
South Africa	V-4 (IV-26)	×		×	×	×		×	
Spain	VII-6 (VII-20)		×		×	×	×		
U.S.A.	III-14 (III-8)	×	×	×	×	×	×		
	VIII-8 (VI-25)	×		×	×	×		×	PS only.
U.S.S.R.	XI	×						×	By area. No species breakdown.
Venezuela	IX-12 (VI-30)		×			×		×	

NOTE: Date in parentheses indicates when data were received in 1976.

Table 2. Progress made in the collection of Task II during 1977 (as of Dec. 1977)

Country	*Date Received*	*Species*	*By Gear*	*By Month*	*By 1° × 1° Area*	*By 5° × 5° Area*	*By Larger Area*	*Effort*	*Weight*	*No. of Fish*	*Years*	*Remarks*
Angola	XI	All		×			×	×	×		1976	
Brazil	VIII-2 (V-3)	All	×	×		×		×	×		1976	LL
Canada	II-1 (IV-2)	All	×	×	×			×	×		1976	
China (Taiwan) *	XI (XI-9)	All	×	×		×		×	×	×	1976	LL
Cuba	VI-3 (VIII-25)	All	×	×		×		×		×	1976	LL
France	IX-5 (X-II)	ALB, BF	×	×	×			×		×	1976	
FIS	VI-3 (III)	YF, SJ	×	×	×	×		×	×		1976	
Ghana	VIII-22	All	×	×	×			×	×		1976	
Japan	II-20	All	×			×		×		×	1975	LL, by quarter. Final.
	VI-6	YF, SJ, BE, FrT	×	×	×			×	×		1970-72	
	VII-1 (VIII-10)	All	×	×	×		×	×	×		1976	BB only.
	VIII-26 (VIII-20)	All	×	×		×		×		×	1976	LL, preliminary.
Korea *	IX-1 (XI-2)	All	×	×		×		×	×		1976	
Morocco	V-19 (VI-30)	All	×	×	×				×		1976	
Portugal	VII-1 (X-6)	All	×	×	×	×			×		1976	
South Africa	V-4 (IV-26)	All	×	×	×			×	×		1976	
Spain	(VII - partly)											
U.S.A.	III-14 (III-8)	Major	×	×	×	×		×	×		1976	PS only. Preliminary.
	VIII-8 (VI-25)	Major	×	×	×	×		×	×		1976	PS only. Final.
U.S.S.R.												

* 1976 data from Secretariat Port Sampling Program are also available in Statistical Series - 3.
NOTE: Date in parentheses indicates when data were received in 1976.

Table 3. Progress made in the collection of biological data during 1977 (as of Dec. 1977)

Country	*Date Received*	*Species*	*Gear*	*Area*	*Month*	*Actual Size Freq.*	*Weighted Size Freq.*	*Years*	*Remarks*
Angola									
Brazil	VIII-2	YF, BE, ALB	LL	Specific	Monthly	×		1969-76	
Canada	VI-17 (VII-20)	BF	PS, TRA, MISC	Specific	Monthly	×		1976	
China (Taiwan)		YF, BE, ALB	LL	ICCAT area	Quarterly	×	×	1976	ICCAT Port Sampling Program.
Cuba	XI (IX-21)	YF	LL	ICCAT area	Monthly	×		1976	
France	(III-30)								
FIS	V (VI)	SJ	PS, BB	1°×1°	Monthly	×	×	1976	Magnetic tape.
Ghana	IV (XI-2)	YF, BE, S J	BB	1°×1°	Monthly	×		1976	Includes foreign fleets.
Japan	IV-4 (VIII-20)	All	LL	5°×10° or 10°×20°	Quarterly	×		1974-75	Final.

		YF, BE, SJ	BB, PS	5°×5° or 5°×10°	Monthly	×		1975	Final.
Korea		YF, BE, ALB	LL	ICCAT area	Quarterly	×	×	1976	ICCAT Port Sampling Program.
	IX-21 (XI-2)	YF, BE, ALB	LL	5°×5°	Quarterly		×	1976	
	IX-21	SJ	BB	5°×5°	Quarterly	×		1976	
Morocco									
Portugal									
South Africa									
Spain	XI	YF, SJ	BB	Regions	Mon. & Quar.	×		1976	
U.S.A.	III-14 (III-8)	All	PS, BB, UNCL	Regions	Quarterly		×	1976	Preliminary. Foreign landings transshipped to Puerto Rico.
	III-14 (III-8)	Tropical	PS	Regions	Monthly		×	1976	Preliminary.
	III-14 (III-16)	BF	PS	Regions	Monthly	×		1976	Preliminary.
	VIII-8 (VI-25)	All	PS, BB, UNCL	Regions	Quarterly		×	1976	Final. Foreign landings transshipped to Puerto Rico.
	VIII-8 (VI-25)	Tropical	PS	Regions	Monthly		×	1976	Final.
	VIII-8 (VI-25)	BF	PS	Regions	Monthly	×		1976	Final.
U.S.S.R.									

NOTE: Date in parentheses indicates when data were received in 1976.

Addendum 1 to Appendix 4 to Annex 9

Agenda for the Sub-Committee on Statistics

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Examination of progress made by national offices
4. Examination of the first year progress made in the ICCAT data bank project
   - 4.1. Progress on establishment of the data bank
   - 4.2. Description of hardware and software, and the possibilities of use
   - 4.3. Data that have been entered
   - 4.4. Codings used in the system
   - 4.5. Format of data presentation
   - 4.6. Data exchange
5. Examination of the Secretariat's statistical program
   - 5.1. Compilation and publication of the data provided by the national offices
   - 5.2. Collection and publication of statistics by the Secretariat
   - 5.3. Biostatistician and Atlantic-wide sampling scheme
   - 5.4. Revision of the Field Manual
   - 5.5. Other matters
6. Examination of the major problems regarding the quality of the statistics
   - 6.1. National problems
   - 6.2. Problems of species identification in statistics
     - a) Yellowfin and bigeye
     - b) Billfishes
7. Problems of quick compilation and dissemination of statistical data in a standard format (rapid estimates of 1976 data and the first three quarters of 1977)
8. Future plans to improve the statistics and recommendations to the SCRS
9. Other matters
10. Adoption of Report
11. Adjournment

Addendum 2 to Appendix 4 to Annex 9

Report of the Working Group on the Data Bank

Madrid, November, 1977

The Working Group on the Data Bank reviewed the progress made by the Secretariat in 1977 and found it quite satisfactory. It recognized that most of the preparatory work on establishing the bases has been completed.

The Group also studied the system which was adopted by ICCAT. The INFONET system was found to be quite versatile and very convenient for data retrieval. However, using the "Aladin" language, which was developed by the system for quick data management in a conversational mode, would result in a rather costly way of running this system. The Secretariat informed the Group that the same data bases can also be accessed and utilized using "Fortran" language in a low-priority batch mode, and in that case, the cost would be comparable to other inexpensive systems available in Spain without giving up such conveniences as reliability of the system and quick access to the system through the terminal set at the Secretariat.

The Group *recommended* that during the coming year, the Secretariat would:

1) Use the present system adopted but try to minimize the cost of running the data management system by using Fortran, and the lowest priority batch whenever possible.
2) Make comparative studies on the cost-effectiveness of maintaining the present system or a similar one and buying or leasing a mini-computer, bearing in mind the possibility of increased data flow from the expanded skipjack program.
3) Conduct studies on the technical aspects of the practicality of buying or leasing a mini-computer.

The results of these studies will be reported at the 1978 Sub-Committee meeting.

Concerning the question of who should incur the cost of the work to be done at ICCAT, the Group *recommended* that for 1977-1978 the following policy should be observed:

1) Duplication of data which recently became available should be provided to member country laboratories on request at the Commission's expense.
2) The results of regular work (recommended by the Committee) should be made available to member country laboratories at the Commission's expense.
3) Any extraordinary work requested by member countries which is not within the scope of the work assigned to the Secretary by the SCRS should be borne by the country requesting such information.

Addendum 3 to Appendix 4 to Annex 9

Report of the Working Group on Sampling Areas

Madrid, November, 1977

A Working Group on defining a map for sampling areas discussed the new areas proposed by the Secretariat (SCRS/77/24).

The Group *recommended* that in the original data file, the data should be kept with *the smallest area identity*, so that, those data can be compiled in any sampling area, as requested.

On the other hand, the Group also recognized the necessity to compile data by the sampling areas which best represent the nature of the stocks or the stock components.

The new sampling areas proposed by the Group are herewith attached to this report. However, for yellowfin and bigeye, the Group recognized some difficulty when data for surface and longline fisheries are combined. The difficulty results from some disagreements in borders of the sampling areas defined for those two types of fisheries. The Group *recommended* that for those two species:

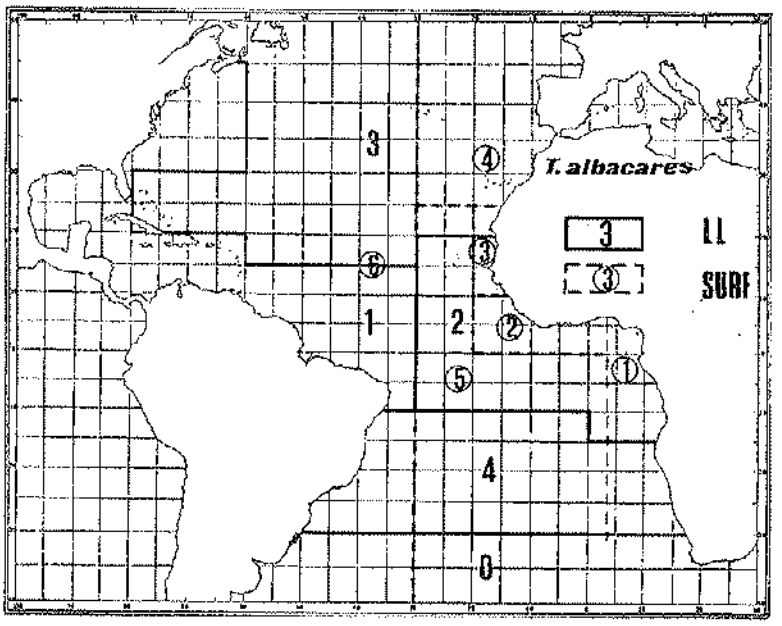
1) Present sampling areas for longline and surface fisheries should be maintained for the compilation of respective data.
2) When all the data of surface and longline are to be combined, the following areas should be used:

Yellowfin

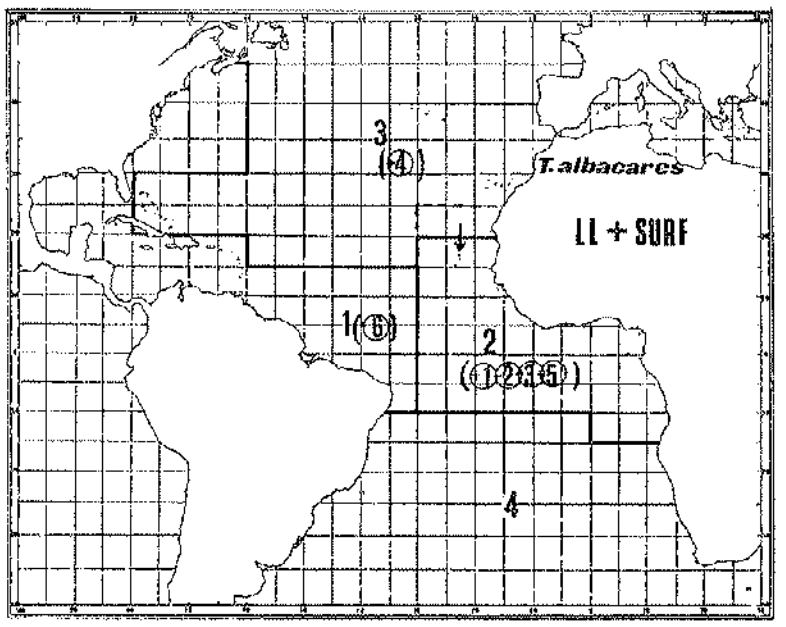
Combined Area	*Longline Area*	*Surface Area*
North	3	4
Central East	2	1, 2, 3, 5
Central West	1	6
South	4	

Bigeye

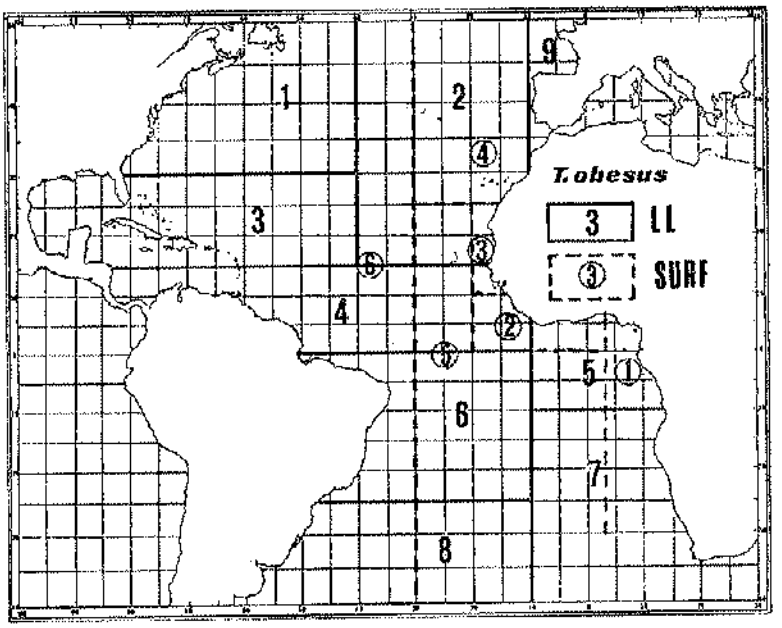
Combined Area	*Longline Area*	*Surface Area*
BE 1	1	3, 4, 5
2	2	2
3	3	1
4	4	
5	5	
6	6	
7	7	
8	8	



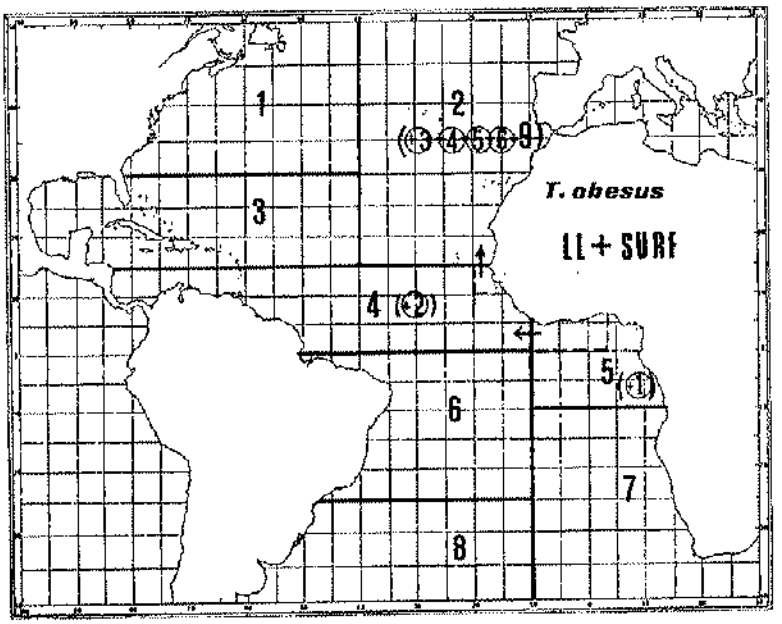
A-1. Yellowfin: Longline and surface — separately.



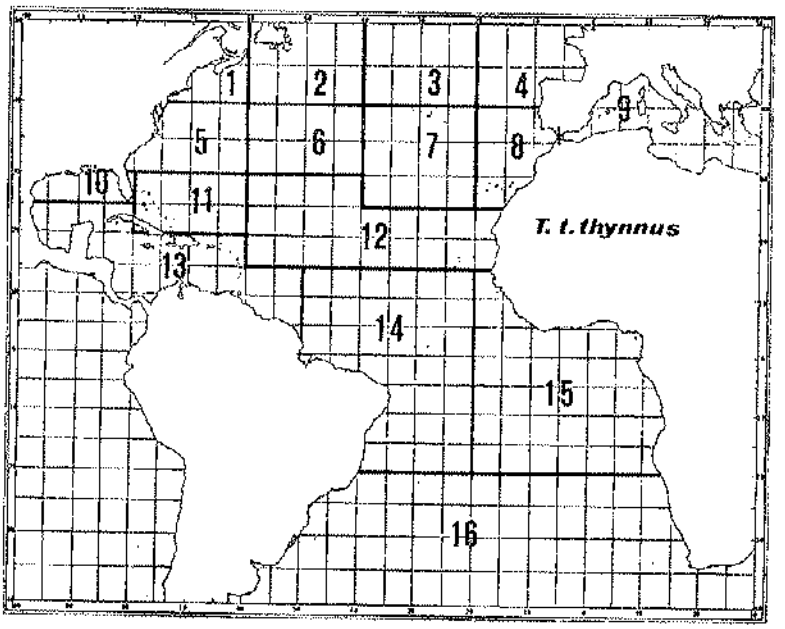
A-2. Yellowfin: Longline and surface — combined.



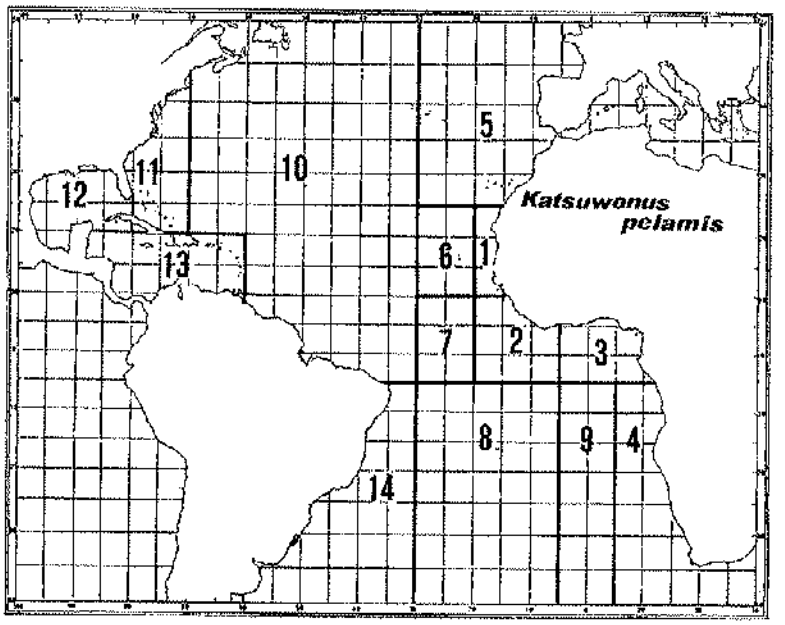
B-1. Bigeye: Longline and surface — separately.



