INTERNATIONAL COMMISSION
for the
CONSERVATION of ATLANTIC TUNAS

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

MADRID, SPAIN 1977

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

Member Countries (as of Feb. 28, 1977)

Angola, Brazil, Canada, Cuba, France, 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
(from December 4, 1973)

First Vice-Chairman of Commission

Mr. Y. S. KANG, Korea
(from November 25, 1975)

Second Vice-Chairman of Commission

Mr. E. B. YOUNG, Canada
(from November 25, 1975)

Panel Membership (as of Feb. 28, 1977)

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.
2	Canada, France, Japan, Korea, Morocco, Portugal, Spain, U.S.A., USSR.	Morocco
3	Brazil, Japan, Korea, South Africa, U.S.A.	Japan
4	Angola, Canada, Cuba, Japan, Korea, Portugal, Spain, U.S.A.	Spain

Council (from November 25, 1975)

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)

Standing Committees

Committees:	Chairman
Committee on Finance and Administration (STACFAD)	Mr. K. YONEZAWA, Japan (from December 4, 1973)
Committee on Research and Statistics (SCRS)	Dr. B. J. ROTHSCHILD, U.S.A. (from December 4, 1973)

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 I (1976)"***, describing the activities of the Commission during the first half of said biennial period.

The volume contains reports of the Fourth Regular Meeting of the Council, held in November, 1976, 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 1976

CON/76/12 (Amended) *

1. Member Countries of the Commission

On August 12, 1976, the Food and Agriculture Organization of the United Nations (FAO) informed the Secretariat that on July 29, 1976, the Government of the People's Republic of Angola 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.

According to Article XIV, paragraph 3, of the Convention, an adherence becomes effective on the date the instrument is deposited. Therefore, on July 29, 1976, Angola became a member of the International Commission for the Conservation of Atlantic Tunas.

The Commission now has the following fifteen (15) member countries, listed herebelow 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
Ivory Coast	"	December 6, 1972
Cuba	"	January 15, 1975
Angola	"	July 29, 1976

* The Administrative Report presented at the Council meeting was revised.

** In accordance with Article XIV, paragraph 3, the Convention entered into effect on March 21, 1969.

2. ICCAT Training Courses

At the Fourh Regular Meeting (Madrid, November 1975), the SCRS proposed and the Commission agreed to hold the following two training courses in 1976:

a) *Sampling Training Course*

This course was scheduled to be held during the month of July, 1976, at the laboratory of the "Instituto Español de Oceanografía" (I.E.O.), Tenerife, Canary Islands. However, due to the limited number of applicants, it was decided to postpone the course until a more opportune time.

b) *Population Dynamics Course*

This course was held September 20-30, 1976, at the I.E.O. Laboratory, La Coruña, Spain. A total of 18 scientists (13 students + 5 instructors) from France, Portugal, Ghana, Korea, Senegal, Ivory Coast and Spain participated in the course. Students from some countries received financial assistance for travel and hotel expenses.

The Secretariat would like to acknowledge those experts who served as instructors for the course, namely, Messrs. Cadima (Portugal), Laurec and Fonteneau (France), Clark (FAO) and Pereiro (Spain). We would also like to express our appreciation to the Spanish Institute of Oceanography for the facilities and services granted to ICCAT for the organization and development of the course.

3. Meetings at which ICCAT was represented

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

The Executive Secretary represented ICCAT at the Regular Meeting of ICSEAF held in Madrid, December, 1975.

b) *General Fisheries Council for the Mediterranean Sea (GFCM)*

The Assistant Executive Secretary attended the GFCM meeting held at FAO, Rome, June 24 - July 3, 1976, as well as the Symposium held on preceding days.

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

The Executive Secretary represented ICCAT at the annual meeting of IATTC, held in Managua, Nicaragua, October 11-15, 1976. He took advantage of this trip to South America to travel to Caracas (Venezuela) to visit the Fisheries Director and other collaborators with whom he discussed matters concerning Commission activities and ICCAT/Venezuelan relations.

d) *FAO Ad Hoc Committee of Specialists to Review the Biology and Status of Studies of Small Tunas*

The Assistant Executive Secretary participated in the above-mentioned meeting, held in Honolulu, Hawaii, December 15-18, 1975. The Group reviewed the potential of those stocks which, up to now, have not drawn as much interest to scientists as the major tuna species on a world-wide basis. The report is presented as document SCRS/76/15.

e) *Japan Tuna Conference*

During his home leave, Dr. P. Miyake attended the 1976 Japanese Tuna Fisheries Conference, held in Shimizu, Japan, February 4-6, 1976.

f) *International organizations*

The Executive Secretary attended the Fourth Session of the FAO Sub-Committee on the Development of Cooperation with International Organizations Concerned with Fisheries. The meeting was held in Lisbon, Portugal, March 8-12, 1976. Preceding the above-mentioned meeting, the Executive Secretary also attended a meeting called by FAO, of the Regional Fisheries Bodies, held in Lisbon, March 5-6, 1976.

g) *Skipjack Workshop*

A workshop on skipjack tuna was organized by and held at the "Centre de Recherches Océanographiques" in Dakar, Senegal, March 22-29, 1976. The ICCAT Secretariat was represented by Dr. W. E. Schaaf, biostatistician. Discussion centered on the review of existing data and population analysis and the need for future coordination of research.

h) *U. S. Tuna Conference*

The Assistant Executive Secretary attended the 27th Tuna Conference held at Lake Arrowhead, California, September 26-29, 1976.

4. Cooperation with International Fisheries 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, while the Commission has also participated in various FAO meetings and likewise has made considerable contributions.

Special mention should be made that Dr. W. G. Clark was loaned to ICCAT during the Population Dynamics Training Course as one of the instructors, at FAO's expense. Also, excellent assistance was made to ICCAT's plan for improving Mediterranean tuna statistics. On the other hand, ICCAT also assisted FAO in developing a plan for the improvement of a statistical system for Indian Ocean and western Pacific tuna fisheries.

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

Close cooperation has been maintained with IATTC in the exchange of valuable scientific information.

c) *Indo-Pacific Fisheries Council/Indian Ocean Fisheries Commission (IPFC/IOFC)*

Because of our common interest in tunas, IPFC/IOFC has continued close cooperation with ICCAT. As mentioned above, ICCAT is cooperating with IPFC/IOFC in the development of an adequate statistical system for their area.

d) *General Fisheries Council for the Mediterranean (GFCM)*

Through a recent amendment to its Convention, the GFCM has been given the power to recommend fisheries management measures. At the time of its Thirteenth Session (Rome, June-July, 1976), the Council showed a strong interest to collaborate with ICCAT concerning Mediterranean tuna studies. Likewise, ICCAT has offered to cooperate with GFCM in the development of an improved statistical and research system for tunas. (See Section 3 — Meetings).

e) *Other organizations*

ICCAT has maintained very close cooperation with the International Commission for the Southeast Atlantic Fisheries (ICSEAF), the International Commission for the Northwest Atlantic Fisheries (ICNAF), and the International Council for the Exploration of the Sea (ICES), etc.

In particular, we have requested information covering the statistical and sampling systems of the various international commissions. The following Commissions have replied: ICNAF, IATTC, ICSEAF, IPHC, IPSFC, SPC. A compendium was prepared and was presented as document SCRS/76/17.

5. Coordination of research

a) *Collection of statistics*

Secretariat activities on this subject are reported in detail in CON/76/11 (SCRS/76/11) and SCRS/76/12, 13, 14, 15, 16 and 17. (See the "Secretariat Report on Statistics and Coordination of Research".)

b) *Biostatistical work*

Biostatistical evaluation of the entire Atlantic sampling strategy was initiated mainly by the biostatistician, who was contracted for a one-year period. This project must be continued in the future.

c) *Progress made by the Secretariat concerning work assigned at the 1975 SCRS meeting*

There were several assignments made to the Secretariat at the 1975 SCRS and

Commission meetings. The Secretariat has reported on the progress made on the following assignments:

1) Improvement in the Mediterranean fisheries statistics.
2) Identification between small yellowfin and bigeye tuna.
3) Sampling schemes adopted by various international organizations.
4) Estimation on carrying capacity of the entire Atlantic tuna fleet.
5) Study on the small tuna species.

d) *International joint tagging*

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

6. Publications

a) *Biennial Report*

Part II of the Biennial Report, "for biennial period 1974-75", was printed in the three official languages of the Commission. The English version was distributed in September, 1975; the French and Spanish versions in October. The Report covers Commission activities during the latter half of the biennial period (1975).

b) *Statistical Bulletin*

In early April, 1976, the Secretariat issued the first preliminary estimates of albacore, bluefin, yellowfin, bigeye and skipjack catches for the entire Atlantic for 1975, by country. The formal version of Volume 6 (1976), which covers the data up to and including 1975, was completed in September and mailed in October. As is reported in the "Secretariat Report on Research and Statistics", we adopted an automated data processing system (ADP), and pages are reproduced directly from the computer printout.

c) *Collective Volume of Scientific Papers*

Volume V, which includes selected papers presented at the 1975 SCRS meeting, was prepared and distributed in March, 1976. Because of the increased number of papers, Volume V was divided into two books: Reports on tropical tunas are contained in Volume V (1), while those concerning temperate tuna species are combined in Volume V (2).

d) *Data Record*

The Secretariat prepared the Data Record, Volume 7, in March, 1976. This volume covers all the catch and effort and biological data (unpublished) submitted to the Commission by the end of 1975.

Volume 8 was issued in September, 1976, and covers the data submitted between January 1 and August 31, 1976.

e) *Statistical Series*

The Secretariat prepared a new informal publication, "Statistical Series". Volume 1 was issued in June, 1976. This series contains the results of statistical works achieved by the Secretariat, whereas the ICCAT Data Record contains most of the data presented by the national offices. Volume 1 includes all the logbook abstracts and sampling data collected directly by the Secretariat in 1975 at various Atlantic ports where tuna were transshipped.

f) *Newsletter*

Newsletters, relating general information on Commission activities, were sent out at intervals of approximately three months. During 1976, four issues were mailed. Distribution has been extended and, at present, about 700 copies are mailed throughout the world.

7. Secretariat and Administration

a) *Staff*

In 1976, Ms. Marcela Estop, Spanish nationality, left the Commission. The new secretary replacing her is Ms. María Ana Fernández de Bobadilla.

The biostatistician, Dr. William E. Schaaf (U.S.A.), completed his one-year contract on September 30, 1976. During his year at the Secretariat, Dr. Schaaf continually demonstrated his fine professional and personal qualities. The Secretariat intends to hire another biostatistician to continue the work. There is, however, another alternative plan, which is to continue the basic work with the present staff and a statistician (hired on a temporary contract) to do the field work. In this case, the analytic aspect of the studies could be achieved by a highly qualified biostatistician, working at the Secretariat for a limited period (about three months).

The Secretariat staff is presently 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		October 1, 1972
MARIE-ELISABETH CAREL Multilingual Secretary	(G-4)	April 1, 1972
PHILOMENA M. SEIDITA Multilingual Secretary	(G-4)	April 1, 1975

		Date of employment
María Ana Fernández de Bobadilla Multilingual Secretary	(G-4)	March 1, 1976
Joan M. Manning Statistical Assistant		September 10, 1973
Ginette Turpeau Multilingual Typist		November 1, 1974
Juan Antonio Moreno		January 6, 1975

b) *Travel*

Besides the trips to attend the various meetings mentioned previously, members of the Secretariat staff undertook the following trips:

1) The Assistant Executive Secretary, Dr. P. M. Miyake, spent two months (January-February, 1976) in Japan for his biannual home leave. This was combined with his trip to attend the FAO "Working Party on Small Tunas". Besides, he also visited Taiwan, China, where he contacted scientists, administrators and industries.

2) Mr. A. de Boisset, Statistical Expert, visited St. Maarten, Dutch Antilles, in March, 1976, to carry out sampling from fishing vessels which directly transship the catches to a cargo freezer. He also arranged to hire a local personnel to carry out the sampling work in the port.

3) The Assistant Executive Secretary spent a week in Rome, in April —at FAO's request— to assist them in drawing up a program for the development of an adequate tuna statistical system for the IOFC/IPFC region. He took advantage of this trip to contact scientists of various laboratories, statisticians in the statistical agency and administrators, in the Italian Peninsula and in Sicily.

4) Dr. W. E. Schaaf, the biostatistician, spent two weeks in Abidjan (Ivory Coast) studying the tuna fishing and sampling procedures there, and at the CRO laboratory discussing sampling schemes adopted for the FIS fleet.

5) The Assistant Executive Secretary visited Dakar (Senegal), Abidjan (Ivory Coast) and Accra and Tema (Ghana) in July, 1976. The trip was in connection with the coordination of research and collection of statistics, and to discuss Commission business, such as the preparation for the Population Dynamics Course, and the regulations in effect for yellowfin and bluefin tuna.

6) Dr. P. Miyake, Assistant Executive Secretary, made a short trip to Brest (France), August 18-20, 1976, to make preliminary arrangements with the ICCAT Population Dynamics Course instructors (Messrs. Cadima, Laurec, Fonteneau). At the same time, he discussed the possibility of establishing an ICCAT data bank.

O. Rodriguez-Martin
Executive Secretary

FINANCIAL REPORT 1976

CON/76/13 (Amended) *

1. Auditor's Report for Fiscal Year 1975

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, 1975. 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 April, 1976. An abstract of the same has been included in the Biennial Report, 1974-75, Part II.

2. 1976 Budget

The Budget (1976) for U.S. $ 293,000 was approved by the Commission at its Fourth Regular Meeting (November 1975) (See Biennial Report, 1974-75, Part II, Page 59). U.S. $ 280,000 correspond to member contributions and $ 13,000 pertain to the unused balance of the previous fiscal year.

3. Current status of Commission accounts

Statement 1 shows the financial situation at the end of fiscal year 1975.

In *Statement 2*, the status of each member country's contributions is shown. Pending contributions corresponding to 1976 amount to U.S. $ 20,949.02 which added to the U.S. $ 1,052.09 pending from the previous year, total U.S. $ 22,001.11.

Statement 3 shows the budget and expenditures up to the end of the fiscal year.

There is an unused balance of U.S. $ 10,887.85. There are also U.S. $ 10,000 in the Contingency Fund which did not have to be used. According to the decision of the Council, $ 10,000 of the unused balance and $ 10,000 corresponding to the Contingency Fund unused were reallocated to the 1977 Budget. The rest, $ 887.85 was allocated to the Working Capital Fund.

Statement 4 gives the total of income and expenditures and the balance in Cash and Bank at the end of Fiscal Year 1976.

Statement 5 shows the state of accounts at the end of Fiscal Year 1976.

* The original report presented at the Fourth Regular Meeting of the Council has been updated to the end of Fiscal Year 1976.

Statement 6 shows the status of the Working Capital Fund, which amounted to U.S. $ 43,295.09 at the close of fiscal year 1975. After adding the non-budgeted income corresponding to 1976 (U.S. $ 3,795.61) and U.S. $ 887.85 from the unused balance of the 1976 Budget, the Fund shows a new balance of U.S. $ 47,978.55.

4. General comments

Chapter 6 — Operating expenses

At the end of the fiscal year, there was a positive balance of U.S. $ 4,507.97. Expenses pertaining to this chapter have all been paid in pesetas. In February, 1976, the peseta experienced an 11 % devaluation, resulting in a practical increase in the value of the budget for this chapter. Thus the increased value now appears as a positive balance.

Chapter 8 — Coordination of Research

The Population Dynamics Course was held at La Coruña, as was informed in the Administrative Report. Total expenditures for the Course amounted to about U.S. $ 8,700.

A charge to this chapter, as equipment of the data bank, the purchase was made of Texas Instruments Terminal, model ASR 742 programmable twin cassette, which is to be installed at the Secretariat.

5. 1977 Budget

The 1977 Budget approved by the Commission (1975) and amended by the Council (1976) is seen as Appendix 1 to Annex 4 of the Proceedings of the Fourth Regular Meeting of the Council (Chapter II of this Report).

6. Auditor's Report for Fiscal Year 1976

The Auditor's Report for fiscal year 1976 was sent in its entirely to all the Contracting Parties in May, 1977. The Balance Sheet at the close of fiscal year 1976 has been extracted from the Report and is given as Statement 7.

STATEMENT 1

Statement at Close of Fiscal Year 1975 *

ASSETS	$	LIABILITIES	$
Cash and Bank	49,028.41	To the 1976 Budget . . .	13,000.00
Outstanding contributions .	7,266.68	Working Capital Fund . .	43,295.09
TOTAL	56,295.09	TOTAL	56,295.09

* Up to February 9, 1976.

Status of Member Country Contributions in 1976

	Balance 1975	*Contributions for 1976 Budget, approved by the Commission*	*Contributions paid for the 1976 Budget*	*Other Contributions*	*1976 Balance*
		$	$	$	$
Brazil	—	11,374	11,374 (23/IV)	—	—
Canada	—	11,906	11,906 (12/III)	—	—
Cuba	—	12,592	5,786.98 (II/1977)	—	6,805.02
France	—	37,021	37,021 (4/V)	—	—
Ghana	5,275.87	6,090	—	5,252.17 (II/1977)	6,113.70
Ivory Coast	42.06	8,054	—	—	8,096.06
Japan	—	38,516	38,516 (26/II)	—	—
Korea	—	26,577	26,577 (5/V)	—	—
Morocco	—	9,764	9,764 (26/V)	—	—
Portugal	—	15,559	15,559 (27/VIII)	—	—
Senegal	1,948.75	7,662	7,662 (20/XI)	962.42 (20/XI)	986.33
South Africa	—	5,384	5,384 (23/III)	—	—
Spain	—	53,302	53,302 (24/VII)	—	—
United States	—	36,199	36,199 (17/V)	—	—
	7,266.68	280,000	259,050.98	6,214.59	22,001.11

STATEMENT 3

Budget, Expenditures and Balance ($) for Fiscal Year 1976

	I	II	III
	1976 Budget	*Total expenditures for 1976 fiscal year*	*Balance*
1. Salaries	120,000	117,698.69	+ 2,301.31
2. Travel	10,000	9,816.94	+ 183.06
3. Meetings	25,000	23,051.13	+ 1,948.87
4. Publications	19,000	19,306.70	— 306.70
5. Office Equipment	2,000	1,878.95	+ 121.05
6. Operating Expenses	25,000	20,492.03	+ 4,507.97
7. Miscellaneous	4,000	3,390.33	+ 609.67
8. Coordination of Research	78,000	76,477.38	+ 1,522.62
Subtotal	283,000	272,112.15	+ 11,194.55
			— 306.70
			+ 10,887.85
9. Contingencies	10,000		+ 10,000.00
TOTAL	293,000		+ 20,887.85 *

* 20,000.00 to the 1977 Budget.
887.85 to Working Capital Fund.

STATEMENT 4

Income and Expenditures ($)

INCOME		EXPENDITURES	
Cash and Bank at the end of fiscal year 1976	49,028.41	Regular Budget 1976	272,112.15
Corresponding to 1976 Budget	259,050.98	Cash and Bank	45,977.44
Ghana (1975)	5,252.17		
Senegal (1975)	962.42		
Bank interest	3,685.16*		
Field Manuals	48.34*		
	318,027.48		318,089.59
Dif. in Currency Exchange	62.11*		
	318,089.59		

* To Working Capital Fund:
3,685.16 + 48.34 + 62.11 = US $ 3,795.61.

STATEMENT 5

Balance Sheet at Close of Fiscal Year

ASSETS		$	LIABILITIES	$
Banco Exterior de España				
1. Time Deposit Account		25,000.00	To 1977 Budget	20,000.00
2. Checking account		16,206.23	Working Capital Fund	47,978.55
c/a domestic	Ptas. 294,265.52			
c/a convertible	Ptas. 13,903.35			
Cash on hand	Ptas. 21,044.85			
	Ptas. 329,213.72	4,771.21		
		45,977.44		
(US $ 1 = 69.00 Ptas.)				
Contributions pending payment		22,001.11		
TOTAL		67,978.55	TOTAL	67,978.55

STATEMENT 6

Breakdown of the Working Capital Fund

		$
At the end of fiscal year 1975		43,295.09
Bank interest (1976)	3,685.16	
Field Manuals	48.34	
Differences in Currency Exchange	62.11	
From the 1976 Budget	3,795.61	
	887.85	4,683.46
TOTAL		47,978.55

STATEMENT 7

International Commission for the Conservation of Atlantic Tunas — Balance Sheet at Close of Fiscal Year 1976

ASSETS			LIABILITIES		
Available:			*Acquired holdings:*		
BANCO EXTERIOR DE ESPAÑA			From previous fiscal years	$ 27,489.98	
C/A 30-31279Q		$ 16,206.23	During Fiscal Year 1976	$ 7,873.95	$ 35,363.93
In time deposit		$ 25,000.00			
C/A 30-17329	Ptas. 13,903.35				
C/A 30-17672	Ptas. 294,265.52				
Cash on hand	Ptas. 21,044.85		*Working Capital Fund:*		
TOTAL	Ptas. 329,213.72		As shown in attachment		$ 47,978.55
At 69 Ptas. per $ 1		$ 4,771.21			
		$ 45,977.44			
Receivables:			*1977 Budget:*		
GHANA	$ 6,113.70		Transfer approved at the Fourth Regular Meting		$ 20,000.00
CUBA	$ 6,805.02				
IVORY COAST	$ 8,096.06				
SENEGAL	$ 986.33	$ 22,001.11			
Equipment:					
Before 1976	$ 27,338.42				
During 1976	$ 7,873.95				
TOTAL	$ 35,212.37				
DEPOSITS	$ 151.56	$ 35,363.93			
TOTAL ASSETS		$ 103,342.48	TOTAL LIABILITIES		$ 103,342.48
Furniture ceded by Undersecretariat of Merchant Marine of Spain		$ 3,365.38	Undersecretariat of Merchant Marine of Spain, furniture ceded		$ 3,365.38

Madrid, April 18, 1977

The Executive Secretary:
O. RODRÍGUEZ-MARTÍN

Certified:
A. OLIVER Y TRUJILLO

SECRETARIAT REPORT ON STATISTICS AND COORDINATION OF RESEARCH

CON/76/11 — SCRS/76/11 (Amended)

I. Statistics and Sampling

1. *COLLECTION OF 1975 STATISTICS THROUGH THE NATIONAL OFFICES*

The request for statistics was sent to all member and non-member countries on February 23 (Circular 1976/06). On May 31, the Secretariat mailed, as a reminder, a progress report on the collection of Atlantic tuna statistics (Circular 1976/13). Throughout the months of June, July and August, the Secretariat corresponded with those countries which had not sent in their Task I and Task II data and requested them to fulfill the requirements.

The progress made by the national offices is shown in Tables 1, 2 and 3 (now contained in Appendix 6 to Annex 8 of the Proceedings), for Task I, Task II — catch and effort, and biological statistics, respectively. To compare this year's progress with that of last year, the dates when the Secretariat received the data are shown for 1976 and 1975 (in parentheses).

a) *Task I — Statistics*

In Table 1, it is noted that most of the countries reported nominal catch statistics much earlier this year than in previous years. By the end of June, almost all the member countries had reported their catches. All the data are now computer processed (explained in detail in the following section). We are experiencing some delay in receiving those data collected through the Coordinating Working Party on Atlantic Fisheries (FAO), although the data represent a relatively small part of the total catch for the entire Atlantic.

b) *Task II — Catch and effort statistics*

As can be seen in Table 2, there was more timeliness in reporting the 1975 data. The quality of the statistics also improved. For the first time, Cuba reported its catch and effort data by 5° × 5° and by month for the 1975 longline fisheries. The Japanese yellowfin and skipjack baitboat data have been requested repeatedly in past years and became available, for the first time, for the years 1969, and 1973 through 1975. For the first time, Spain submitted (for the tropical fleet) catch and effort statistics by 1° × 1° area and by month for 1975.

c) *Biological data*

In Table 3, it can be noted that the improvement in the biological data during 1976 was steady, although it was not as good as that of the catch/effort data. The major improvement made was in the size frequency data from Cuban longliners and those collected by the Secretariat from the Oriental longliners which transship at Atlantic ports. It should also be mentioned here that the U. S. measured a considerable number of fish caught by foreign vessels and transshipped to Puerto Rico.