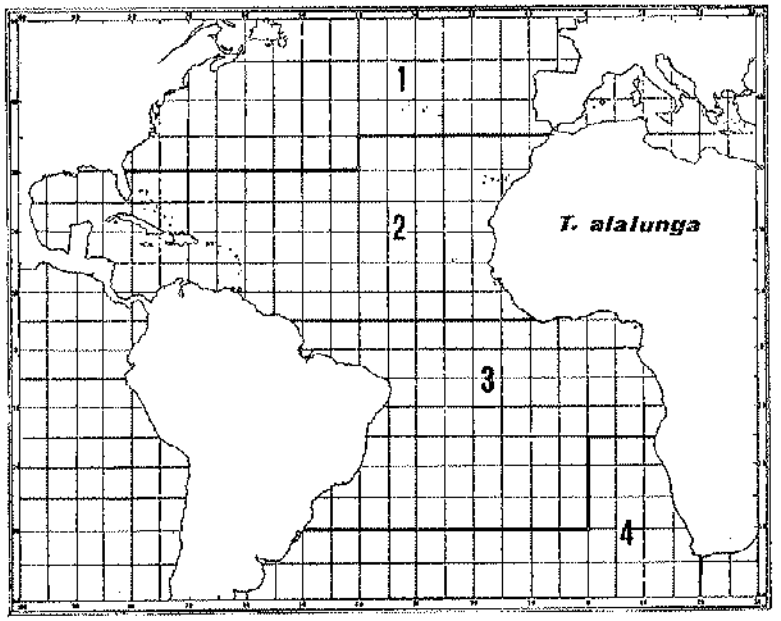
B-2. Bigeye: Longline and surface — combined.



C. Bluefin: All gears.



D. Skipjack: All gears.



E. Albacore: All gears.

Appendix 5 to Annex 9

REPORT OF THE WORKING GROUP TO EXAMINE THE PROPOSED INTERNATIONAL SKIPJACK YEAR PROGRAM

Madrid, November, 1977

The SCRS Chairman established this Working Group to review the report on the International Skipjack Year Program assembled by an *ad hoc* working group which met August 9-11, 1977, in Madrid (SCRS/77/21). The SCRS Chairman appointed Dr. W. W. Fox (U.S.A.) and Mr. R. Letaconnoux (France) as Co-Conveners of the Working Group.

The Group met twice during the course of the SCRS meeting to review the report (SCRS/77/21), considered several issues outlined by the SCRS Chairman, and offered any recommendations regarding the program to the SCRS. All countries and observers were invited to send a representative to the meetings.

The SCRS Chairman opened the meetings with several items for discussion:

1. Substance of the program
2. Management of the program
3. Funding of the program, and
4. Presentation of the program to the Commission.

The Group examined the report on the program and found that the report does, for the most part, an excellent job of summarizing and presenting the program, its elements, and its justifications. The Group *recommended* adopting the report (SCRS/77/21) with some modifications given below.

Because of the extensive, comprehensive and complex natures of the position and the program, the Group *recommended* that the Program Coordinator be a full-time position for the duration of the program within the ICCAT Secretariat and *recommended* that the individual be hired as soon as possible after the Commission approves the program. The Group *recommended* that the Coordinator operate under the general direction of the SCRS Chairman and closely with the Convener of the Sub-Committee on the International Skipjack Year Program.

In selecting the Coordinator, the Group *recommended* that the Secretariat consult closely with the SCRS Chairman and the Sub-Committee Convener.

The Group *recommended* that the Sub-Committee be established inmediately, with one representative from each country participating in the program and *recommended* that the Convener be appointed by the new SCRS Chairman as soon as possible. For countries which are absent, the Group *recommended* that the Secretariat contact those countries for a national correspondent in the Skipjack Program.

The Group discussed the various elements of the program and the proposed Activity Teams. The Group felt that the elements should be grouped as moderate-sized Activity Teams to facilitate planning and coordinating efforts. Therefore, the Group *recommended* that the following Activity Teams be established immediately:

Activity Teams	*Program elements (Addenda of SCRS/77/21)*
1. Exploration	7, 12
2. Population dynamics	1, 2, 3, 4, 8, 9, 11
3. Research vessel cruises	5, 6, 10
4. Program policy and management	

It was *recommended* that the last team (No. 4) oversee the general direction of the program and its progress during the four years of its existence.

The Group discussed the expected levels of participation by each country. To initiate the second phase of program planning, the Group *recommended* that following the Commission's approval of the program, each country participating in the program develop detailed plans of its expected or proposed level of participation, including funding levels, vessels, personnel, etc., setting out both those activities that can be definitely promised, and those which it is hoped will be carried out, but for which definite commitments cannot be made. These plans should be submitted to the ICCAT Secretariat as soon as possible, but prior to March 15, 1978, with the expectation that the Coordinator would be hired by April 1, 1978. The Secretariat should circulate copies of the plans to the members of the Sub-Committee.

The Group carefully examined the proposed budget for ICCAT in the report. It *decided* that an austerity budget for ICCAT's Coordinating Services should be prepared to facilitate acceptance of the program by the Commission. The Group noted that the austerity budget would represent the absolute minimal level required for carrying off the program successfully. In preparing this low budget, the Group *noted* that there may be hardships as to space and amount of personnel to effectively implement the program and no provisions are made for any unexpected extraordinary costs that may arise due to inflation, oversight, or other matters. In other words, the austerity budget has a reasonable, but relatively low probability of requiring additional funding particularly in the final years of the program. The Group also *noted* that the austerity budget requires individual countries to support their own scientists or technicial experts for expenses incurred while traveling to or attending any planning sessions or working groups established. The Group also *noted* that the austerity budget requires each country to assume to the fullest extent possible, all initial compilation and processing of data collected during the program.

The proposed austerity budget, in the form of three alternatives involving funding the Coordinator, is given in Addendum 1. The Group *noted* that the austerity budget recommends only one coordinator/scientist (rather than two, as in SCRS/77/21) and only one permanent assitant/secretary, which would begin in 1979, and that temporary clerical or technical help be employed to help with periods of heavy work. Along this line, the Group also *noted* that the austerity budget relies on the Commission approving the increased funding proposed for its regular budget and, if any cuts are made, then more funding must be added to the austerity skipjack program budget.

The Group *recommended* that the SCRS select one of the three alternatives presented in the austerity budget and *recommended* that all of the above caveats be relayed to the Commission at the time of presentation of the program to the Commission. The three alternatives involve the future fate of the biostatistician and the work to be accomplished by that person.

Under Alternative 1, the Coordinator would be hired in place of the biostatistician and would minimally assume some of his duties. Under Alternative 2, hiring the biostatistician would be delayed by two years. Under Alternative 3, both positions would be filled immediately. It must be *noted* that under Alternatives 1 and 2, funding for the biostatistician must remain in the regular ICCAT budget to fund the Coordinator.

The Group *recommended* that the ICCAT Secretariat and the Coordinator seek outside funding from international and bilateral agencies, e.g. UNDP and its regional programs CECAF and WECAFC) to augment and complement the national contributions, especially in respect to exploratory fishing and the development of new fishery grounds.

The Group examined the research elements to be funded by ICCAT. The Group's opinion was that these funds were absolutely essential to guarantee reasonably the success of the program and to guarantee the essential participation by all ICCAT member countries. The Group *recommended* that these elements be funded as proposed, for a total of $ 185,000 for the period of the program. Finally, the Group examined ideas to improve the presentation to the Commission. The Group *recommended* that the following points be covered:

1. The necessity for the program (outlined in 1975, 1976, and 1977 SCRS reports).
2. The desire to be as frugal as possible through the preparation of an austerity budget.
3. The great international goodwill to be established through a multi-national cooperative research program.
4. The large volume of information that will be obtained on other tuna and baitfish stocks in addition to that obtained on skipjack.
5. The value of the information that will facilitate development of new skipjack fisheries, particularly for those developing countries with small or developing fisheries.
6. The very large size of the landed value of the present skipjack fisheries that will be protected will increase understanding of the dynamics of the stocks (~100,000 MT/year worth ~$ 90,000,000/year for 4 years totalling ~$ 360,000,000) for the relatively small 4-year expenditure of the ICCAT program ($ 425,000). Also to be added to the above value is the value of increased catches of skipjack throughout the Atlantic which can only be speculated on at this point.

Addendum 1

Alternative Austerity Budget — see Table 2, Appendix 5 to Annex 6 to the 1977 Proceedings (page 99).

Appendix 6 to Annex 9

THE REPORT OF THE WORKING GROUP ON INTENSIFIED ATLANTIC-WIDE SKIPJACK RESEARCH PROGRAM *

(COM-SCRS/77/21)

The meeting was held on August 9-11, 1977, at ICCAT Headquarters, Madrid, Spain. Mr. A. Fonteneau was selected convener and Drs. Gulland and Sakagawa served as rapporteurs.

Messrs. A. Fonteneau (France), J. Gulland (FAO), S. C. Kim (Korea), A. Laurec (France), O. Moura (Portugal), Al. Santos Guerra (Spain), G. Sakagawa (USA), O. Rodríguez-Martín (ICCAT) and P. M. Miyake (ICCAT) attended the meeting.

The agenda (Attach. 1) for the meeting was adopted by the participants, and papers (Attach. 2) prepared for the meeting by various authors were reviewed by the participants.

1. Background

Skipjack tuna is believed to be the most abundant of the commercial species of tuna in the Atlantic. It was not exploited on a large scale until recently, but since 1961 catches have increased rapidly, reaching a maximum of 110,000 tons in 1974.

With growing world demand for tuna, and the fact that little increase in catch can be expected from the larger species of tuna from any ocean, including the Atlantic, there is an obvious opportunity for expanding production from Atlantic skipjack tuna. However, apart from a general feeling among scientists that these stocks are not yet fully exploited, there is at present insufficient information to plan this expansion in a rational manner, avoiding on the one hand any failure to take advantage of opportunities where they exist, and on the other, damaging the stocks and the fisheries on them through overdevelopment and overexploitation.

Accordingly, the Standing Committee on Research and Statistics (SCRS) has been giving special attention to improved and increased research on Atlantic skipjack tuna in order to be able to provide the scientific advice necessary for the rational development and management of this resource. An outline plan was developed at the 1976 SCRS meeting for an Intensified Atlantic-wide Skipjack Research Program. This plan included the proposal that a more detailed outline of the Program should be prepared for consideration by SCRS and by the Commission at their 1977 sessions.

A draft program was prepared at a meeting of French scientists in Brest in

* Now renamed "International Skipjack Year Program".

June 1977, and other proposals and suggestions on particular types of activity were received from a number of scientists, including several concerned with skipjack tuna research outside the Atlantic as a result of a request from the Chairman of SCRS and the Executive Secretary. This present report is based largely on these documents, especially the French report.

Reviews of the population biology of Atlantic skipjack tuna have shown that despite the importance of the fishery for skipjack tuna and the volume of research that has already been done, many of the most important questions about skipjack cannot be answered. Even the wide-spread belief that current catches could be considerably increased is based on qualitative impressions, rather than on any quantitative assessment of how much skipjack tuna could be caught in the Atlantic. The present fishery is concentrated along the eastern border of the Atlantic, and catches fish up to about 60 cm (5 kg). There are some minor catches by the surface fisheries in the Caribbean, and catches of a few fish which are bigger (60-80 cm, 5 to 15 kg) by longliners in the central Atlantic. There is a reasonable hypothesis, therefore, that catches could be increased by extending fishing into other areas, and onto other sizes of fish, though the extent of such increase will depend critically on the relation between the fish in different areas, and whether any increase in catches in say, the western Atlantic [1] would be partially or wholly at the expense of the present catches in the eastern Atlantic.

At the same time, it is difficult to determine the current state of the stocks in the eastern Atlantic. Catches dropped abruptly from the peak of 110,000 tons in 1974 to about 60,000 tons in 1975 and 1976. Previously there have been year-to-year fluctuations and the recent drop may be no more than a pause in a general upward trend that could be continued for some time yet; on the other hand, it may indicate that the eastern Atlantic stock (or stocks) are already fully exploited within the present pattern of exploitation. Assessment is difficult because the growth and mortality rates are not well known, so that the more sophisticated analytical models of fish population dynamics cannot be used. Even the simpler models are difficult to use because of uncertainties in the measurement of abundance, and catch per unit of effort, due in particular to the fact that the fleets fish for both skipjack and yellowfin tuna.

The degree of uncertainty, and its practical importance, is shown by the fact that the total sustained catch from the Atlantic could be little more than the 1974 catch; or it could be as much as 400,000 tons. The difference in value is around $ 240,000,000 annually.

The problems on which the Commission requires solution can be summarized in four major questions:

A. Can catches be increased by fishing new areas (and presumably new stocks), especially in the western Atlantic?

B. Can catches be increased by fishing other elements of the currently exploited stocks, especially fish over 5 kg?

[1] Unless otherwise stated, western Atlantic in this report includes the Caribbean Sea, Gulf of Mexico as well as the western half of the Atlantic Ocean.

C. What could be the effects of the above two actions, if successful, on the existing fisheries?

D. How can better assessments be obtained of the existing fisheries? In particular, will increasing effort in these fisheries significantly increase the total catch?

These are questions that are not easy to answer directely. What can be done is to identify certain research topics (e.g., study of stock structure) which should help answer one or more of these questions. Those topics in turn can be studied by engaging in some specific research activities (e.g., tagging). The following sections of this report describe first, in general terms, the major topics and research activities and their relation to each other, and to the main practical questions (Table 1); and second, for each activity in more detail, how it will be carried out, and what support will be needed from national sources and from the Commission.

2. Research topics

2.1 DISTRIBUTION OF SKIPJACK TUNA

Better knowledge is required of where skipjack tuna occurs in the Atlantic outside the known fishing grounds (Figure 1). A distinction needs to be made between the occurrence of skipjack, even in considerable numbers and the presence of skipjack in suitable concentrations, or behaving in suitable ways, to provide opportunities for catching on an economic scale with available gears. Both aspects (presence or absence and availability to fishing) will be examined; the latter aspect will include, where appropriate, examination of the availability of bait fishes. This topic will help solve questions A and B.

2.2 THE RELATION OF SKIPJACK TO THE ENVIRONMENT

Skipjack are active fish, capable of moving rapidly, vertically and horizontally, out of unfavorable locations to more preferred locations. Research already carried out and currently in progress, has shown that skipjack tuna preferences, in terms of temperature and oxygen concentration, can be well predicted from their physiological and metabolic requirements. Better knowledge of this topic can, on an ocean-wide basis, help predict the general areas in which skipjack tuna are likely to be found; in a smaller area, it can promote the understanding of the local behavior of skipjack tuna, e.g., formation of schools, or either aggregation at particular places, and hence assist the development of improved fishing techniques and the interpretation of catch and effort statistics. The ocean-wide studies will assist in question A (and partly B); the other studies will assist in question D. This is a large topic, and may be divided into two parts:

1) Studies on physical environment.
2) Studies on the physiology and behavior of skipjack tuna.

2.3 STUDIES ON THE ABUNDANCE OF SKIPJACK TUNA AND THE RELATION BETWEEN ABUNDANCE, CATCH PER UNIT EFFORT, FISHING EFFORT, AND FISHING MORTALITY

No good method is presently available to adequately monitor the abundance of skipjack tuna and its changes from year to year. Methods used in other fisheries (acoustic surveys, or surveys by research vessels with normal types of fishing gear) present unsolved technical or practical obstacles. The nominal catch per unit effort (CPUE) obtained from the presently available statistics seems to be a poor index of abundance, partly because a variable part of the effort is directed towards yellowfin tuna. Research under this topic will concentrate on obtaining a better understanding of the relation of CPUE to abundance and also of the fishing mortality exerted by a nominal unit of effort. This should lead to devising improved units of effort, and CPUE, more nearly related to fishing mortality and abundance, and possibly also to an increased efficiency of the fishing fleet itself. The first of these would represent a major advance in relation to question D. The second would help question B.

2.4 STOCK STRUCTURES

The Atlantic skipjack tuna is a highly migratory species, but certainly not a uniform population with rapid and complete ocean-wide mixing. Little is known of the structures of different stocks and other groups in the Atlantic, and the rate of mixture between them, though it is suspected that some degree of separation exists on all scales; at one extreme between adjacent schools on the same fishing ground; at the other, between fish in the eastern and western Atlantic. This topic is highly relevant to question C and could also help with question D.

2.5 POPULATION PARAMETERS

A full analysis of the population dynamics of skipjack and hence a full understanding of the reaction of the stock to different patterns of exploitation, require a knowledge of the parameters of growth, mortality (including its separation into fishing and natural mortality) and reproduction. None of these are at present more than poorly known. This topic is very important in relation to question D.

In addition to these specific research topics in which it is expected that there will be significant advances as a result of the proposed program, it is also expected that the increased volume of interest and research on skipjack tuna will produce a more general improvement in the knowledge of skipjack biology and behavior and could lead to improvement in fishing techniques.

3. The program

The Intensified Atlantic-wide Skipjack Research Program is basically organized around a set of activities that concentrate on collection of new data and infor-

mation through intensive sampling and experimentation in 1980. Certain activities, however, are scheduled to commence as early as 1979 and all activities are scheduled to be in some phase of organization and planning by January 1978.

The program is not an ICCAT funded and controlled program but one in which ICCAT would *coordinate* the collective inputs of interested parties. Funds, material and labor that are required in preparation and execution of the activities would be borne, for the most part, and controlled by the individual participating countries. Participating countries, however, would share in the outputs of the activities.

All activities of the Program are grouped into three major Program elements: (1) Intense Study of the Eastern Atlantic, (2) Study of New Fishing Areas, and (3) Supporting Activities. A brief description of the individual activities is contained in Addenda 1-12.

3.1 INTENSE STUDY OF THE EASTERN ATLANTIC

The eastern Atlantic, off Africa, is currently the major fishing area for Atlantic skipjack tuna. Catches from the area fluctuated upward to a peak of 110,000 tons in 1974 before abruptly falling to about 60,000 tons in 1975 and 1976. Whether this decline is a signal that the stocks are already fully exploited or just a pause in a general upward trend is not known. Assessment is difficult because basic information on the population dynamics parameters is unavailable. ICCAT's skipjack tuna program proposes to obtain information to assess the condition of the stocks through a detailed study of the eastern Atlantic fishery.

Activities such as super-sampling (comprehensive collection of data on fishing operations), tagging, collection of oceanographic data, aerial survey, sonic tagging, and behavior/physiology, are included in the proposed program. The activities will be executed during a 3-month period in the Annobon area in 1979, and again during 3-month periods in each of three areas in 1980.

The purpose will be to obtain a detailed synoptic picture of the hydrographic conditions, the distribution of fish (including the sizes of fish in different schools), and of the fishing fleet, as well as the short-term movements of individual fish. This should provide a picture of the behavior of fish in relation to oceanographic conditions, the formation and dispersion of aggregations and movement into and out of the fishing area.

Super-sampling. Super-sampling will be designed to collect detailed information on the fishing operations of the fleets for use in refining the measures of skipjack fishing effort in a fishery which is basically a muti-species, skipjack-yellowfin tuna fishery. This activity will require collection of data aboard fishing vessels of as many fleets as possible by trained technicians.

Tagging. Tagging will be used to obtain information on general movement, behavior-physiology, mortality and short-term growth. Dart tags will be used on a large number of releases, whereas sonic tags will be used on a selected few to obtain information on short-term behavior and physiology.

Sonic tagging. Sonic tagging will require the use of at least two research

vessels for simultaneous tracking of the fish and collection of oceanographic data along the fish's track.