2. *STATISTICAL WORK IN WHICH THE SECRETARIAT HAS BEEN DIRECTLY INVOLVED DURING 1976*

Since 1975, with the authorization of SCRS and the Commission, the Secretariat started abstracting logbooks and measuring fish at five transshipping ports in the Atlantic Ocean. The project is reported in detail in SCRS/75/9 (Collective Volume Vol. V (2)). The results collected in 1975 are summarized and reported in the Statistical Series - 1. The project was continued in 1976.

Table 4 (now contained in Appendix 6 to Annex 8 of the Proceedings) summarizes the number of samples and number of logbooks abstracted at each port in 1975 and 1976.

The current situation at each port is summarized as follows:

i) *Las Palmas and Tenerife.* — Mr. Arnaud de Boisset, of the ICCAT Secretariat staff, effected sampling at these two ports in 1975. After Mr. de Boisset was transferred to the Secretariat headquarters in early 1976, two local people were hired to effect the sampling there. The project has been supervised directly by the Secretariat and has progressed very well.

ii) *Abidjan.* — Sampling has been conducted through a contract with CRO. There have been some difficulties in obtaining logbook abstracts in 1976. This work had been done by the CRO and not as part of the Secretariat plan. Unfortunately, the CRO scientist engaged in this work has left the laboratory and the work has not been resumed. As a result, the biological data collected by CRO for the ICCAT has no associated information, such as locations and the time the catches were made. This problem has been partially solved through the assistance of a Korean Fisheries Attaché (Mr. J. H. Kim).

Also, at this port, as many as five or six samples were taken from one unloading. In 1975, in order to give equal weight to each boat, only one sample per boat was compiled; however, in the future, all the data could enter in the compilation, depending on the results of the biostatistical analyses.

iii) *Cape Town.* — The sampling work at this port has been conducted through a contract with the Sea Fisheries Department, South Africa. Generally, the sampling itself is very well conducted, but the logbook abstract is not quite adequate. This is due to communication difficulties. However, as the boat captains become more familiar with the recording format of the logbooks, the difficulties are being reduced.

iv) *St. Maarten.* — In 1975, the work was done through a contract with a commercial firm which transships the Oriental longline catches at St. Maarten. In 1976, a local man was directly contracted to do the work for ICCAT. Since then, the situation has improved, and almost all the landings at the port are being well sampled.

Besides the five aforementioned ports, some boats have been transshipping their catches at Montevideo, Trinidad and Freetown. The Secretariat has been monitoring those transshipments and if they should become more important, we will consider to start sampling at those ports.

3. *BIOSTATISTICAL WORKS DONE BY THE SECRETARIAT*

a) *Work done in 1975-76*

Following the decision and recommendations by the SCRS and the Commission (1974), the Secretariat made a one-year contract with Dr. William E. Schaaf (U.S.A.) to carry out the biostatistical project for the Commission.

The following schedule was developed for the first year of the project:

i) Request all the countries to provide the Secretariat with basic data for a data inventory system.

ii) Design a data management system for a sampling data inventory.

iii) Complete the matrix (as was suggested by the SCRS) to show the transatlantic sampling strategy.

iv) Circulate this matrix among the scientists for comments and complete the data inventory accordingly.

v) Make an analysis so as to develop a sampling scheme which minimizes the effort and the cost and yet adequately covers all the existing fisheries. This may involve variance studies and examination of variations of sampling techniques and procedures adopted by each agency at each port.

In reality, considerable progress was made in steps i) through iii); step v) has been initiated. Details of the study are reported separately as document SCRS/76/12 (included in Collective Volume VI).

The main difficulty we encountered was the lack of an overall data retrieval system at the Secretariat. Since, in the past, the Secretariat has not stored any biological nor catch and effort data by the computer system, most of the data available are in the form of reports, Data Records, etc. Besides, since the data available at the Secretariat are only partial, we have to depend mostly on the information sent directly to the Secretariat in response to our Circular 1976/01 (dated January 12, 1976). As the inventory thus prepared is still incomplete, the Secretariat now requests each national section to review very carefully the listings of the inventory and the matrix for the global sampling strategy (which are attached as appendices to document SCRS/76/12), and to inform the Secretariat of the information lacking from the list.

b) *Proposal for the continuation of biostatistical work in the immediate future*

As is noted in SCRS/76/12, the progress made this year is very encouraging. The Secretariat proposes the following steps to be taken:

i) Complete and update the data inventory. This will be easier in the future, since the basic scheme has already been designed and we know exactly what information we have to request from each national office.

ii) Continue the variance analysis to give more proper recommendations to each national office as to the adequacy and frequency of sampling, etc.

iii) Study the matrix more carefully and develop some criteria for between species allocations of sampling effort at a given port.

iv) Develop new criteria for comparing the efficiency of various sampling techniques.

c) *Proposal for the position of biostatistician*

The Secretariat is not, at present, adequately staffed to carry out the proposals made in section b). Dr. W. E. Schaaf recommended in his report that a full-time permanent biostatistician be hired by the Secretariat. As an alternative plan, he recommended to hire biostatisticians on a temporary basis and for short periods. For the immediate future, the second alternative plan could be more practical and more economical.

There are two levels of work to be done. The first level is the completion and updating of the data inventory and matrix (Section 3-a, steps i to iv). The second level concerns the analytic aspects of the biostatistical work and is based on the data prepared in level 1. As level 1 work has already been well designed, the work should be more routine (though very time consuming) in the future. On the other hand, the second level will require a scientist who is highly qualified in the biostatistical field. Level 2 work can only be done after the first level of work is completed.

Both levels could be achieved by one additional permanent staff member or by hiring a few people with different statistical training. In the latter case, one or two scientists could work with the Secretariat to complete level 1 work, while level 2 could be achieved through a limited-term contract (e. g. three to four months per year) with a specialist.

4. *SECRETARIAT EVALUATION OF THE PRESENT DATA COVERAGE*

Table 5 summarizes the Secretariat's view on the adequacy of the data coverage, based on Sections 1 through 3 of this report. In the table, "catch per effort" refers to the catch per effort data by 5° × 5° and quarterly for the longline fleets and 1° × 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 particular fleet. Also, this table does not indicate if the size frequency data can be assigned to the area and time of the catches. For example, if the samples are made at the ports and there are no associated data available, the value of such samples is less than that of the sample from the catch for which the area and time is known.

II. Processing and dissemination of Statistical Information

1. *PROCESSING DATA*

a) *Present status*

In 1976, for the first time, the Secretariat adopted an automated data processing system (ADP) to the Task I data. All the nominal catch data since 1965 and up to the present are punched by species, by flag, by gear and, as far as possible, by areas. The areas adopted are as follows: northeast, northwest, east tropical, west tropical, southeast and southwest Atlantic, and Mediterranean. The division of the areas has been done rather arbitrarily and varies according to the species. (See explanatory notes in the ICCAT Statistical Bulletin, Vol. 6.) In the future, we might be able to separate the catch more accurately according to the ICCAT sampling areas, but at present, this was the best that could be done. We hope that this area division increases the value of the statistics appearing in the ICCAT Statistical Bulletin.

As in the past, Task II and biological data submitted by the national offices are included in the Data Record, but the ADP system was not applied to them at the Secretariat.

On the other hand, all the Oriental longline data collected by the Secretariat directly at the ports (see section I-2) were processed by computer. At present, we have three types of printouts made:

i) Landing statistics by port, by species and by vessels;

ii) Catch and effort (in number of hooks) by species, by 5° × 5° area and by month;

iii) Size frequencies by ICCAT sampling areas, by species, by quarter, and size frequencies weighted by the catch from which the samples are made in the same area/time stratum.

b) *Data archive system*

As was already discussed in the previous section, when the biostatistical work was conducted at the Secretariat, we found that it was very difficult to complete the sampling inventory, and, in particular, to find the corresponding catch break-

down for the proper area/time stratum. This is partly because the catches reported to the Secretariat do not correspond to the ICCAT sampling area, and partly because such data are not available or all the data were dispersed among several volumes of the Data Record, formal and informal publications, etc. Also, the data were submitted to the Commission in various formats.

In 1973, the Secretariat proposed a centralized data bank or data archive system (SCRS/73/7). However, the opinion of the scientists at that time was that the present system is satisfactory, whereby each national office completes its data and exchanges them, if necessary (1973 SCRS Report — Appendix 9). Since then, however, logging and sampling have improved and much more data have become available. Under the circumstances, it is the Secretariat's opinion that we should again consider the possibility of establishing a data center or data bank for easy retrieval of the data.

After a brief discussion of the problem with the Convener of the Sub-Committee on Statistics, the Secretariat circulated a request (Circular 1976/17, dated August 17) for information on what types of data are compiled by each national office and in what format. Based on the good response to that circular, the Secretariat prepared a paper on the subject, presented as document SCRS/76/16 (Included in Collective Volume VI).

2. *DISSEMINATION OF INFORMATION AND PUBLICATIONS*

a) *Quick estimate*

According to the recommendations made by the SCRS, the Secretariat, in early 1976, requested the national scientists to submit preliminary estimates on 1975 tuna catches in the Atlantic (including Mediterranean) for the major species. Progress in the collection of Task I statistics was so prompt in 1976 that most of the countries sent in the final or preliminary statistics, rather than the estimates. Together with the estimates made by the Secretariat on catches of various fleets which were not covered by the national offices, provisional figures for 1975 total Atlantic tuna catches were prepared and distributed on April 1, 1976. The species covered were yellowfin, bluefin, skipjack, albacore and bigeye tunas.

b) *Statistical Bulletin*

The first formal issue of the Statistical Bulletin (Vol. 6) was circulated in October, 1976, and the revised final version in February, 1977. As was mentioned in the previous section, all Task I data are now entered in computed cards and a program was developed at the Secretariat to compile the statistics in a format for the Statistical Bulletin. Accordingly, the format of the Statistical Bulletin has been somewhat modified.

In Part II of the Bulletin, in addition to the subtotals by gears, catches are further broken down by major areas and gears for the major species. They are also broken down by countries, but not by countries and gears, as was previously done. In Part IV, the catches are compiled by country, by area and gear. (In the previous Bulletins, the breakdown was by gear only.)

c) *Data Record*

Volume 7, which contains all Task II data presented at the 1975 SCRS meeting and some information received immediately afterwards, was issued in March of this year. Volume 8, containing all such statistics received between January 1 and August 31, 1976, was issued in September.

d) *Collective Volume of Scientific Papers*

Volume V (1 & 2), consisting of all the papers submitted at the 1975 SCRS meetings, and whose inclusion was approved by the authors, was issued in March, 1976. According to the decision made at the 1975 SCRS meeting, the series is now a citable document.

e) *Statistical Series*

This year, the Secretariat started a new series called "Statistical Series". It is a new informal publication which contains the results of statistical works achieved by the Secretariat. The ICCAT Data Record, on the other hand, contains most of the data presented by the national offices. Volume 1 of the Statistical Series was issued in June, 1976, and contains the catch and effort statistics and size frequencies which were collected by the Secretariat at the transshipping ports from the Oriental longliners.

It should be noted that the Series-1 includes all the data collected in 1975. Since many longliners which operated during the latter half of 1975 returned to the ports in early 1976 (and therefore were sampled in 1976), the data for those boats were not included in the Statistical Series-1. In early 1977, we intend to complete the 1975 statistics.

III. Progress made by the Secretariat as to the Assignments of the 1975 SCRS Meeting

1. *Mediterranean fisheries statistics*

At the 1975 SCRS meeting, the Secretariat was instructed to look into the problem of the fisheries statistics in the Mediterranean areas. In 1976, the Assistant Executive Secretary visited various Italian fisheries research laboratories and statistical offices in Rome and in Sicily. During the year, we maintained very close contact with various Italian scientists and administrators. As a result, a substantial amount of new information on the Italian tuna fisheries in the Mediterranean became available. Through collaboration with the Italian scientists, we hope that some improvement will materialize with respect to the catch and effort and biological data for the Italian fisheries.

The Assistant Executive Secretary also attended the 13th Session of the General Fisheries Council for the Mediterranean (GFCM) held in Rome, June 24 - July 3, 1976. Through his attendance, contact was made with many scientific members of the Mediterranean tuna fishing countries, namely, Yugoslavia, Tunisia, Turkey,

Algeria, Italy, Cyprus, Greece, etc. The present status of tuna research and the regulatory measures taken by ICCAT were fully explained to the Council. All the member countries of the Council showed a keen interest in this information. The Council decided to maintain close contact with ICCAT and the possibility of joint studies on tuna resources in the Mediterranean was discussed by the Council. The Assistant Executive Secretary offered ICCAT's full collaboration and invited the scientists to attend the ICCAT SCRS meeting in November; this invitation was followed up by the Secretariat and by the Chairman of the SCRS as well.

2. *Data archive system*

In 1975, the SCRS recommended that the Secretariat initiate computerization of the longline data (and surface data, if possible), beginning with 1975 and working backwards. This project was not carried out at all, except for those data collected directly by the Secretariat. The reason is that the Secretariat does not have sufficient staff and, above all, there are no adequate computer facilities available at present to do such work. (See section II-1-b and SCRS/76/16.)

3. *Identification between small yellowfin and bigeye tuna*

The Secretariat was asked at the SCRS meeting to solicit information from the field workers, scientists, taxonomists, etc., as to how the young yellowfin and bigeye tuna can be identified. On April 27, 1976, the Secretariat mailed Circular 1976/11 which requested such information. There were very few responses to the circular and not much new information was obtained to supplement what has already been written in the Field Manual.

At the request of the Fishery Research Unit in Ghana, the Secretariat prepared an identification sheet for yellowfin and bigeye for use by the Oriental baitboat crew members based at Tema, Ghana. Also, on a visit to Abidjan (Ivory Coast), Dr. W. E. Schaaf, the biostatistician, made some comparative measurements of the young fish. The results were presented in document SCRS/76/14.

4. *ICNAF sampling scheme*

At the Workshop held in Nantes in 1973, the Secretariat was asked to contact ICNAF and request its sampling schemes. At the 1974 SCRS meeting, the Secretariat presented document SCRS/74/58, concerning the ICNAF sampling program. Although document 74/58 well summarized the sampling program, the SCRS has repeatedly requested the Secretariat to study this scheme in 1974 and in 1975. Accordingly, the Secretariat not only contacted ICNAF, but all the existing international fisheries commissions as well and requested information on each organization's sampling and data collection requirements, criteria, etc. All the responses were combined in a compendium, which was presented as document SCRS/76/17.

5. *Carrying capacity of the fleet*

In Part III of the Statistical Bulletin, the number of boats by size categories for each country, was presented. In 1975, the SCRS recommended that the Secretariat

make estimates on the total carrying capacity of the entire fleet which fished tuna in the Atlantic Ocean. However, since many countries do not supply this information on their fishing fleet for all years, the data are not complete enough to make an accurate estimate for inclusion in the Statistical Bulletin. For this reason, a separate document (SCRS/76/13) was presented on this subject.

6. *Photo sampling*

Mr. Arnaud de Boisset further investigated the photographic techniques for measuring fish at the Canary Islands. However, the present Secretariat staff was kept very busy with an excessive work load and could not further analyze the data.

7. *Tagging of young bluefin tuna*

In 1975, the SCRS approved the establishment of a trust fund at the Secretariat to activate a joint international tagging plan for young bluefin tuna. The Ad Hoc Working Group on Tagging of Young Bluefin Tuna recommended to start the tagging project in the Bay of Biscay. On January 12, 1976, the Secretariat circulated a note soliciting contributions to the trust fund. Only one country, the United States, pledged money to the fund ($ 2,000). The Secretariat informed the scientists concerned of this contribution and asked the French and Spanish scientists, in particular, if they could plan a joint tagging cruise for this species. Although the Secretariat repeatedly called the scientists' attention to this matter, nothing materialized during 1976, or at least the Secretariat has not been informed of any activities along these lines.

8. *Small tuna species*

The SCRS requested improvement in the statistics for small tuna species. Since the Assistant Executive Secretary attended the "FAO Ad Hoc Committee of Specialists to Review the Biology and Status of Studies of Small Tunas" (Honolulu, December 1975), the report of the meeting was presented as SCRS/76/15.

9. *Training Courses*

(See Administrative Report.)

IV. Secretariat assistance to the Joint Tagging Plans

1. *Tuna tagging lottery*

As in the past, and according to the decision of the SCRS, the Secretariat carried out a tagging lottery to promote the recovery of tagged tuna fish. The 1976 lottery was held at the headquarters of the Freezer Tunaboat Association (Bermeo, Spain) on April 8. A $ 300 award for tropical tuna species was won by a Puerto Rican port shoreman, while the other $ 300 award for temperate species was shared by two Canadian cannery workers.

2. *Tagging materials provided by the Secretariat*

The Secretariat maintains a stock of tags and needles so that it can provide these to tagging agencies who are initiating tagging activities or who need tags promptly but do not have sufficient time to order them. In 1976, we provided 500 tags to South Africa, 100 to Brazil and 1,000 tags and 100 needles to Spain.

(Tables 1-4 are included in Appendix 6 to Annex 8 of the Proceedings.)

Table 5. Review of the available data (as of September 30, 1976)

	Catch (1975 1,000 MT)	*Catch/Effort*		*Size Frequency*		*Source & Remarks*
		Years	%	*Years*	%	
BLUEFIN TUNA						
Atlantic						
Longline						
Japan	4.4	-1975	90	-1975	Adequate	FSFRL
Surface						
Canada	.3	-1975	100	-1975	Adequate	FRBC
France	.8	-1975	90-100	-1975	Adequate	ISTPM & CNEXO
Morocco	.2	-1975	Catch only	—	—	Nat. scientists
Portugal	.2	1975	Catch only	—	—	Nat. scientists
Spain	1.8	—	0	-1975	Adequate	I.E.O.
U.S.A.	2.7	-1975	90-100	-1975	Moderate	NMFS
Sports						
Canada	.2	—	0	-1975	Adequate	FRBC
U.S.A.	.1	—	0	—	—	
Catch covered adeq.[1] . .		8.2	61.7 %	7.5	56.4 %	
Catch covered part. . . .		8.6	64.7 %	10.2	76.7 %	
TOTAL CATCH [2]	13.3					

Mediterranean						
Longline						
Japan	1.0	-1975	90	-1975	Adequate	FSFRL
Surface						
Italy	8.0	-1975	10?	-1975	Moderate	Various labs.
France	1.5	—	0	—	—	
Tunisia	(.3) [3]	—	0	—	—	
Catch covered adeq. [1] . .		1.0	9.3 %	1.0	9.3 %	
Catch covered part. . . .		9.0	84.1 %	9.0	84.1 %	
TOTAL CATCH [2]	10.7					
ALBACORE						
Longline						
China (Taiwan) . .	21.5	-1974	30	—	—	T. U.
		(-1976)*	(60) *	(1975-76)*	(Adequate)*	Secretariat
Japan	1.6	-1975	85	-1975	Adequate	FSFRL
Korea (+Panama) .	6.1	1974	60	1974	Moderate	Nat. scientists
		(-1976)*	(80) *	(1975-76)*	(Adequate)*	Secretariat
Surface						
France	8.6	-1975	90-100	-1975	Adequate	CNEXO & ISTPM
Spain - Pen. . . .	20.8	-1975	90-100	1975	Adequate	I.E.O.
Spain - Can. . . .	1.0	—	0	1974	Moderate	I.E.O.
Portugal	.8	1975	Catch only	—	—	Nat. scientists
Catch covered adeq. [1] . .		58.6	92.3 %	58.6	92.3 %	
Catch covered adeq. + part.		59.4	93.5 %	59.6	93.9 %	
TOTAL CATCH [2]	63.5					

Table 5. (Continued)

	Catch (1975 1,000 MT)	*Catch/Effort*		*Size Frequency*		*Source & Remarks*
		Years	%	*Years*	%	
YELLOWFIN, SKIPJACK, BIGEYE						
Longline						
China (Taiwan) . .	6.3	-1974	20-30	—		T. U.
		(-1976)*	(60-80) *	(1976)*	(Adequate)*	Secretariat
Japan	25.0	-1975	80	1975	Adequate	FSFRL
Korea (+Panama) .	25.7	1974	60	1974	Moderate	Nat. scientists
		(-1976)*	(80-90) *	(1976)*	(Adequate)*	Secretariat
Cuba	4.2	1975	Adequate	1975	Adequate	Nat. scientists
Surface						
FIS	62.3	-1975	90-100	1975	Adequate	CRO & ORSTOM
Japan	5.7	-1975	90-100	1975	Adequate	FSFRL
Korea (+Panama) .	7.5	—	0	(1974)**	Adequate	FRU
Morocco	5.2	-1975	Catch only	—	—	Nat. scientists
Portugal	5.2	1975	Catch only	—	—	Nat. scientists
Spain (Africa) . .	39.9	1975	20-30	1975	Not adeq.	I.E.O.
Spain (Can.) . . .	7.5	—	0	1975	Not adeq.	I.E.O.
Ghana	6.5	—	0	1975	Adequate	FRU
U.S.A.	22.1	-1975	90-100	1975	Adequate	NMFS
Catch covered adeq.[1] . .		151.3	66.9 %	165.3	73.0 %	
Catch covered adeq.+part.		206.8	91.4 %	212.7	94.0 %	
TOTAL CATCH [2]	226.2					

[1] "Catch covered adequately" for 1975. However, catch covered at least partially includes the fisheries covered up to 1974, assuming the data for 1975 will become available in the near future.
* Figures in ( ) are those collected by the Secretariat.
[2] Includes the catches made by countries not listed here.
** By Ghana Fishery Research Unit.
[3] 1975 data not available.

CHAPTER II
Records of Meetings

PROCEEDINGS OF THE FOURTH REGULAR MEETING OF THE COUNCIL

Madrid, Spain, November 17-22, 1976

Table of Contents

Opening Plenary Session — November 17, 1976

Item 1. *OPENING OF THE MEETING*

1.1. 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).

1.2. Dr. Malick Dia sent his regrets for not being able to attend and chair the meeting, which were transmitted to the Council.

1.3. Mr. Young welcomed all the attendants to the meeting. A special welcome was extended to the People's Republic of Angola, which became the fifteenth member country of the Commission.

1.4. The Angolan delegation thanked the Council for the warm welcome, and mentioned that Angola was pleased to become a member of the Commission.

The Angolan Delegate explained about the development plan of his country, and indicated its interest in the proper management of fish resources. The Delegate offered his country's collaboration with the Commission. (The complete text of the Angolan statement is attached as Annex 3.)

1.5. In his opening remarks, Mr. E. B. Young, who chaired the Council meetings, noted the unique nature of the highly migratory tuna resources, and stressed that international cooperation is essential for the proper management of tunas. He also expressed appreciation for the hard work done by the scientists in the past and during the SCRS session, through which much new scientific knowledge has been accumulated on tuna fisheries.

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

2.1. The Council adopted the Tentative Agenda without change (attached as Annex 1).

Item 3. *ADMISSION OF OBSERVERS*

3.1. The delegations of the members of the Council, and Commission members attending the Council as observers, as well as observers from non-member countries and international organizations, were introduced. (The List of Participants is attached as Annex 2.)

3.2. All observers were admitted.

Item 4. *APPOINTMENT OF SUBSIDIARY BODIES FOR THE MEETING*

4.1. The Council decided to form a Working Group on Finance and Administration to review Council Agenda Items 5, 6, 7, 8, 9, 10, 19, 20, 21 and 22. It was noted that all Commission member countries attending the Council in an observer capacity are welcome to attend the Group meeting in the same capacity.

4.2. The Council recognized that the following groups were scheduled to meet during the week:

a) The Working Group on International Inspection.
b) Panels 1, 2, 3 and 4.

It was also recognized that the members of the Working Group on International Inspection and the Panels are not affected by whether or not their country belongs to the Council.

Second Plenary Session — November 18, 1976

Item 11. *REPORT OF THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)*

11.1. Dr. B. Rothschild, Chairman of the Standing Committee on Research and Statistics, presented his Committee's Report (Annex 8) and summarized its scientific findings. He drew the attention of the Panels and the Council to the pertinent sections (in Item 6) of the Report in respect to the present conditions of stocks. He also drew the Council's attention to the studies made by the Committee on the impact of the current regulatory measures on the various tuna fisheries and stocks.