Oceanographic data. Oceanographic data will be routinely collected for analysis with data from super-sampling on the relationship of fishing success and oceanographic factors and with data from aerial surveys on the relationship of occurrence of surface schools and oceanographic factors.

Aerial surveys. Aerial surveys will be conducted to obtain information on occurrence of surface schools of tuna in areas where the fishing fleet is not fishing or searching. The information is important in evaluating catch-per-unit-effort data from the fishing fleet. Airplanes will also collect data on sea surface temperature, which can be related to some oceanographic conditions that affect skipjack tuna behavior.

3.2 STUDY OF NEW FISHING AREAS

The present geographic location of skipjack tuna fisheries in the Atlantic is primarily limited to the coastal areas off Africa, parts of the Caribbean Sea and parts of the Gulf of Mexico. Compared to the total distributional range of the species (Figure 1), the current fisheries are located in a small area, and it seems that the fisheries can expand and possibly produce a higher total catch. ICCAT's skipjack program proposes to study this possibility of expansion into new fishing areas. Indirect and direct methods will be used in the study.

Indirect methods will include the collection and analysis of *oceanographic data* to locate areas favorable for skipjack tuna and to appraise the fishability of the areas; *larval survey* data will be used to locate areas where spawning skipjack tuna occur; and *stomach contents* data from predators will be used to locate areas where young skipjack tuna occur.

The direct methods will be with *exploratory fishing* and *aerial survey*. Both techniques will be used to determine the occurrence and apparent abundance of skipjack tuna and bait fishes in areas where are no major skipjack fisheries, such as in the western Atlantic. Exploratory fishing for skipjack tuna will be conducted with baitboats and purse seiners. The baitboats will also be used to assess the availability of bait, an important factor for development of new fishing areas in the western Atlantic. Aerial surveys will be conducted in 1980.

3.3 SUPPORTING RESEARCH ACTIVITIES

Grouped in the following section are a variety of activities which can be carried out independently of the two major groups of activities outlined above. They will, however, be of supporting value to some of these activities, as well as improving in a more general way our understanding of the skipjack resource.

Tagging. The most conclusive evidence of interchange between any two fishing grounds is the movement of tagged fish from one to the other. The returns (or lack of returns) from the main fishing areas in the eastern Atlantic of fish tagged elsewhere would be the most valuable piece of information in studying the possible stock structure, and in assessing the likely effect on the existing fisheries of

increased catches from the other areas. Emphasis will be given to tagging a large number of fish as well dispersed in space and time as possible over the western Atlantic. This will require chartered baitboats; these boats could to some extent also work on the survey of new fishing areas.

Genetics. The existence of a genetic and, therefore, very clear-out distinction between groups of fish can sometimes be established by the detailed examination of the biochemical characteristics of the blood and tissues, morphometrics, or a combination of these. Preliminary analyses of small samples from the Gulf of Guinea and the Caribbean showed no distinguishable difference (Fujino, 1969), but larger and carefully selected samples might give clearer results with different genetic systems. The work would have to be carried out by laboratories experienced in the techniques. Initially only a few well-chosen samples will be examined, if possible in 1978; inclusion of large scale sampling in the main program for 1980 will depend on the results of the preliminary analysis.

Otoliths. In temperate waters the age of individual fish and hence the growth and mortality rates in the population can be determined by counting annual rings on otoliths, scales or other hard parts. Skipjack tuna otoliths and scales do not show clear annual rings. Recently the existence of daily rings on the otoliths of anchovies and other small tropical fish has been demonstrated. If the same technique of counting daily rings could be validated for skipjack tuna, this would be a major breakthrough in studying skipjack population dynamics. This will be true even if the technique is so time-consuming that it can only be applied to a few fish, since this will establish a growth curve for the sampled stock with a good degree of confidence. The immediate emphasis will be given to stimulating further research into the technique. Examination of the otoliths of tagged fish (i.e., fish, a part of whose history is known) would be especially valuable if the fish were injected with tetracycline which leaves a mark on the otolith at the time of tagging.

Improved statistics. The need to improve statistics has been a constant call of SCRS since the establishment of the Commission. Nevertheless, the present statistics are still below the standards that would be desirable if the scientists are to have adequate information available to them in preparing advice to the Commission. At the same time, it is clear that maintaining the current standard of statistics, let alone improving them, is becoming a significant burden on the fisheries administration of some members of the Commission — which is not to say that this burden should not be accepted. It is, therefore, proposed that special effort be applied in 1980 to raise the standard of statistical reporting to the highest possible level. The resulting data will be analyzed to show the improvement in scientific understanding and hence in scientific advice that can be achieved, as well as the costs of maintaining such a high level of statistical reporting as a matter of routine. This will enable the Commission and member countries to determine more accurately and realistically the optimum level of statistical work, bearing in mind costs and potential benefits.

4. Organization and schedule of actions

ICCAT's Intensified Atlantic-wide Skipjack Research Program is designed to provide information so that the SCRS can develop scientific advice necessary for rational development and management of the Atlantic skipjack tuna resource. National contributions of technicians, scientists and funding to plan, execute and analyze the data will be required to perform the Program activities.

Because diverse activities will be executed and various scientists of different nations will participate, the program will require a special organization to ensure that the activities are properly designed, scheduled and executed. The organization should consist of a Program Coordinator, who would be a member of the Secretariat's staff, with supporting administrative staff to coordinate the Program activities; an SCRS advisory committee of scientists to provide the necessary link between the SCRS and Program Coordinator; and various "activity groups" to prepare detailed plans for each activity.

The Program Coordinator would be an additional member of the Secretariat's current staff, hired to assist in the planning of activities, coordinating the execution of the activities, and monitoring progress of the activities and final reports. The individual hired should have a broad scientific background with wide experience in managing research activities. Estimated period of service is January, 1978, through at least June, 1981. An estimated budget for this coordinating task is:

Activities	*Budget in thousands of dollars*			
	1978	*1979*	*1980*	*1981*
Tagging with dart tags	0	30	45	10
Improved fishery stat.	0	0	35	10
Super-sampling	0	15	20	10
Maturity and fecundity	0	0	0	0
Larval survey	0	0	*	0
Physical oceanography	0	0	0	0
Aircraft survey	0	0	*	0
Genetics	0	5	5	0
Otolith Ageing	0	0	0	0
Tagging with sonic tags	0	0	0	0
Stomach contents	0	0	0	0
Exploratory fishing	0	*	*	0
Administration				
ICCAT Coordination services	110	135	175	80
TOTAL	110	185	280	110

* Funding arrangements for these activities are not yet clear. The Secretariat may require funds to administer the arrangement that is adopted.

The development of the Program Plan has so far been performed by working groups of the SCRS with loose membership and no elected conveners. While such working groups have been sufficient for the early phases of the Program development, they would not be appropriate for more advanced phases of the Program nor to serve as the link between the SCRS and the Program Coordinator. A Committee with more structure and authority to communicate and advise the Program Coordinator on Program matters on a timely basis and on behalf of the SCRS will be required. It is therefore recommended that the SCRS at the November, 1977, meeting establish a Sub-Committee with elected convener and selected representatives to oversee further developments of the Program and serve as the link with the Program Coordinator. The Sub-Committee will also evaluate and advise the Program Coordinator on new activities or technology that may become available or brought to its attention for possible inclusion in the Program Plan.

It is also recommended that the Chairman of SCRS organize teams, "Activity Teams", of experts to prepare detailed plans for each activity. The activity plans will be consolidated and integrated according to objectives by the Sub-Committee into the overall Program Plan.

The proposed organizational chart and schedule of actions (Table 2) are shown below. It should be noted that the Program Plan and schedule of actions are developed on the assumptions that: (1) the Plan will be approved by the Commission at the 1977 meeting, a week after the SCRS meeting; and (2) at least 12 month of lead time is required between final plans and execution of any field activities in July-September 1979 and January-December 1980.

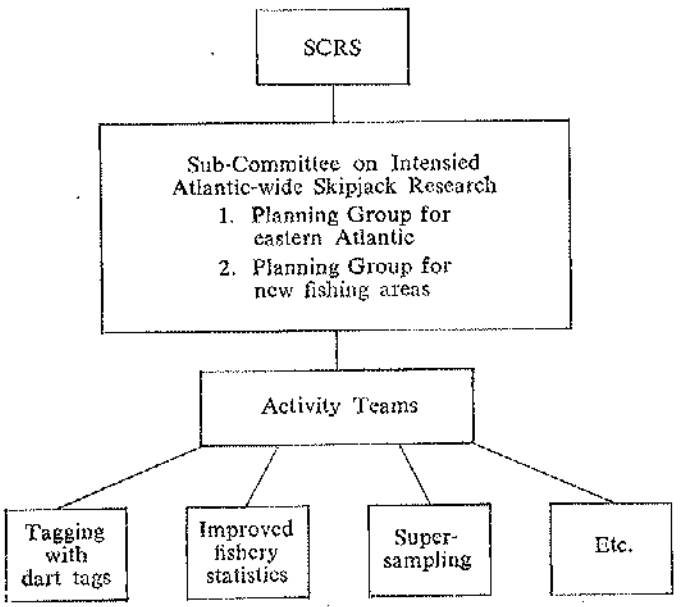


Table 1. Interrelation between research topics, activities and the basic questions for which the Commission requires answers [1]

Basic questions

A — New grounds
B — Increased fishing on existing stocks
C — Interaction between fisheries
D — Stock assessment

	Research Topic						
					Population Parameters		
Activity	*Distribution*	*Fish & Environment*	*Abundance*	*Stock Structure*	*Growth*	*Mortality*	*Reproduction*
Intense study							
Super-sampling		b, d	D		D	d	
Tagging			D	c	D	D	
Oceanography	a, b, c	c, d					
Sonic tags		c, d					
Aerial survey	b	c, d	d				
New areas							
Oceanography	a	b		c			
Larval survey	a		d				d
Stomach contents	a						
Exploratory fishing	A						
Aircraft survey	A		d	c			
Supporting activities							
Tagging	a, b, c			c	d		
Genetics				c			
Otolith ageing					D	D	c
Maturity/Fecundity				c			d
Improved statistics			D		d	d	

[1] Capital letter denotes a major contribution to a question; lower case letters denote a smaller contribution.

Table 2. Schedule of actions for the Intensified Atlantic-wide Skipjack Research Program. Detailed schedule developed through July 1978

1977	
Aug.-Sept.	Report of August meeting circulated to SCRS and Commission.
Aug.-Nov.	Chairman of SCRS, in correspondence with others, identifies potential members of "Activity Teams".
November	(1) SCRS establishes Skipjack Sub-Committee and appoints convener. (2) Sub-Committee reviews outline program, proposes modifications if needed, and refers to SCRS. (3) SCRS approves scientific program and provides ICCAT with estimates of direct cost. (4) ICCAT approves outline programs and authorizes 1978 budget. (5) ICCAT initiates action to recruit Program Coordinator. (6) SRCS nominates conveners of "Activity Teams".
1977-78	
Dec.-March	Activity teams prepare detailed plans for each activity, including estimates of costs, vessel requirements, etc. Some of this can be done by correspondence, but meetings will be unavoidable for some groups.
1 April	Plan of Activity Teams circulated to members of Sub-Committee.
May-June	Meeting of Sub-Committee and planning groups to draw detailed Program Plan.
July	Program Plan distributed to participants for development and implementation in national plans, particularly for field studies.
1979	
July-Sept.	Execution of selected field studies.
1980	
Jan.-Dec.	Execution of "International Skipjack Year".

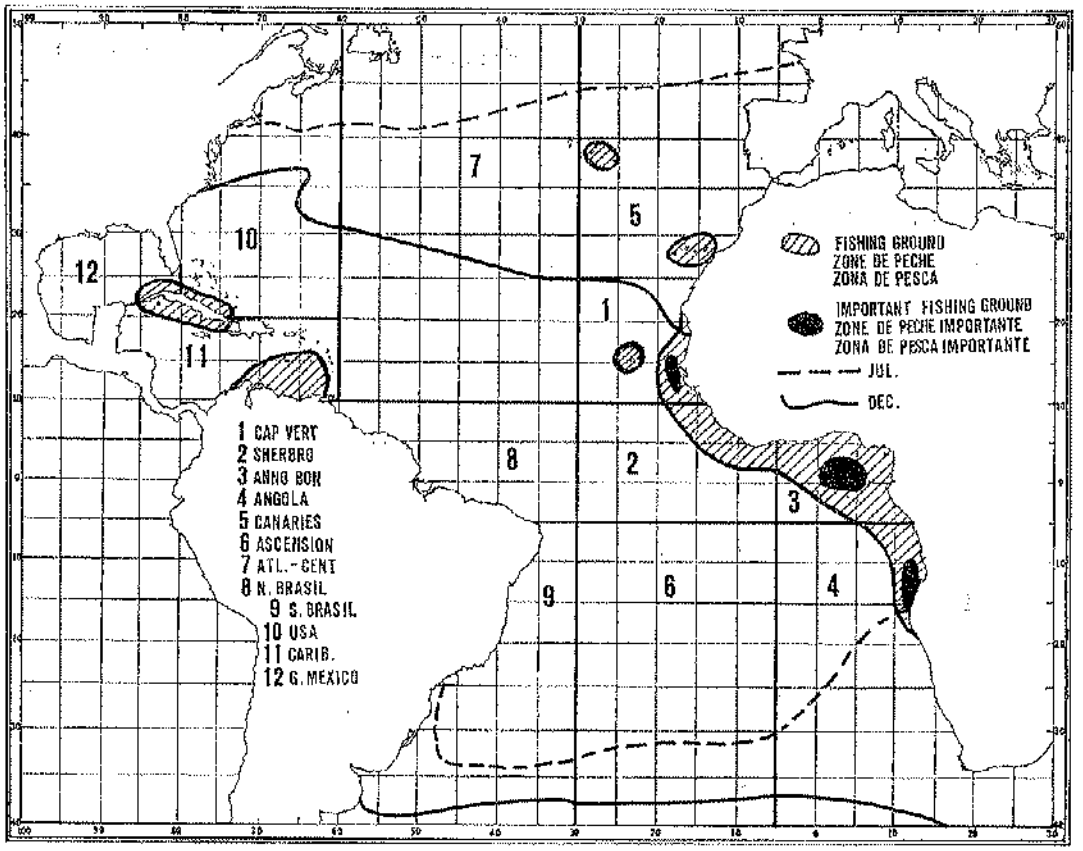


Fig. 1. Distributional range and location of fisheries for Atlantic skipjack tuna. Range is determined from data on larvae distribution, catches and skipjack preferred temperature of 18°C.

Addendum 1 to Appendix 6 to Annex 9

Tagging with Dart Tags

1. PLAN OF ACTIVITY

1979-1980 Eastern Atlantic. — Intense tagging in the Eastern tropical Atlantic for short-term recoveries (< 1 year). Activity is for 3 months in the Annobon area in 1979 and in all areas in 1980. This activity must be coordinated with super-sampling.

1979-1980 Western Atlantic. — Concentrated tagging in the western tropical Atlantic for short- and long-term recoveries (> 3 months). Activity is for approximately 6 months each year.

2. NATIONAL CONTRIBUTION

1979 Charter of one baitboat for 3 months in the eastern Atlantic and one baitboat for 6 months in the western Atlantic.

1980 Charter of 3 baitboats for 3 months each in the eastern Atlantic and 2 baitboats for 6 months each in the western Atlantic.

Scientists and technicians to participate in the planning in 1978 and 1979, execution of the plan in 1979 and 1980 and analysis of the data in 1980 and 1981 will be provided by individual countries.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Coordinator would be responsible for various aspects, including the purchase and distribution of tags and tagging equipment, paying of rewards, data editing and filing, etc. The cost will amount to:

	Cost in thousands of dollars (man-months)				
Year	*Tags & Tagging equipment*	*Reward*	*Data Processing*	*Personnel*	*Total*
1979	15	5	5	5 (2)	30 (2)
1980	15	20	5	5 (2)	45 (2)
1981	0	5	5	5 (2)	15 (2)

Addendum 2 to Appendix 6 to Annex 9

Improved fishery statistics

1. PLAN OF ACTIVITY

1980 Collection of fishery statistics (catch, catch-effort, length-frequency) with more complete and improved sampling schemes. Skipjack fisheries in all parts of the Atlantic would be sampled.

2. NATIONAL CONTRIBUTION

1980 Intense sampling for fishery statistics (catch, catch-effort, length-frequency) of each skipjack tuna fleet will be required. Data collected from the fleets will be processed by the individual countries and submitted to the Secretariat.

3. AUGMENTATION OF ICCAT SECRETARIAT RESOURCES

The Coordinator would be responsible for summarizing the data and providing technicians for collecting data from some fleets. The estimated cost is:

	Cost in thousands of dollars (man-months)		
Year	*Data Processing*	*Personnel*	*Total*
1980	5	30 (72)	35 (72)
1981	10	0	10

Addendum 3 to Appendix 6 to Annex 9

Super-sampling

1. PLAN OF ACTIVITY

1979 Collection of detailed data on fishing operations from fishing vessels in the Annobon area with technicians. Technicians will be aboard vessels for 3 months to collect data.

1980 1979 level of activity will be expanded to include the entire eastern Atlantic fishing area. Activity will be for 3 months in each of three areas.

2. NATIONAL CONTRIBUTION

1979-1980 Individual countries would be responsible for placing technicians on their vessels and for collecting and pre-processing the detailed data.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Coordinator would be responsible for coordinating the operations and summarizing the data. The estimated cost is:

	Cost in thousands of dollars (man-months)			
Year	*Travel*	*Data Processing*	*Personnel*	*Total*
1979	5	5	5 (5)	15 (5)
1980	10	5	5 (3)	20 (3)
1981	0	5	5 (4)	10 (4)

Addendum 4 to Appendix 6 to Annex 9

Maturity and Fecundity

1. PLAN OF ACTIVITY

1980 Collection of data on maturity and fecundity. Skipjack tuna will be sampled to obtain information on season and size at maturity and fecundity.

2. NATIONAL CONTRIBUTION

1980 Member countries will be asked to collect samples.

Selected scientists would be involved in processing the samples and in analysis of the data.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Coordinator would coordinate the sampling effort and monitor progress of analyses. No augmentation will be necessary.

Addendum 5 to Appendix 6 to Annex 9

Larval Survey

1. PLAN OF ACTIVITY

1978-1979 Survey of all available data and plankton collections and as best possible an analysis of existing data on tuna larvae occurrence in the Atlantic Ocean. Feasibility study with existing information on the possible use of larval surveys to estimate spawning biomass.

1980 Collection of plankton samples in selected areas to determine the occurrence of skipjack tuna.

2. NATIONAL CONTRIBUTION

1978-1979 Selected scientists would conduct analysis of existing data and perform feasibility study.

1980 Plankton samples from selected areas will be collected aboard charter vessels and research vessels. Samples will be analyzed by selected scientists.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Coordinator would coordinate the sampling effort and monitor progress of analysis. No augmentation will be necessary.

Addendum 6 to Appendix 6 to Annex 9

Physical Oceanography

1. PLAN OF ACTIVITY

1978-1979 Review and analyze existing data on oceanographic parameters that limit skipjack tuna distribution or that concentrate them.

1979-1980 Collection of oceanographic data for studying the distribution and concentration of skipjack tuna. In 1979 this activity will be performed in the Annobon area in tandem with super-sampling. In 1980 the level of effort will increase along with an increase in effort of tagging and super-sampling.