11.2. The SCRS Chairman presented various programs proposed by the Committee for consideration by the Council, which were as follows:

a) The Commission should establish a data base management system (data bank) in Madrid, for easy retrieval of all statistical and biological information on Atlantic tunas.
b) The Commission should create a permanent position of biostatistician (presently temporary) at the Secretariat, who would engage in long-term studies based on the sampling theory.
c) The Field Manual should be revised with many detailed sampling instructions for each landing port.
d) The Secretariat should continue and intensify the present sampling program from longliners transshipping their catches at foreign ports.
e) The problem of misidentification of small yellowfin and bigeye should be solved.
f) The Commission should carefully plan a training course on statistics and sampling.
g) Planning of an intensified Atlantic-wide skipjack research program should be initiated.

The SCRS Chairman noted that programs *a*) and *b*) have equivalent high priority. Also, item *f*) was considered very important by the SCRS.

11.3. Dr. Rothschild stated that the procedure of the SCRS meeting has been reorganized for this year and that the Committee decided to continue this revised procedure next year.

11.4. The acting Chairman thanked the SCRS Chairman for his very efficient presentation and expressed his appreciation for all the hard work done by all the Committee members. This feeling was shared by all the members of the Council. The French Delegate hoped that a summary of the SCRS Report could be added to future reports.

11.5. The acting Chairman of the Council emphasized the importance of the responsibility of each nation fishing tuna to compile and promptly present adequate statistics. After these discussions, the Council formally accepted and adopted the SCRS Report. The Report is attached to the Proceedings as Annex 8.

Third Plenary Session — November 19, 1976

Item 17. *MEASURES FOR PROMOTING ACTIVITY IN RESEARCH AND STATISTICS*

17.1. The SCRS Chairman reported on the various recommendations with regard to future research plans. The Council noted that there are many programs which were to be completed by the national scientists. On the other hand, there are some recommendations whose achievement would possibly require some procedural change in the operation of the Commission and the Secretariat. Those are listed in Section 11.2 (*a* through *g*) of the Proceedings. Dr. Rothschild reviewed these programs somewhat in detail.

17.2. Special emphasis was placed on creating a permanent position of a biostatistician in the Secretariat. Equal emphasis was placed on establishing a database management system for biostatistical data in order to facilitate the work of the Secretariat and of all the SCRS scientists in the easy preparation, administration, processing, retrieval and dissemination of increasingly complicated and accumulating statistical data.

17.3. The Council also noted that all the items appearing in 11.2 (*a* through *g*) are important projects.

17.4. The Council concurred with these opinions and asked the Working Group on Finance and Administration to take these points into consideration when the Group considers revision of the 1977 budget.

Final Plenary Session — November 22, 1976

Item 14. *REPORTS OF SUBSIDIARY BODIES APPOINTED BY THE COUNCIL FOR THE MEETING*

14.1. The Report of the Working Group on Finance and Administration (Annex 4) was presented by the Convener of the Group, Mr. C. J. Blondin (U.S.A.). The Report was reviewed, with particular attention to the following items on the Council Agenda:

Item 5. *Review of Panel members*
" 6. *Administrative Report*
" 7. *Auditor's Report (1975)*
" 8. *Review of financial status (1976)*
" 9. *Review of second half of the Biennial Budget (1977)*
" 10. *Review of the Working Capital Fund*
" 19. *Review of Commission publications*
" 20. *Relations with other organizations*
" 21. *Date and place of the next meeting of the Commission*
" 22. *Date and place of the next meeting of the Council*

14.2. The Report was adopted, together with all the pertinent recommendations it contained concerning the above Agenda Items. The Report is attached to the Proceedings as Annex 4.

Item 12. *REPORT OF THE WORKING GROUP ON INTERNATIONAL INSPECTION*

12.1. The Report was presented by the current Chairman, Mr. J. N. N. Adjetey (Ghana). The Council adopted the Report after a careful review. The Report is attached as Annex 6 to the Proceedings.

Item 18. *MEASURES FOR RENDERING EFFECTIVE THE PROVISIONS OF THE CONVENTION (INTERNATIONAL INSPECTION)*

18.1. The Report of the Working Group on International Inspection (Annex 6) was referred to. The Council concurred with all the recommendations that the Group made concerning this Council Agenda Item.

Item 13. *REPORTS OF PANELS 1-4*

13.1. Reports of Panels 1, 2, 3 and 4 were presented by the respective Chairmen. All the reports were reviewed and adopted by the Council. The reports are attached to the Proceedings as Annex 5.

Item 15. *STATUS OF THE PROPOSALS ADOPTED BY THE COMMISSION FOR THE CONSERVATION OF YELLOWFIN AND BLUEFIN*

15.1. Document CON/76/15 was presented by the Executive Secretary and carefully studied. The Table of said document, which summarized the present status of the measures each government has taken in regard to the Committee's regulations, is attached as Annex 7.

Item 16. *OTHER REGULATORY MEASURES FOR THE CONSERVATION OF TUNA STOCKS*

16.1. The Reports of the Panels were referred to under this Agenda Item. The Council recognized that no regulatory measures had been proposed by any Panel at this time. No further comments were made.

Item 23. *OTHER MATTERS*

No other matters were discussed.

Item 24. *ADOPTION OF REPORT*

The Council adopted the Proceedings of the First through Third Plenary Sessions. The Council *agreed* that the Proceedings of the Final Plenary Session, as well as the Council Report in its entirety, should be approved at a later date by mail.

Item 25. *ADJOURNMENT*

At the time of adjournment, Mr. E. B. Young, who chaired the Council meetings, thanked all the meeting attendants for their cooperation and for the smooth and meaningful deliberations held during the session. He praised the work achieved by the scientists and by the Executive Secretary and his staff, and expressed appreciation to the interpreters for their efficient work. The Delegate of France congratulated Mr. Young on behalf of the participants for his excellent chairmanship.

Annex 1

AGENDA

Procedure of the meeting

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

Administration

5. Review of Panel members
6. Administrative Report

Finance

7. Auditor's Report (1975)
8. Review of financial status (1976)
9. Review of the second half of the Biennial Budget (1977)
10. Review of the Working Capital Fund

Reports to the Council

11. Report of the Standing Committee on Research and Statistics (SCRS)
12. Report of the Working Group on International Inspection
13. Reports of Panels 1-4
14. Reports of subsidiary bodies appointed by the Council for the meeting

Measures for the conservation of tuna stocks

15. Status of the proposals adopted by the Commission for the conservation of:
    a) Yellowfin
    b) Bluefin
16. Other regulatory measures for the conservation of tuna stocks
17. Measures for promoting activity in research and statistics
18. Measures for rendering effective the provisions of the Convention (International Inspection)

Publications

19. Review of Commission publications

International Cooperation

20. Relations with other organizations

Other matters

21. Date and place of the next meeting of the Commission
22. Date and place of the next meeting of the Council
23. Other matters
24. Adoption of Report

Adjournment

25. Adjournment

Annex 2

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Annex 3

STATEMENT MADE BY THE ANGOLAN DELEGATE AT THE OPENING PLENARY SESSION OF THE COUNCIL MEETING

"Mr. Chairman:

Delegates:

"The delegation of the People's Republic of Angola greets the International Commission for the Conservation of Atlantic Tunas and wishes to express its satisfaction for the warm reception extended at the Fourth Regular Meeting of the Council.

"Last November 11, peace-loving nations and the progressive forces of the world enthusiastically celebrated an occasion which represents a fundamental step for liberation of nations from colonialism and imperialism. On that same day we commemorated the first anniversary of our country's independence and its constitution as the People's Republic of Angola.

"Exactly one year ago, on November 11, 1975, at the very door of our capital, the coalition of forces remotely controlled by international imperialism tried to prevent Angola from affirming itself as a free nation. They were not successful in carrying out their treacherous objectives. From the very beginning, Angola has joined the body of nations as a sovereign, democratic and revolutionary State, in spite of the imperialistic siege which tried by all possible means to nullify already acquired revolutionary achievements.

"However, it took more than four months of hard fighting and blood generously shed by our country's best sons to drive out definitely from Angolan soil those invading forces of the racist army. Thus, the myth of the invincibility of the authoritarian and agonizing regime of southern Africa fell, like a giant with clay feet.

"This contains a valuable lesson for the history of humanity: 'A nation united and determined to fight for its independence, correctly guided by its revolutionary vanguard and acting in close alliance with socialist countries, the working class and the world revolutionary movement, can confront and defeat the coalition of world imperialistic reactionary forces, in spite of their power.' *

"Mr. Chairman:

"As a consequence of the recent past of our country, we are not able to present to this Commission even the most elemental information concerning the tuna fishery.

* Quoted from the Action Program approved by the Central Committee of the PMLA, October, 1976.

Upon the adherence to this Commission, we were prompted by the desire to co-operate within international organizations, whereby the People's Republic of Angola could, while defending its own interests, also defend those of oppressed nations fighting for their full political and economic liberation.

"The socio-economic set-up inherited from colonialism and wanton plunder cannot bring about the happiness of our nation. During this first year of independence and within the context of our socialist option, we have made some very important progress in the political, economical and social field. We have undertaken the confiscation of various enterprises, nationalization of education and health, to make education and medical assistance free, and formalization and regulation of the People's Power. Action has also been taken for the control of banking and real estate. More recently, an important sector of banking has been confiscated to give way to the National Bank of Angola.

"The land which previously was in the possession of the colonialist owners has been confiscated and we are getting ready to apply the principle of justice whereby: 'The land is for those who work it', by distributing the land among those peasants who have no land at all or only very little.

"In the area of industry, and considering objectively the conditions of our country, we shall develop light industries in support of agriculture, using principally our local resources.

"We will create the conditions for the middle-term development of heavy industry, a determining factor in our process. Nevertheless, our effort will definitely be directed towards the land, from which we expect to accumulate the necessary capital for the development of industry. Taking agriculture as a base and industry as a decisive factor, we will convert Angola into a prosperous and rich country, with the help of the progressive and revolutionary countries of Africa as well as that of the socialist community.

"In this phase of national reconstruction, the Central Committee of our Revolutionary Vanguard, the People's Movement for the Liberation of Angola, pointed out at its last Plenary Meeting, the necessity, from a tactical point of view, of attaining as soon as possible, 1973 production levels as concerns the sectors most decisive and important for the welfare of the nation.

"The fishery has been defined, in turn, as one of the sectors of the short-term development of the economy. Therefore, in the last analysis, the Angolan nation should be the principal beneficiary of the resources of our sea.

"We are aiming for building up a powerful fishery sector, and therefore, important means for catching and processing. We will continuously monitor our resources, based on adequate scientific methods, in order to avoid the over-exploitation of the species. We will defend our territorial sea of 20 miles, as well as our jurisdictional waters up to the limit of 200 miles, from the plunder by certain foreign fleets, some of which allege, 'acquired historical rights'. The People's Republic of Angola does not recognize in this allegation, any foundation legitimating any operation whatsoever in the waters of its jurisdiction, where, in the exercise of its attri-

butes as a sovereign State, the country will relentlessly exercise the powers which are inherent to it.

"Finally, within the scope of our very broad overall and unfailing support of the establishment of a New International Economic Order, eliminating the dependence of underdeveloped countries with respect to developed capitalistic countries, we will utilize resources of our immense sea as an element to contribute to the consolidation of our economic independence, and consequently, that of all southern Africa.

"The delegation of the People's Republic of Angola wishes to express its satisfaction for participating from now on in this International Commission. In this sense, our country is prepared to respect and to make others respect the contents of the International Convention for the Conservation of Atlantic Tunas, signed in Rio de Janeiro on May 14, 1966.

"The fight continues!

"Victory is assured!

"Thank you, Mr. Chairman."

Annex 4

REPORT OF THE WORKING GROUP ON FINANCE AND ADMINISTRATION

The Working Group met at the Hotel Luz Palacio on November 17 and 22, 1976. The following countries were present at the meeting: Brazil, Canada, Cuba, France, Japan, Korea, Senegal, Spain, U.S.A.; observers from the following member countries: Angola, Ghana, Portugal and South Africa; and observers from non-member countries and international organizations attending the Council meeting also attended the meetings of this Group.

Mr. E. B. Young (Canada), as acting Chairman of the Council, opened the session. Mr. C. J. Blondin (U.S.A.) was elected Convener of the Group and the Secretariat served as Rapporteur.

The Chairman confirmed that Council Agenda Items 5, 6, 7, 8, 9, 10, 19, 20, 21 and 22 had been referred to this Group. (See Council Agenda — Annex 1 to the Proceedings.)

Item 5. *Review of Panel members*

Membership of the Panels (CON/76/14) was reviewed and no changes were observed.

Panel 1: Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Korea, Morocco, Portugal, Senegal, Spain and U.S.A. (Chairman).
Panel 2: Canada, France, Japan, Korea, Morocco (Chairman), Portugal, Spain and U.S.A.
Panel 3: Brazil, Japan (Chairman), Korea, South Africa and U.S.A.
Panel 4: Canada, Cuba, Japan, Korea, Portugal, Spain (Chairman) and U.S.A.

Item 6. *Administrative Report*

The Administrative Report-1976 (CON/76/12) was presented and fully explained by the Executive Secretary. He made special reference to the fact that Angola became a member of the Commission as of July 29, 1976. He emphasized the successful Training Course on Population Dynamics held at La Coruña, Spain, in September, 1976. The Working Group reviewed the Report and it was adopted.

Item 7. *Auditor's Report (1975)*

The Group noted that the Auditor's Report for fiscal year 1975 had been officially transmitted to all the member country governments in April, 1976, and had been approved.

Item 8. *Review of financial status (1976)*

The Financial Report (CON/76/13) was presented by the Executive Secretary and fully explained. The Group noted that an unused balance of $ 10,300 is expected at the end of 1976. Besides, $ 10,000 in the Contingency Fund will also not be used. It was decided to consider the allocation of these unused funds when the 1977 budget is discussed.

Item 10. *Review of the Working Capital Fund*

Statement 6 of the Financial Report (CON/76/13) was presented by the Executive Secretary. The Group reviewed the Statement with satisfaction.

Item 19. *Review of Commission publications*

The Executive Secretary explained the Commission's publications referring to the pertinent section contained in the Administrative Report (CON/76/12). The Group agreed that the present publication policy was satisfactory.

Item 20. *Relations with other organizations*

The Group studied the relations the Commission has maintained in the past with various international organizations, presented in the pertinent section of the Administrative Report (CON/76/12), and found them to be satisfactory.

Item 9. *Review of the second half of the Biennial Budget (1977)*

The Group studied carefully the future research plans agreed upon by the Council (Item 17 of the Proceedings) and considered that some modification would be needed to the 1977 Budget, which had been approved by the Commission in 1975. Accordingly, the Executive Secretary presented a proposal for revising the 1977 Budget (attached as Appendix 1), which included the following points:

a) A total of $ 20,000, consisting of $ 10,000 of the unused balance of the 1976 budget and $ 10,000 unused under "Contingencies" in the same budget should be reallocated to Chapter 8 of the 1977 Budget.

b) In the 1977 Budget, $ 10,000 originally allocated to "Contingencies" should be moved to Chapter 8, "Coordination of Research".

c) The increase in Chapter 8 of the 1977 Budget will be, therefore, $ 30,000, of which $ 3,000 are added to *a*) Personnel, to cover additional personnel required for various new programs; $ 3,000 to *c*) Equipment, to cover the expense of a computer terminal to be located at the Secretariat; $ 17,000 to *d*) Data Processing, to cover the expense of establishing a data bank; and $ 7,000 to *f*) Training Course, which is scheduled on sampling and statistics.

d) The $ 7,000 allocated to Chapter 8-f is equivalent to the amount budgeted for the 1976 Training Course on Sampling and Statistics, which had been postponed. Therefore, the conditions established for the use of this fund by the Standing Committee on Finance and Administration (Section 9.7 — Annex 5 to the Proceedings of the 1975 Commission meetings) are still valid.

The Group *recommended* that the Council adopt this revised budget for 1977.

The Group also *recommended* to the Council that the unused balance of the 1976 budget exceeding $ 20,000 ($ 10,000 of this $ 20,000 is under contingency) should be transferred to the Working Capital Fund.

The Group also recognized that a fund for the temporary position of a biostatistician had been included in the original budget. It *recommended* that the Council make the position a permanent one, pending confirmation by the Commission.

Item 21. *Date and place of the next meeting of the Commission.*

The Delegate from Spain mentioned that there is a possibility of his government inviting the next meeting of the Commission to Las Palmas, Canary Islands. He added, however, that since this was not studied in detail, the terms and conditions of the invitation were still pending.

The Group recognized that the revised budget was made on the assumption that the meeting be held in Madrid and any increase in the budget for meeting expenses would adversely curtail research activities.

The Group *recommended* that the Council authorize the Executive Secretary to study the matter further, outline the terms and conditions in close contact with the Spanish Government, and make the final decision on whether or not to hold the meeting in Las Palmas (providing that this change can be executed without altering the Commission budget for 1977).

If the decision to hold the meeting in Las Palmas is made, it should be announced soon so that each delegate can prepare his travel plans in time. The Group *recommended* that otherwise the meeting would be held in Madrid.

The question was raised whether it would be beneficial to shorten the length of the Commission meeting by one day at the beginning, to allow for a full day's break between the SCRS and the Commission sessions. After considering the various possibilities, the Group *decided* not to change the timing of the meeting at this occasion.

The Group *recommended* that the Council reconfirm the decision of the Commission made in 1975, to hold the next meeting for a period of approximately one week, beginning on November 16, 1977.

Item 22. *Date and place of the next meeting of the Council*

Recognizing that the Council should hold its next regular meeting in 1978, the Group *decided* that the Council would leave the decision regarding the exact date and place to the next Commission meeting.

Adjournment

The Report was adopted and the meeting was adjourned.

Appendix 1 to Annex 4

Revision of 1977 Budget

	Approved by the Commission in 1975 (US $)	*Revised by the Council in 1976 (US $)*	*Changes (US $)*
TOTAL	300,000	320,000	+20,000
Contributions from member countries	300,000	300,000	0
Unused balance from previous fiscal year reallocated		20,000	+20,000
Chapters			
1. Salaries	130,000	130,000	0
2. Travel	10,000	10,000	0
3. Meetings	26,000	26,000	0
4. Publications	20,000	20,000	0
5. Office Equipment	2,000	2,000	0
6. General Operating Expenses	26,000	26,000	0
7. Miscellaneous Expenses	4,000	4,000	0
	218,000	218,000	0
8. Coordination of Research			
a) Personnel	44,000	47,000	+ 3,000
b) Travel	16,000	16,000	0
c) Equipment	3,000	6,000	+ 3,000
d) Data Processing	6,000	23,000	+17,000
e) Miscellaneous	3,000	3,000	0
f) Training Course	—	7,000	+ 7,000
	72,000	102,000	+30,000
Sub-Total	290,000	320,000	+30,000
9. Contingencies	10,000	0	—10,000
TOTAL	300,000	320,000	+20,000

Annex 5

REPORTS OF THE MEETINGS OF PANELS 1 THROUGH 4

Report of the Meeting of Panel 1

Madrid, November 18 and 22, 1976

1. *OPENING*

The meeting was called to order by the Chairman, Mr. C. J. Blondin (U.S.A.).

2. *ADOPTION OF AGENDA*

The Tentative Agenda (Appendix 1) was adopted after it had been agreed to consider Item 5 (Review of the Report of the Standing Committee on Research and Statistics) and Item 6 (Review of possible measures for the conservation of stocks) species by species.

3. *ELECTION OF RAPPORTEUR*

Mr. J. S. Beckett (Canada) was elected Rapporteur.

4. *REVIEW OF PANEL MEMBERSHIP*

There were no changes in Panel membership. Representatives of all members of the Panel were present, i. e. Brazil, Canada, Cuba, France, Ghana, Ivory Coast, Japan, Korea, Morocco, Portugal, Senegal, Spain, U.S.A. Angola was present as an observer.

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 (Thunnus albacares)*

The Chairman of SCRS, Dr. B. J. Rothschild, noted that landings in 1976 were expected to be a record 126,000 MT, and drew attention to the twin problems of large catches of undersized yellowfin and the apparent misreporting of some of these catches as bigeye.

Following an inquiry by Senegal with regard to possible action to solve these problems, Japan stated that the size of their baitboat fleet based in Tema was expected to remain near the current level, that efforts were being made to reduce both the proportion of undersized yellowfin and the proportion of yellowfin in the present age compositions in the total baitboat catches, and that Japan was willing to allow inspection of its vessels by officials of the port state. Korea reported a reduction in the ratio of yellowfin to skipjack (from 49.4 % to 16.5 %) in the catches of their vessels based in Tema. Ghana reported that steps are being taken to develop its own tuna fleet. In the light of information on undersized yellowfin, it would be necessary to review the operations of the Tema-based foreign fleets.

On the question of misreporting of yellowfin as bigeye, Japan noted that examination of the problem had resulted in more bigeye being identified in the catches, a trend magnified by an unusual abundance of bigeye in 1976.

France emphasized the importance of the problem and mentioned the conclusion of SCRS that a size limit for bigeye similar to that for yellowfin would be beneficial to both species and would tend to reduce the reason for misidentification of small yellowfin.

The Assistant Executive Secretary drew the Panel's attention to document SCRS/76/14, which gives details on distinguishing between yellowfin and bigeye. Ghana noted that its scientists on occasion had difficulty in obtaining cooperation from the captains of foreign vessels when carrying out port sampling, and urged the authorities of countries operating vessels out of Tema, to encourage cooperation by their vessel captains.

b) *Skipjack (Katsuwonus pelamis)*

The Chairman of SCRS reported that the substantial decline in catches in the past two years appeared to be due to changes in effort rather than fish abundance.

7. *RESEARCH NEEDED TO BE CARRIED OUT*

The SCRS Chairman drew attention to Appendix 8 of the SCRS Report, which provided information on the research needed and commitments made in this connection for 1977. He gave details on the proposed three-year program of intensified Atlantic-wide skipjack research (Appendix 4 of the SCRS Report) that would culminate in an "International Skipjack Year", and noted that the Secretariat had been asked to prepare a detailed study of the proposal, including funding (for submission to the Commissioners at the next Commission meeting. France welcomed the proposal, whereas Spain, while supporting the preliminary phases, pointed out the need to scrutinize the costs and benefits of the later phases.

8. *DATE AND PLACE OF NEXT PANEL MEETING*

The Panel agreed to meet at the same time, and in the same place, as the Fifth Regular Meeting of the Commission.

9. *OTHER MATTERS*

There was no other business.

10. *ADOPTION OF REPORT*

The Report was adopted on November 22, 1976.

11. *ADJOURNMENT*

The Panel adjourned on November 22, 1976.

Report of the Meeting of Panel 2

Madrid, November 18 and 22, 1976

1. *OPENING*

The meeting was called to order by Mr. M. El Bacha (Morocco).

2. *ADOPTION OF AGENDA*

The Tentative Agenda was approved as presented in Appendix 1.

3. *ELECTION OF RAPPORTEUR*

Dr. J. P. Troadec (FAO) was nominated Rapporteur.

4. *REVIEW OF PANEL MEMBERSHIP*

The Chairman presented the list of member countries, i. e., Canada, France, Japan, Korea, Morocco, Portugal, Spain and U.S.A. In addition, delegates from Angola, Brazil and Cuba attended as observers.

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

The Chairman of SCRS, Dr. B. J. Rothschild, gave a summary of the sections of the SCRS Report relevant to bluefin and albacore.

5.a. *Bluefin (Thunnus thynnus thynnus)*

As regards to bluefin, he stressed that the total landings have been at about the same level in 1974 and 1975, following a period of low catches in the early 70's. However, there has been an appreciable redistribution of fishing effort, as illustrated by the expansion of certain purse seine and longline fisheries in the Mediterranean. He referred to the question of stock (one or two) structure as one which generates serious difficulties in the assessments. Fishing mortality on the small and medium size group has affected recruitment to the large size group. Overall fecundity in the northwestern stock has sharply decreased. However, recruitment of the one-year-old

class does not show any significant trend. Considering the long life span of the species, the increase in average age at first capture would significantly increase the overall yield per recruit.