2. NATIONAL CONTRIBUTION

1978-1979 Selected scientists would conduct analysis of existing data.

1979 At least 2 research vessels for 3 months each would be required to perform this activity in the Annobon area.

1980 Several research vessels for 3 months each would be required to perform this activity in the eastern and western Atlantic.

Participating nations would process the data.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

No augmentation would be necessary.

Addendum 7 to Appendix 6 to Annex 9

Aircraft Survey

1. PLAN OF ACTIVITY

1980 Eastern operation. — Intense survey in the eastern Atlantic to obtain information on school density and location and oceanographic conditions in relation to the location of the fishing fleets. Activity is for 6 months' duration.

1980 Ocean-wide operation. — Survey to locate new fishing areas, particularly west of the African fishing area.

2. NATIONAL CONTRIBUTION

1980 At least 2 airplanes for 3 to 6 months will be required to execute the ocean-wide operation. One airplane would be adequate for the eastern operation.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

This activity would require coordination by the Program Coordinator but at no increase in cost to the Secretariat.

There is uncertainty on how best to handle the funding and participation in this activity. Special funding arrangements may be necessary to insure that contributors have priority in analyzing the data, especially from new fishing areas.

Addendum 8 to Appendix 6 to Annex 9

Genetics

1. PLAN OF ACTIVITY

1979 A feasibility study will be conducted to identify useable genetic systems for stock identification. The study will rely on few samples collected from especially the eastern and western Atlantic.

1980 Depending on results of the feasibility study, activity will be expanded or abandoned.

2. NATIONAL CONTRIBUTION

Scientists and technicians to participate in the planning and execution of this activity and analyzing the samples collected by this activity would be provided by various member countries. (Sampling and analysis can be done by different nationalities.)

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Secretariat's responsibility would be limited to the Coordinator's time, and about $ 4,000 at least for 1979 for contingency of shipping samples, trip expenses for experts, etc. Also technicians hired by ICCAT at ports might have to devote part of their time to sampling.

	Cost in thousands of dollars			
Year	*Materials*	*Shipping samples*	*Travel*	*Total*
1979	2	1	2	5
1980	2	1	2	5

Addendum 9 to Appendix 6 to Annex 9

Otolith Ageing

1. PLAN OF ACTIVITY

1978-1979 Validation and improvements of ageing techniques, especially in terms of discovering a faster reading technique.

1980 Collection of otolith samples from the entire size range of skipjack tuna caught in the eastern and western Atlantic. Execute experiments to validate daily rings with injection of tetracycline compound into tagged fish in the eastern Atlantic. Experiments would be conducted during the super-sampling period and will require coordination with the tagging with dart tag activity.

2. NATIONAL CONTRIBUTION

1978-1980 Scientists and technicians to execute this activity would be provided by various member countries.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

This activity would require some coordination by the Program Coordinator but would not incur extra cost to the Secretariat.

Addendum 10 to Appendix 6 to Annex 9

Tagging with Sonic Tags

1. PLAN OF ACTIVITY

1979-1980 Fish will be released and tracked in the eastern Atlantic. Activity will be performed in tandem with super-sampling.

2. NATIONAL CONTRIBUTION

1979-1980 One research or chartered vessel will be required to catch and tag fish. Another vessel suitably equipped with sonic equipment to follow the tagged fish will be required. Both vessels should be available for one month each year.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Secretariat will be responsible for coordinating some minor aspects of this activity to insure that they are executed simultaneously with super-sampling and other activities. No augmentation will be required.

Addendum 11 to Appendix 6 to Annex 9

Stomach Contents

1. PLAN OF ACTIVITY

1980 Stomachs from large predators, particularly billfishes, will be collected and examined for juvenile skipjack tuna.

2. NATIONAL CONTRIBUTION

1980 Countries will be asked to collect samples. Selected scientists will be involved in processing the samples and in analysis of the data.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

The Coordinator will coordinate the sampling effort, distribute the samples and monitor progress of analysis. No augmentation will be necessary.

Addendum 12 to Appendix 6 to Annex 9

Exploratory Fishing

1. PLAN OF ACTIVITY

1979 Collection of data from longliners on incidental catches of skipjack tuna with troll gear. Exploration of offshore areas in the eastern Atlantic. Fishing survey for skipjack tuna and bait fish in the western Atlantic. Activity will be coordinated with tagging.

1980 More intensive survey effort in the western Atlantic. Activity will be coordinated with tagging.

2. NATIONAL CONTRIBUTION

1979 Charter of one baitboat or purse seiner for 3 months of exploration in the eastern Atlantic. Charter of one baitboat for 3 months of survey in the western Atlantic. At least one research vessel will be required for 3 months.

1980 Charter of one baitboat for 6 months of survey in the western Atlantic. At least one research vessel will be required for 3 months.

Scientists and technicians to participate in the execution of this activity and in analysis of the data would be provided by various member countries.

3. AUGMENTATION OF ICCAT SECRETARIAT'S RESOURCES

This activity will require coordination from the Secretariat but not result in extra cost. It is not very clear how results from this activity will be handled to assure that contributors have priority in analyzing the data. The Secretariat would be responsible for investigating funding schemes and appropriate procedures for handling data from this activity.

Attachment I to Appendix 6 to Annex 9

Agenda for the Working Group on the Skipjack Program

Madrid, August 9-11, 1977

1. Opening of the meeting
2. Selection of Convener and rapporteurs, and meeting procedures
3. Adoption of the Agenda
4. Review the papers presented
5. Review objectives and the techniques
6. Review of the Plan (when, where, quantity, intensity, scale of cruises)
7. Review of cost (Commission and national)
8. Review of priority
9. Organization of the program
10. Data and sample collecting system
11. Dissemination of data
12. Analyses and publication
13. Steps to be taken
14. Assignments and recommendations
15. Other matters
16. Adoption of report
17. Adjournment

Attachment II to Appendix 6 to Annex 9

List of working documents

BAYLIFF, W. H.

Note on skipjack tagging. July 7, 1977.

FUJINO, K.

A plan for stock identification research by means of biochemical genetics. July 15, 1977

KUME, S.

Exploratory survey of skipjack in the Atlantic. July 14, 1977.
Predator-prey approach to biology and ecology of young skipjack. July 14, 1977.

MILLER, F. R.

Notes on applications of spacecraft instruments to marine fisheries problems and aerial survey. July 18, 1977.

MIYAKE, P. M.

Review and proposals on the organization of the Atlantic-wide skipjack program. July, 1977.

ORSTOM - COB

Project de recherches intensives sur le listao de l'Atlantique (*Katsuwonus pelamis*). June, 1977. (English translation by ICCAT also available.)

SAKAGAWA, G. T., N. BARTOO, A. COAN and E. WEBER

Program development plan for stock assessment of skipjack tuna in the Atlantic Ocean for 1978-1983. August, 1977.

SHARP, G. D.

Notes on application of genetic studies to Atlantic skipjack research. July 22, 1977.

SHOMURA, R. S.

Notes on stasis respiration studies and ultrasonic telemetry. July 18, 1977.

STEVENSON, M.

Comments on spacecraft and aerial survey techniques for consideration by ICCAT. July 5, 1977.

YUEN, H. S. H.

Comments on applications of acoustic methods and acoustic transmitters for skipjack. July 1, 1977.

Appendix 7 to Annex 9

REPORT OF THE WORKING GROUP ON THE TAGGING OF BLUEFIN TUNA

1. The following people attended the meeting of the Working Group: H. Aloncle and H. Farrugio (France), J. C. Brêthes (Morocco), O. Cendrero, A. Dicenta and J. C. Rey (Spain), J. Mason and F. Mather (U.S.A.) and G. Piccinetti (Italy).

2. The Group reviewed national and international bluefin tuna tagging activities. This review showed that, for various reasons, the results of bluefin tagging are, up to now, unsatisfactory.

3. Notwithstanding the above conclusion, the Group unanimously *agreed* that tagging is, for the time being, the most reliable and least complicated way of knowing about any interaction which may exist between eastern and western stocks of this species. The Group believed that it should be *recommended* that ICCAT member countries continue to take tagging studies into consideration when preparing the research chapter of their respective budgets.

4. In order to avoid a duplication of efforts and to be able to carry out efficient work in the future, the Group suggested that the first stage consist of a pilot program for one year. This would permit a better evaluation of the cost involved in tagging a number of statistically significant specimens. To determine the number of specimens, the Working Group will maintain contact with the Secretariat statistician or biostatistician. Also, the establishment of priority tagging zones was considered as follows: western Mediterranean (including the Italian coasts and the Alboran Sea) and the Ibero-Moroccan Gulf.

5. In order to increase the efficiency of the work, as well as the recovery rate, the Group proposes the following:

a) To increase the dissemination of tagging information through news and television media in all interested countries.
b) To involve the sport fishermen in tagging activities. Along these lines, there are good prospects in the French Mediterranean.
c) To inform the fishermen who return a tag of details of the specimens recovered (place, date and size at the time of tagging, distance covered, ect.).
d) At the time of sending the reward to a tag recoverer, also send ICCAT publications (such as the Field Manual or other similar texts) to the fishermen.

e) To increase the reward for tags to the equivalent of U.S. $ 4.00 payable in local currency.

6. The Group believed that ICCAT should include a tagging fund in its budget to aid those member countries who are interested in bluefin tagging but have economic difficulties to carry out such work.

7. For those non-member countries which may wish to collaborate in tagging projects, coordination will be established through CIESM.

PROGRESS MADE ON 1976 ASSIGNMENTS

A. Tasks to be undertaken and updated every year (list of names applies to 1977)

Tasks	*Yellowfin*	*Skipjack*	*Albacore*	*Bluefin*	*Bigeye*	*Billfishes*
1. Production models	* Fox (USA) [1] * Fonteneau (Fr.)	* Pianet [2] (Senegal) Fernández (Sp.)	* Bard (France) [2] * G.-Garcés (Sp.)	* Tyler (USA) [3]	* Fox (USA) [1] * Kume (Japan)	* Beardsley [1] (USA)
2. Cohort analysis (including spawner-recruitment relationship)	* Fox (USA) [3] * Marcille (I. C.)		* Bard (France) [2]	* Tyler (USA) [2] * Kume (Japan) * Bard (France)	* Kume (Japan) [1] * Al. Santos (Sp.)	
3. Size/Age composition of catch by fisheries (in Table)	* Fox (USA) [1] Marcille (I. C.) Fernández (Sp.)	* Pianet [3] (Senegal) Fernández (Sp.)	G.-Garcés [3] (Spain) * Le Gall (Fr.) Kume (Japan)	* Tyler (USA) [2] Kume (Japan) * Bard (France)	* Kume (Japan) [1] Al. Santos (Sp.) Marcille (I. C.)	* Beardsley [2] (USA) Kume (Japan) Beckett (Canada) Rey (Spain)

4. Yield per recruit	* Fox (USA) [3] * Fonteneau (Fr.)	* Pianet (Senegal) [3]	* Bard (Fr.) [N-2] * Kume (Jap.) [S-3]	* Tyler (USA) [2] * Kume (Japan)	* Kume (Japan) [1]	* Beardsley (USA) [3]
5. Analyses of impact of regulation on conservation	* Fox (USA) [2] * Fonteneau (Fr.)	* Pianet (Senegal) [3]	* Le Gall (Fr.)	Beckett (Canada) [3] * Tyler (USA) Cort (Spain) * Bard (France) Kume (Japan)	Ansa-Emmim (Ghana) [2] * Kume (Japan)	
6. Estimate of catch in 1st half of the current year	SECRETARIAT WITH NATIONAL STATISTICAL CORRESPONDENTS [2]					
7. Study of proportion of undersized fish **	* Fox (USA) [2] Ansa-Emmim (Ghana) * Fonteneau (Fr.) B. A. Kim (Korea)			* Tyler (USA) Rey, Cort (Sp.) * Bard (France)	* Fox (USA) [2] Ansa-Emmim (Ghana) Fonteneau (Fr.) B. A. Kim (Korea)	

* Person with primary responsibility.

** In the case of bigeye, the fish less than 3.2 kg, although no regulations have been set.

[1] Done.

[2] Completely or partially done, but to be updated.

[3] Not done.

B. Special items of works to begin — or complete — by the 1977 SCRS meeting

B-I STATICTICS AND SAMPLING

1. Establishment of a computerized data center . .	Secretariat [1]
2. Sampling manual for each sampling port (revision of Field Manual)	Secretariat [1]
3. Advice on adequacy of sampling for each fishery/species/gear/port/flag	Secretariat [1]
4. Continue sampling and logbook abstract from foreign vessels transshipping the catches at Atlantic ports	Secretariat [2]
5. Separation of yellowfin and bigeye catches . . .	Ansa-Emmim (Ghana),[2] Marcille (Ivory Coast)
6. Fundamental planning for Atlantic-wide skipjack project	Secretariat and Advisory Committee [1]
7. Improvement of catch statistics by minor tuna fishing countries	Secretariat [2]
8. Study a system to estimate rejects by fishing boats	Ansa-Emmim (Ghana) [3]
9. Organize a training course on sampling and statistics or a mission to train local statistical people to be sent to each major sampling port	Secretariat [1]

B-II GENERAL POPULATION PROBLEM (NON-SPECIES SPECIFIC)

1. Application of cohort analysis to the fisheries . .	National scientists should report on their country's status of studies in these respects.
2. Methods of estimating yield from multiple species fishery	
3. Review of possibility of application of techniques to tuna stock identification	

[1] Done.
[2] Completely or partially done, but to be updated.
[3] Not done.

B-III GENERAL PROBLEMS SPECIFIC TO SPECIES TO BE UNDERTAKEN IN 1977

Tasks	*Yellowfin*	*Skipjack*	*Albacore*	*Bluefin*	*Bigeye*
1. Analysis of stock structure	Zavala [3] (Brazil)	*	Bard [2] (France) Kume (Japan)	Tyler [3] (USA)	**
2. Investigation of variability of recruitment on yield	Fox [3] (USA) Fonteneau (France)	*	Bard [2] (France) Kume (Japan)	Tyler [3] (USA) Bard (France)	Kume (Japan)
3. Age determination	**	Fox [2] (USA) Le Gall (France)	**	Tyler (USA)	*
4. Interaction of multi-gear fisheries	Fonteneau (France)	*	Bard [1] (France) Kume (Japan)	Tyler [3] (USA) Kume (Japan)	Kume (Japan)
5. Analysis of recruitment indices	Fox [3] (USA)	Pianet (Senegal)	Kume [2] (Japan) South.Alb.	Tyler [3] (USA) N.W. - BF Bard (France) N.E. - BF	*
6. Estimation of effective effort in multi-species fishery	Fox [2] (USA) Fonteneau (France) Kume (Japan)	*	Bard [3] (France) Kume (Japan)	Tyler [3] (USA) Kume (Japan)	Kume (Japan)

* Studies needed but not planned for 1977.
** Studies completed and information adequate. No additional studies are planned for 1977.

[1] Done.
[2] Completely or partially done, but to be updated.
[3] Not done.

B-IV SPECIAL ACTIVITIES FOR 1977

1. Yellowfin: Relations of fish caught in offshore and inshore areas of the eastern tropical Atlantic (Fonteneau, France).[1]
2. Skipjack: Growth rate by sex (See Appendix 5).[3]
3. Albacore: Analysis of catch rates and biological data to determine mixing between stocks (Kume, Japan).[1]
4. Bluefin: Tagging of young fish in the eastern Atlantic and Mediterranean (Secretariat).[2]
5. Bigeye: Analysis of spacial distribution of effort and catch on sizes of fish caught (Kume, Japan).[1]
6. Swordfish: Analysis of catch and effort data of Canadian fishery (Beckett, Canada).[3]

ASSIGNMENTS FOR THE FUTURE

A. Tasks to be undertaken and updated every year (list of names applies to 1978)

Tasks	*Yellowfin*	*Skipjack*	*Albacore*	*Bluefin*	*Bigeye*	*Billfishes*
1. Production models	* Fox (USA) * Fonteneau (Fr.)	* Pianet (Senegal) Fernández (Spain)	* Bard (France) * G.-Garcés (Sp.)	* Tyler (USA)	* Fox (USA) * Kume (Japan)	* Beardsley (USA)
2. Cohort analysis (including spawner-recruitment relationship)	* Fox (USA) * Marcille (I. C.)		* Bard (France)	* Tyler (USA) * Kume (Japan) * Bard (France) (Atl.) * Farrugio (Fr.) (Med.)	* Kume (Japan) * Al. Santos (Sp.)	
3. Size/Age composition of catch by fisheries (in Table)	* Fox (USA) Marcille (I. C.) Fernández (Sp.)	* Pianet (Senegal) Fernández (Sp.)	G.-Garcés (Sp.) * Le Gall (Fr.) Kume (Japan)	* Tyler (USA) Kume (Japan) * Bard (France) * Farrugio (Fr.) (Med.)	* Kume (Japan) Al. Santos (Sp.) Marcille (I. C.)	* Beardsley (USA) Kume (Japan) Beckett (Canada) Rey (Spain)
4. Yield per recruit	* Fox (USA) * Fonteneau (Fr.)	* Pianet (Senegal)	* Bard (France) * Kume (Japan)	* Tyler (USA) * Kume (Japan)	* Kume (Japan)	* Beardsley (USA)
5. Analyses of impact of regulation on conservation	* Fox (USA) * Fonteneau (Fr.)	* Pianet (Senegal)	* Le Gall (Fr.)	Beckett (Canada) * Tyler (USA) Cort (Spain) * Farrugio (Fr.) (Med.) Kume (Japan)	Ansa-Emmim (Ghana) * Kume (Japan)	
6. Estimate of catch in 1st half of the current year	SECRETARIAT WITH NATIONAL STATISTICAL CORRESPONDENTS					
7. Study of proportion of undersized fish **	* Fox (USA) Ansa-Emmim (Ghana) * Fonteneau (Fr.) B. A. Kim (Korea)			* Tyler (USA) Rey, Cort (Sp.) * Bard (France) (Atl.) * Farrugio (Fr.) (Med.)	* Fox (USA) Ansa-Emmim (Ghana) Fonteneau (Fr.) B. A. Kim (Korea)	

* Person with primary responsibility. ** In the case of bigeye, fish less than 3.2 kg although no regulations have been set.

B. All the items in Tables B in Appendix 8 which are marked with 2 or 3 should also be continued in 1978

C. Special recommendations concerning statistics:

— Recruitment of a biostatistician as soon as possible
— Approval of a new system for data submission and dissemination
— Preparation of a compendium of codings and specifications of computer magnetic tapes used by each laboratory *
— Approval of proposed new sampling areas *
— Processing to be done by the ICCAT data bank
— Print-out format and substitution procedures in combining size/catch-effort data *
— Change in the nature of the Data Record
— Manuscript of the revised ICCAT Field Manual *
— Timely reporting of quick estimates of catch
— Improvement of statistics for bluefin, yellowfin, skipjack, etc.
— Correct identification of species and reporting of catch by species (yellowfin vs. bigeye and billfishes)
— Establishment of a tagging data base at the Secretariat
— Comparative studies of computer systems

D. Special recommendations concerning the proposed international skipjack year are listed in Appendix 5

E. Specific recommendations regarding each species:

Yellowfin

— Statistics for the Spanish fleet should be processed
— Identification problem between small yellowfin and small bigeye
— Discard of small yellowfin
— Logbooks for a better evaluation of CPUE
— Effect of further increase of fishing effort
— Relation between inshore-offshore population
— Year class strength independent of CPUE

Skipjack

— Skipjack year project and preliminary work

* Comments and/or suggestions to the Secretariat are due by March 1, 1978.

Bluefin

— Improved statistics for catch, effort, and age-composition
— Statistics for Mediterranean countries
— Producing standard age tables
— Standard set of terms should be developed
— Recruitment monitoring for exploiting small bluefin tuna
— Evaluation of tagging
— Practical method of age determination
— Age composition of catch tables
— Sensitivity analyses of the impact of choices of population parameter estimates, stock structure hypotheses and age-composition
— Effect of increasing size-limit
— Larval surveys?
— Aerial surveys?

Albacore

— Breakdown of historical statistics
— Study of sub-stock in the North Atlantic
— Estimates to determine actual age classes

Bigeye

— Statistics from the U.S.S.R., broken down by species
— Obtain detailed catch, effort and size data for surface fishery
— Increase samplings of yellowfin and bigeye in Puerto Rico
— Effect of common size limit for yellowfin and bigeye on fisheries

Billfishes

— Improved estimates for magnitude and species composition of catch in sport fishery
— Catch statistics in Canada and U.S. for swordfish
— Improve species breakdown

Southern bluefin tuna

— Surface-longline relationship
— Examine population analyses
— Full exchange of information

CHAPTER III

NATIONAL REPORTS

REPORT ON THE FISHERIES AND RESEARCH ON TUNAS AND RELATED SPECIES IN BRAZIL

by

JOSE AUGUSTO NEGREIROS ARAGÃO

1. State of the Fisheries

The fisheries of tunas and related species in Brazil are expanding. Until 1976, tuna fishing was carried out only by four longliners operating in the southeast-south waters off the coast of the country (20°S to 32°S) and trolling by the artisanal fleet in the northeastern waters.

The fisheries in the southeast-south have been studied by the Fisheries Institute of the State of São Paulo which, besides collecting and analyzing statistical data, is studying the biology of the species. In the northeast the study of the artisanal fisheries is done by the Institute of Marine Biology of the Federal University of the Rio Grande do Norte and by the Laboratory of Sciences of the Sea of the Federal University of Ceará. At present, the Superintendency for the Development of Fisheries (SUDEPE), through its Fisheries Research and Development Programme (PDP), in prospecting and studying the biology of tunas in the northeast.

The catch statistics for 1976 are presented in Table 1, and for 1977, made by the industrial fleet operating in the northeast, in Table 2.

The catches in the southeast-south increased from 1,024 MT in 1975, to 1,276.1 MT in 1976 (GG weight). There was an increase of fishing effort from 724,590 hooks in 1975, to 1,085,005 hooks in 1976. As in previous years, the main species caught were yellowfin tuna followed by the broadbill swordfish.

The industrial fishery which started in the northeast at the end of 1976, landed in that year in the port of Recife, a total of 446 MT of tunas. The catches consisted mainly of yellowfin tuna, albacore, bigeye and broadbill swordfish. From

Original report in English.

January until September of 1977, the catches were 1,709.9 MT and the predominant species were the same. Catches of bluefin tuna were not registered.

The industrial fleet operating in the northeast (02°S to 13°S) consisted initially of three boats (average capacity of 170 tons), increased lately to four boats. This fleet will consist of six boats by the end of 1977.

Besides the catches of the longliners, 1,777.9 MT of tunas and related species were caught in 1976 along the whole coast of Brazil by various gears, such as trolling lines, seines and others. The largest amount, about 1,500 MT, was caught in the northeast by the artisanal fleet mainly by trolling. The most common species caught were: king mackerel (*S. cavalla*), spotted Spanish king mackerel (*S. maculatus*), yellowfin (*T. albacares*), albacore (*T. alalunga*), bigeye (*T. obesus*) and blackfin tuna (*T. atlanticus*).

2. Programme of expansion of the tuna fisheries

The Brazilian government started in 1976 a programme for the development of the tuna fisheries. Since the industry was not equipped for the establishment of a purely national fishery, legislation was promulgated to organize the chartering of foreign vessels by the local industry. As a result, it is expected that by 1978 a fleet of about 44 longliners will be operating along the whole Brazilian coast.

3. Programme of tuna research

In view of the development of the tuna fisheries, the need for the establishment of a tuna research and statistics programme was recognized to study the fisheries along the whole coast of the country. Besides the regional institutions studying tunas, SUDEPE, through the PDP, started biological investigations and prospecting as well as the regular collection of statistics of the fisheries.

3.1. *Biology*

The programme of biological research includes studies of maturity, migration, parasites, stomach contents, abundance, and determination of biological parameters of the species which, together with statistical information, will be the basis for population analysis. Skipjack and young yellowfin tuna are being tagged in the northeast of Brazil, and a programme to tag yellowfin, albacore and billfishes (including swordfish) will start in the south-southeast.

3.2. *Statistics*

The statistical work will consist of recording of catch statistics, biological sampling of the main species of tunas, swordfish and marlin. Sampling will be conducted on-board the boats and on land. Data will be collected on length composition and eviscerated and live weight.

4. Scientific documents presented to SCRS in 1977

AMORIM, A. F. and C. A. ARFELLI

MS Informe sobre las investigaciones del pez vela, *Istiophorus albicans* (Latreille), en el sudeste-sur del Brasil (1971-76).

ZAVALA-CAMIN, L. A.

MS a. Frecuencia mensual de tallas y sex ratio del patudo (*Thunnus obesus*) capturado en el sudeste y sur del Brasil (1976 - agosto - 1977).

MS b. Frecuencia mensual de tallas y sex ratio del atún blanco (*Thunnus alalunga*) capturado en el sudeste y sur del Brasil (1976 - agosto - 1977).

MS c. Anotaciones sobre la presencia del listado en el sudeste y sur del Brasil.

Table 1. Tuna catches in Brazil in 1976

Gear	Effort (N° of hooks)	Catches (MT) Total	Mackerel	Yellowfin	Albacore	Bigeye	Little tuna	Swordfish	Bonito	White marlin	Sailfish	Black marlin	Blackfin tuna	Others
Longline (Northeast)		446.0	—	202.1	110.4	60.9	—	20.0	—	6.9	6.7	9.0	—	30.0
Longline (Southeast-South)	1,085,005	1,276.1	—	375.5	156.8	99.9	—	309.8	—	25.8	94.8	17.5	0.4	195.6
Others		1,777.9	850.0	278.4	139.8	149.2	94.0	0.2	73.0	17.6	64.5	11.6	99.6	—
TOTAL		3,500.0	850.0	865.0	407.0	310.0	94.0	330.0	73.0	50.3	166.0	38.1	100.0	225.6

Table 2. Tuna catches in the northeast of Brazil, from October, 1976 to September, 1977

Species	Catches (MT)*
Yellowfin	713.1
Albacore	429.0
Bigeye	290.6
Swordfish	69.9
White marlin	27.1
Sailfish	27.5
Black marlin	42.3
Others	110.4
TOTAL	1,709.9

* Data are subject to corrections.

CANADIAN RESEARCH REPORT 1976-77

by

C. D. BURNETT and T. D. ILES

A. Status of the fisheries

1. *Swordfish*

The landings of swordfish in Canada for 1976 amounted to 15 MT.

2. *Tunas*

Candaian landings of bluefin by all methods in the west Atlantic yielded 846 MT (round weight) in 1976; the purse seine fishery for juveniles off the eastern coast of the United States accounted for 332 MT, the mackerel trap fishery accounted for 168 MT of giant bluefin in St. Margaret's Bay, N.S., and 4 MT east of Halifax, N.S.; and the sport (rod and reel) fishery yielded 342 MT.

There was no purse seine fishery for yellowfin or skipjack in the Gulf of Guinea in 1976, but Canadian boats landed 161 MT of yellowfin, 181 MT of skipjack and 23 MT of bigeye from the west Atlantic.

The regulations for the 1976 giant bluefin tuna fishery were essentially the same as in 1975 except that a minimum size limit of 300 pounds was set for the large tuna fishery, and night fishing for tuna was prohibited on the grounds of safety.

B. Special research studies

1. *Swordfish*

No experimental cruises were conducted this year for swordfish.

One swordfish released by harpoon in 1970 was recaptured this year within 200 miles of the tagging site, continuing to indicate that swordfish return to the same area each summer.

2. *Tuna*

Weights were determined for 1,298 large bluefin. In the Gulf of St. Lawrence area, 837 fish averaged 397 kg, and 455 from the St. Margaret's Bay trap fishery

Original report in English.

averaged 332 kg, both averages continuing the trend of being higher than in the year before (1975 - 389 and 319 kg, respectively). The other six fish sampled were from the eastern part of Newfoundland. Lengths were obtained for 1,409 juveniles taken in the purse seine fishery, the range was 51-112 cm, with ages 2 and 3 predominantly.

In 1976, eleven (11) giant bluefin were tagged and released from the trap fishery in St. Margaret's Bay, N.S. A further 17 giants caught on rod and reel were tagged and released in the Bay of Chaleur (Gulf of St. Lawrence) area.

Four tagged bluefin were recovered in 1976; two caught in the Gulf of St. Lawrence had been tagged in St. Margaret's Bay, N.S., in 1971 and 1976, respectively; one captured off North Cape, Prince Edward Island, had been tagged in 1975 in the Bay of Chaleur, and the fourth had been released in St. Margaret's Bay in 1975 and was recovered from the same general area.

In St. Margaret's Bay, nine impoundments were established with 292 giant bluefin being held for a period of two to three months and successfully fattened for the raw fish market. They were fed trash fish once or twice a day at an approximate rate of 5 % body weight per day, and were harvested from September to early November (average weight from 372-416 kg): 10 to 15 fish died when the water temperature dropped to 6-7°C.

The otolith sampling program for age determination was continued and involved approximately 500 giant bluefin and 191 juveniles.

C. Preliminary information for 1977

The purse seine fishery for juveniles off the New Jersey coast yielded 298 MT. Lengths have been recorded for 732 fish. From this number, 50 otoliths were extracted for age determination; a few vertebrae and gonads were also taken.

Preliminary data indicate a catch of 670 MT of giant bluefin, 302 MT by angler and 368 MT from traps. Size data and otoliths have been collected. Average weight in the Gulf of St. Lawrence was virtually the same (398 kg) as in the previous year, while the weights of fish killed immediately after capture in mackerel traps (rather than being kept in pounds) gave an average weight of 334 kg, as compared to 315 kg in 1976.

The only tag releases in 1977 were of ten fish taken by rod and reel.

Five tagged blufien were recovered in 1977. Four had been tagged from the Chaleur Bay area after capture on rod and reel in 1973-76; three of these were recaptured by rod and reel in the same general area, whereas, the other was taken on a Japanese longline in the Gulf of Mexico. The fifth recapture had been released in 1976 from the trap fishery in St. Margaret's Bay and was also recovered in the Gulf of Mexico by a Japanese longliner.

RESEARCH REPORT FOR 1976 — FRANCE

by

H. ALONCLE [1]

Status of fishing in France

Tuna catches taken off the coast of France and on the high seas in 1976 are estimated at about 77,000 tons.[2]

Development of the catches

Species	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Albacore	6.6	9.8	9.8	6.0	7.5	5.6	6.1
Yellowfin	26.0	25.9	35.6	32.3	31.5	38.0	48.0
Skipjack	14.0	19.5	20.5	12.7	24.5	11.4	16.4
Bigeye	1.2	0.5	0.3	2.5	0.5	0.04	1.0
Bluefin	2.5	3.4	2.8	1.5	2.3	2.3	3.8
Thousand tons	50.3	59.1	69.0	55.0	66.3	57.34	77.3

Along the French Atlantic coast, 197 vessels participated in the albacore fishery, a decrease of more than 12 % as compared to 1975.

Sales of fresh albacore show an increase of 12 % to 14 % from those of the last year. The average yield per boat is approximately 30 tons.

Research

1. RESEARCH CARRIED OUT BY ISTPM

During the 1976 albacore season, the oceanographic vessel "La Pélagia" conducted two exploratory cruises between the French coast and the Azores.

[1] "Institut Scientifique et Technique des Pêches Maritimes", rue de l'Ile d'Yeu — B.P. 1049. 44037 Nantes (France).

[2] Statistics from the Merchant Marine.

Original report in French.

A third cruise, conducted off southwest Ireland and the Bay of Biscay, concluded 83 days of research and exploratory cruises for albacore tuna during 1976.

Between May 31 and June 19, albacore were found in the areas 19°W - 25°W and 39°N - 41°N.

During these various cruises, 577 single or double-tagged albacore were released.

Between January 1 and December 31, 1977, 4 tags were returned to ISTPM. This is the least amount of tags returned over several years. Three of these recaptures are from Spain (one from the Canary Islands), and the fourth was reported by a French fisherman from St. Jean de Luz. These recaptures confirm our previous observations about the migratory routes of albacore of the northeastern Atlantic.

One thousand sixty-six specimens were measured.

2. RESEARCH CARRIED OUT BY ORSTOM SCIENTISTS

Research was conducted on intertropical tunas, primarily yellowfin and skipjack. These studies were carried out in coordination with national research programs of Senegal and Ivory Coast. The research conducted by ORSTOM is shown in the national reports of Senegal and Ivory Coast.

3. CNEXO

No report.

NATIONAL REPORT — TUNA FISHERIES 1976 — GHANA

1. Tuna fleet

Out of a total of forty-three tuna vessels that were registered in Ghana, thirty-three operated in 1976. These consisted of twenty-seven foreign and six Ghanaian vessels.

The Ghanaian fleet that operated comprised the following:

Vessel	*Gear*	*G R T*
Joy	Baitboat	253.88
Leader	"	251.90
Mary Radine	"	283.88
No Catch No Pay	"	284.73
Boreal	Purse seine	104.00
Austral	" "	104.00

The foreign flag vessels that operated consisted of the following:

Flag	*Gear*	*Number*	*Range in GRT*
Japanese	Baitboat	16	253.76 - 299.96
Korean	"	7	188.84 - 269.09
Panamanian	"	4	192.89 - 457.11

In addition to the industrialised tuna fleet, Ghanaian artisanal fishermen also caught tunas and related species in 1976.

2. Landings

The following landings in metric tons were made in 1976 by foreign and Ghanaian flag vessels.

Original report in English.

Species	*Foreign flag*	*Ghanaian flag*	*Ghanaian artisanal*	*Total*
Yellowfin	2,216.062	450.990	—	2,667.052
Skipjack	18,865.243	2,198.514	5,967.900	27,031.657
Bigeye	6,225.915	664.141	—	6,890.056
Little tuna	643.340	76.288	—	719.628
Frigate tuna	—	—	4,310.800	4,310.800
Others	250.898	682.118	—	933.016
TOTAL	28,201.458	4,072.051	10,278.700	42,552.209

The total landings (foreign, Ghanaian industrialised and artisanal) increased from the 1975 level of 30,530.667 MT to 42,552.209 MT The total catch by the Ghanaian vessels (both industrialised and artisanal) increased from 13,423.667 MT in 1975 to 14,350.751 MT in 1976.

The catch of yellowfin decreased from 3,446.535 MT in 1975 to 2,667.052 MT in 1976. The skipjack catch increased from 16,635.100 MT in 1975 to 27,031.657 MT in 1976. Similarly, there was an increase in the catch of bigeye from the 1975 level of 3,206.459 MT to 6,890.056 MT in 1976.

Landings during the first and second quarters were fairly stable, whereas substantial increases occurred during the third and fourth quarters of the year.

3. Research

During the year, research into the biology and the population dynamics of tunas continued.

Biological Sampling

Sampling continued for studies into the length frequency distributions, maturity and feeding, etc., of the tropical tunas. A total number of 2,860 yellowfin, 4,556 skipjack and 2,402 bigeye were measured during 1976.

Special cruises were organized by the Fisheries Research and Utilization Branch with assistance from Star-Kist Int., the Ghana Tuna Development Company and Mankoadze Fisheries Ltd. for biological sampling as well as solving identification problems regarding young yellowfin and bigeye tunas.

Bigeye is often caught together with yellowfin by baitboats and purse seiners. The young fish resemble each other and it is confusing at times even to the most experienced fisherman. This confusion was detected in late 1975 and early 1976, and so a programme was mounted to tackle this problem ashore as well as at sea to find a system for the identification of these young fishes.

Discards

Yellowfin tuna occur in schools of mixed sizes in which some of the fish are smaller than the minimum size limit. Small yellowfin are also frequently mixed

with skipjack in the same school. This, at times, makes it impossible to catch skipjack without removing small yellowfin.

In view of the losses that may be experienced with the long-term yield of yellowfin, a programme was mounted towards the end of 1976 to estimate the quantity of undersized yellowfin discarded at sea. Data obtained so far are too scanty for analysis and for conclusions to be drawn.

Co-operation in Research

Ghana continued her co-operation in tuna research with the "Centre de Recherches Océanographiques" of Abidjan, Pointe Noire and Dakar, and also with the Southwest Fisheries Centre of La Jolla, U.S.A. The co-operation involved exchange of scientific data.

4. Research Programme for 1977-78

i. Research into the population dynamics of yellowfin, skipjack and bigeye will continue. In addition to these, studies would be carried out on the small tunas such as *Auxis thazard* and *Euthynnus alletteratus*. These studies would include biological sampling, monitoring of catch and effort, feeding and reproduction.

ii. Co-operative tagging programme between the "Centre de Recherches Océanographiques", Abidjan, and the Research and Utilization Branch of the Department would be conducted.

iii. The biological sampling programme on-board commercial tuna vessels would continue. This programme is designed to throw light on the dynamics of tropical tunas, especially the occurrence of young fish off the Ghanaian coast.

iv. The programme to estimate the quantity of undesized yellowfin discarded at sea will be continued.

v. The Research and Utilization Branch will continue to assist the tuna fleet in Ghana in the identification of young yellowfin and bigeye.

vi. Also to continue is the arrangement for the exchange of scientific data between the "Centre de Recherches Océanographiques", Abidjan, and the Research and Utilization Branch of the Fisheries Department.

NATIONAL REPORT OF IVORY COAST

Development of the Ivorian fleet and the catches

From two vessels in 1970 (one medium seiner MS and one large seiner GS), the fleet increased to four vessels in 1975 and to seven vessels in 1977 (2 MS and 5 GS). The fleet should increase by two units of 68 meters towards the end of 1979. The catches which were 10,530 MT in 1976 reached 16,354 MT in 1977 (see Table 1).

Table 1. Catches of the Ivory Coast tuna fleet

	Yellowfin	*Skipjack*	*Bigeye*	*Total*
1970	549	298	1	848
1971	1,323	992	21	2,336
1972	2,189	1,306		3,495
1973	2,275	879	123	3,277
1974	3,036	2,054	137	5,227
1975	6,325	2,008		8,333
1976	7,418	3,112		10,530
1977	9,686	6,329	339	16,354

Abidjan — major Atlantic port for tuna transshipment

The tuna landings and transshipments effected at Abidjan are given for each country in Table 2. Since 1975, Abidjan is the major Atlantic port for tuna transshipment.