Dr. B. J. Rothschild also reviewed the effects of the bluefin tuna regulations. On both sides of the Atlantic a reduction in the proportion of tuna below 6.4 kg. in the catches is apparent over the period 1974-76. Maintaining F constant raises special difficulties, as this parameter can be estimated only after fishing has been exerted. Although the regulation on F seems to have met more varying success, it can be said that as a whole, F has probably remained stable or even decreased.

5.b. *Albacore (Thunnus alalunga)*

Reviewing the status of albacore stocks, Dr. Rothschild indicated that for both the northern and southern stocks, recent total catches are close to their respective estimates of average maximum yields. The relation between albacore stocks in the Indian Ocean and South Atlantic and between those in the South and North Atlantic are not yet sufficiently clarified.

The status of the northern Atlantic stock raises serious concern. In 1975, its overall catch was at its lowest level. In addition, there is evidence of a declining trend in recruitment. Unfortunately, no data on effort or stock abundance subsequent to 1972 were available to assess the present stock status. If effort has been increasing since that date, then there is a danger sign that the fishery is overexploited.

Caution should be exercised in increasing the fishing effort on albacore until the analyses are updated.

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

6.a. *Bluefin*

The Delegate from Canada called attention to the increasing modal size in the large size group in the northwestern Atlantic. He expressed the opinion that there was more evidence supporting the two stock (East and West Atlantic) concept, since even if tagged fish have crossed the Atlantic, such proportion has been low. This would, therefore, justify making separate assessments and management on these two stocks. He recommended that SCRS further analyze the foreseeable effects of the reduced spawning biomass on future recruitment. Because the abundance of medium and progressively large-size class fish is at very low levels, maximum protection should be given to incoming year-classes by increasing age at first capture.

Canada, France, Japan and the U.S.A. summarized the actions already taken or envisaged in their respective countries to enforce the ICCAT regulations on bluefin tuna. Although definite improvements are observed, there are still reasons for concern. Catches have been reduced in several fisheries. However, total fishing mortality in the western Atlantic large-fish fishery has not yet decreased in relation to the reduced stock size. The U.S.A. regulates its various fisheries using special catch limitations for each size category of fish. Restrictions regarding closing the

seasons or areas are determined according to the accumulation of catch in the various fisheries.

The Panel concluded that every effort should be made at national levels to rapidly assure full compliance with the regulations already adopted by ICCAT with respect to the 6.4 kg. minimum size and maintaining fishing intensity at present levels. No further measure was thought necessary for the present time.

6.b. *Albacore*

No measures were suggested.

7. *RESEARCH NEEDED TO BE CARRIED OUT*

The Chairman of SCRS drew the attention of the Panel to the recommendations included in the SCRS report as regards research needs for bluefin and albacore. Tagging of young bluefin should be intensified in the Mediterranean and in the Ibero-Moroccan sector. The Delegate of Morocco expressed his country's willingness to participate in this project. The possibilities to mobilize the required means and staff through cooperation should be explored by the Secretariat. Considering the present stock level and size composition, it is essential to monitor recruitment and exploitation of various size groups. Finally, the Panel endorsed the recommendations to pursue investigations on age determination of bluefin and the effects on assessments of divergences in age determination.

As regards to albacore, the use of more recent data in a new assessment, through a production model, was considered by the Panel as the most urgent task. The relationships between the Indian Ocean, southern Atlantic and northern Atlantic stocks should be further explored. The Panel also *recommended* that the effects and feasibility of changing the age at first capture in the northern stock surface fishery be considered in more detail.

8. *DATE AND PLACE OF NEXT PANEL MEETING*

The Panel agreed to hold its next meeting at the same time and place as the forthcoming Commission meeting.

9. *OTHER MATTERS*

No other matters were discussed.

10. *ADOPTION OF REPORT*

The Report was adopted on November 22, 1976.

11. *ADJOURNMENT*

The meeting was adjourned.

Report of the Meeting of Panel 3

Madrid, November 19 and 22, 1976

1. *OPENING*

The meeting was called to order by the Chairman, Dr. A. Suda (Japan).

2. *ADOPTION OF AGENDA*

The Tentative Agenda was adopted (Appendix 1).

3. *ELECTION OF RAPPORTEUR*

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

4. *REVIEW OF PANEL MEMBERSHIP*

All the members of Panel 3 were present, i. e., Brazil, Japan, Korea, South Africa and U.S.A. Also, Angola, Canada, Cuba, Ghana, Morocco and Spain attended as observers.

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

The SCRS Chairman, Dr. B. J. Rothschild, reviewed relevant parts of the SCRS Report for the Panel.

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

No recent changes were observed in the level of the stock. The stock is commonly distributed in the Pacific, Indian and Atlantic Oceans. It was also noted that an increase in age at first capture would increase the total yield.

5.b. *Albacore, South (Thunnus alalunga)*

It was noted that there has been a decline in the catch level in recent years. Some production model studies indicate 30,000 MT as the optimum annual yield but the analysis must be updated by using more recent data.

The importance of studies on the relationship between albacore stocks in the South and North Atlantic and those in the South Atlantic and Indian Ocean was emphasized, as new findings on these points could effect population studies significantly.

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

6.a. *Bluefin, South*

The Panel was informed that Japan has been observing voluntary regulatory measures on southern bluefin tuna since 1971.

6.b. *Albacore*

No comments were made.

7. *RESEARCH NEEDED TO BE CARRIED OUT*

The Panel *agreed* with all the recommendations made by the SCRS concerning future research plans. In specific, the Panel *recommended* that past and future results of cooperative studies under way between Australian and Japanese scientists on southern bluefin tuna be made available to the SCRS by its next meeting.

Regarding albacore, the need to update population analysis using data for recent years was emphasized. Also, studies on stock structure of Atlantic albacore (north vs. south) and its possible relationship with Indian Ocean stocks should be developed. The importance of securing and analyzing data from the Taiwanese fleet was also emphaszed.

8. *DATE AND PLACE OF NEXT PANEL MEETING*

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

9. *OTHER MATTERS*

No other matters were discussed.

10. *ADOPTION OF REPORT*

The Report was adopted.

11. *ADJOURNMENT*

The meeting was adjourned.

Report of the Meeting of Panel 4

Madrid, November 19 and 22, 1976

1. *OPENING*

The meeting was called to order by the Chairman, Mr. V. Bermejo (Spain).

2. *ADOPTION OF AGENDA*

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

3. *ELECTION OF RAPPORTEUR*

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

4. *REVIEW OF PANEL MEMBERSHIP*

The Chairman noted that the seven members of the Panel are: Canada, Cuba, Japan, Korea, Portugal, Spain and U.S.A. All members were present. Observers from Angola, Brazil, France, Ghana and Morocco also attended the meeting.

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

The SCRS Chairman summarized the relevant sections of the SCRS Report.

5.a. *Bigeye (Thunnus obesus)*

It was noted that the catch in recent years has been on the order of 52,000 MT. It seems that the fishery has been relatively stable at the present level of effort. Considerable concern was expressed on the misidentification of small yellowfin tuna as bigeye tuna.

Concern was also expressed about obtaining Russian statistics.

5.b. *Atlantic bonito (Sarda sarda)*

No special progress was reported.

5.c. *Billfishes (Xiphiidae)*

The catch has been stable in recent years, but at a lower level than it had been in the early years of the longline fishery. The SCRS showed some concern on the stock conditions. Some analysis on swordfish is expected by the next SCRS meeting.

5.d. *Small tuna species*

The Report of the FAO Working Group on Small Tunas was reviewed. It was noted that frigate tuna (*Auxis* spp.) is the second most abundant species of tuna based on stomach contents studies. Some concern was expressed on the need for a study on the possibility of exploitation of this species.

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

6.a. *Bigeye*

The Panel expressed concern over the misidentification of small yellowfin as bigeye. France, as an observer, stated that we might initiate a study on the possibility of setting a size limitation on bigeye tuna similar to that for yellowfin, so that the implementation of a size limit regulation on yellowfin tuna may become more effective. The view was supported by Cuba.

The Japanese Delegate also indicated concern on the effect the catching of small bigeye tuna has on its recruitment to the large-fish fishery. He suggested that some studies be made to estimate the catch of actual small bigeye, and the biological impact that possible size regulations on bigeye might have on various segments of the fisheries. This view was shared by the U.S.A.

6.b, c, d. *Atlantic bonito, billfishes and small tuna species*

No comments were made.

7. *RESEARCH NEEDED TO BE CARRIED OUT*

The SCRS Chairman summarized his Committee's future plans regarding bigeye, billfishes and other small tuna species. A study to establish the correct identification of small fish catches of yellowfin and bigeye was emphasized. The Panel concurred with the SCRS recommendations that a multi-gear analysis be carried out on the effects which various segments of the fishery have on other portions of the fishery.

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 Commission meeting.

9. *OTHER MATTERS*

No other matters were discussed.

10. *ADOPTION OF REPORT*

The Report was adopted.

11. *ADJOURNMENT*

The meeting was adjourned.

Appendix 1 to Annex 5

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 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

Annex 6

REPORT OF THE WORKING GROUP ON INTERNATIONAL INSPECTION

Madrid, November 19, 1976

1. *Opening*

The Acting Chairman of the Council, Mr. E. B. Young, opened the meeting of the Working Group on International Inspection. Mr. J. N. N. Adjetey (Ghana) was appointed temporary chairman of the Working Group in the absence of the current chairman, Mr. E. Oltuski (Cuba).

2. *Adoption of the Agenda*

The Tentative Agenda was adopted (Appendix 1).

3. *Election of Rapporteur*

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

4. *Model of flag or pennant for vessels carrying on-baord inspectors conducting international control*

Referring to the inspection system approved by the Commission at its 1975 meeting, the Executive Secretary called the attention of the Working Group to a life-sized model of the pennant on display in the conference room. The group approved the model as displayed but requested that the Executive Secretary make minor adjustments in the lettering in accord with international usage, if necessary.

5. *Model of identity card for the inspector*

The Executive Secretary distributed, for consideration by the group, model identification cards in French, Spanish and English. An unfolded single sheet card was approved, and it was clarified that the date would be left blank and added at the time of issuance.

6. *Suggestions as to the most effective way of insuring control at the ports*

The Executive Secretary referred to the questionnaire circulated by the Secretariat on May 25, 1976, and to the document (CON/76/16) prepared consisting of responses from the member countries. Although responses from a number of the member countries were not received prior to the meeting of the Working Group,

comments from France, Ivory Coast, Senegal and Spain indicated agreement, in principle, with an international port inspection system.

Cuba reiterated its strong support for a system of inspection of landings in port, but outlined in detail (Appendix 2) its opposition to inspections on the high seas. Such inspections Cuba felt to be costly, difficult, and inappropriate. Cuba advocated that member countries appoint their own inspectors to make inspections in their home ports and communicate the results of such inspections, including violations and subsequent penalties imposed, to the Secretariat. Cuba added that an exchange of inspectors would not be necessary.

Brazil noted the negative responses of Japan and Korea to the inspection questionnaire and expressed concern over the problem of the large catches of undersized tuna by the Tema-based baitboat fleet. Japan and Korea were requested by Ghana to clarify their responses to the inspection questionnaire.

Japan stated it had no opposition to the port inspection of its pole and line vessels provided that such inspections did not interfere with the operations of the vessels. However, Japan could not agree to the inspection of its longline vessels because of the market requirements for high quality fresh tuna. Japan noted such vessels normally take only medium and large tunas not covered by the ICCAT size limit regulations.

Korea noted that it preferred inspection arrangements through bilateral agreements, because there are many complexities involving international jurisdiction between nations. Brazil stated that it would review annually the international programs on port inspection and evaluate its national position accordingly.

The Chairman requested that the Executive Secretary take note of the consensus developed in favor of port inspection and accepted by the majority of the Working Group and prepare, prior to the 1977 Commission meeting, a document elaborating on a port inspection system.

7. *Date of entry into effect of the international inspection system*

The group *agreed* to leave in abeyance the date of entry into effect of the international inspection scheme as agreed by the Commission in 1975.

8. *Date and place of next meeting*

The group *agreed* that the next meeting would be held at the same time and in the same place as the next Commission meeting.

9. *Other matters*

There were no other matters discussed.

10. *Adoption of the Report*

The final report was adopted on Monday, November 22, 1976.

11. *Adjournment*

The meeting was adjourned on November 22.

Appendix 1 to Annex 6

Agenda for the Working Group on International Inspection

1. Opening
2. Adoption of Agenda
3. Election of Rapporteur
4. Model of flag or pennant for vessels carrying on-board inspectors conducting international control (2)
5. Model of identity card for the inspectors (3)
6. Suggestions as to the most effective way of insuring control at the ports
7. Date of entry into effect of the international inspection system
8. Date and place of next meeting
9. Other matters
10. Adoption of Report
11. Adjournment

Note: The numbers in parentheses refer to the paragraphs of the ICCAT Scheme of Joint International Enforcement which deal with these points.

Appendix 2 to Annex 6

Proposal of the Cuban Delegation

"Mr. Chairman:

"Our delegation persists that inspection *should not be carried out* on high seas, but *fully supports* the implementation of the inspections at tuna landing ports. We consider that, in this way, the objective will be successfully achieved, since the degree of application will not depend greatly on the possibilities of each member country.

"Besides, a series of obstacles and objections have been posed concerning the application of this measure on high seas, which are herebelow listed:

"(1) The weight limits stipulated by ICCAT for bluefin and yellowfin catches, are not yet so significant to undertake such an important program, with the costs which it involves.

"(2) The area which should be covered includes the whole Atlantic Ocean, which would make the execution of this plan even more difficult.

"(3) Many of the nations are not able to bear the cost of such an inspection program. It is clear that the program would create a great imbalance in the possibilities of equality for all nations.

"All of these reasons were expressed in the Report of the Working Group on International Inspection, and appear in the 'Biennial Report, 1974-75, Part II'.

"Besides these, the following can be added:

"(4) Encounters on high seas, or the interception of a fishing vessel by another carrying an international inspector, causes breaks or delays in fishing operations. We are all aware of the importance of the time factor on high seas and its economic results.

"(5) These inspections at sea can cause misunderstanding or conflicting situations between the parties, including refusals even though regulations may be adopted.

"(6) It is very difficult, or even almost impossible, that an ICCAT inspector could determine the proportions of yellowfin or bluefin of sizes regulated by this Commission, since we know that catches of tuna vessels are stored in bulk. In the case of longliners the fish are piled or packed tight one on top of another, and in the case of purse seiners they are stored in brine-filled wells. In both instances inspection is almost impossible.

"(7) In past meetings of this Working Group, the inspection scheme has been based on the inspectons taking place on the high seas, in order to also inspect the fishing gear. However, up to now, nothing has been approved in this respect and there is no scientific basis which recommends such a practice.

"(8) If, in the future, some regulation might be considered regarding fishing gear, we cannot understand any reason for the inspection being carried out in international waters. As everyone knows, each type of tuna vessel, whether baitboat, purse seiner or longliner, uses only one type of gear, and the accessory equipment with which it is supplied is exclusively for use in case of a breakdown.

"We think that inspections in international waters would entail these and many more objections.

"We think that, in one way or another, each member country has a full obligation to comply with the rules set up by this Commission for the conservation of tuna stocks. For that purpose, supervision or inspection of the various fishing activities is necessary. Therefore, *we emphasize the aforementioned proposals for carrying out this work at the vessels' landing ports.*

"In the same way, we submit our views on this matter for consideration by the various delegations. We also hereby submit in detail our ideas on the matter and our concept of how to carry out this scheme.

"(*a*) Each member country will appoint or, if not, engage its inspectors to carry out the inspections of national and foreign vessels *in their own ports.* The ICCAT Secretariat will be informed of the names of the inspectors.

"(*b*) Inspections which are carried out on board foreign vessels should strictly follow the fundamental objectives: inspection of catches while landing or trans-

shipping and inspection of the logbooks. In the future, and providing that such a measure is approved, the nets and fishing gears can also be inspected.

"(c) The countries will inform ICCAT of the results of their inspections of national and foreign vessels and will also inform the flag country of the vessel of these results.

"(d) Any infractions of the rules will be notified to the Commission by the various countries — not only those infractions which take place in the inspector's own country, but also those which may have taken place in a foreign country.

"(e) ICCAT will also be informed of the sanctions or penalities imposed.

"(In such case, we consider that each country should impose the corresponding sanctions, in accordance with its legislation, not only for its own flag vessels, but also for those infractions committed by its vessels at foreign ports and which have been duly notified by that foreign country.)

"(Another variation could be that any fines imposed be added to ICCAT funds and be used for research activities.)

"(f) In the same way that the member countries issued their regulations collaborating with the ICCAT recommendations, they could also inform their boat captains to cooperate in every way in the inspections carried out in national as well as foreign ports.

"With these conditions, which can serve as a starting point, and by perfecting the system later, we believe that better results will be attained in the application of the measures established by ICCAT for the conservation of the species. These views are based on the following fundamentals:

"These measures do not affect the sovereignity or the laws of the member countries.

"When a vessel enters a foreign port it abides by the existing regulations there. Therefore, the legislation of one country or another is not at all affected.

"A major part of the catches which are effected in the Atlantic are not necessarily landed at the country of the flag vessel.

"An exchange of inspectors between countries is not necessary.

"We believe that all the member countries are interested in maintaining or increasing the amount of present catches. Therefore, they would place great emphasis on the completion of these duties.

"This system is positive in that all the countries, whether developed or not, can look out for their own interests. The interest of developing countries would not be covered if their vessels were inspected in international waters.

"The area of the Atlantic would be covered.

"Problems on high sea are avoided.

"The inspections can be carried out more objectively.

"We believe this is and should be of concern to all; therefore, we propose this inspection system and, at the same time, we ask that you, Mr. Chairman, solicit the opinion of the various countries here represented.

"Thank you, Mr. Chairman."

Annex 7

SUMMARY TABLE ON THE PRESENT STATUS OF THE REGULATORY MEASURES TAKEN BY EACH MEMBER GOVERNMENT

(Date entered into effect)

Countries	*Yellowfin (1-VII-1973)*	*Bluefin*		
		1 (in force 10-VIII-1975)	*2*	*2 - Extended (Until 10-VIII-1978)*
Angola				
Brazil	23-II-1973 *			
Canada	4-IX-1973 *	17-II-1976 *	17-II-1976 *	17-II-1976 *
Cuba	VII-1973			
France	29-VI-1973 *	8-VIII-1975 *		
Ghana	19-VI-1976 *			
Ivory Coast	III-1970			
Japan	14-VI-1973	2-IV-1975 *	2-IV-1975 *	2-IV-1975 *
Korea	21-VI-1973	17-XII-1975 *	17-XII-1975 *	17-XII-1975 *
Morocco	No fishing	Doc. COM/75/21		
Portugal	26-XI-1973 *			
Senegal	7-XI-1970 *			
South Africa	V-1973 *	27-VI-1975 *	27-VI-1975 *	19-X-1976 *
Spain	29-V-1974 *	3-III-1975 *	19-II-1976 *	19-II-1976 *
USA	5-XI-1975 *	13-VIII-1975 *	13-VIII-1975 *	18-V-1976 *

* Formally notified to the Secretariat.

Annex 8

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

Madrid, November 10-16, 1976

Table of contents

Item 1. Opening of the meeting

1.1. At the opening of the meeting the Chairman, Dr. B. J. Rothschild, introduced Mr. Victor Moro, the Director General of Sea Fisheries (Spain). Mr. Moro welcomed all the scientists attending the meeting and commended the important role scientists play in the international management of tuna fisheries. He stated that Spain, which has one of the most important tuna fisheries in the world, attaches particular interest to the tuna management problem. Mr. Moro also recognized that proper scientific advice depends on the collection of accurate statistics on a timely basis. At the end of his address, Mr. Moro offered his full cooperation to the scientists in making the SCRS meeting a success.

1.2. The Chairman then formally opened the Seventh Regular Meeting of the Standing Committee on Research and Statistics (SCRS). He welcomed all the delegates and observers (Annex 2 to the Proceedings). Angola was welcomed as a new member of the Commission, though no representatives were in attendance at the SCRS meeting. He reviewed the terms of reference of the SCRS (Rule 13-2, Rules of Procedure).

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

2.1. The Tentative Agenda was adopted and is attached to this Report as Appendix 1.

2.2. After an explanation of the new procedure adopted at the last SCRS meeting, the Chairman stated that three *ad hoc* working groups had been established and rapporteurs for each group had been nominated by the Chairman:

— Ad Hoc Working Group on Yellowfin and Skipjack — A. Fonteneau (France) and G. Sakagawa (U.S.A.).
— Ad Hoc Working Group on Albacore — S. Kume (Japan), J. Y. Le Gall (France), W. Parks (U.S.A.) and J. A. Pereiro (Spain).
— Ad Hoc Working Group on Bluefin, Bigeye, Billfishes and Other Species — J. S. Beckett (Canada) and J. P. Troadec (FAO).

2.3. It was confirmed that the responsibilities of the rapporteurs were to review all the pertinent papers and draft a summary report of their findings for discussion at the full SCRS meeting under Agenda Items 6-8.

2.4. Dr. J. P. Troadec (FAO) was selected general rapporteur and the Assistant Executive Secretary was asked to assist him in drafting the report.

2.5. The Ad Hoc Group on Admission of SCRS Documents was established and Mr. J. N. N. Adjetey (Ghana) was asked to chair the Group.

Item 3. **Admission of Observers**

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

Item 4. **Admission of scientific papers**

4.1. Mr. Adjetey reported the results of the meeting of the Ad Hoc Group on Admission of SCRS Documents (Report attached as Appendix 2).

4.2. He explained that Rule 3 of the Document Policy established at the last SCRS meeting (Appendix III to the 1975 SCRS Report) should be modified to exempt National Reports and late-arriving documents which are, however, absolutely necessary to the proceedings of SCRS.

4.3. He reported that the Group reviewed 12 documents which fall in the new criterion iii. It decided to admit three of these documents, namely Documents SCRS/76/82, 94 and 95, as they contain important information on recent development of fisheries.

4.4. The list of documents accepted at the SCRS is attached as Appendix 3.

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

5.1. *Brazil*

In 1975, longliners which operated off southern Brazil caught 1,130 MT (gilled and gutted weight) of tuna and tuna-like species, using 842,140 hook days, 10.3 % and 16.2 % more than in 1974, respectively. Biological research continued on tunas, marlins and swordfish caught by longliners. Also, a program of exploratory fishing using livebait was initiated in the northeast area. Attention was paid to proper identification of species.

5.2. *Canada*

Catches —all bluefin from the northwest Atlantic— amounted to 641 MT in 1975, a decline of 127 tons compared to 1974. Preliminary data for 1976 indicate a catch of about 750 tons. Restrictions were placed on all sectors of the fisheries. Biological sampling was carried out in all fisheries and included otolith collection for age analysis. Tagging programs were continued with 168 large bluefin released. Two experimental cruises were mounted to monitor swordfish abundance and collect samples for mercury analysis.

5.3. *Cuba*

Cuban catches in the Atlantic amounted to 10,200 MT consisting of the following species: Yellowfin (2,600 MT), albacore (100 MT), bigeye (1,900 MT), skipjack (2,600 MT), and other tunas and tuna-like species (3,000 MT). A biological program was developed for sampling yellowfin tuna on-board Cuban commercial vessels. A program of sampling for skipjack size frequency was also developed and carried out at the port of landing. A conversion factor was determined for round weight and gilled and gutted weight for yellowfin caught in the western Atlantic; sampling of ichthyoplankton for bluefin (*Thunnus thynnus*) continued in the western Atlantic.

5.4. *France*

In 1975, French catches were about 57,000 tons, of which 38,000 tons were yellowfin, 11,400 tons skipjack, 5,600 tons albacore and 2,300 tons bluefin; there has been a decrease in albacore and skipjack catches and an increase in yellowfin catches.