Tuna transshipments have been maintained in 1977 at the same level as in the previous year (about 71,000 MT).

Tuna research

In 1976-1977 studies were continued on fishery statistics, biology and population dynamics at the "Centre de Recherches Océanographiques" (CRO).

Since August, 1977, very special attention was given to sampling and to the biology of bigeye. This effort will be pursued in 1978.

Original report in French.

List of papers presented by the CRO, Abidjan, at the 1977 SCRS meeting

Reference	*Title*	*Authors*
SCRS/77/107	Statistiques de pêche de la flottille française, ivoirienne, marocaine et sénégalaise, année 1976	F. Barbe Y. Le Hir J. Marcille
SCRS/77/108	Statistiques de pêche de la flottille française, ivoirienne, marocaine et sénégalaise au 30 Septembre 1977	F. Barbe Y. Le Hir J. Marcille
SCRS/77/102	Note sur les indices gonado-somatiques des albacores (*Thunnus albacares*) capturés à la senne et à la palangre	A. Fontana A. Fonteneau
SCRS/77/100	Examen synoptique de l'évolution de la pêcherie thonière franco-ivoiro-sénégalaise de 1969 à 1976	A. Fonteneau J. J. Le Chauve
SCRS/77/101	Analyse de l'état des stocks d'Albacore (*Thunnus albacares*) de l'Atlantique au 30 septembre 1977	A. Fonteneau J. Marcille

Table 2. Development of tuna landings and transshipments at Abidjan from 1965 to 1976

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Ivory Coast							1,444	1,813	2,123	3,474	5,992	10,530
Spain	1,575	41	458	74	417	180	1,010	309	1,619	5,832	13,390	10,884
France	1,188	6,170	6,368	6,022	5,304	10,125	9,696	12,651	11,818	23,280	36,210	39,828
Senegal			1,398	1,095	759	730	599	2,364	3,081	2,469	563	600
U.S.A.				1,326	7,734	4,992	1,975	6,400	1,245	3,371	1,586	0
Other countries	(2,308)	677	1,470	1,821	2,773		229	790	1,527	1,030	1,000	2,983
Total Surface	(5,071)	6,888	9,694	10,338	16,987	16,027	14,953	24,328	21,414	39,456	58,741	64,825
Japan	(9,900)	4,520	6,069	3,558	560	1,191	585					
Korea		132	496	173	380	2,927	7,854	6,683	5,446	10,796	10,117	5,580
Panama						748		5,189	4,069			
Taiwan		504	876	6,264	5,344	3,741	5,479	6,590	3,238	5,022	2,507	1,891
Total Longline	(9,900)	5,156	7,441	9,995	6,284	8,607	13,918	18,462	12,754	15,818	12,624	7,471
Total landing weight	14,971	12,044	17,135	20,333	23,271	24,634	28,871	42,790	34,168	55,274	71,365	72,296
Total round weight *	17,450	13,348	18,520	22,199	24,466	25,653	30,695	44,937	36,114	57,330	72,880	73,118

* A conversion factor has been introduced since tuna caught by longline are head off, gilled and gutted.

JAPANESE TUNA FISHERIES AND RESEARCH IN THE ATLANTIC, 1976-77

by

SUSUMU KUME

Far Seas Fisheries Research Laboratory

1. Fishing activities

The Japanese tuna fisheries in the Atlantic produced about 45,000 MT (preliminary figure) of tunas and tuna-like fishes in 1976, which correspond to the low level of the catch of the previous year (Fig. 1). The longline fleet decreased in number and recorded the lowest catch of the past decade, while the activity of the pole-and-line fleet recovered towards its best years. No Japanese purse seiner has operated in the Atlantic since early 1975 (Tables 1 and 2).

In the first half of 1977, the number of longline boats participating in the Atlantic remained at the same level as in 1976, but the pole-and-line fleet showed a slight increase.

1.1 LONGLINE FISHERY

The catch of the longline fishery in 1976 was estimated to be about 23,000 MT, which accounts for two-thirds of the previous year's catch and to half of the total tuna catch in 1976. The Japanese longline fleet has been concentrating recently on bigeye and bluefin tunas; the combined catch of these species corresponds to one-third of the total longline catch (Table 3). On the other hand, the catch of albacore and yellowfin tuna was only a quarter of the total longline catch. Such concentration of the longline fleet on specific species has been associated with the demand for domestic fresh tuna consumption and reflected by the pole-wards shift of fishing areas (Fig. 2). This species preference is different from that of the longline fleets of other nations which concentrate mainly on albacore and yellowfin tuna.

All 146 longline boats which operated in the Atlantic in 1976 were based in Japan. In general, vessels spend about a year at sea for each trip and some even operate in the Pacific and Indian Oceans to fill their capacity.

In the first half of 1977, the number of longliners in the Atlantic was the same

Original report in English.

as that for the corresponding period of 1976; however, the spatial distribution was different from the previous year, that is, about half of the longliners concentrated in the area off southern Africa fishing for southern bluefin tuna.

1.2 POLE-AND-LINE FISHERY

The Japanese baitboat fleet based at Tema, Ghana, which numbered 15 vessels in 1976 and harvested 21,600 MT of tunas, demonstrated a sharp increase compared with the previous year, and recovered to the level of the second best year — 1973. The main fishing ground in 1976 was shifted to more offshore areas than in previous years when the fishing area had been formed in coastal waters (Fig. 3).

Skipjack was the predominant species of the 1976 catch and made up about 70 % of the total pole-and-line catch. The proportion of bigeye tuna in the catch increased to 17 % and exceeded that of yellowfin tuna (10 %). It appears that this was attributed to an increase in bigeye abundance, more accurate identification between bigeye and yellowfin, and/or avoidance of capturing young yellowfin tuna.

During the period from January to June, 1977, 18 boats operated in the Gulf of Guinea and unloaded about 7,600 MT as follows: 6,500 MT of skipjack, 400 MT yellowfin, 540 MT bigeye and 250 MT of other species.

1.3 REACTION RELEVANT TO THE REGULATORY MEASURES OF ICCAT

To observe the yellowfin minimum size regulation, the Japanese pole-and-line fleet has continued its effort to avoid the capture of very small-sized yellowfin tuna, resulting in a shift of the fishing ground towards offshore areas. An instruction was issued to fishermen to observe accurate identification of species between young yellowfin and bigeye tuna. As a result, the amount of the yellowfin catch decreased and the proportion of yellowfin tuna in the baitboat catch fell below 10 % in 1976.

Since April, 1975, the internal enforcement of a regulation on bluefin tuna has been in effect for Japanese fishermen, in accordance with the ICCAT regulatory measures on the species. The enforcement involves a combination of the closure of a certain fishing area and a catch quota. The 1976 catch of bluefin tuna was estimated to be about 5,200 MT, quite similar to that of the previous two years. In 1977, the Fishery Agency dispatched a patrol boat to monitor the longline fleet for the implementation of the bluefin tuna regulatory measures. In addition, a government official was sent to Tema, the base port of the baitboat fleet, to inspect the yellowfin size regulation and give direct pertinent guidance to the fishermen there.

2. Research activities

The research on Atlantic tunas and billfishes continued extensively during the 1976-1977 period.

2.1 CATCH AND EFFORT STATISTICS

General catch statistics (Task I). — The 1975 final figures of the official catch statistics for the longline and pole-and-line fleets were provided by the Statistics and Information Department of the Ministry of Agriculture and Forestry. Catches by species in 1976 and the first half of 1977 were estimated by the Far Seas Fisheries Research Laboratory (FSFRL), as preliminary figures as of July, 1977.

Detailed statistics (Task II). — The Fishery Agency has been collecting detailed catch records from the major tuna fisheries. These data are adequate enough to prepare Task II statistics. The annual report on the 1975 longline catch and effort statistics by area was published in May 1977 (Fisheries Agency 1977). Data compilation for 1976 is now underway and the provisional statistics (as of July, 1977) were prepared for submission to the ICCAT Secretariat. The catch and effort statistics by area on the pole-and-line fishery have become available for four years, 1970-72 and 1976, by the FSFRL. Therefore, the series of data are now completed for all years since 1969.

2.2 LENGTH STATISTICS (BIOLOGICAL SAMPLING)

An on-board survey program for length measurement has been extended to most of the tuna fleet operating in the Atlantic. Because of this intensified sampling scheme, the Japanese biological data have progressively improved. In 1976, length composition data taken in 1975, and reported to the FSFRL by the end of September, were compiled for tunas and billfishes. The resultant size statistics from the Atlantic Ocean were tabulated and sent to the ICCAT Secretariat in March, 1977. Provisional tabulation on length measurements in 1976 was made available utilizing the data collected up to June 1977, and was immediately submitted to the Secretariat.

2.3 STOCK ASSESSMENT

To evaluate the effective longline effort for each species, the FSFRL estimated the overall fishing intensity of the Japanese and Taiwanese longline fisheries for tunas and billfishes. The improvement made in the calculation was the inclusion of Taiwanese data, 1967-75.

Two working documents were prepared as a contribution for the *Ad Hoc* Working Group on the International Skipjack Year Program, held in Madrid in August, 1977.

Studies on biology and population dynamics of Atlantic tuna resources were continued in 1977 to explain the stock structure in detail, estimate various population parameters and assess recent stock conditions. The results of these studies were presented at the 1977 SCRS meeting and are indicated in the document list shown in the following references.

3. References

FISHERIES AGENCY

1977. "Annual Report of Effort and Catch Statistics by Area on Japanese Tuna Longline Fishery, 1975." 267 p.

KUME, S.

a) Predator-prey approach to biology and ecology of young skipjack. Working document for the August Skipjack Meeting of SCRS.

b) Exploratory survey of skipjack in the Atlantic. Working document for the August Skipjack Meeting of SCRS.

DOCUMENTS PRESENTED AT THE 1977 SCRS MEETING

HONMA, M. and Z. SUZUKI

Overall fishing intensity, catch, catch by size and spawning indices of yellowfin tuna in the Atlantic tuna longline fishery, 1956-75.

KIKAWA, S. and M. HONMA

Status of the Atlantic billfishes caught by the longline fishery, 1957-75.

KUME, S.

a) Overall fishing intensity of Atlantic longline fishery for bigeye tuna, 1956-75.

b) Age composition of the Atlantic bigeye tuna, 1965-75.

c) Recent status of the bigeye tuna stocks in the Atlantic Ocean.

d) Change in catch per unit of effort for skipjack and yellowfin tuna caught by Japanese pole-and-line fishery in the Gulf of Guinea, 1969-76.

MORITA, S.

a) On the relationship between the albacore stocks of the South Atlantic and Indian Oceans.

b) Y/R analysis for the surface and longline fisheries of North Atlantic albacore stock.

SHINGU, C. and K. HISADA

a) Recent status of the medium and large bluefin tuna population in the Atlantic Ocean.

b) Recent status of the southern bluefin tuna stock.

SHIOHAMA, T.

Overall fishing intensity and yield by the Atlantic longline fishery for albacore, 1956-75.

Table 1. Japanese catch (in metric tons) of tunas and tuna-like fishes by types of fisheries, Atlantic and Mediterranean, 1971-1976

Type of fishery		*1971*	*1972*	*1973*	*1974*	*1975*	*1976 **
TOTAL		77,678	67,831	64,303	75,048	42,024	44,710
Longline	Subtotal	53,316	45,122	38,008	42,454	35,843	23,100
	Deckloaded motherboat	6,602	3,847	450	—	276	—
	Homeland-based boat	39,815	39,262	37,059	42,454	35,567	23,100
	Foreign-based boat	6,899	2,013	499	—	—	—
Purse seine	Subtotal	9,390	7,750	3,348	1,918	291	—
	Single-boat seiner	1,983	2,399	2,751	1,918	291	—
	Double-boat seiner	7,407	5,351	597	—	—	—
Pole-and-line		14,972	14,959	22,947	30,676	5,890	21,610

* Preliminary.

Table 2. Number of Japanese tuna boats which operated in the Atlantic Ocean and Mediterranean Sea, 1971-1976

Type of fishery		*Size class* *	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Longline	Deckloaded motherboat	Total	11	8	1	—	1	—
		201 - 500	—	2	1	—	1	—
		501 - 1,000	7	5	—	—	—	—
		1,001 -	4	1	—	—	—	—
	Homeland-based boat	Total	142	186	199	221	228	146
		51 - 200	142	1	—	—	—	—
		201 - 500		181	199	221	228	146
		501 - 1,000	—	4	—	—	—	—
	Foreign-based boat	Total	36	11	2	—	—	—
		51 - 200	6	2	—	—	—	—
		201 - 500	30	9	2	—	—	—
Purse seine	Single-boat seiner	Total	3	2	2	2	1	—
		101 - 200	1	—	—	—	—	—
		201 - 400	1	1	1	1	1	—
		401 -	1	1	1	1	—	—
	Double-boat seiner **	Total	3	3	3	—	—	—
		51 - 150	3	3	3	—	—	—
Pole-and-line		Total	7	14	22	24	24	15
		151 -	7	14	22	24	24	15

* Size for single-boat seiner is expressed in carrying capacity, while that for others is given in gross tonnages.

** Number of double-boat seiners is given in terms of a fishing unit that comprises two net-boats and several carriers.

Table 3. Catch (in MT) of tunas and tuna-like fishes taken by the Japanese Atlantic longline fishery, 1971-1976

	Year	*1971*	*1972*	*1973*	*1974*	*1975*	*1976 **
	TOTAL	53,316	45,122	38,008	42,454	35,843	23,100
Atlantic	Subtotal	53,316	45,009	37,762	40,259	34,583	22,100
	Albacore	10,113	3,892	2,154	2,448	1,766	1,500
	Bigeye tuna	20,772	18,525	20,243	21,356	17,664	9,500
	Bluefin tuna	1,532	562	1,141	3,100	4,413	4,200
	Southern bluefin tuna	4,648	10,775	7,533	6,397	1,690	800
	Yellowfin tuna	11,026	7,527	4,189	4,296	5,958	4,000
	Skipjack	2	3	0	0	1	0
	Swordfish	1,683	2,023	1,186	1,486	1,626	800
	Blue and black marlin	1,435	444	368	310	641	350
	White marlin	999	456	366	441	449	550
	Sailfish	446	222	144	138	152	150
	Others	660	580	438	287	223	250
Mediterranean	Subtotal	0	113	246	2,195	1,260	1,000
	Albacore	0	1	0	0	0	0
	Bluefin tuna	0	112	246	2,195	1,260	1,000

* Preliminary.

Table 4. Catch (in MT) of tunas and tuna-like fishes taken by the Japanese Atlantic pole-and-line fishery, 1971-1976

Year	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
TOTAL	14,972	14,959	22,947	30,676	5,890	21,610
Bigeye tuna	0	0	190	606	328	3,588
Yellowfin tuna	2,475	4,425	8,068	9,518	1,270	2,225
Skipjack	11,730	10,149	13,401	19,798	4,100	15,042
Frigate tuna	0	25	1,237	461	17	14
Others	767	360	51	293	175	741

Table 5. Catch (in MT) of tunas and tuna-like fishes taken by the Japanese Atlantic purse seine fishery, 1971-1976

Year	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
TOTAL	9,390	7,750	3,348	1,918	291	—
Albacore	0	0	3	0	0	—
Bigeye tuna	249	308	18	115	0	—
Yellowfin tuna	2,232	2,827	1,542	868	145	—
Skipjack	6,222	3,386	1,544	910	143	—
Frigate tuna	635	1,189	216	25	3	—
Others	52	40	25	0	0	—

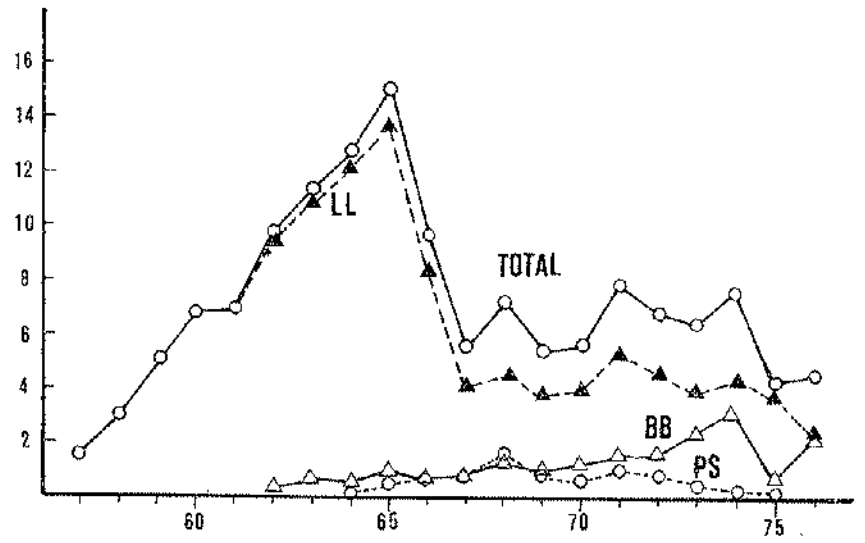


Fig. 1. Annual yield of Japanese tuna fisheries in the Atlantic Ocean and Mediterranean Sea by type of fishery, 1957-1976.

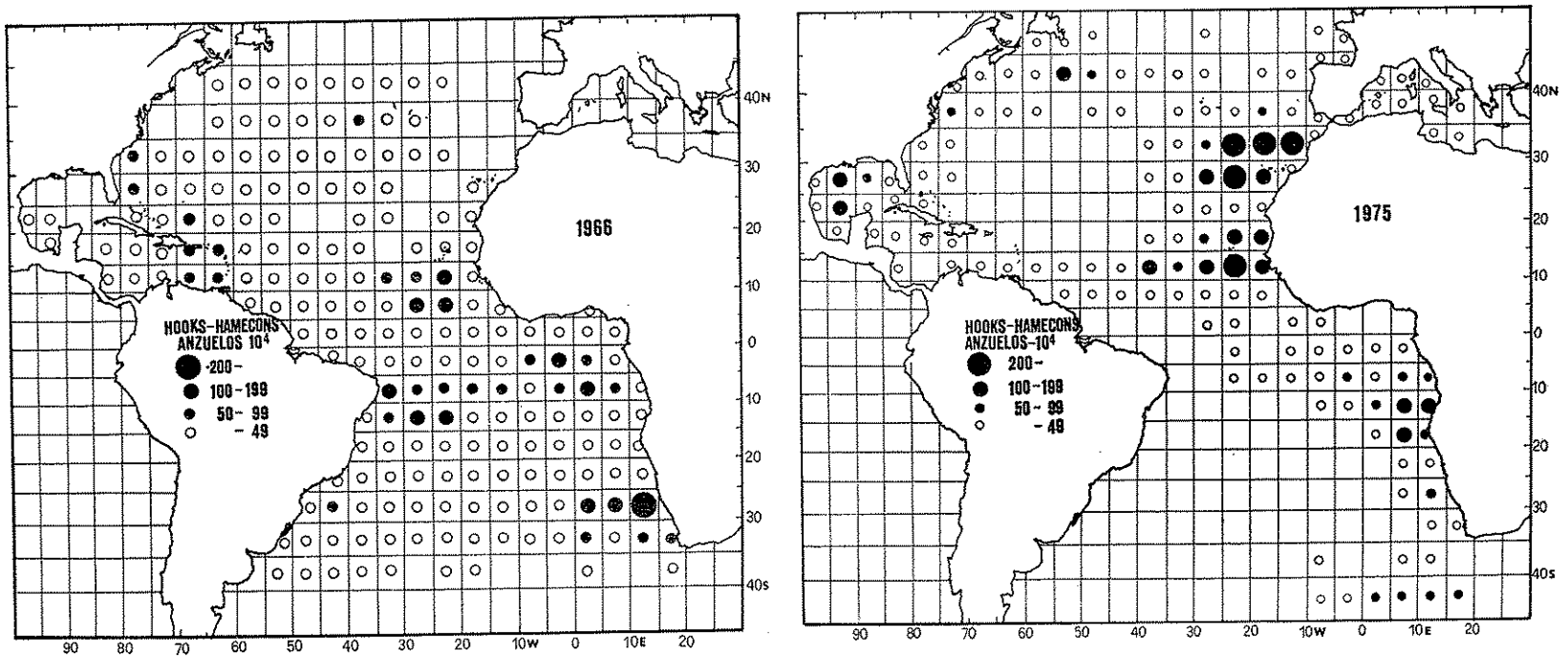


Fig. 2. Comparison of the fishing ground of the Japanese longline fishery in the Atlantic Ocean, 1966 and 1975.