Research work at sea has been mostly oriented towards albacore tagging, a survey of surface tuna concentrations in the North Atlantic from the south of New Foundland to the Bay of Biscay, as well as a study — through the aid of aerial surveys — of mechanisms that concentrate tropical tunas in the frontal zone of Cape López. Data collection on all species has been carried out following the program adopted for previous years and in cooperation with several African countries for the tropical species. Emphasis was placed on age composition, recruitment of albacore and bluefin in the surface fisheries, and population dynamics in general.

5.5. *Ghana*

Thirty-two foreign and five Ghanaian tuna vessels fished from Tema during 1975. The total landings during the year amounted to 30,500 tons. There was a decrease in the total landings as compared to the 1974 landings due to the suspension of fishing by an important part of the Tema-based baitboat fleet. The catch of the Ghanaian baitboat fleet increased from 2,000 tons to nearly 3,000 tons.

There is still the problem of identification of bigeye and yellowfin tunas. It is being solved through education and by demonstration.

Research on biology and population dynamics of tunas in the Gulf of Guinea continued during the year. Sampling of yellowfin, skipjack and bigeye tunas was also pursued. The predominance of undersized fish in the yellowfin tuna catch of Tema-based baitboats still remains a problem. Special attention is being paid to this problem.

For the future, a program of biological sampling on-board tuna vessels will be mounted by the Fishery Research Unit, for the purpose of gaining more insight into the dynamics of the tunas in the area.

5.6. *Ivory Coast*

Tuna fishing of the Ivory Coast developed considerably in 1975 and 1976. The Ivorian catches reached 9,000 tons in 1975 and should approach 12,000 tons in 1976. The amount of tuna landed and transshipped reached 70,000 tons. Tuna research on the FIS fleet continued (data processing is centered in Abidjan), as well as for the whole of the international fleet. According to an agreement between the local CRO and the ICCAT Secretariat, biological sampling is being executed, mainly from Korean and Taiwanese longliners and to an agreement with the Spanish Oceanographic Institute, from Spanish purse seiners.

5.7. *Japan*

Japanese tuna fisheries in 1975 produced about 45,000 tons, 40 % less than in 1974. The decrease in catch was mainly due to the major suspension of fishing by the pole-and-line and purse seine fleets operating for tropical tunas. Consequently, the catch of surface fisheries dropped to 6,200 tons in 1975, as compared to 32,600 tons in 1974. The longline fleet again directed its operations mainly on bigeye and bluefin tunas, the catch of which made up the bulk of the longline catch. As a result of domestic regulations taken in advance of ICCAT recommendations, the catch of bluefin tuna in the North Atlantic in 1975 was almost identical to that of 1974.

In 1975-1976, considerable progress was made in data processing and reporting. Catch and effort statistics of the pole-and-line fishery were made available for the years 1969 and 1973-1975. Because of the intensified on-board sampling, both the quality and quantity of biological samples have been improved. The compilation of various statistics was also improved and done on a more timely basis. Major tuna and billfish stocks were assessed.

5.8. *Korea*

In 1975, the Korean tuna fleet in the Atlantic consisted of 118 longliners and 8 baitboats. Its total catch amounted to 46,472 metric tons, of which 38,819 tons were caught by longline vessels and 7,653 tons by baitboats. The major species caught were yellowfin, bigeye, albacore and skipjack.

Regarding 1975 research activities, two Korean experts were sent to Abidjan and Tenerife for two months in order to collect catch-effort and biological data from Korean tuna fisheries. The data thus collected were submitted to ICCAT. To further Korean research activities in 1976, one expert was also sent to Tema, Abidjan and Tenerife from July to August.

5.9. *Morocco*

Moroccan tuna catches show an increase in 1975 (4,760 MT) as compared to 1974 (2,119 MT). This increase is due in part to higher catches from Moroccan Atlantic waters and in part to the catches of Moroccan purse seiners operating in the intertropical region. The decrease in Mediterranean catches is due to a reduction in setting traps. In August-September, 1975, important catches of large bluefin (100 to 150 kg.) have been made by sardine fishing boats in the Agadir region, but the production had to be limited as the processing capacities ashore became saturated. In 1976, two new Moroccan purse seiners arrived in tropical waters and so far have landed 870 tons of yellowfin and skipjack.

In 1976, an attempt to sample bluefin failed, due to the irregularity of the catches and to the fishermen's refusal to allow such sampling. For reasons of convenience, effort and sampling data on national tuna vessels operating in the intertropical area are collected by laboratories located in this region.

5.10. *Senegal*

In 1975, FIS landings at Dakar were about 8,000 tons (3,500 tons for the Senegalese fleet and 4,500 tons for the French freezer baitboats). Only the Spanish fleet transshipped its catches in the same port (about 24,000 tons). To this must be added landings at Dakar of catches effected in the southwest part of the Bissagros by large FIS seiners at the end of the second quarter in 1976.

Sampling and data collection activities as well as population dynamic studies have continued in Dakar. A cooperation agreement has been made with Spain in order to sample the Spanish purse seine catches transshipped in Dakar.

A meeting of the Working Group on Atlantic Skipjack was called by CRO in Dakar, in March 1976; it was attended by experts from France, Ghana, Ivory Coast, Senegal, Spain, United States and the ICCAT Secretariat. Japan was unable to attend. This meeting allowed intensive study of the skipjack fishery, based on all available data, as well as a discussion of the main pending problems. The results of this Working Group are summarized in a report presented to SCRS (SCRS/76/89).

5.11. *Spain*

In 1975 the Spanish tuna catches totalled 79,000 tons, which represent a slight decline from the 1974 level. Albacore catches noticeably decreased and skipjack catches decreased by 50 % as compared to 1974. On the other hand, yellowfin

and bigeye catches increased considerably. Bluefin catches remained stable. In the Bay of Biscay and northwest of Spain, an appreciable decrease is noted in albacore effort, whereas bluefin effort increased slightly. Work continued on the collection of swordfish statistical data. In the Gulf of Guinea, fishing effort increased appreciably, but the total catches were less than in 1974. Auxiliary baitboats which work with the purse seiners were withdrawn in early 1976. Since the beginning of this year a sampling program was established and surveys were conducted concerning Spanish vessels transshipping in Dakar and Abidjan. Estimates for 1976 indicate that the yellowfin catches will be about the same as in 1975, while skipjack catches will decrease. In the area around the Canary Islands, total catches were significantly less than those of 1974. Good statistical and sampling coverage is now ensured for the major species. Finally, total catches from the Mediterranean increased slightly as compared to 1974. A continuous decline in catch has been noted in the bluefin tuna trap fisheries. Catches of the major species are presently fully covered.

5.12. *U.S.A.*

The United States total catch of Atlantic tuna and tuna-like fishes for 1975 was off by 22 % from that of 1974. The decline is attributed to lower catches of Spanish mackerel, king mackerel, skipjack and bigeye tuna. The U.S. tropical purse seine tuna fleet caught about 21,300 MT of tropical tunas in the eastern Atlantic in 1975. The catch consisted predominately of yellowfin tuna. Preliminary results indicate that fishing effort and the catch for the U.S. fleet will be much lower in 1976. The U.S. bluefin tuna fishery produced 2,845 MT in 1975. In 1976, the catch is much lower and the fishery operated under catch and size regulations.

5.13. *ICCAT Secretariat*

Details of the work in statistics and coordination of research done by the Secretariat are given in SCRS/76/11, 12, 13, 14, 16 and 17. The routine work included Collecting Tasks I, II and biological data through the National Offices, making quick estimates of the total catches, compiling them into the Statistical Bulletin, etc. The port sampling and log abstract program, initiated in 1975, has been continued and improved. At five major ports in the Atlantic, international longline fleets transshipping their catches have been surveyed. The data thus collected are compiled by Automated Data Processing system and published in the new "Statistical Series". This year the Automated Data Processing System was also adapted to Task I — nominal catch statistics; this will expedite the preparation of the Statistical Bulletin. Progress made on various tasks assigned to the Secretariat has been reported. Special mention was made of the biostatistical review of the transatlantic international sampling strategy. The work was initiated by a biostatistician under a one-year contract, and it was proposed that the work be continued in the future.

5.14. *Italy*

The Italian bluefin catch in 1976 (as of October) has remained at about the same level or has been at an even higher level as compared to 1975. Purse seiners,

15 big boats in the Tyrrhenian Sea and 30 small boats in the Adriatic Sea caught 7,720 MT so far, while the catch by four traps set in Sicily declined to 650 MT. Statistics for the longline swordfish fishery are not available.

Research on bluefin and albacore has been in effect and will be expanded, including: tagging of 0-age group bluefin, larval surveys, collection of improved biological data, distribution of fish, etc.

Item 6. **Brief presentation of major papers on stock conditions**

Item 7. **Review of conditions of stocks**

Item 8. **Reports of various working groups on species**

(This three items were combined and dealt with together.)

6.1. *YELLOWFIN TUNA*

6.1.1 *Recent trends in catch and effort*

Catch statistics for Atlantic yellowfin tuna are summarized in Table 1. Included in the table is a preliminary estimate for 1976. The total longline catch has remained fairly constant for the period 1969 to 1975, fluctuating between 26,000 and 32,000 MT.

The catch in the surface fishery has been increasing over the years, reaching a record high of 88,300 MT in 1975, but in 1976, the catch is expected to be even higher than in 1975, i.e., approximately 99,100 MT. An estimated 9,800 MT in 1975 and 18,500 MT in 1976 are expected to be caught in offshore areas that traditionally have not been fished in previous years.

A large amount of the total surface catch is now made by large purse seiners, and in 1976 they appear to be catching larger numbers of small yellowfin tuna (age 1). During the first three quarters of 1976, age 1 fish comprised 27 % of the FIS catch, versus 19 % for the same period in 1975. Size composition of catches made in 1976 by the other large purse seine fleets is not yet available. Assuming that the size composition in the U.S. and Spanish fleets is the same as that of the FIS fleet, the effect of this shift towards smaller fish has been tentatively estimated: the above-mentioned proportions of small fish correspond to a reduction in yield per recruit by about 3.5 % as compared to 1975.

It has also been noted that the Tema-based baitboat fleet which used to catch very small yellowfin tuna (1 to 4 kg.) had reduced fishing substantially during 1975 for economic reasons. In 1976, however, the fleet resumed fishing at a high level of effort. The catch of this fleet continues to consist of small yellowfin tuna, though of slightly larger average size than in 1975 (judging from data collected from transshipment landings in Puerto Rico (SCRS/76/72)).

The problem of misidentification of bigeye tuna and inclusion of bigeye tuna in the reported yellowfin tuna catches was also noted by the Committee as being still outstanding.

The Committee also voiced concern about some fisheries reporting catches of small yellowfin as bigeye tuna. The results of such practice could seriously affect

the ability of scientists to accurately assess the status of the stocks and the effects of size limit regulations as well as gains to be expected from recommendations already adopted on the basis of scientific evidence. Effort should, therefore, be exerted to curtail this practice.

The growth of the major tropical tuna fleets that participate in the eastern Atantic surface fishery is summarized in Table 2. (This carrying capacity pertains, of course, to both yellowfin and skipjack.) The growth of the fleet has been steadily increasing between 1967 and 1975. In 1976 preliminary data indicate that the carrying capacity will decrease by approximately 12 % owing to a reduction in participation by the U.S. fleet. Standardized fishing effort, however, is estimated to remain the same as in 1975.

6.1.2 *Stock structure*

No new evidence was presented on the stock structure of yellowfin tuna in the Atlantic Ocean. Available data tend to support the hypothesis of two stocks — eastern and western — but the evidence is not conclusive. A hypothesis was presented in document SCRS/76/25 that two different stocks are recruited into the Brazilian longline fishery. Tagging studies were suggested as possibly useful in clarifying the stock structure of the yellowfin tuna population of the Atlantic.

On a smaller scale, the recent (1975-76) expansion of surface fishing operations to new offshore areas in the eastern Atlantic raises the question of the relationships between the concentrations exploited in these new areas and those fished in traditional areas. In both years, large catches were made in offshore waters of Sierra Leone and the Ivory Coast fishing areas that were not previously fished (Figure 1). Only large fish were caught in these offshore areas, and off Sierra Leone most of them were in spawning condition, unlike large yellowfin tuna caught in the traditionally fished inshore waters. This offshore expansion of fishing operations will have different effects on yields in the surface and longline fisheries, according to whether such development corresponds to (i) a redistribution of fishing effort over year classes currently exploited by the existing fisheries, (ii) an increase in the stock availability and (iii) the access to a stock not yet accessible by the surface fishery. This situation is similar to the development of the eastern tropical Pacific fishery, where yellowfin tuna were first exploited in inshore areas but gradually expanded to offshore areas. With this offshore expansion of the fishery, the sustainable yield, for a given effort, increased substantially. The Committee felt that a comprehensive sampling program should be conducted to obtain more information on fish that are being exploited in the offshore areas.

6.1.3 *Population parameters*

Natural mortality rates for yellowfin tuna of the Atlantic have not yet been estimated directly. Instead, an estimate of average M = 0.80, which was determined for the yellowfin tuna of the eastern Pacific, has been assumed to be applicable to Atlantic yellowfin tuna. This assumption has been evaluated in a review of published estimate of M for yellowfin tuna (SCRS/76/71). Available information suggests that the "best" estimates of average M range between 0.6 and 1.0 and are adequate for the models currently used to assess the state of the Atlantic

stocks. The Committee *recommended,* however, that a direct estimate of the Atlantic stock is desirable, but effort should be directed on estimating age-specific M's rather than an overall average M. Tagging was mentioned as a method for estimating age-specific M's.

Growth is currently assumed to follow the Von Bertalanffy equation with parameter estimates given by Le Guen and Sakagawa (1973). However, there may be growth differences between sexes which could affect overall yield assessments. The Committee *recommended* that selective studies be undertaken to investigate this problem. These studies should incorporate data on growth of juvenile yellowfin tuna caught by the baitboat fisheries.

6.1.4 *Recruitment*

The 1975 catch is the highest on record for the fishery. The catch consisted of a high proportion of 2 and 3 year-old fish (SCRS/76/73), belonging to the strong 1972 and 1973 year classes. Based on 1975 CPUE, the incoming (1974) year class appeared to be weak. However, judging from preliminary data from the 1976 fishery (SCRS/76/95), it appears that the 1974 year class is not weak, but either was not exploited in proportion to its true abundance in the fishing grounds or was fully not available within the fishing grounds in 1975. The incoming 1975 year class also appears to be strong.

With more universal implementation of ICCAT's minimum size regulation by participating countries, the catch of one-year-old fish, which have a modal size of about 55-60 cm, may become less reliable as an index or recruitment strength.

The Committee felt that estimation of successive year class strength is a growing problem and *recommended* that a survey be conducted to identify better methods of indexing abundance of recruits. Simulation studies to evaluate the effects of changing year-class strength on yield are also *recommended.*

6.1.5 *Yield-per-recruit*

Some yield-per-recruit analyses in non-equilibrium states (simulations) were presented (SCRS/76/95). The results of observed and simulated catches by age for each gear allow a better understanding of the fishery during 1975 and 1976.

In 1972, ICCAT adopted a minimum size regulation for yellowfin tuna of 3.2 kg. with a 15 % tolerance for incidental catches of undersized fish. This regulation was based on evidence which indicated that the average long-term yield would increase if the capture of small yellowfin tuna (weighing less than 3.2 kg.) was avoided.

The reduction of fishing operations by the Tema-based baitboat fleet has resulted in a reduction by about two-thirds in the number of undersized fish caught in 1975 (as compared to 1974 — SCRS/76/37 and 73).

However, the catch of undersized fish is still substantial and steadily growing in most surface fleets. (The percentage of undersized fish (in number) in the surface fishery was about 59 % in 1974 and 38 % in 1975 (Tables 3 and 4).) It is expected that the number of undersized fish caught in 1976 will be comparable to the 1974 figure.

The Committee stressed that the catch of small fish should be reduced further

in order to increase the long-term yield from the stocks. About 11,000 and 4,000 MT of yellowfin tuna weighing less than 3.2 kg. were caught in the surface fishery in 1974 and 1975, respectively. The loss in future yield due to the capture of these undersized fish in 1974 and 1975 was estimated, based on the assumption that $M = 0.7$ and $F = 0.7$, at approximately 10,000 tons and 4,000 tons, respectively.

6.1.6 *Production model analysis*

Production model analysis was performed (SCRS/76/70) as in previous years. The results continue to support the conclusion that the curve relating average sustained catch to fishing effort is flattopped, i.e., the curve labeled $m = 0$ in Figures 2 and 3. It should be noted that this curve depicts average equilibrium conditions and implies that as fishing effort increases, production will be sustained from a decreasing stock. This is, of course, impossible and in fact, at some high level of fishing effort long-term deficits in recruitment will occur as the spawning stock is reduced. As a result, the catch will also seriously decline. Whether or not this point will be reached soon by the fishery is not clear. The analysis suggests, however, that further increases in fishing effort would produce a negligible increase in equilibrium yield.

It should be pointed out that when, as in 1975, there is a sharp increase in effort, the stock will not immediately reach equilibrium, and the catch will temporarily be above the equilibrium yield curve. Conversely, when there is a marked decrease in effort, the catch will be immediately below the equilibrium yield curve and progressively tend towards it.

The Committee noted that the 1975 and estimated 1976 points are above the equilibrium curve, owing to unusually large catches made in offshore fishing grounds that traditionally were not fished by the fleets as well as to a rapid increase in fishing effort (Table 2). Because of the recent expansion of fishing into new areas, the 1975 and 1976 points may not be entirely comparable to other points in the series. Therefore, the data were adjusted by removing the catch and effort corresponding to fishing operations in the new offshore areas. The adjusted points do not significantly alter the above conclusions of the analysis (Figure 2).

6.1.7 *General discussion*

The immediate future of the fishery will depend on trends in fishing effort, strength of the year classes, and effects of the exploitation in the new offshore fishing areas. Currently, fishing effort appears to have stabilized or even declined. Potential vessels that are currently not participating in the Atlantic tropical tuna fisheries, however, have very large aggregate carrying capacity readily available for entry into the fishery at short notice if conditions are right. Also, the amount of effective fishing effort for yellowfin tuna is very complex, as results on analysis of purse seine fishing effort indicated (SCRS/76/75), and is highly dependent on the availability of skipjack tuna. The trend in future fishing effort effectively exerted on yellowfin tuna is, therefore, difficult to predict with a reasonable degree of confidence.

The trend in the strength of year classes, on the other hand, is somewhat easier to predict because some year classes are already contributing to the catch. For

example, the 1974 year class appears to be reasonably strong and the 1975 year class, which is entering the fishery in 1976, appears promising. All these conclusions strongly depend upon the relationship between presently used CPUE and real abundance of the yellowfin tuna stock. If the relationship is strong, we can expect 1977 to be a reasonably good year for yellowfin tuna fishing, barring any major alterations in the configuration of the current fishery.

Only recently (1975 and 1976) have the offshore fishing grounds of Sierra Leone and Ivory Coast yielded substantial catches. The ability of yellowfin concentrations occurring in these new fishing areas to contribute to larger yields by the surface fleet and even the extent of the offshore fishing areas is not yet clear. Of great concern to the Committee is the possibility that the age composition and availability of fish exploited in the offshore areas are actually identical to those caught in the inshore grounds and/or by the longline fishery. If this is the case, the gain in the overall equilibrium yield will probably be negligible or even nil from exploitation in the offshore areas, while the costs will grow as effort increases. The Committee, therefore, *recommended* that research to determine the relationship among the fish exploited in the longline fishery and in the offshore and inshore fishing areas, receive more attention in the coming years.

The long-term future of the fishery will depend on the relationship between spawning stock and recruitment, more universal application of the minimum size regulation and control of fishing mortality rate. The Committee felt that all of these factors should receive more research attention.

6.1.8 *Recommendations*

The more important recommendations of the Committee for yellowfin tuna research are summarized here for easy reference.

1) The practice of reporting small yellowfin tuna as bigeye tuna should be stopped immediately.
2) The relation of fish caught in the offshore and inshore fishing grounds, as well as the relation of fish caught by the surface and longline fisheries, should be investigated.
3) New indices of recruitment strength should be developed.
4) The offshore expansion of the fishery should be closely monitored.

6.2. *SKIPJACK*

A complete review of data, estimates of population parameters and required research activities were performed by the Skipjack Working Group which met in Dakar, Senegal, under the sponsorship of the "Institut Sénégalais de Recherches Agricoles". The report of this Working Group (SCRS/76/89) is available by request to ORSTOM, Paris, France.

6.2.1 *Recent trends in catch and effort*

A complete summary of catch, effort and size frequency data is contained in SCRS/76/89. The data are summarized by country, gear, ICCAT skipjack tuna areas and quarters for 1966 to 1975. Additional data were provided for the Japanese

baitboat fleet based in Tema, Ghana (SCRS/76/37). A summary of skipjack tuna catches is given in Table 5.

Final results for 1975 show a catch of approximately 60,000 MT, i. e., about half of the 1974 yield. This low catch is attributed to a combination of reduced fishing effort in some traditionally productive areas for skipjack (e. g. Angola and Annobon areas) and to poor availability or low abundance in 1975 of the incoming 1974 year class. Preliminary data for 1976 indicate that the catch will again be low (approximately 40,000 to 50,000 MT). However, the catch rates for skipjack appear to be high in yellowfin tuna areas.

The Spanish fleet, which traditionally had taken 20 to 30 % of the total skipjack tuna catches, has directed its fishing effort on yellowfin tuna. This information leads the Committee to predict that the 1976 catch will be low, not because of poor availability or low abundance of skipjack tuna, but merely because relatively more fishing effort is being directed onto yellowfin tuna than on skipjack.

6.2.2 *Stock structure*

Only limited information is available on the stock structure of the Atlantic skipjack tuna population. Tagging data presented to the Dakar Working Group showed some significant migrations within the Gulf of Guinea (Figure 4). Other data on skipjack tuna catches of the Japanese longline fishery (SCRS/76/36) and catches of larvae (SCRS/76/68) indicate that skipjack tuna are widely distributed in the Atlantic between about 30° N and 30° S lat., suggesting that one stock inhabits the entirely Atlantic. On the other hand, correlation analysis of CPUE of skipjack tuna among the four ICCAT skipjack areas indicated that the CPUE's were highly correlated among the Dakar, Sherbro and Annobon areas but not between these areas and the Angola area. These results suggest the existence of a single population, at least in the Gulf of Guinea region.

Because of the paucity of data on the stock structure of the Atlantic skipjack tuna population, and the importance of information on stock structure in assessment studies and management decisions, the Committee *recommended* that research be conducted on the structure of the population.

6.2.3 *Population parameters*

A literature review of natural mortality rates was presented in SCRS/76/89 and SCRS/76/71. The mean estimate of M for skipjack tuna ranges between 0.3 and 1.7. This range of estimates clearly shows that either an estimate of the average M for skipjack tuna is very difficult to estimate accurately or that it is very variable. Of more importance in fishery management is the apparent natural mortality, which is the resultant of actual natural mortality and the result of changes in availability usually caused by emigration and immigration. For skipjack tuna, which apparently migrate over large areas because of biological requirements, apparent natural mortality can be high when a year class is only available to the fishery during a short period of its life. This seems to be the situation in the eastern Atlantic where fish, especially those greater than 50 cm. long, are available to the fishery for one or at most two years.

Age specific fishing mortality estimations obtained from cohort analysis were

presented in SCRS/76/89. The results were preliminary because of great uncertainties in the growth and natural mortality estimates used in the analysis.

A review of skipjack growth was presented in SCRS/76/89. Very few studies on growth have been completed for Atlantic skipjack tuna. Size frequency distributions have not been too useful in analysis of growth by modal progression.

Tagging has not been extensive enough to produce sufficient returns for determining growth, although the rate of growth may be different for tagged fish. The possibility of great variability in growth owing to sub-population differences was also noted by the Committee. The Committee, however, *recommended* that further research be devoted to improving the current estimates of growth of Atlantic skipjack tuna.

6.2.4 *Recruitment*

A common observation in skipjack tuna fisheries is that the catch is quite variable. The reasons are that:

1) The fishery is dependent on only a few age groups, usually one or two, which are subject to wide variations in availability and abundance.
2) The fishery is part of a multi-species, yellowfin-skipjack tuna fishery that is subject to changes in the directed fishing effort, depending on fishing conditions of either one of the species.

Estimates of recruitment variability are presently unavailable, primarily because of difficulties in accurately aging skipjack tuna and in separating skipjack tuna fishing effort in the multiple species fishery. However, the recent changes in the performance of the fishery indicate that the year class recruited during 1974 was probably strong and the one recruited in 1975 was weak.

6.2.5 *Yield-per-recruit*

Some analyses of skipjack yield-per-recruit were reviewed by the Dakar Working Group (SCRS/76/38) using several hypotheses about growth, natural mortality and present levels of exploitation.

The conclusions of the Working Group are in agreement with previous yield-per-recruit analyses which indicated that a size limit regulation for skipjack would not produce a significant increase in long-term yield. This conclusion was based on analyses using a relatively low growth rate and high apparent natural mortality rate.

6.2.6 *Production model analysis*

Previous production model analyses for both Atlantic and Pacific skipjack tuna did not show any close relationship between CPUE and effort. New analyses performed by the Dakar Working Group (SCRS/76/68) and in SCRS/76/78 for Atlantic skipjack tuna indicate a decrease in CPUE, with large increases in fishing effort. Although the relationship is not very good, with the current configuration of the fishery maximum yield for skipjack of the eastern tropical Atlantic is estimated to be about 100,000 MT with an effort slightly higher than the current level (Figure 5). However, a large variation in catch concerning this equilibrium

maximum average yield is expected because of the large variation in recruitment and availability, instability caused by the small number of exploited year classes, as well as difficulties in correctly estimating effective fishing effort.

Due to the present difficulties in estimating the critical parameters necessary for application of other approaches to stock assessment, production model analysis, even with its shortcomings, appears to be useful for assessing the state of the Atlantic skipjack tuna fishery. The Committee, therefore, *recommended* that research should concentrate on developing better estimation procedures for skipjack tuna fishing effort.

6.2.7 *General conclusions*

The understanding of the skipjack tuna fishery and the exploited stocks appears to have improved since the 1975 meeting. The present fishery is highly dependent on the availability of the incoming year class for most of its catch, and it is clear that a size limit for skipjack will not increase the yield in respect to yield per recruit. The wide distribution in time and area of the adult spawning stock probably allows the species a high fecundity and probability that a large number of young survive to maturity. This suggests that the stock could withstand high exploitation of small-sized fish without seriously affecting recruitment to the spawning stock. This general conclusion should be reevaluated as:

— better estimates of all basic parameters such as growth, natural mortality (biological and apparent), fishing mortality, fishing effort, etc., become available; and
— better knowledge of the stock structure within the eastern Atlantic as well as within the entire Atlantic becomes available.

This information is critical to the determination of the actual potential yield from the Atlantic skipjack tuna population.

6.2.8 *Recommendations*

The ICCAT Working Group on an Intensified Atlantic-wide Skipjack Research Program, which met during the 1975 SCRS meeting, suggested two stages of research. Most of the goals of the first stage have been attained. The Working Group should meet again in order to develop a more precise program for the second stage of research. (The Report of the Group is attached as Appendix 4 — See Section 11.2.) The Dakar Working Group has provided some guidelines which the ICCAT Working Group should review. It is also noted that there are outstanding research questions to be answered but that they would require international cooperation, preferably with ICCAT coordination and support.

6.3. *ALBACORE*

6.3.1 *Recent trends in catch, effort and size composition*

Table 6 lists Atlantic albacore catches by gear and nation, for the period 1965-1975. Total catch has remained in the range of 60,000-90,000 MT since 1965. In

the most recent years, catch has declined from 83,400 MT in 1972 to 61,200 MT in 1975.

Since 1965, the contributions of the northern and southern Atlantic to the overall albacore catch have been 62 % and 38 %, respectively. There have been no consistent trends during this period (Table 6). The average distribution of the total Atlantic catch between gear types has been 50 % longline and 50 % surface, again with no consistent trend.

Table 7 shows total catch and effort by longline and surface gears, by ICCAT subarea (see subarea boundaries in Figure 6), for the period 1956-1974. During this period the proportions of the northern longline catch in subareas N-1 and N-2 changed from 100 % (N-1): 0 % (N-2) before 1964, to an average of 70 % (N-1): 30 % (N-2) after 1964, with no continuing trends. The northern surface fishery has operated exclusively in area N-2.

From 1956 to 1961, essentially the entire southern longline catch was made in subarea S-1. After 1961, albacore were taken in S-2 as well. Since 1962, the distribution has gradually changed from 96 % (S-1): 4 % (S-2) to 41 % (S-1): 59 % (S-2). In the South Atlantic, there is no significant surface fishery for albacore. For the albacore surface fishery (subarea N-2) size frequency data are available for all years since 1960. The quality of the data is better for the years after 1968.

Japanese longline catches in both northern and southern areas had been small until 1960. The processing of available size frequency data for this fishery for the years since 1960 has almost been completed. However, certain substitutions between time/area stratum are still required. Size frequency data from the significant Korean and Taiwanese albacore longline fisheries are available only since 1974, having been collected by the ICCAT Secretariat. The Committee *recommended* that the ICCAT Secretariat attempt to obtain pre-1974 data from these fisheries. For the past data, substitution of Japanese frequencies within subareas seems to be the only remedy for the missing data.

Figure 7 shows recent trends in age frequency of albacore catches in the North and South Atlantic for the longline and surface fisheries. The figure shows that during the period 1970-1974, the northern longline fishery caught albacore of about 3-9 years old and the dominant age shifted from age 7 to age 5. During this period, the southern longline catches consisted of predominately 3 to 8-year-old fish and the modal age remained constant at 4 years. The figure also shows that in recent years, the baitboat fishery has taken albacore of 2-6 years old and that the dominant age has shifted from 2 to 4 years. The troll fishery has taken albacore in the range of 2-5 years old. The dominant age of albacore caught in the troll fishery has remained constant at 3 years.

6.3.2 *Stock structure*

Three major albacore stocks are possibly involved in the Atlantic albacore fisheries, the northern and southern Atlantic stocks, and the possible Indian Ocean stock (Figure 8).

Results of research presented in document SCRS/76/82 suggest that recent catches in the northern Atlantic longline fishery are greater than expected for a given recruitment estimated from cohort analysis of surface catches. The study

projects future catch in northern fisheries and estimates the magnitude of the implied northerly immigration from the South Atlantic necessary to support observed northern longline catches. Specifically, estimated northern recruitment in the range of 10-13 million fish of age 2 albacore appears insufficient to support longline catches in excess of 3,000 MT (assuming fishing mortality remains at recent levels). The study concludes that to support longline catches in the range of 9,000-11,000 MT (the average 1970-1974 catch is 11,000 MT) would require an average annual immigration of 500,000 fish of 5-year-old albacore into the northern system.

On the other hand, information presented in document SCRS/76/30 suggests that the above migration may not have occurred. The relation between catch and effort indicates that the southern stock has been more heavily exploited than the northern stock has been, suggesting that sufficient quantities of fish have not been available in the southern stock to support such an emigration to the northern area.

Average recruitment in southern areas has been estimated at 8.6 million age 2 albacore for the period 1956-1967. Calculations suggest that this recruitment can support an average yield of 25,400 MT. Since the average southern longline catch for 1971-1975 is 27,900 MT, it seems unlikely that the southern stock provided recruitment of 500,000 age 5 albacore to the North Atlantic stock. One explanation for this apparent insufficiency of recruits to the northern longline fishery could be that a segment of the population of age 2 fish is unavailable to the surface fishery, but is eventually recruited into the longline fishery. The Committee feels that there are insufficient data to resolve the question of north-south interaction at this time, and that the question should be investigated further. Until further analyses show otherwise, it is appropriate to assume a two-stock structure for Atlantic albacore.

No information was presented on possible interaction between South Atlantic and Indian Ocean albacore. Figure 8 shows that catches occur all around South Africa at some time during the April-September period, implying possible interaction. On the other hand, until monthly data are analyzed, it cannot be inferred from this one semester map that albacore occur simultaneously in adjacent South Atlantic and Indian Ocean areas.

Documents SCRS/76/20 and SCRS/76/21 present the results of albacore tagging experiments in the eastern North Atlantic. During the period 1968-1975, 4,830 albacore were tagged; to date there have been 145 recoveries, a return rate of 2.3 % (Figure 9). Preliminary results suggest a complex migratory pattern within the North Atlantic and the possibility of two partially interacting groups occurring in the North Atlantic: one group east of 15° W longitude, which has been historically fished by the surface fishery; and one group west of 25° W longitude, fished more by the longline fisheries.

The catches of albacore made in June-July in waters off southern Brazil and northern Argentina, and in December-January off northern Brazil were suggested as evidence of two groups or stocks in the southern Atlantic. Length frequency distributions and length-weight relationships of albacore caught in these waters are presented in SCRS/76/57.

6.3.3 *Population parameters*

Document SCRS/76/71 reviews estimates of instantaneous natural mortality rate, M, for different Atlantic tuna species. The report concludes that the most reasonable M for albacore lies between 0.2 and 0.4. Document SCRS/76/30, using southern longline fishery data, estimates M at 0.475. The document states that this value probably overestimates M for young albacore and applies instead to albacore greater than 6 years of age. This information indicates that M in the range 0.2-0.4 is appropriate for younger albacore and that a somewhat greater value, perhaps in the vicinity of 0.5, applies to older fish.

Two documents present new estimates of catchability for Atlantic albacore. Document SCRS/76/33 estimates q in the southern longline fishery. Document SCRS/76/47 estimates age and gear-specific q in the northern surface fisheries. The latter document concludes that for age 2-5 albacore, q has shown no clear trend as the fishery expanded westward. The document further concludes that q decreases at the end of the surface fishing season. The Committee noted that estimates of q have been used for standardizing effort in the northern surface fisheries.

6.3.4 *Recruitment*

Figure 10 shows estimated recruitment of age 2 albacore in the northern stock for years 1947-1971 based on cohort analysis (performed on surface fishery data, SCRS/76/59). The figure suggests a general decline of recruitment from about 14 million age 2 fish in the mid-1950's to about 8 million fish in more recent years with increasing variability in its level. The figure suggests the 1972 recruit class is the smallest for the period. Since the estimate of the 1972 class is based on an incomplete catch series, the estimate should be considered tentative.

Document SCRS/76/59 presented indices of abundance for albacore in the northern longline fishery and for age 2 albacore in the surface fishery for years 1957-1972. The Committee fitted two stock-recruitment curves to these data (Figure 11). Although more work is needed to establish the actual shape of the stock-recruitment relation, low recruitments seem to occur more frequently when the spawning biomass is low. This observation, together with the fact that both the adult stock and recruitment have apparently reached rather low average levels during recent years, raises serious concern.

Document SCRS/76/33 estimates an average recruitment for the period 1956-1967 of 1.9 million age-at-first-capture fish (between 5 and 6 years), which corresponds to 8.6 million age 2 fish (with $M = 0.2$ for ages 2 to 5, and $M = 0.47$ for older fish for the southern stock).

6.3.5 *Yield-per-recruit*

No new specific yield-per-recruit studies were presented to the SCRS. However, the Committee saw no reason to amend the conclusions of previous analyses. Figure 12, isopleths of equilibrium yield-per-recruit suggest that, with keeping F constant, increasing age at first capture in the northern Atlantic albacore fishery could result in the following increase in yield-per-recruit (relative to yield at present age at first capture = 2 years old).

Increase age at first capture to	*Change in equilibrium, yield-per-recruit*
3	+ 8.0 %
4	+ 13.0
5	+ 6.0
6	—13.0

Age frequency distributions suggested that more older fish occurred in the surface fishery towards the end of the season. Shifting surface fishing effort towards the end of the season thus appeared to be one possible means of increasing the age at first capture.

These results should be considered preliminary since, as noted in section 6.3.2 of this Report, there is some evidence suggesting that not all segments of the population pass through the fisheries, and the yield-per-recruit analysis assumes a unit stock, with cohorts equally available to the fisheries.

6.3.6 *Production model analysis*

Document SCRS/76/31 presents the results of fitting northern and southern longline and surface albacore fishery data to a production model. Data used suggest that the northern stock could sustain an annual yield between 80,000 and 90,000 MT (average 1970-1975 catch 45,000 MT) and that this yield could be reached by increasing effort. According to a similar assessment, the southern stock could sustain an annual yield in the vicinity of 30,000 MT, roughly the current level (Figure 13-2).

The Committee noted that surface fishery data used in the above-mentioned analysis for the northern stock have been recently refined. Analysis with the refined data gave a maximum sustained yield of between 45,000 and 55,000 MT, which encompasses the current level of catch (Figure 13-1). As it is based on more refined data, more confidence should be attached to this second analysis. However, the Committee still voiced caution in interpreting the results of this analysis, because the variation of standardized effort appears to be unusually small. The Committee *recommended* that further studies be conducted.

6.3.7 *Discussion*

The exact stock structure of albacore in the Atlantic is still uncertain. However, no new evidence has been obtained to alter the traditional view of two stocks in the Atlantic for assessment purposes.

Current yields in the southern fisheries (average 1971-1975 yield is 27,900 MT) are near the maximum sustainable level (in the vicinity of 30,000 MT), as estimated by production model analysis. This sustainable yield is confirmed by calculations of potential yield from estimated recruitment. The increase in average yield to be expected by increasing fishing effort from the present level, therefore, would be negligible. Apparently, improvement of yield through changes in average age of capture appears to be unfeasible.

Current yields in the northern fisheries (average 1970-1975 yield is 45,000 MT) have already reached the maximum sustainable level (in the range of 45,000-55,000 MT) as estimated by production model analysis using refined data for the surface fishery. Yield-per-recruit analysis suggests that the yield would be increased by concentrating fishing mortality on ages 4 and 5. A trend toward this is currently occurring in both the longline and surface fisheries. A preliminary stock-recruit analysis suggests that 1972 recruitment is the lowest ever observed. It is also noted that 1973 and 1974 recruitments are thought to be better than in 1972. The apparent recent average decline in recruitment does not contradict the results of production and yield-per-recruit analyses.

More specifically, the Committee noted significant trends in the North Atlantic albacore fishery.

1) The overall catch in 1975 was at its lowest level (Table 6).
2) Recruitment appears to be declining (Figures 10 and 11).
3) Owing to the apparent increase in average age in the surface fishery, the yield-per-recruit has probably been increasing. If catches were adjusted to a 1970 level for example taking the above in consideration, the decline in catch would be greater than that observed.

Unfortunately, data obtained subsequent to 1972 were not available and, therefore, it is difficult to determine whether the decreased catches are accompanied by decreased effort. If effort has been increasing, then there is a danger sign of overfishing. The Committee, therefore, suggests that caution should be taken in increasing fishing effort on North Atlantic albacore and urges that the analyses be updated as quickly as possible, even before the next SCRS meeting.

6.3.8 *Recommendations*

Research presented to the Committee this year suggests that the question of the extent of interaction between northern and southern albacore stocks and between southern Atlantic and Indian Ocean albacore stocks is becoming more important. Accordingly, the Committee *recommended* that further analysis of albacore catch rates by fine time and area resolution be carried out and that research be undertaken to assess the origin of albacore catches at various landing sites.

This could be accomplished by collecting more detailed catch per effort data either directly by the ICCAT Secretariat of through a contract. In addition, examination of biological data (which already exist or are to be collected) from suspected mixing areas of stocks would be useful.

The Committee *recommended* that research directed at assessing recruitment of age 2 albacore in southern areas be undertaken. It is suggested that analysis of data from the Taiwanese longline fishery in this area might be valuable.

6.4. *BLUEFIN*

6.4.1 *Recent trends in catch and effort*

Details of catches by individual fisheries are given in Table 8, together with trends in average landings over various periods.

Landings in 1975, at 24,000 MT for the Atlantic and Mediterranean combined, maintained the recovery trend noted in 1974 landings (25,000 MT), following a period of catches declining to a minimum of approximately 13,500 MT in 1972 and 1973 (Table 8). The 1974 and 1975 catches are about 40 % above the 1970-1974 average. The recovery in total catch reflects differential changes in the various components of the fisheries. In the western Atlantic, Canadian and U.S. catches of small bluefin (2,175 MT) by surface gears in 1975 nearly doubled those in 1974 (1,229 MT), but were below levels of earlier years of the decade. Landings of larger fish in 1975, from the western Atlantic surface fisheries (1,340 MT) were essentially the same as in 1974. (The data for years before 1973 are not complete.) Surface fisheries in the eastern Atlantic accounted for 6,442 MT in 1975, about 1,400 MT more than in 1974. The increase is mainly due to exceptional baitboat catches of large bluefin tuna in Morocco.

Longliners operating in the Atlantic took 4,468 MT in 1975, somewhat higher than in 1974 (3,292 MT) and approximately doubled that for immediately preceding years. In the Mediterranean, catches in 1975 amounted to 11,081 MT, which, while below the 1974 level (13,620 MT) were above those (4,000-5,500 MT) pertaining to the earlier 1970's as a result of new or expanded longline (most recent two years only) and particularly purse seine effort.

The Committee noted with pleasure the receipt of information on a number of smaller bluefin fisheries and also noted the receipt of longline data at least a year earlier than usual, despite the difficulties distant-water longline fishing poses with respect to timely submission of data.

The geographical distribution of longline effort in the Atlantic (SCRS/76/43) demonstrated significant changes since 1970 and particularly in 1974, the last year examined, with effort tending to increase in waters off North America and West Africa. These changes in distribution of effort were associated with substantial increases in catches of bluefin, between 1972 and 1975, especially of smaller sized fish. Catch-per-unit-of-effort (CPUE) of longliners, adjusted for changes in target species, appears to have been stable, but fishing for bluefin in these areas is relatively recent. CPUE in the eastern Atlantic surface fishery has improved slightly in recent years, but the performance of Spanish traps continues to decline.

Available data on effort are included in Table 9.

6.4.2 *Stock structure*

Opinions differ as to whether the bluefin tuna of the Atlantic (excluding the Mediterranean) constitute a unit stock or two stocks (eastern and western Atlantic) with some mixing. The "two stocks" hypothesis is discussed first. This hypothesis as well as the unit stock hypothesis assumes major recruitment from the Mediterranean. Bluefin tuna of all sizes, (with the apparent exception of larvae and post larvae in the northeastern Atlantic) occur on both sides of the Ocean. The migratory patterns vary with the size of fish, those of the larger individuals being generally much more extensive than those of the small bluefin. However, the patterns of the respective size groups on the two sides of the Atlantic appear to be quite similar. The main differences that are seen can be explained by different spawning periods (those in the western Atlantic spawn earlier) and by uncertainty

with regard to the spawning migration of eastern Atlantic bluefin in the Mediterranean.

In addition to the differences in spawning seasons, the spawning areas of the two proposed stocks are very widely separated. There is practically no evidence of spawning or occurrences of larvae of early stages in mid-Atlantic. The principal known spawning area for western Atlantic fish is in the Gulf of Mexico, whereas the principal spawning area for eastern Atlantic bluefin is believed to be in the Ibero-Moroccan Gulf and/or at various places in the Mediterranean Sea.

Tagging and other information indicate that many large (over 100 kg.) bluefin from the eastern Atlantic enter the Mediterranean to spawn, and then return to the Atlantic. Smaller (less than 100 kg.) mature bluefin are believed to spawn in the Mediterranean or in the eastern Atlantic, without moving from one area to the other.

No larval or small (less than 120 mm.) bluefin have been found in the Ibero-Moroccan Gulf. On the other hand, extremely high densities of larval and small bluefin tuna over large areas have been reported in the Mediterranean. This leads to the possibility that the small bluefin fisheries in the eastern Atlantic depend, at least in part, on recruitment of age 0 fish from the Mediterranean.

Some transatlantic migrations of ages 1 plus have been indicated by tag returns. Although such migrations may affect the fisheries considerably in some years, they do not appear to be part of a regularly repeated pattern.

Facts favoring the unit stock hypothesis are: (1) degree of uniformity in long-term trends in catches throughout the Atlantic, except where new fisheries have been initiated; (2) the similarity between the growth rates of bluefin tuna from different parts of the ocean; (3) transatlantic and trans-equatorial migrations which have been recorded by tag returns. Also, no conclusive differences between samples from the two areas have been shown by morphological and biochemical analyses.

As in the two-stock hypothesis, the younger fish tend to separate into groups in different areas, but mix more freely at older ages. Even then, concentrations during the spawning and feeding seasons could still result in temporary splitting of the stock into regional groups.

The relationship between Atlantic and Mediterranean bluefin would remain as described under the two-stocks hypothesis.

Regardless of which stock concept is accepted, migrations take place between many Atlantic and Mediterranean fishing areas, some of which are widely separated. The quantitative importance and the variability of those migrations are virtually unknown.

Knowledge of these factors is essential not only to determine which stock concept is correct but, more significantly, as a basis for effective management of the fisheries. Perhaps the most economical and potentially productive initial step toward solving these problems would be extensive tagging of age 0 or age 1 bluefin in western Mediterranean and eastern Atlantic waters. It is noted, however, that the effects of alternative stock structure hypotheses on various possible management schemes can be assessed even before the true structure is known.

A study presented to the SCRS (SCRS/76/65), compared age-frequencies of fish in the various fisheries of the Atlantic and Mediterranean Sea and postulated a

unit stock with an easterly transatlantic spawning migration of ages 5-11 fish. This migration was assumed to be age-specific, with peak activity at age 9 and to be the cause of the large numbers of medium-sized fish in the eastern Atlantic catches. The author attributed the apparent contradiction between this hypothesis and his 1975 report (SCRS/75/89), showing morphometric and meristic differences between bluefin tuna from the two sides of the Atlantic, to possible differential growth rates resulting from different environmental conditions in the respective areas. The results of tagging in the western North Atlantic (SCRS/76/18), however, do not support this hypothesis. Historical size composition data suggest that the preponderance of medium-sized bluefin in the catches varied between one side of the Atlantic and the other, often as a result of dominant year classes, rather than following any consistent trend. Since 1967, medium-sized bluefin tuna have not been predominant in catches from the Atlantic. Prominent catches of medium-sized bluefin were reported from the Tyrrhenian Sea in 1975.

However, in view of the significance attached to the relative scarcity of bluefin of 6-13 years of age in the Atlantic, it seems desirable to consider this hypothesis further. In the first place, size composition data from the two areas should be considered on a year-to-year basis and, in addition, gonad conditions, sex ratios and the length-weight relationships of fish from the two areas should be examined. If these studies justify further efforts, a tagging program to test the proposed migration route might be in order.

An analysis (SCRS/76/58) of the distribution of bluefin tuna catch rates during the eastern Atlantic surface albacore fishing season (June-October) for the years 1967-1974, suggests that if any transatlantic migrations of bluefin had passed through the area, they did not involve large numbers of fish. Although inconclusive in regard to transatlantic migrations due to sampling being limited to part of the year and to surface fishing only, the seasonal movements of the bluefin were clearly shown. As the surface albacore fishery extends its range, studies of this nature should provide useful data on the distribution of the bluefin.

Among the important results fo bluefin tuna tagging in the western North Atlantic (SCRS/76/18) were four returns which appear to confirm a wintering area for bluefin less than 6 years old, previously suggested by two similar returns (SCRS/74/36). All of these fish had been tagged in the summer coastal fisheries off the northeastern United States and recaptured in oceanic waters near 40° N latitude and 66° W longitude by Japanese longline fishermen in January and February. The size composition data for the Japanese longline catches during this period also suggest that this is a wintering area for young bluefin.

6.4.3 *Population parameters*

Data on the population parameters of bluefin continue to be inadequate. One review (SCRS/76/71) concludes that M most likely lies between 0.1 and 0.2 as an average for all sizes.

The effects of assuming an age-dependent natural mortality model of a particular type (high M for age 1; decreasing M for ages 2 to 8; rapidly increasing M above age 9) on yield-per-recruit have been estimated (SCRS/76/61).

The comparison indicates that the use of an age-dependent or independent

model has little effect on the selection of best age at first capture, but appreciably influences the yield to be expected for the selected age at first capture.