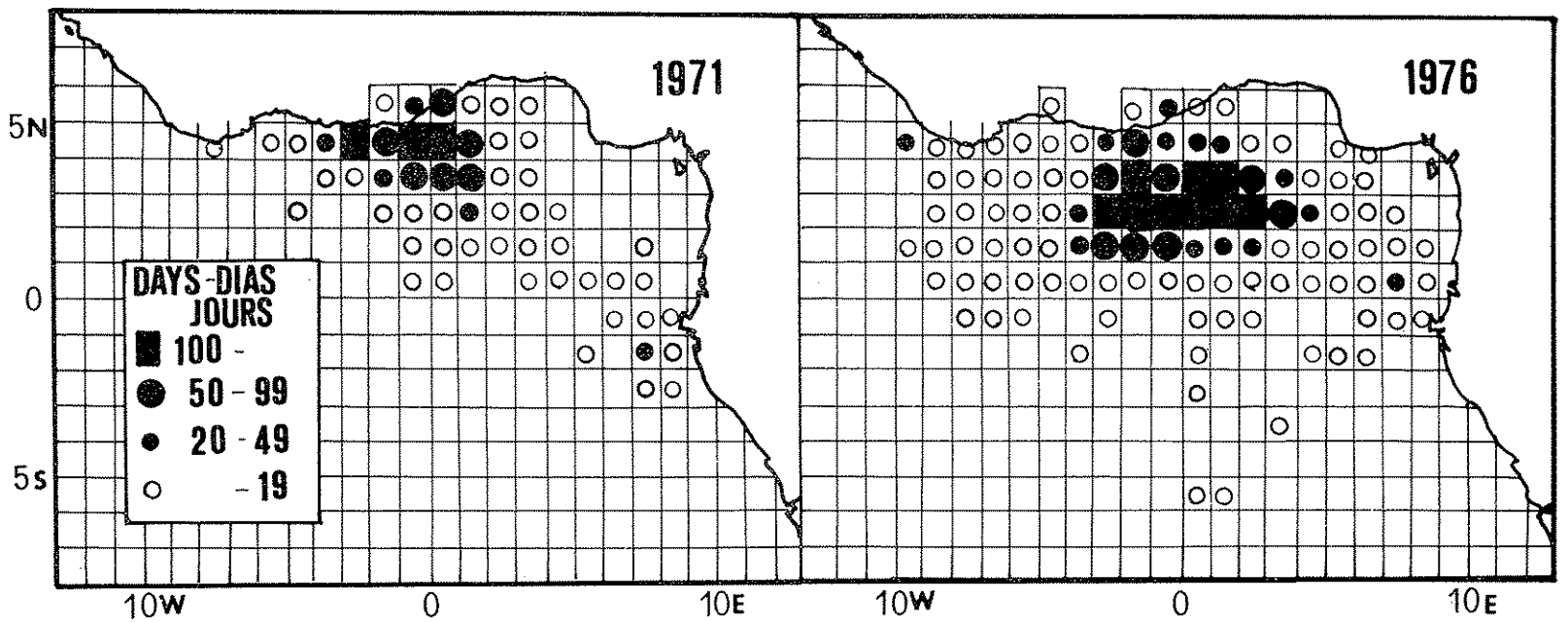


Fig. 3. Comparison of the fishing ground of the Japanese pole-and-line fishery in the Gulf of Guinea, 1971 and 1976. Days indicate number of fishing days.

KOREAN FISHERIES AND RESEARCH ACTIVITIES ON TUNA AND TUNA-LIKE FISHES IN THE ATLANTIC OCEAN, 1975-1976

1. Fishing activities

The Korean commercial catch of tuna and tuna-like fishes from the Atlantic Ocean declined in 1976 to 34,914 MT from the record high of 46,949 MT in 1975 (Table 1). This is about 26 % less than that of the previous year, despite the same number of fishing boats in 1976 as in the previous year. A breakdown of the total catch by gear type is as follows: 117 longliners caught 31,575 MT, about 20 % less than that of 1975, and 8 baitboats caught 3,339 MT, about 56 % less than that of the previous year. This was due to a decrease in fishing effort.

1.1 LONGLINE FISHERY

The catch of the longline fishery in 1976 was 31,575 MT, which is 20 % less than that of the previous year and corresponds to 90 % of the total catch in 1976. A breakdown of the total catch by species is shown in Table 2. The bluefin catch has decreased continuously. Yellowfin and bigeye catches which had shown a steady increase up to 1975, dropped fairly in 1976.

Albacore catches have reversed their downward trend in 1976. Due to a decrease in fishing effort, the total catch dropped in 1976.

1.2 POLE-AND-LINE FISHERY

In 1976, 8 Korean baitboats participated in the tropical tuna fishery of the east Atlantic Ocean. The fleet caught 1,948 MT of skipjack tuna, 810 MT of bigeye tuna, 365 MT of yellowfin tuna and 216 MT of unclassified species (Table 3), totaling 3,339 MT. This is about 56 % less than that of the previous year and corresponds to 10 % of the total catch. In 1972, the Korean pole-and-line fishery was started in the Gulf of Guinea and gradually has increased its fishing fleet. However, in 1976, the total catch experienced a substantial decrease. It is suggested that the reduction was due to less operation and to low abundance of skipjack tuna in 1976.

Original report in English.

2. Research activities

Korean research activities on tuna and tuna-like fishes of the Atlantic Ocean were conducted in 1972-1976 by the Fisheries Research & Development Agency in Pusan, Korea. At the beginning, research was not active because the fishing ground is located far from Korea and because of the poor cooperation of fishermen and because of budgetary restrictions.

However, since the Korean Government dispatched two scientists in 1975 and one in 1976 to the Korean fishing bases in the Atlantic, noticeable progress has been made, especially in statistical accomplishments.

Furthermore, the Government took strong measures and promulgated a law whereby, starting this year, all the fishing firms and captains of the boats should submit their logbooks and fish measurement data to the Fisheries Research and Development Agency.

In 1977, one tuna scientist was dispatched to Tema, Ghana, to carry out research on the proportion of undersized yellowfin and bigeye tuna in the catch, as was assigned at the ICCAT meeting in 1976.

3. Scientific document presented to SCRS in 1977

"Study on the catch proportion of undersized fishes caught by Korean baitboats in 1974-1977."

Table 1. Number of boats and Korean catch (in MT) of tunas and tuna-like fishes in the Atlantic Ocean, since 1964

	Number of boats			*Catch (MT)*		
Year	*Longline*	*Baitboat*	*Total*	*Longline*	*Baitboat*	*Total*
1964	1	—	1	167	—	167
1965	9	—	9	520	—	520
1966	54	—	54	7,114	—	7,114
1967	56	—	56	12,836	—	12,836
1968	49	—	49	12,624	—	12,624
1969	67	—	67	12,594	—	12,594
1970	105	—	105	34,865	—	34,865
1971	117	—	117	37,142	—	37,142
1972	105	2	107	36,345	—	36,345
1973	106	3	109	32,638	1,822	34,460
1974	124	8	132	33,910	4,416	38,326
1975	118	8	126	39,296	7,653	46,949
1976	117	8	125	31,575	3,339	34,914

Table 2. Catch (in MT) by species and catch percentage (in *italics*) of tunas and tuna-like fishes taken by the Korean longline fishery in the Atlantic, 1971-1976

Year	*Bluefin*	*Yellow-fin*	*Albacore*	*Bigeye*	*Skip-jack*	*Sword-fish*	*Unclassi-fied and others*	*Total*
1971	3,039	9,901	11,539	7,355	47		5,263	37,142
	8.2	*26.6*	*31.1*	*19.8*	*0.1*		*14.2*	
1972	30	11,078	13,577	5,730	45		5,885	36,345
	0.1	*30.5*	*37.4*	*15.8*	*0.1*		*16.2*	
1973	66	12,844	8,525	5,829	—		5,374	32,638
	0.2	*39.3*	*26.1*	*17.9*	—		*16.5*	
1974	56	15,918	5,216	7,372	116		5,632	33,910
	0.2	*45.8*	*15.4*	*21.7*	*0.3*		*16.6*	
1975	23	15,344	6,073	10,162	196		7,498	39,296
	0.1	*39.0*	*15.5*	*25.9*	*0.5*		*19.1*	
1976	10	11,211	8,755	6,747	26	1,147	3,679	31,575
	0.0	*35.5*	*27.7*	*21.4*	*0.1*	*3.6*	*11.7*	

Table 3. Catch (in MT) an percentage (in italics) of tunas and tuna-like fishes taken by the Korean baitboat fishery in the Atlantic, 1973-1976

Year	*Yellowfin*	*Bigeye*	*Skipjack*	*Unclassified and others*	*Total*
1973	900	—	922	—	1,822
	49.4		*50.6*		
1974	2,169	4	2,123	120	4,416
	49.1	*0.1*	*48.1*	*2.7*	
1975	1,259	1,750	4,469	175	7,653
	16.5	*22.9*	*58.4*	*2.3*	
1976	365	810	1,948	216	3,339
	10.9	*24.3*	*58.3*	*6.5*	

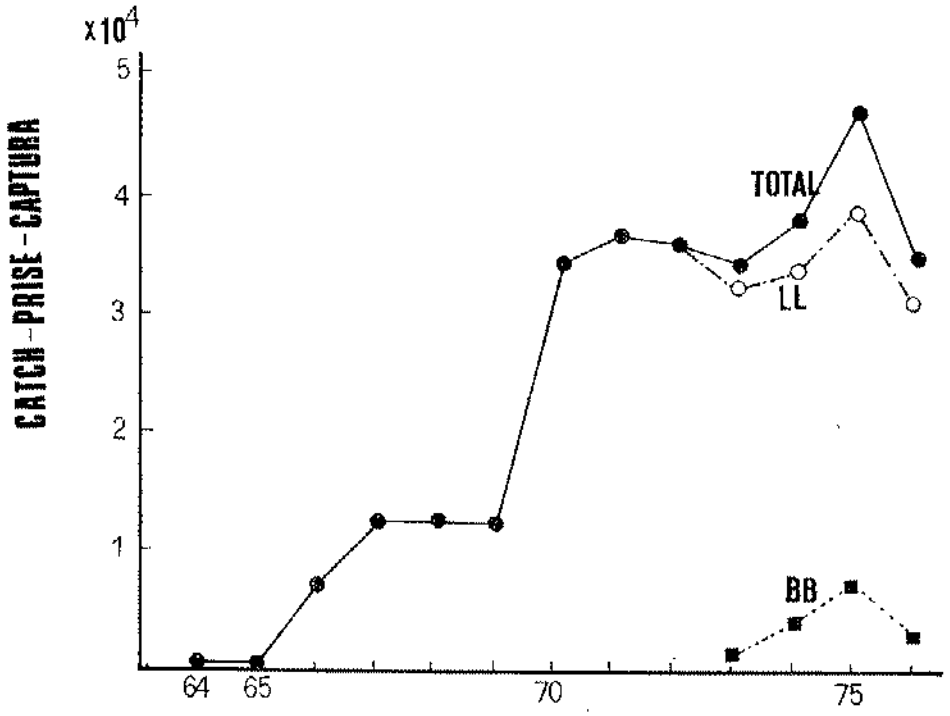


Fig. 1. Annual yield of Korean tuna fisheries in the Atlantic Ocean, 1964-1976.

NATIONAL REPORT OF MOROCCO, 1976-77

by

J. HAMOU-TAHRA and J. C. BRETHES *

1. Fishing

The 1976 landings were similar to those of 1975. Declines in the overall landings off Morocco, especially those of bluefin tuna were compensated by the increase of catches in inter-tropical waters.

In 1977, the fishing trend in Moroccan waters shows a sharp gain, since the landings during the first seven months are higher than those during the same period in 1976. This is due, on one hand, to the increase of bluefin tuna catches, and on the other, to a sharp gain in the catches of skipjack tuna. (See table below.)

Year	*Total catch (MT)*	*Catch in tropical waters (MT)*	*Catch in Moroccan waters (MT)*		
			Total	*Bluefin*	*Skipjack*
1975	4,760	1,309	3,541	2,664	24
1976	4,804	2,942	2,262	332	3
1977 **	3,283	821	2,462	789	915

2. Scientific research

Following an agreement made between the "Office National des Pêches" (Morocco) and ICCAT, a tagging cruise for young bluefin tuna was carried out in July, 1977 (SCRS/77/22).

* Oceanographic biologists of the "Institut Scientifique des Pêches Maritimes".

** Data are from the first seven months for Moroccan waters and for the first six months for tropical waters.

Original report in French.

NATIONAL REPORT OF PORTUGAL — 1976

1. The fishery

In 1976, Portuguese landings amounted to 5,786 MT. This total represents a decrease of approximately 15 %, compared to landings in 1975 (Table 1).

The breakdown by species in somewhat different from that of previous years. However, this difference may be due to inadequate statistics.

The major part of the catches was effected in the Madeira archipelago. As can be seen in Table 2, the landings from this island group represent 66 % of all Portuguese tuna landings.

2. Research

No tuna research programs were carried out in Portugal in 1976, due to priorities in other sectors of activities.

Original report in French.

Table 1. Breakdown by species of Portuguese landings from 1970 to 1976 (Unit: Metric Tons)

Species	*1970 **	*1971 **	*1972 **	*1973 **	*1974*	*1975*	*1976*
TOTAL	8,200	6,046	6,927	8,545	12,320	6,790	5,786
Bluefin					1	321	628
Yellowfin					1,253	54	313
Albacore					1,246	1,034	504
Bigeye					9,079	4,906	2,107
Skipjack					0	475	2,223
Others					741	0	11

* There are no data broken down by species.

Table 2. Landings in Portuguese Islands in 1976 (Unit: Metric Tons)

Islands	*Total*	*Bluefin*	*Yellowfin*	*Albacore*	*Bigeye*	*Skipjack*	*Others*
TOTAL	5,786	628	313	504	2,107	2,223	11
Madeira	3,832	323	0	483	1,639	1,387	—
Azores	1,954	305	313	21	468	836	11
S. Miguel	120	15	4	—	75	20	6
Terceira	1,041	117	232	—	206	482	4
Faial	793	173	77	21	187	334	1

REPORT ON TUNA FISHING AND RESEARCH IN SENEGAL IN 1976-1977

1. Tuna fishing

Tuna landings and transshipments at Dakar in 1976 and 1977 are shown in the attached table.

In 1976, the fleet based at Dakar was comprised of 32 baitboats (30 French and 2 Senegalese) and 15 purse seiners (14 Senegalese and 1 French). These vessels landed 9,600 MT of tuna (5,300 MT of yellowfin, 3,000 MT of skipjack and 1,300 MT of bigeye), which were processed at the canneries based in Dakar. In addition, 30,000 MT were transshipped (9,600 MT for the large FIS purse seiners and 20,400 MT for Spanish seiners), which brings the total at Dakar to approximately 40,000 MT.

After the breakup of SOSAP at the end of 1976, the Dakar fleet comprised 27 baitboats and 4 purse seiners in 1977. However, the landings have increased 20 %, reaching almost 11,400 MT (4,400 MT of yellowfin, 4,400 MT of skipjack and 2,600 MT of bigeye). The transshipments were also more important and amounted to 43,000 MT (half corresponding to FIS and half to Spain). The total amount of fish handled was about 55,000 MT, an increase of almost 40 %. This is due essentially to more and more intense exploitation after 1975 in the area of the Guinea dome by the FIS and Spanish fleets which catch big yellowfin during the first quarter. It is also due to a strong increase in skipjack catch, which went from 11,000 MT to 25,000 MT.

2. Research

Sampling activities and the collection of statistics as well as population dynamics studies were continued in 1976 and 1977. The agreement made with the Spanish Oceanographic Institute, allowing the "Centre de Recherches Océanographiques" of Dakar - Thiaroye to sample the Spanish transshipments in Senegal has been extended in 1977 and 1978. This has allowed for making about 250 samples between July and December, 1976. In 1977, 320 samples were taken of all species transshipped from the 63 out of 80 landings registered.

Original report in French.

Research activities of CRODT were mainly directed towards skipjack problems:

— In 1976, CRODT organized a working group on Atlantic skipjack, at which scientists from Ivory Coast, Spain, U.S.A., France, Ghana, Senegal and ICCAT participated. Japan was unable to participate. This meeting allowed for an exhaustive study on the fishery, utilizing the maximum amount of data, and pointed out the main problems pending. The working group presented a report to the SCRS (Document SCRS/76/89).

— In 1977, CRODT actively participated at Brest in initiating the FIS project on intensive skipjack research. Unfortunately, a CRODT representative could not participate in the synthesis meeting which took place in Madrid in August, 1977.

— An echo-integration cruise for skipjack in the area of Cape Verde was held in October, 1977. The report of this cruise could not be presented at the meeting, and at first glance, the results do not appear to be very conclusive.

— In 1977, two cruises tagged about 120 tunas of three species in the area of Cape Verde. At present, CRODT has been notified of only one recovery.

— In 1977, a study on the fecundity of skipjack was started in the region of Cape Verde, and the preliminary results should be obtained after 1978.
The resulting data from the exploratory cruises for tuna larvae, carried out by the oceanographic vessel "Capricorne" in previous years, are currenly being classified. A synthesis in this regard should be carried out jointly with CRO in Abidjan.

3. Work presented by CRODT to the ICCAT Meeting

FONTENEAU, A. (ORSTOM-Brest) and R. PIANET (CRODT)

Projet de Recherches Intensives sur le Listao de l'Atlantique (*Katsuwonus pelamis*). Document presented at the skipjack meeting, Madrid, Sept. 1977.

PIANET, R. (CRODT)

Etat des stocks de Listao dans l'Atlantique Est. (SCRS/77/110).
Rapport du Groupe de Travail sur le Listao Atlantique, Dakar, 22-27 mars 1976 (SCRS/76/89).