Fishing mortality rates, F, for the years 1952-1969 were estimated by cohort analysis for the Atlantic plus Mediterranean fisheries. Average F's ranged from 0.15-0.30 for ages 1-4 and from 0.05 to 0.20 for ages 8-13 (SCRS/76/43). Another cohort analysis for the Atlantic fisheries only estimated F as high as 1.0 for ages 1-5, about 0.3 for ages 6-11 and in recent years as high as 1.2 for ages 12+ (SCRS/76/61).

There are several possible reasons why the estimates of F made by the two cohort analyses are different. First, the stock structures assumed by the analyses are different: SCRS/76/43 considers the Atlantic plus the Mediterranean as a unit stock; SCRS/76/61 considers the Atlantic only as a unit stock. Secondly, document 43 presents average F's over ages 1-4 and 8-13, while document 61 presents year- and age-specific F's. Since averaging merely indicates overall tendency and not trends over time, the results of the two analyses are not comparable.

Thirdly, it appears that the results presented in document SCRS/76/43 reflect the analysis of catches of ages 1-5 fish and of ages 8-14 fish separately. Re-analysis of the 1960 cohort, using the same data and suggested starting F as document 43 and using the entire catch series, results in a 69 % average difference between both estimates of F for ages 1-5 indicating that the different techniques give considerably different results. Until the question of the effect of the two techniques is resolved, the advisability of using the results of document 43 is uncertain.

Disregarding differences in technique (using incomplete catch series versus entire series), the smaller estimated F in the Atlantic plus Mediterranean analysis suggests a larger population currently available to Mediterranean fisheries than to Atlantic fisheries.

It was further noted that considerable differences of opinion exist with regards to the age of bluefin and that the age composition used in various analyses may need revision which could change the results of the analyses.

Evidence was presented which suggests that fishing mortality in the western North Atlantic purse seine fishery for ages 2-5 bluefin has been decreased by approximately 46 % as a result of regulations imposed in 1976 (SCRS/76/63). The F in certain western North Atlantic fisheries directed at age 9+ bluefin, however, increased by approximately 240 % in 1976.

Two studies (SCRS/76/67 and SCRS/76/86) provided significantly different information on size/age relationship for large bluefin, to the extent that a 245 cm. fish might be 12-14 or 14-18 years old. The differences in postulated age increase with fish size from as early as six years old. The basis for the difference centers on the interpretation of growth marks on otoliths with regard to the number formed in any year, and it is recommended that this be resolved as rapidly as possible (Appendix 5).

It is clear that attempts to utilize fish weight in calculating age of large bluefin must take full account of the season (estimated increase in body weight 7.5-10 % per month during the summer in coastal waters) and, apparently, sexual dimorphism (SCRS/76/86).

6.4.4 *Recruitment*

Recruitment of age 1 fish to the Atlantic alone was estimated (SCRS/76/61) to have fluctuated during the period 1960-1972 around one million individuals with a peak of 2.1 million in 1966 and recruitment in 1968 and 1970, in the western Atlantic at least, was also estimated to be strong. Estimates (SCRS/76/43) including the Mediterranean, place the recruitment fairly steady at about 1.5 million individuals with strong recruitment in 1960 (4.0 million) and 1966 (3.3 million).

Differences in recruitment estimates between these two analyses are due to the following reasons:

1) Stock structure: Document SCRS/76/43 assumes Atlantic and Mediterranean; document SCRS/76/61 assumes Atlantic.

2) Technique: Document 43 analyzes catches of ages 1-5 fish and ages 8-14+ fish separately. Re-analysis of the 1960 cohort using the data and starting F of document 43 and using the entire catch series result in a 56 % difference in estimated recruitment of age 1 bluefin suggesting that the two techniques give considerably different results. As noted in section 6.4.3, until the entire effects of the different techniques are known, the advisability of using the results of document 43 is uncertain.

Numbers of bluefin surviving to age 8 in document 43 were estimated to have declined to about a third of the original level in the period 1960-1968, while in document 61, numbers of ages 6-11 fish in 1973 were estimated to have declined 15-25 % of the 1960 level.

It is noted that differences in assumed stock structure in documents 43 and 61 have affected these estimates. Therefore, they are not comparable.

Results in document 63 suggest that the average fecundity for the bluefin population of the western North Atlantic has declined, and for the period 1976-1985 it is estimated to be 4 % of the average 1960-1965 level. While there is no evidence to suggest a particular fecundity-recruit relation, the estimated decline is cause for concern and indicates the need for improved recruit-class monitoring.

6.4.5 *Yield-per-recruit*

Equilibrium yield-per-recruit for Atlantic bluefin, was calculated with different stock structure hypotheses: North Atlantic-wide and western North Atlantic only (SCRS/76/61). Figure 14 shows isopleths of yield-per-recruit for the North Atlantic-wide system for each gear separately and for the combined fisheries. The figure suggests that if fishing mortality is kept at recent levels (defined as the average for 1970-1973), increasing age-at-first-capture in the system could be expected to result in the following changes (compared to the present age at first capture of 2 years).

Increase age at first capture to	*Change in equilibrium yield-per-recruit*			
	Fishery			
	1	*2*	*3*	*Total system*
3 years	7.7 %	22.2 %	26.7 %	16.1 %
4 years	7.7	100.0	73.3	38.4
5 years	3.1	177.8	140.0	47.3
6 years	— 7.7	233.3	200.0	49.1
7 years	—23.1	233.3	266.7	49.1

For the purpose of this report, the North Atlantic bluefin fisheries are defined as follows:

1) Fishery 1: eastern and western North Atlantic baitboat, troll, purse seine, and sport fisheries historically catching bluefin of age 1 to (variously) ages 5 to 8.

2) Fishery 2: central North Atlantic longline fisheries historically catching bluefin of ages 4 to 15.

3) Fishery 3: eastern and western North Atlantic harpoon, handline, purse seine, and sport fisheries historically catching bluefin of age 5, to maximum age bluefin.

The results indicate that increasing age at first capture to 3, 4, or 5 years would increase equilibrium yield-per-recruit in all bluefin fisheries. The results further suggest that the major beneficiaries would be fisheries 2 and 3 with the fishery 1 catch not declining. This is based on the assumption that age-specific fishing mortality remains at recent levels. If in fishery 1 fishing mortality in fact shifts from younger fish (1-5 years) to older fish (3-8 years), the benefits of increasing age at first capture will accrue to all three fisheries.

The results are dependent on a number of assumptions:

1) All fisheries operate in such a way that the distribution of fishing mortality over ages above that at first capture remains as in recent years;

2) Fishery 1 can avoid fish below the specified age at first capture. In this connection, Table 10 illustrates the present size composition for the various gear-area combinations.

3) Availability of fish to fishery 1 does not change.

Finally, the results reflect equilibrium conditions and do not reflect yield-per-recruit during the years before equilibrium is reached, i. e. the age structure of the population approaches stability (approximately 15 years, SCRS/75/92).

6.4.6 *General discussion*

Due to the scattered nature and small size of many bluefin tuna fisheries, there are difficulties in collecting appropriate information about the stocks. The very complex stock structure makes it even more difficult to understand the relationships between the various age groups exploited in distinct parts of the Atlantic and

Mediterranean. These are the main reasons for the deficiencies in our understanding of bluefin stocks and their current status.

The rapid decrease of catch rates in the Ibero-Moroccan traps and the collapse of the Norwegian fishery, both of which caught high proportions of large fish, was the first sign that important changes were occurring in the stock composition. The general expansion of fishing throughout the North Atlantic during the past 25 years by various gears at different times resulted in greatly increased catches. As a consequence, total removals from cohorts entering the large size group in recent years has been extremely high. The reduction of these cohorts has caused a sharp decline in the spawning biomass. Although there is no information on the relationship between the spawning biomass and the resulting recruitment, the fact that in the northwestern Atlantic the fecundity level during the next decade will be very low as compared to the 1960-65 level raises serious concern.

Yield-per-recruit analysis indicates that there would be benefits in delaying the exploitation of such a long-lived species as bluefin to age 5 or more and that delaying age-at-first-capture beyond the current age would be beneficial for all fishery segments (assuming F remains constant).

The comparison of recent information with that analyzed at previous sessions does not show any major changes in the status of the stock. Notwithstanding the difficulties in collecting more and better data on the stock, it should be stressed that such changes will only occur extremely slowly in such a long-lived species.

Size composition of catches does show some improvement resulting from the implementation of the size limit regulation in certain fisheries.

The Committee also noted that a regulation aimed at maintaining F constant is not easy to implement. In this respect, it noted that keeping catch constant will not by itself ensure a constant F for decreasing population of any stock. This observation should be kept in mind for bluefin as recruitment to the successive size groups is changing and is expected to continue for several years to come.

6.4.7 *Recommendations*

a) *Recruitment monitoring*

As the decrease in population fecundity (a more appropriate measure than abundance of spawners) may result in a decline in average recruitment, it is essential to obtain information on recruitment at the earliest age. Priorities are:

1) The evaluation of past indices of recruit-class strength in the Mediterranean and eastern (Bay of Biscay) and western (purse seine and sports) Atlantic fisheries.

2) The monitoring of similar indices during the forthcoming years and their comparison with past values. Such studies should be augmented, where possible, by other means of assessing recruit-class strength, possibly for ages less than the age at first capture (e. g. aerial surveys).

b) *Exploitation monitoring*

Because of numerous uncertainties regarding the effects of fishing in one fishery segment on other segments, it is important to monitor the strength of year classes entering each fishery segment. This cannot be achieved effectively without accurate and timely reporting of statistics.

Of particular significance will be improvements in data on catches and size composition of bluefin in the catches of the Mediterranean fisheries.

The Committee also reaffirmed its concern with regard to catches of age 0 bluefin for which no data are available and emphasized that the ICCAT Secretariat should make every effort to obtain these data.

c) *Stock structure*

Better management of bluefin tuna depends largely on improvements in our understanding of the stock structure, i. e. of the relations and amount of intermingling (i) between western and eastern Atlantic concentrations, and (ii) between Mediterranean and Atlantic groups. On various occasions, the Committee has stressed the importance of tagging experiments in this respect. The difficulties encountered in tagging young bluefin in the Bay of Biscay have been discussed at length and it is likely that conditions are not going to improve in the near future. It was considered that conditions might be better off Morocco, where ages 0 and 1 bluefin are known to be abundant. The Committee, therefore, *recommended* that the ICCAT Secretariat contact the Government of Morocco for the purpose of (i) ascertaining its willingness to organize a cooperative tagging project, and (ii) requesting it to indicate the staff and means required for executing such a project.

The Committee also noted a need to improve information on the movement of bluefin of all sizes through the Strait of Gibraltar. It, therefore, *recommended* that efforts be made to intensify tagging programs on small and medium bluefin in the Mediterranean. It further *recommended* that the Secretariat contact the institutes in the Mediterranean region which have conducted such programs in the past to see how these experiments could be intensified and what collaboration may be required.

d) *Age determination*

Divergent views regarding the aging of age 6+ bluefin tuna exist. The impact of changing the present aging criteria, if incorrect, on estimates of mortality, recruitment optimum age at first capture and population fecundity could be great. The Committee, therefore, *recommended* that measures be undertaken to standardize aging techniques.

e) *Sensitivity analyses*

The Committee *recommended* that the sensivitity of estimation and assessment techniques to uncertainty in age composition, stock structure and population parameters be investigated.

6.5. *BIGEYE*

6.5.1 *Recent trends in catch and effort*

After having steadily increased during the past ten years, total reported catches remained stable in 1975, as compared to those of 1974 (52,400 MT and 53,600 MT, respectively). (See Table 13.)

However, the overall amount of bigeye caught in 1975 may well have been

below the 1974 level for, as noted in the yellowfin section, it is suspected that increased quantities of small yellowfin have recently been reported as bigeye. On the other hand, substantial quantities of surface-caught bigeye are thought to be marketed as yellowfin. The latter source of bias would have caused a more or less constant underestimation, whereas the former would have resulted in an overestimation for recent years only. The past expansions have not equally affected the various fishery segments since the percentage of total catches landed by the surface fisheries (pole and line and purse seine) which was less than 20 % before 1974 has exceeded 30 % since then.* Improvement in both data coverage and quality is observed.

The Spanish fishery in Canary Islands, which is responsible for almost half the surface catches, is now properly monitored. Monthly length frequency distributions for the period 1969-1976 for the Brazilian longline fishery off southern Brazil were presented (SCRS/76/56).) Taiwanese statistics, together with updated Japanese data, were used to compute new estimates of overall effective effort (SCRS/76/34). (See Table 12.) However, the bigeye catches are still inappropriately monitored in several fisheries and the recommendation, made by SCRS at its Sixth Session (1975), that effort be made to obtain USSR tuna catches broken down by main species, has not yet been put into effect.

Overall effective effort in the longline fishery increased to a maximum in 1971 and has remained at a high, though slightly lower level since. Such expansion, which essentially reflects the increase in interest by the Japanese fleet for that species, is particularly marked in the statistics for the northern Atlantic.

In the longline fishery, hook rates have been decreasing since 1961. However, the decline has not been sharp: The 1974 hook rate is only one-third below the 1961 value (when catches were only one-quarter of the present amount). The nominal data have been processed according to methods aimed at eliminating biases from various sources such as changes in the respective distribution of effort and species.

6.5.2 *Stock structure*

All available data on catch rates and biological data — especially length composition by fishing sectors and seasons — from the longline fishery have recently been reviewed and recomputed (SCRS/76/35). The species is caught throughout the Atlantic between 45° N and 40° S latitudes. The fact that catch rates are somewhat lower along the Equator has been claimed as evidence of the existence of two stocks, one in each hemisphere, although such discontinuity is less marked during the northern winter. Even if some intermingling between northern and southern groups occurs from December to March, the rate of mixing might be low. There would, therefore, be some justification in assessing and managing the northern and southern hemisphere fisheries separately. Japanese data on spacial and temporal distribution of availability of size/age classes in the longline fishery has been processed, but this kind of information is still unavailable for the other fleets.

* This is partly attributable to improvement of Portuguese statistics which previously classified all the catches into miscellaneous tunas and are now presented by species. (Note by the Secretariat.)

Analysis of maturity index and larvae abundance indicates that spawning should take place in equatorial waters, during two seasons at six-month intervals — each possibly corresponding to the separate stocks.

6.5.3 *Population parameters*

No new information on bigeye tuna growth was presented to the Committee. The equation given by Champagnat and Pianet (SCRS/73/68) — the parameters which have values similar to the ones estimated by Yukinawa and Yabuta (1963) for the Pacific — was noted as the only growth equation so far available for bigeye tuna.

M has been estimated at .45 with the method described by Suda (1970) and comparison of age 5+ and 4+ fish in catches in numbers gave an average estimate of 0.60 for Z in the late sixties (SCRS/76/41). SCRS/76/71, which reviews estimates of M of tuna species given in the literature, concluded that M for bigeye tuna ranges from 0.4 to 0.7, which is in agreement with the estimate reported in document 41.

6.5.4 *Recruitment*

The comparison of numbers of 3-year-old fish entering the longline fishery (1.5 million estimated in SCRS/76/41) and of total numbers of younger fish caught by the various surface fleets, suggests that cohorts may be fairly intensively exploited during the first years of the exploited phase. However, because of the problem with some surface-caught yellowfin tuna being reported as bigeye tuna and vice versa, the Committee *recommended* that more refined analyses be undertaken.

6.5.5 *Yield-per-recruit*

A yield-per-recruit analysis concerning the longline fishery is presented in SCRS/76/41. Parameter estimates discussed above were used in the analysis. The results are graphically presented in Figure 15 and indicate that present catches of the longline fishery have not yet reached the level of maximum average yield.

An analysis of the effects of independently increasing fishing effort in each of the three fishery segments (pole-and-line, purse seine, longline) on yield was also presented. The results showed that (i) catch increased only in the fishery segment where effort increased, and (ii) the highest maximum yield — for the fishery segment where effort is increased as well as for the entire fishery — would be obtained by expanding the longline effort.

Such analysis assumes, for each of the fishing gears, the following ages of fish being exploited:

(i) pole-and-line: 1-3 years,
(ii) purse seine: 1-5 years,
(iii) longline: >3 years.

Recent length frequency distributions (Table 11) suggest that such assumptions are only partly justified with regards to pole-and-line catches. The Tema-based baitboat fleet essentially exploits age 1 fish, whereas the Spanish baitboats based

in the Canary Islands — as well as perhaps the Portuguese baitboats based in Madeira and the Azores Islands — exploit a much broader size range of fish closer to that of the purse seiners (2 to 6 year-old fish). The Committee *recommended* than an analysis simulating the interactions of the gears in the fishery and based on the most recent fork-length frequency distribution of catches be undertaken.

6.5.6 *Production model*

Previous assessments based on pre-1974 catch and effort statistics (Kume, SCRS/75/34; Sakagawa, SCRS/75/79) indicated that the Atlantic bigeye stock(s) were exploited near the maximum. The relationship between annual catches and effective hook rate suggested that in 1974 the fishery had not reached the stage of full exploitation, although in 1974 (as well as in 1975 according to official catch statistics) annual catches were about 20 % above the 1973 value.

Assuming a single Atlantic stock, a previous analysis based on production model has been updated (SCRS/76/69). With the data available, it is difficult to determine what mathematical function best fits the equilibrium yield/effort relationship. According to assumptions used regarding the shape of the production curve, and with the data available, a wide range of estimates are obtained for maximum average surplus yield, 43,000 to 181,000 tons. 1974-1975 catches (a little more than 52,000 tons) are comprised within that range, but near its lower limit.

These observations are in agreement with the estimated changes in total effective fishing effort exerted by the longline fishery, which since 1971, have roughly remained stable in the Atlantic as a whole.

The Committee noted that with the separation adopted for allocating catch and effort statistics by hemispheres, the northern "stock" seems to be relatively less intensively exploited than the southern one. The northern stock is also felt to be larger and should be able to produce a higher absolute additional yield with increased fishing effort.

6.5.7 *General discussion*

Recent changes in the relative importance of catches reported as bigeye and yellowfin tuna and the difficulty in distinguishing young individuals of the two species suggested the possibility that undue catches of undersized yellowfin were being made. This possibility raises the question of enforcement of an appropriate size regulation in such multiple species fishery. In order to clarify this point, the first task would be to check to what extent the species can be identified before young fish schools are actually caught by the surface fishery.

If such identification appears to be too imprecise, the adoption of a common regulation for both species may appear appropriate. Before a common size limit is considered, however, a series of questions need to be answered:

(i) What changes in bigeye yields in the surface and longline fisheries are to be expected from size limitation? Yield-per-recruit analysis presented in SCRS/76/41, as well as information on the yellowfin stocks and fisheries suggest that higher yields of bigeye tuna may well result from some shift of F towards relatively older age classes.

(ii) What long-term losses would result from the harvesting of undersized/misidentified yellowfin tuna? For that purpose, the present and potential catches of fish belonging to the undersized category will have to be assessed.

(iii) How long-term changes in yellowfin and bigeye yields compare to the loss of bigeye below the present yellowfin size limit or any other size likely to be adopted as a common limit for both species — and presently caught.

Considering that 1) according to all assessments the rate of exploitation of bigeye appears to be near the level of maximum average yield, 2) the exploitation of younger fishes has recently increased simultaneously with the expansion of the surface fishery and that this may reduce the overall production of the stock, and 3) the uncertainties on the precise present status of the stock, the Committee concluded that further expansion of the fishery should proceed with caution.

6.5.8 *Recommendations*

The decision to apply to both bigeye and yellowfin the same minimum size limit, which is currently in force for yellowfin will not eliminate the need to improve identification and allocation of catches between the two species. The question of separate assessments for the species will always remain. This need for better species breakdown in collection and reporting of catch statistics applies to the surface fisheries as well as to catches of some countries such as the USSR from which ICCAT has so far been unable to obtain statistics.

The Committee *recommended* that a multi-gear yield-per-recruit analysis using fork length frequency distributions now available for the various fishery segments be rapidly carried out in order to elucidate the respective effects of changes in fishing effort. It further suggested that various proportions in the contribution of northern and southern Atlantic stocks to the bigeye tuna fishery be considered. It would also be desirable to explore scenarios in which fishing effort would vary at different places but simultaneously in the main fishery segments.

6.6. *BILLFISHES (INCLUDING SWORDFISH)*

Information on the billfishes and swordfish fisheries of Taiwan and Japan (SCRS/76/42), Brazil (SCRS/76/44), the United States (SCRS/76/19 and 79) and Spain (SCRS/76/46) was reviewed by the Committee. The information in general consisted more of an updating of data already available than a presentation of new data and analyses.

6.6.1 *Recent trends in catches*

In 1975, 4,993 tons of billfishes were caught (Tables 14 and 15). This figure lies within the range of annual yields observed since 1967. Swordfish catches were 9,078 tons in 1975; this amount compares to the 1974 figure, but is somewhat lower than catches for the earlier decade when catches fluctuated between 10,000 and 15,000 tons. However, there has been some redistribution of effort within this overall reduction of swordfish catches. For instance, the Canadian fishery, which during the late 1960's had a stable production of 4,500 tons, has completely ceased since 1970. Taiwan started recording swordfish catches in 1972 and has been

recording about 1,000 tons annually since then. Brazilian catches doubled in 1974 and 1975 and swordfish (300-350 MT) now contribute about one-fourth of the total yield of the Brazilian longline tuna fleet.

6.6.2 *Stock structure*

Japanese hook rates for white and blue marlins for the period 1965-1974 have been summarized and displayed as monthly averages by 5° squares (SCRS/76/42). These maps confirm the higher concentration of marlins along the western side of the Atlantic, but do not clearly indicate separate distribution in the two hemispheres. However, previous analysis of tagging experiments on white marlin clearly indicated the existence of two stocks, one in the north and another in the south Atlantic.

Document SCRS/76/44 gives monthly length frequency distributions of Brazilian swordfish catches as well as the length/weight relationship for the same species. Document SCRS/76/79 shows that white marlin spawns in April/May in waters south of Florida, particularly between Cape Hatteras (U.S.A.) and the Bahama Islands. Data on the fecundity rate for the same species are presented in the same document.

New data on tagging experiments conducted by the United States (SCRS/76/19) largely confirm previous findings. Recaptures of white marlin are in conformity with the already described migration pattern (Mather et al., 1972), with one exception: one fish which was recaptured in the summer in the Gulf of Mexico one year after release; this observation suggests that the group is able to change its migratory and distribution patterns. Sailfish recaptures do not show any exclusive migrations.

6.6.3 *Present state of stocks*

From information on the Japanese and Taiwanese fisheries (SCRS/76/42), total catches of white marlin for 1974 are slightly above the 1973 figure (1,600 MT against 1,400 MT). These yields are well below the figures for the 1960 decade during which production peaked at 4,800 MT in 1965. Present total Atlantic effort for white marlin is estimated to be less than half of the 1964 maximum (400 hooks/5° square against 950 hooks/5° square). A similar change is also observed with respect to blue marlin: total catches have been stable since 1966 (between 1,700 and 2,800 MT), but were appreciably higher in the earlier period (7,700 MT in 1964). Simultaneously, fishing intensity has declined from a maximum of 850 hooks/5° square in 1964 to 510 hooks/5° square ten years later.

Annual catches have been plotted against fishing intensity for both white and blue marlins and for the Atlantic as a whole as well as separately for northern and southern hemispheres (SCRS/76/42). In all instances — except for white marlin/whole Atlantic and white marlin/northern Atlantic — catches for recent years are well below the levels observed in the early 1960's when, with the rapid development of the longline fisheries, the fishing intensity was equivalent to present levels. Such differences in catches for similar levels of effort — i. e. in fishing efficiency — are most likely related to changes in target species and geographical distribution of fishing effort.

6.6.4 *Conclusions*

At last year's SCRS meeting a production model analysis of blue marlin data gave unclear results, probably because the data used were not detailed enough. No new attempt has been made this year to fit the production model since data available are still basically the same. However, as blue and white marlin catches are rather stable, at levels well below those observed in the 1960's, the state of the stocks has probably not changed much during recent years.