Tuna fishing in Dakar, 1976-1977

	1976						1977					
	No. boats	*Effort*	*YF*	*SJ*	*BE*	*Total*	*No. boats*	*Effort*	*YF*	*SJ*	*BE*	*Total*
Dakar												
Baitboat	32	3,550	4,000	2,100	1,300	7,400	27	3,200	3,600	2,800	2,500	8,900
Purse seine	15	800	1,200	1,000	—	2,200	4	450	800	1,600	100	2,500
Total	47	4,350	5,200	3,100	1,300	9,600	31	3,650	4,400	4,400	2,600	11,400
Foreign												
FIS	19	950	8,800	700	—	9,500	22	2,150	13,700	7,000	500	21,200
Spanish	22	2,850	12,800	7,300	—	20,100	28	2,750	7,400	13,500	1,100	22,000
Total	41	2,800	21,600	8,000	—	29,600	50	4,900	21,100	20,500	1,600	43,200
Total transshipment	88	7,150	26,800	11,100	1,300	39,200	81	8,550	25,500	24,900	4,200	54,600

N.B.: Spanish tansshipments in Dakar have been estimated from surveys caried out in collaboration between CRODT and the Spanish Oceanographic Institute.

1,200 MT of Atlantic little tuna and frigate tuna should be added to the 1977 transshipments in Dakar.

NATIONAL REPORT — SOUTH AFRICA

by

C. S. de V. NEPGEN

1. The fishery

The catch, which consisted almost 100 % of albacore, was very poor and was made by 34 sport fishing boats in the vicinity of Cape of Good Hope. Four boats were given permits to purse seine for tuna but they did not make use of their permits because of reduced availability.

2. Biological sampling

Measurements of 5,154 albacore were taken from tuna transshipped by foreign boats in Table Bay Harbour.

3. Environment

Monthly environmental surveys will be done during 1977 at a series of stations between 31° 40′ S on the South African west coast and 21° 30′ E on the south-east coast.

Original report in English.

SPANISH NATIONAL REPORT ON TUNA FISHERIES AND RESEARCH IN 1977

In 1977, Spanish scientists conducted studies on the major tuna species of the Atlantic and Mediterranean Sea.

Regarding yellowfin and skipjack, species which are caught in the tropical area of Africa, data collection at the ports of Abidjan and Dakar was at a higher level than in 1976. Survey data and size sampling data are now abundant.

Albacore catches have decreased as compared to the previous year. Size samplings were conducted at the major landing ports, showing two different fishing time-areas, one corresponding to the traditional migratory fishery, and another which corresponds to large fish that are caught at the end of the year in the Azores-Madeira area.

In 1977, 957.3 MT of bluefin tuna were caught in the Bay of Biscay, which shows an increase in catches with respect to 1976. The total catch, in terms of number of fish, was 68,069, distributed in the following way, according to age:

Age	*Frequency*	*%*
I	4,934	7.2
II	46,712	68.6
III	10,393	15.3
IV	5,371	7.9
V	346	0.5
VI	219	0.3
VII	94	0.1

Effort remained at levels similar to last year and CPUE increased considerably.

In the Mediterranean, traps increased the catches of bluefin slightly, with respect to 1976. The Mediterranean longline fleet caught some 400 MT.

In the Canary Islands data collection continued for the five principal tuna species. It should be noted that there was an increase in the fishing of giant bluefin in these waters.

Original report in Spanish.

Studies on swordfish were carried out in its distinct fishing areas. About 3,000 MT of swordfish were caught in the Atlantic and 400 MT in the Mediterranean. Fishing effort was maintained at levels similar to the previous year.

During 1977, a series of tuna research cruises were carried out, on commercial vessels as well as on research vessels. Preferential attention was given to the study of bluefin and tagging cruises were conducted in the Bay of Biscay, Mediterranean Sea and off the Atlantic coast of Morocco. Also, an oceanographic cruise to collect ichthyoplankton was carried out, for the study of tuna spawning in the Mediterranean. Thanks to an invitation of I.S.T.P.M. of France, Spain participated in an exploratory cruise for tuna in the Atlantic between the Azores and the Canary Islands.

Tuna catches 1970-1976

Year	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Spain (except Canary Islands)							
Yellowfin	5,803	7,011	7,622	12,253	14,407	23,000	34,900
Skipjack	5,735	12,140	19,254	17,753	31,095	17,000	17,778
Albacore	23,481	29,796	24,396	19,321	24,240	21,344	26,204
Bluefin	5,500	4,482	2,094	3,000	2,822	917	856
Swordfish	3,160	3,384	3,210	3,833	2,893	3,747	2,047
Canary Islands							
Yellowfin		420	3,079	1,388	2,032	1,031	228
Skipjack		13,028	8,149	6,924	5,357	752	604
Bigeye		6,990	1,747	935	3,170	5,721	5,278
Albacore		1,836	1,601	3,247	2,692	1,006	656
Bluefin		1,682	—	7,017	516	930	832

REVIEW OF UNITED STATES FISHERIES AND RESEARCH ACTIVITIES ON TUNAS AND TUNA-LIKE FISHES OF THE ATLANTIC OCEAN FOR 1976-1977

by

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE [1]

The fisheries

United States commercial fisheries for tunas and tuna-like fishes in the Atlantic Ocean recorded a sharp decline in total catch in 1976 as compared to that in 1975. The catch was 17,085 MT in 1976 compared to 33,379 MT in 1975 (Table 1). Sharply lower catches were recorded especially for bluefin tuna (*Thunnus thynnus*), yellowfin tuna (*T. albacares*) and skipjack tuna (*Katsuwonus pelamis*).

Tropical Tunas

In 1976, United States participation in the Atlantic tropical tuna (yellowfin and skipjack) fisheries was at a 7-year low. Eleven purse seiners participated in the fisheries but only seven fished in the productive yellowfin-skipjack tuna areas off Africa. Factors, including high fuel cost, prospects of a good skipjack tuna season in the eastern tropical Pacific and uncertainty of fishing-zone jurisdictions of especially African countries kept many American boats out of the Atlantic fisheries.

Catch rates for the American boats that fished in the eastern tropical Atlantic were high but the fleet was able to land only 3,500 MT of tuna in about 339 boat days of fishing (Table 2). Off Angola, where in previous years the American fleet experienced good skipjack fishing in the fall, fishing was exceptionally poor in 1976.

A greater number of American seiners are participating in the 1977 fishery. As of October 1, 13 American boats have so far fished in the eastern tropical Atlantic and catches of both yellowfin and skipjack tunas have already exceeded the total caught by the American fleet in 1976.

Temperate Tunas

The bluefin tuna fishery of the northwestern Atlantic continued to be an important Atlantic tuna fishery for United States fishermen. In 1976, the fishery

[1] Prepared by staff members of the Southwest Fisheries Center, La Jolla, California, and the Southeast Fisheries Center, Miami, Florida.
Original report in English.

operated under strict size, catch and season regulations that conformed to ICCAT guidelines. The net result was a 34 % reduction in total catch from that of 1975 (Table 1); and virtually complete abstention on catches of medium-sized fish (52.3 to 136 kg).

This year, 1977, the fishery is operating also under strict regulations. Catches so far amount to: 1,226 MT of giant (in excess of 136 kg) and school (between 6.4 kg and 52.3 kg) bluefin tuna by purse seiners; 634 MT of giant tuna by hand gear; and 54 MT of school tuna by sport gear. This is quite similar to the catches in 1976, when the respective gears caught 1,225 MT, 662 MT and 39 MT. A more detailed breakdown of the 1977 catches by type of gear, dates, numbers or weights and year classes is shown in Table 3.

Tuna-like species

United States commercial catches of tuna-like species from the Atlantic continued to be strong in 1976 with Spanish mackerel (*Scomberomorus maculatus*) and king mackerel (*S. cavalla*) dominating the landings as in previous years. The catches of these mackerels were higher in 1976 than in 1975 (Table 1). Most of the landings were made in Florida.

Research activities

United States research activities on tunas and tuna-like fishes of the Atlantic Ocean in 1976-1977 involved life history, stock assessment and fishery management studies. These studies were conducted in support of domestic requirements and in response to recommendations of the Standing Committee on Research and Statistics (SCRS) of ICCAT. Results of the activities are contained in the working documents submitted to the 1977 SCRS (see section on documents submitted to ICCAT).

Tropical tunas

United States research activities on tropical tunas of the Atlantic Ocean are conducted by the Southwest Fisheries Center (SWFC), La Jolla, California, of the National Marine Fisheries Service. During the period 1976-1977, research activities involved collection of biological and fisheries data from U.S. tuna fisheries and from import landings of Atlantic-caught tunas; analyses of fisheries data to assess the current state of the yellowfin tuna, and bigeye tuna (*T. obesus*) stocks; continued development of a data management system for tuna-fishery data; and development of a plan for an intensified Atlantic-wide skipjack tuna research program.

Temperate tunas

United States research activities on Atlantic bluefin tuna are conducted by the Southeast Fisheries Center (SEFC), Miami, Florida, of the National Marine Fisheries Service and on Atlantic albacore by the SWFC.

The Atlantic Bluefin Tuna Program of the SEFC continued its research on the life history and fisheries management of the North Atlantic bluefin tuna in 1976-1977. Much of this research effort was in direct response to the recommendations of the SCRS.

The main recommendations of the SCRS for United States participation in bluefin tuna research and a brief summary of the Atlantic Bluefin Tuna Program's responses to them follow:

1. Prepare a table on age structure. — Many man-months of research were devoted in 1976 and 1977 to an analysis of sequential markings on otoliths and vertebrae in order to accurately determine age, especially in the older and more difficult to age fish. Preliminary results of this long-term study are presented in several working documents submitted to the SCRS.
2. Prepare an updated cohort analysis. — The 1976 cohort analysis using 1973 and earlier data was extensively revised to include 1974 and 1975 data, particularly data on longline catches in the Gulf of Mexico which had never been used before in the United States cohort analyses. This newly revised cohort analysis is submited to the SCRS as a working document.
3. Prepare a yield-per-recruit analysis. — As part of the revised cohort analysis, an updated yield-per-recruit analysis was prepared.
4. Prepare production model and fishing-effort analyses. — These and similar analyses have not yet been performed due to the time needed to complete the revised cohort and yield-per-recruit analyses. These analyses are planned for 1978.

Research on albacore was focused on assessing the status of the south Atlantic stock. Both cohort and production model analyses were employed to evaluate the effects of fishing on the yield.

Billfishes

United States research activities on billfishes are conducted at the SEFC. Research on the biology and population dynamics of billfishes continued in 1976-1977. Catch rates (CPUE) in the recreational fishery for billfishes in the Atlantic and Gulf of Mexico declined for white marlin (*Tetrapturus albidus*) but increased for blue marlin (*Makaira nigricans*) and sailfish (*Istiophorus albicans*) in most areas in 1976 as compared to 1975. Comparisons of CPUE from the Japanese longline fishery in the northern Gulf of Mexico for 1971-1974 to CPUE from the recreational fishery in the same area for the same period revealed that both measures of apparent relative abundance trended in the same direction for seven out of nine comparisons.

A new sport fishery for swordfish (*Xiphias gladius*) was developed off the southeastern U.S. in 1976 and 1977. In 1977, it is estimated that over 350 swordfish have been taken by rod and reel. Data on size, sex, maturity, and samples for age and growth and fecundity are being collected.

Scientific documents submitted to ICCAT

BAGLIN, R.
Length and age composition per set of bluefin tuna (*Thunnus thynnus*) from Atlantic purse seine vessels. SCRS/77/39.

BAGLIN, R., J. MASON, F. MATHER and B. FREEMAN
Update on United States Atlantic bluefin tuna tagging. SCRS/77/42.

BARTOO, N. W.
An assessment of the south Atlantic albacore stock. SCRS/77/67.

BARTOO, N. W. and G. T. SAKAGAWA
Size frequency of bigeye tuna (*Thunnus obesus*) in the catch of the Atlantic surface fishery, 1967-1975. SCRS/77/66.

BEARDSLEY, G. L. (Summarizer)
Report of the swordfish workshop held at the Miami Laboratory, Southeast Fisheries Center, National Marine Fisheries Service, Miami, Florida 33149, June 7-9, 1977. SCRS/77/70.

BEARDSLEY, G. L. and W. J. RICHARDS
Size, seasonal abundance and length-weight relation of some scombrid fishes from southeast Florida. (1970. U.S. Fish Wildl. Serv. Spec. Sci. Rep., Fish. 595; 6 p.) SCRS/77/31.

BEARDSLEY, G. L. and D. C. SIMMONS
A bibliography of the blackfin tuna, *Thunnus atlanticus* (Lesson). (1971. NOAA Tech. Rep. NMFS. SSRF-635, 10 p.) SCRS/77/30.

BERRY, F.
a) Techniques for ageing Atlantic bluefin tuna by vertebrae.
b) Biodynamics of giant Atlantic bluefin tuna in the Gulf of Mexico spawning grounds. SCRS/77/44.

BERRY, F., P. CAHN, M. HOLLIDAY and T. BOSWELL
Analysis of the 1977 United States sport fishing catch of Atlantic bluefin tuna. SCRS/77/45.

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Age structure in some western North Atlantic bluefin tuna. SCRS/77/46.

BUCHANAN, C. C., F. J. MATHER III and J. M. MASON, Jr.
Results of United States tagging of Atlantic billfishes October 1, 1976 through September 30, 1977. SCRS/77/72.

COAN, A. L.
Length and age composition of yellowfin tuna (*Thunnus albacares*) from the Atlantic Ocean, 1966-1976. SCRS/77/64.

COAN, A. L. and N. W. BARTOO
An analysis of the status of the yellowfin tuna (*Thunnus albacares*) stock in the eastern Atlantic.

FOX, W. W., Jr. and A. L. COAN
A production model analysis of Atlantic yellowfin tuna (*Thunnus albacares*, (1964-1976)). SCRS/77/62.

OTTO, R., G. SAKAGAWA and J. ZUBOY
A preliminary assessment of the status of western North Atlantic billfish stocks. SCRS/77/71.

RICHARDS, W. J. and H. R. BULLIS
Status of the knowledge on the biology and resources of the blackfin tuna, *Thunnus atlanticus* (Pisces, Scombridae). SCRS/77/36.

RICHARDS, W. J. and T. POTTHOFF
Distribution and abundance of bluefin tuna larvae in the Gulf of Mexico in 1977. SCRS/77/47.

RIVAS, L.
a) Aerial surveys leading to 1974-1976 estimates of the numbers of spawning giant bluefin tuna (*Thunnus thynnus*) migrating past the western Bahamas. SCRS/77/48.
b) Preliminary models of annual life history cycles of the North Atlantic bluefin tuna (*Thunnus thynnus*). SCRS/77/41.

SAKAGAWA, G. T. and J. H. UCHIYAMA
Age and growth of Atlantic skipjack tuna (*Katsuwonus pelamis*) from daily growth increments in otoliths — a progress report. SCRS/77/63.

SCHAAF, W. and L. RIVAS
A population and fishery analysis of Atlantic bluefin tuna (*Thunnus thynnus*).

TILLERSON, W. E., A. L. COAN and E. P. HOLZAPFEL
Sampling of imported Atlantic-caught tunas for size and species composition in Puerto Rico, U.S.A., 1976-1977. SCRS/77/65.

THOMPSON, H. and R. FARRAGUT
Preliminary report on the status of electrophoretic stock identification of Atlantic bluefin tuna (*Thunnus thynnus*) from the eastern and western Atlantic Ocean. SCRS/77/40.

TYLER, J. C., R. BAGLIN, F. BERRY and L. RIVAS
A review of the United States scientific research on the biology and the status of bluefin tuna stocks and of the bluefin tuna fisheries. SCRS/77/49.

WALTERS, V.
Parasites of western Atlantic bluefin tuna. SCRS/77/50.

WEBER, E. C. and G. T. SAKAGAWA
Production model analysis of bigeye tuna (*Thunnus obesus*) from the Atlantic Ocean, 1965-1975. SCRS/77/60.

WILLIAMS, F. and M. ROFFER
Atlantic bluefin tuna oceanography. SCRS/77/52.

Table 1. Catch and landing (metric tons) of Atlantic tunas and tuna-like fishes by United States fishermen, 1967-77 [1]

Year	*Bluefin*	*Yellow-fin* [2,3]	*Albacore*	*Bigeye* [2]	*Little tunny*	*Skipjack* [2]	*Bonito*	*Sword-fish*	*Spanish mackerel*	*King mackerel*	*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	—	34,625
1973	1,294	3,590	0	113	20	21,246	261	—	4,437	2,710	—	34,077
1974	1,857	5,621	13	865	51	19,973	92	1,594	4,990	4,747	1	39,804
1975	2,823	14,335	1	67	67	7,567	117	—	5,288	3,095	19	33,379
1976 [4]	1,867	2,300	0	28	5	2,422	23	—	6,385	4,053	2	17,085
1977 [4]	1,945											

[1] Estimated catch is for bluefin, yellowfin, albacore, bigeye, skipjack and little tunny. Landing is for all other species. Sport catches are not included except for bluefin tuna.

[2] Includes catches of purse seiners flying the flags of Panama, Netherlands, Antilles and Bermuda.

[3] Includes small quantities of bigeye tuna.

[4] Preliminary.

Table 2. Summary of logbook estimates of catch and catch rate of yellowfin and skipjack tunas caught by American seiners [1] in the eastern tropical Atlantic

Year	Number of seiners	Yellowfin		Skipjack	
		Catch (metric tons)	Catch rate (metric tons/ day's fishing)	Catch (metric tons)	Catch rate (metric tons/ day's fishing)
1967	3	1,000	7.8	500	3.8
1968	8	6,200	23.3	3,200	12.0
1969	25	19,800	10.9	4,400	2.4
1970	23	9,100	4.0	11,400	5.1
1971	24	4,400	2.7	16,100	10.0
1972	33	10,900	3.3	12,200	3.7
1973	24	2,600	2.2	20,400	17.0
1974	26	5,600	2.8	20,000	8.7
1975	32	14,000	5.6	7,400	2.7
1976	7	1,700	5.2	1,800	5.1

[1] Purse seiners flying the flags of Canada, Netherlands, Panama and USA are included. Data were collected by the Inter-American Tropical Tuna Commission through contract.

Table 3. Dates, catches and approximate age composition of bluefin tuna in the 1977 U.S. fisheries

Fishery	Dates Open	Dates Close	Catch by number of fish	Catch by round weight	Approximate age composition (by number)
Small fish, purse seine					
Regular Season	15 June	20 June	31,600	972 MT	25 % age 2 70 % age 4 5 % ages 1, 3, 5
Tagging Season	1 July	15 July	7,615	86 MT	7 % age 1 91 % age 2 2 % ages 3-4
	? Oct.	? Oct.	530 [1]	6 MT [1]	
Small fish, sport	1 Jan.	24 Sept. [2]	4,765	54 MT [1]	14 % age 1 72 % age 2 10 % age 3 4 % ages 4-5
Large fish, purse seine	3 Sept.	18 Sept.	556	168 MT	ages 7-9+
Large fish, hand gear					
Northern Area	1 Jan.	5 Sept.	1,946	634 MT	ages 7-9+
Southern Area	1 Jan.	9 Sept.			
	16 Sept.	still open			
Medium fish, purse seine (special quota)	? Oct.	? Oct.	250 [1]	23 MT	ages 5-8

[1] Estimated.
[2] Last date included for catch in this table; season closes December 31, 1977.