6.6.5 *Recommendations*

The Committee *recommended* that available data on billfishes be promptly processed so that the yield potentials and state of exploitation of the stocks can be assessed with more accuracy. Of prime importance in the task will be apportioning the overall nominal effort in the longline fishery among the various stocks.

The Committee also noted that an appreciable amount of data mainly concerning catch and effort were collected in Canada but have not yet been fully processed. The problem of aging swordfish was also mentioned as outstanding, and the Committee expressed the wish that Canadian data be rapidly analyzed. The hope was expressed that the question of age determination of swordfish be considered.

6.7. *SMALL TUNAS*

Almost all new information gathered on this group since the last session is included in the report (SCRS/76/15) of the Ad Hoc Committee of Specialists which was set up by the FAO Expert Panel for the Facilitation of Tuna Research and met in Honolulu (Hawaii) in December, 1975. While reviewing the present status of biology, assessment, utilization and management of small tunas, the Committee of Specialists confined its detailed discussions to the following genera: *Katsuwonus, Auxis, Sarda, Euthynnus* and *Scomberomorus* as well as the species *Thunnus atlanticus*. It discussed more briefly a second group which includes genera such as *Acanthocybium, Cybiosarda, Orcynopsis*, etc.

With the exception of *Katsuwonus, Auxis* is, from a numerical standpoint, probably the most abundant species of tunas, as evidenced by the ocean-wide distribution and high abundance of larvae and juveniles, as well as by the common occurrence of the latter in the stomach of predators. It is, for instance, commonly found in the stomach of yellowfin, billfishes and dolphin fish (*Coryphaena*). The present catch of this species, which is estimated to be in the vicinity of 15,000 to 20,000 tons, can most likely be substantially increased. *Auxis* is already an important species in artisanal pelagic fisheries in Africa.

For the entire Atlantic, development prospects are more limited for *Sarda* (present estimated catches 10-60,000 MT). Because of their localized distribution, only moderate expansion is expected for *Euthynnus* and *Thunnus atlanticus*. This does not mean that their economic importance cannot be substantial in certain areas, as evidenced by the active fisheries for blackfin tuna in the western central Atlantic (e. g. northern Brazil).

Based on current economic conditions, the production of small tunas as a whole

is not expected to reach in the near future the level of maximum potential yield. In fact, economic constraints seem to be of major importance when considering present development prospects of small tuna production. The total Atlantic catches reported for the whole group do not show any significant upward trend, fluctuating between 80,000 and 130,000 tons during the period 1966-1973 (Table 6). However, the fact that the corresponding statistics (ICCAT Statistical Bulletin, Vol. 6) declined to 65,000 and 31,000 tons in 1974 and 1975, respectively, should not be interpreted as a reduction of exploitation, since this decrease is at least in part due to better identification of species in national statistics (e. g. reduction of the miscellaneous category).

Some taxonomic problems exist for *Auxis* and *Scomberomorus* and the reported occurrence of blackfin tuna in the eastern Atlantic needs to be confirmed. The Committee was informed by the ICCAT Secretariat that arrangements have been made to ensure that in case suspected blackfin tuna are caught in the Canary Islands zone, specimens can be dispatched to experts in tuna taxonomy. Much more crucial for proper assessments of present and potential yields of small tunas are the detrimental effects of inappropriate differentiation of species in the collection and processing of catch statistics. In addition to the fact that catches of small tuna species are often not recorded separately, additional confusion of species arises, at the data processing stage, from the use of misleading vernacular names. FAO and ICCAT have, therefore, been requested to promote the use of better names and the collection and reporting of more detailed statistics on small tunas, especially *Auxis*. The decrease in quantities reported under the miscellaneous category may indicate that progress is being made in this respect.

Landings of *Sarda* often show very wide year-to-year fluctuations. Research is needed to understand better the mechanisms underlying such changes. However, the major research requirements are in the field of stock assessment. This statement applies especially to *Auxis* and *Thunnus atlanticus*. Similar needs also exist for *Sarda* and *Euthynnus*, but it is recognized that, since these species do not dominate the catches of tunas in any area, investigations will probably be subsidiary to research on other tuna groups.

6.8. *SOUTHERN BLUEFIN TUNA*

This stock is made up of a single unit, whose area of distribution extends the southern Indian, Atlantic and Pacific Oceans at high latitudes. The spawning ground is located in the northwestern waters off Australia.

In the southeastern Atlantic, this species has been caught in relatively large amounts by longline. Since 1971, Japanese longline fishermen have been under a voluntary regulatory scheme to improve a decreasing age at first capture.

In June, 1975, Australian and Japanese scientists participated together in a special IPFC/IOFC Working Group on Stock Assessment of this species. They discussed in detail matters such as stock structure, tagging results, cohort analysis, catchability, etc. The Group concluded that the fishing intensity in the longline fishery was high and that the stock was being heavily exploited.

In brief, the stock is at a low level, but there has been no significant change in the stock condition during past recent years. The increase in age at first capture

is expected to bring some improvement in terms of yield-per-recruit. A cooperative study involving Australian and Japanese scientists is being executed at present.

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)

9.1. The Report of the Sub-Committee on Statistics (Appendix 6) was presented by the Convener, Mr. A. Fonteneau.

The Committee approved the Report and concurred with all the recommendations made by the Sub-Committee. The major points of the recommendations concern:

- establishing a data bank
- continue sampling and log abstracting from longliners transshipping their catches at foreign ports
- breakdown the catch by accurate species (yellowfin or bigeye)
- reporting of yellowfin catch by new areas
- recruitment of a biostatistician
- updating the ICCAT Field Manual (sampling section)
- long-term biostatistical assignments.

9.2. The Committee commended the hard work and good progress demonstrated by the Convener of the Sub-Committee and by the Secretariat, regarding problems in the collection of adequate statistics.

Item 11. Review of SCRS research programs and consideration of future plans

11.1. *EVALUATION OF ASSIGNMENTS*

11.1.1 The Working Group, convened by Dr. P. Miyake (Secretariat), reported its evaluation of the progress made on assignments given at the 1975 SCRS meeting (Appendix 7). The Group also reviewed the recommendations made throughout the meetings of the SCRS and the Sub-Committee on Statistics in 1976, and composed a new table of assignments for 1977 and beyond (Appendix 8). The table is now divided into two sections: (i) tasks to be undertaken and updated every year and (ii) special items of work to be initiated or completed by the 1977 SCRS meeting.

11.1.2 The Committee concurred with the tables presented and assigned the items to individuals. This list of assignments is attached as Appendix 8.

11.1.3 The Committee *recommended* that, shortly after the 1976 meeting the Secretariat list all the recommendations which all the national scientists have to fulfill and circulate the list widely as a reference. The list can be added to the formal version of the SCRS Report.

11.2. *INTENSIFIED ATLANTIC-WIDE SKIPJACK RESEARCH PROGRAM*

11.2.1 The Committee was informed of the work achieved during this SCRS Session by the Working Group on an Intensified Atlantic-wide Skipjack Research Program. As a follow-up of the Dakar Skipjack Working Group (SCRS/76/89), the framework of an intensified Atlantic-wide skipjack research program has been designed. The objective is to substantially and rapidly improve the information required for a better assessment of Atlantic skipjack resources which are believed to be large — probably several times more than the present catches. However, the level of the skipjack resources is difficult to evaluate. It is, therefore, thought that a quantum jump in the evaluation of skipjack potentials will be achieved only if extensive research effort is concentrated on this species. A preliminary description of this project proposal is given in Appendix 4 which describes the procedures of implementation and provides a rough formulation of the project's content.

11.2.2 The Committee expressed its profound interest for this project, and country representatives indicated their intent to actively participate in its execution. The Committee also stressed that, because of its magnitude, it will have to be carefully formulated. Costs and means required, as well as the expected findings of each project element should be properly assessed so that priorities can be correctly selected. This preparation phase was considered essential for the mobilization of funds, and for the final success of the project. In this task, the views of experienced scientists, such as those who are involved in the investigations on Pacific skipjack, should be sought.

The Committee further proposed that before the appointment of a program officer, the ICCAT Secretariat should act as Program Planner. The Secretariat should also coordinate the various actions which can be implemented with existing means. A list of such actions is given in the table attached to Appendix 4. It was also noted that the project proposed for the cooperative investigations should be ready in draft form for distribution to member countries and Commissioners for consideration, at least three months before the forthcoming ICCAT Regular Session.

Item 12. **Cooperation with other organizations**

12.1. The Assistant Executive Secretary reported on the cooperation between ICCAT and various international fisheries organizations. The Committee noted with many thanks the excellent contributions made by FAO officers during the SCRS sessions and at the ICCAT Training Course on Population Dynamics held this year. Also, it was noted that a very close relationship has been kept with FAO in the work of mutual interest.

12.2. Special mention was made that a questionnaire was sent out to existing international fishery organizations concerning the statistical and sampling schemes, and that many organizations had sent in responses (SCRS/76/17).

12.3. Considering the importance of tuna studies in the Mediterranean, the Committee agreed to keep closer contact with the General Fisheries Council for the Mediterranean (GFCM).

12.4. Mr. A. Dicenta (CIESM) presented a summary of the CIESM Working Group on Marine Vertebrates and Cephalopods. CIESM has carried out six cruises in the Mediterranean since 1970 and collected fish eggs and larvae. Future programs include studies on spawning bluefin stocks.

Item 13. **Scientific publications**

13.1. The Committee reviewed the present publication policies in respect to the "Statistical Bulletin", "Data Record", "Collective Volume" and "Statistical Series". It is noted that the nature of the contents of the "Data Record" should be modified when the computerized Data Bank is established and starts functioning. It is *recommended* that the data, which appear in past issues of the "Data Record", should be reissued after the data have been recompiled in a uniform format, probably on a species basis rather than on an annual basis.

13.2. The Committee noted little progress made on the publication of the Nantes Reports. It recognized the problem as being the authors' slow response to the editor. The Committee *recommended* that the Secretariat, in coordination with the SCRS Chairman, look into the problem and collaborate with the editor in the prompt publication of the Reports.

Item 14. **Other matters**

14.1. *ORGANIZATION*

14.1.1 The Committee considered the new working procedures adopted for this session. It fully recognized that the preparation of stock assessment summaries for each species on which the Committee has to provide advice has proved to be very useful. This practice should be maintained and reinforced. In this task it is essential that the rapporteurs receive as many contribution documents as possible at least one week before the meeting starts. This information should include summary tables of essential statistics. Such tables should be prepared by the Secretariat before the meeting and be presented according to the format given in Appendix 9. It also *recommended* the nomination of one rapporteur — or more for complex stock/fleet situations — for each of the main tuna species (yellowfin, skipjack, albacore, bluefin, bigeye and others). In selecting rapporteurs, language requirements should be taken into account. How extensive the summaries should be is left to the rapporteur's direction. However, digests should identify agreements in findings and divergences of observations or opinions. They could usefully include as well some preliminary and provisional assessment of the present understanding on stock status. Rapporteurs should arrive in Madrid early (two days before the opening of the meeting was suggested) so that they have sufficient time to review late coming information and finalize their reports.

14.1.2 The Committee also *agreed* that *ad hoc* groups on various species should meet during the first days of the meeting. These *ad hoc* groups — in which all

scientists concerned or interested in the pertinent species will participate — will serve several purposes:

(i) To ensure that all relevant information is used.
(ii) To provide opportunity for confrontation of diverging investigation, conclusions and understandings.
(iii) To allow for additional computations to be made, and
(iv) To ensure full participation of national experts in the assessment work and formulation of scientific advice.

14.2. *TRAINING ACTIVITIES*

14.2.1 The Committee was informed by the Secretariat that two training courses were organized during the intersessional period. The first course, on statistics and sampling, was postponed because it did not have sufficient participation. Several reasons were given for the lack of participants. Shortage of funds for ensuring national participation was one reason. This problem could apparently be solved by contributions from ICCAT and possibly other outside sources. The Committee *agreed* that the purpose and curricula of planned courses should be precisely defined well in advance.

14.2.2 It was suggested that visits of an ICCAT statistical staff member to main landing ports could be useful in training local data collectors. He could organize short lectures and practical work sessions with local scientists responsible for the designing of national statistical schemes, as well as review the performance of such schemes and offer suggestions for upgrading them. It was also mentioned that short-term workshops could be organized in various member countries and attended by experts of the home and neighboring countries. Financial assistance could be given to the national experts plus one or two outside instructors (probably including the ICCAT biostatistician). Participants from various levels and fields could attend different parts of such workshops (for example, administrators may attend the introductory phase).

14.2.3 Considering the need to improve national capabilities in collecting Atlantic tuna statistics, the Committee further *recommended* that the Secretariat undertake to assess the number and level of potential trainees, countries, etc., keeping in mind the following three objectives:

— Amount of training required at the data collection and processing level.
— Amount of training required at high level.
— The need to improve the design of national statistical schemes.

14.2.4 Should the response be positive, the Secretariat should organize in 1977 a training course on sampling and statistics with a curriculum suited to the objectives indicated by member countries.

14.2.5 The Committee felt that training is essential, but only a small number of highly qualified experts in the field need to be trained annually, while the cost of holding such a course runs rather high. Cooperation with other organizations

such as FAO, ICSEAF, ICES, etc. in sponsoring courses in sampling and stock assessment was *recommended*. Such collaboration would be most useful not only in attracting more participants, but also in encouraging more diverse training material, exchange of instructors, providing broader points of view, etc.

14.2.6 The Secretariat informed the Committee that the second course on popuation dynamics was held at La Coruña (Spain) in September of this year, in collaboration with the Spanish Institute of Oceanography — and with participation of instructors kindly provided by France, Portugal, Spain and FAO. It was attended by 13 students from member countries and met with good success.

Item 15. **Recommendations**

15.1. The attention of Panel 1 was drawn to sections 6.1 and 6.2 of this report, which concern the status of yellowfin and skipjack stocks, respectively. For Panels 2 and 3, the status of albacore, bluefin and southern bluefin is reviewed in sections 6.3, 6.4 and 6.8, respectively. Panel 4 should refer to sections 6.5, 6.6 and 6.7 for the status of bigeye, billfishes and small tunas, respectively.

15.2. Numerous recommendations to the Council are presented in the Report. Special attention is drawn to the study on the impact of the present regulations on the condition of the regulated species, which is presented in the pertinent species sections (Section 6), and for bluefin as Appendix 10.

15.3. Appendix 8 lists all the assignments and recommendations made through the Committee.

Item 16. **Date and place of next meeting**

16.1. The Executive Secretary presented a verbal report on a feasibility study of holding the SCRS meeting at some other time, rather than in mid-November. He noted that the main difficulty in making a major change in the meeting time would be for the Commissioners to rearrange their annual time schedule of various international meetings. The pros and cons of holding the SCRS meetings separately from the Commission meeting were also mentioned.

16.2. The Committee did not feel that it was necessary to shift the time of the SCRS meeting at present, and *agreed* that the next meeting should be held at the same place and about one week before the next Commission meeting.

Item 17. **Adoption of Report**

The Report was adopted by the SCRS.

Item 18. **Adjournment**

The meeting was adjourned.

Literature cited (in this Report which was not presented at the SCRS meetings)

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Table 1. Yellowfin tuna catch (thousand metric tons) in the Atlantic Ocean, 1964-76

	1964	*1965*	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976* [1]
TOTAL	68.7	69.8	64.9	58.5	82.6	93.0	76.4	79.7	95.8	93.7	107.8	117.4	124.6
Subtotals [2]													
Longline	38.7	37.3	23.4	15.5	24.1	26.8	27.2	27.4	29.6	32.0	30.3	27.1	25.5
Japan	35.1	36.9	22.4	12.8	13.9	10.0	6.8	11.0	7.5	4.2	4.3	6.0	—
Korea + Panama	...	...	—	—	2.3	6.0	13.3	11.5	11.2	18.4	18.7	15.3	—
China (Taiwan)	0.4	0.2	1.1	2.7	7.9	10.8	7.1	4.4	4.7	2.7	2.3	2.4	—
Surface - East Atlantic	28.2	29.0	37.8	36.7	54.3	62.2	45.1	50.4	62.8	58.9	75.5	87.3	99.1
Purse Seine													
FIS	4.3	5.4	7.5	8.9	12.6	14.7	18.0	18.0	24.6	25.0	32.8	42.9	57.0 [2]
Japan	0.5	1.1	4.8	5.2	7.5	5.8	1.3	2.2	2.8	1.5	0.9	0.2	
Spain	1.0	1.0	3.0	3.0	3.6	5.3	6.4	15.2	8.0	12.8	14.4	23.0	28.5 [2]
U.S.A.	—	—	—	1.1	5.9	18.8	9.0	3.8	12.0	3.0	5.6	14.0	3.6
Baitboat													
FIS	13.2	14.7	15.9	14.9	19.9	14.2	8.1	7.8	8.4	5.6	6.4	2.8	— [2]
Japan	2.1	1.3	0.5	1.3	2.2	0.9	1.0	2.5	4.4	8.1	8.3	1.0	10.0 [3]
Korea-Ghana-Panama									0.4	1.2	2.9	2.0	
Angola	4.5	2.8	2.4	1.6	1.6	1.0	0.4	0.5	0.6	0.6 [1]	0.6 [1]	—	—
Spain	2.6	2.7	3.1	...	0.4	0.6	0.7	0.4		0.8	2.0	1.0	—
Surface - West Atlantic									2.9	2.3	1.6	1.9	

[1] Provisional estimates.
[2] BB included in the PS.
[3] Combined Ghana-Japan-Korea-Panama.

Table 2. Estimated carrying capacity (thousands of metric tons) and standardized fishing effort (thousands of days fished) for the surface fishery 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*
Estimated effort [5] ($\times 10^3$ standard days at sea)	9.24	11.43	20.03	19.69	23.30	23.27	28.38	30.98	43.67	43.85
Carrying capacity										
BB — Ivory Coast - Senegal	3.7	3.9	2.1	2.0	2.2	2.0	1.4	1.2	0.8	0.8
BB — Tema-based [4]	1.2	1.2	0.9	0.9	1.2	2.6	4.0	5.4	5.4 [6]	5.4
Total BB	4.9	5.1	3.0	2.9	3.4	4.6	5.4	6.6	6.2	6.2
PS — FIS	1.5	1.6	8.0	9.7	12.0	13.9	17.2	21.9	24.2	24.2
PS — Spain	0.6	1.0	2.1	2.1	4.5	7.5	7.9	10.5	17.1	20.1
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
Total PS	2.4	3.2	14.5	17.2	20.3	29.3	28.0	37.9	51.7	45.0
TOTAL PS AND BB	7.3	8.3	17.5	20.1	23.7	33.9	33.4	44.5	57.9	51.2

[1] Estimates from ICCAT Biennial Report, 1974-75, Part II (1975).
[2] Estimates for 1969-1975 from Peter Miyake (SCRS/76/13).
[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/76/70).
[6] This is an overestimate of the actual capacity engaged in the fishery since Japanese baitboats fished only the early part of the year.

Table 3. Yellowfin surface catches by size in 1975

	FIS		*Spanish*		*U.S.A.*	*Ghana*	*Japan*	*Korea & Panama*	
Length	*BB*	*PS*	*PS* *	*BB*	*PS*	*Tema-based baitboats*			*Total*
-45	14	73,202	38,105	0	75,241	127,918	72,726	179,488	1,711,598
45-54	34,965	236,114	122,908	0	149,211	92,866	216,477	292,363	
55-	64,578	118,309	61,585	0	240,414	17,560	42,561	56,628	
65-	13,923	20,630	10,738	0	87,763	4,085	13,990	16,011	
75-	16,094	21,518	11,201	0	49,388	0	2,543	8,024	
85-	29,552	83,137	43,276	0	49,798	0	3,391	7,472	
95-	42,991	96,993	50,489	0	55,584	0	671	7,592	
105-	17,949	96,226	50,090	0	52,406	0	0	3,298	
115-	2,787	198,185	103,164	0	37,024	0	0	0	
125-	2,733	92,124	47,954	55	29,638	0	0	0	
135-	2,395	104,950	54,631	305	30,136	0	0	0	
145-	1,760	156,827	81,636	3,895	33,298	0	0	0	
155-	164	98,914	51,489	5,790	24,655	0	0	0	
165-	0	45,634	23,754	2,025	7,531	0	0	0	
175-	0	5,313	2,766	995	914	0	0	0	
Total in number	229,905	1,448,076	753,793	13,065	923,001	242,429	352,359	570,876	4,533,504
Catch in weight	2,800	43,800	22,800	1,000	14,000	486 t	957 t	1,676 t	
% undersized	15	21	?	0	24	91	82	83	38 %

* No sample, assumed as FIS PS.

Table 4. Development in catches of undersized yellowfin

[1] In number (thousands)

Year	Japan		Ghana	Korea	FIS		USA	Spain *	Total
	BB	PS	BB	BB	BB	PS	PS		
1974	2,254	50	485	406	175	727	57	509	4,663
1975	289	0	220	472	35	309	224	160	1,709
1976	2,600 **				700 ***				

[2] In percent

Year	Japan		Ghana	Korea	FIS		USA	Spain *	Total
	BB	PS	BB	BB	BB	PS	PS		
1974	81	29	94	67	24	37	14	37	59
1975	82	—	91	84	15	21	24	21	38
1976	+90 **				27 ***				

* Estimated.

** 6 month estimate based on transshipments in Puerto Rico (Puerto Rico samples are suspected to be biased towards large size fish).

*** 9 months.

Table 5. Skipjack catch (thousand metric tons) in the Atlantic Ocean, 1964-76

	1964	*1965*	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
TOTAL	18.7	33.0	40.3	38.1	63.9	43.8	64.0	87.6	76.8	77.3	114.7	61.7	42.4
Subtotals [1]													
Surface - East Atlantic	17.6	31.5	38.5	35.4	61.4	42.1	61.6	85.1	74.6	74.3	110.2	54.3	42.4
—Purse Seine													
FIS	0.4	0.7	1.9	1.6	5.1	3.8	9.2	13.8	16.7	8.7	24.8	13.9	21.0 [2]
Japan	0.0	1.8	1.4	2.2	6.3	0.7	3.5	6.2	3.4	1.5	0.9	0.1	0
Spain	0.4	1.0	2.3	2.9	8.9	4.3	6.9	15.0	18.6	17.8	31.1	17.0	4.8 [2]
U.S.A.	3.9	0.1	0.0	0.5	3.3	4.8	11.8	16.2	12.3	21.2	20.0	7.4	1.6
—Baitboat													
FIS	1.8	3.5	4.5	3.9	7.9	4.6	4.8	5.7	3.8	3.7	4.7	1.8	[2]
Japan	3.1	6.3	4.4	3.7	7.3	4.9	7.5	11.7	10.1	13.0	18.7	3.7	15.0
Spain	4.1	8.5	16.2	10.7	10.2	14.0	15.3	13.0	8.2	4.3	5.4	0.8	
Korea+Panama+Ghana										1.2	3.8	7.9	
Surface - West Atlantic								1.6	1.1	2.5	3.0	3.2	

[1] Breakdown consists of major fisheries only.
[2] BB included in the PS catches.

Table 6. Albacore catch (thousand MT) in the Atlantic Ocean, 1965-1975

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
TOTAL	88.3	75.9	76.6	72.5	79.4	73.9	81.6	83.4	77.7	73.6	61.4
Subtotals											
North Atlantic	57.7	48.7	56.2	43.4	43.2	42.9	48.3	39.5	50.3	52.8	39.5
Surface											
—Baitboat	19.7	16.4	17.6	13.7	13.8	14.2	14.2	8.0	9.2	15.5	21.1
France	4.9	3.7	4.2	2.4	1.8	2.0	1.6	1.1	1.0	0.5	0.7
Spain	14.8	12.7	13.4	11.3	12.0	12.2	12.6	6.9	8.2	14.5	19.4
—Trolling	23.1	23.4	31.4	24.3	18.4	15.8	21.7	23.7	18.0	20.1	9.9
France	8.9	10.6	12.4	11.9	8.2	4.6	8.2	8.7	5.1	8.5	5.4
Spain	14.2	12.8	19.0	12.4	10.2	11.2	13.5	15.0	12.9	11.6	4.5
—Longline	14.3	8.0	5.5	4.5	7.8	9.4	10.6	5.5	19.9	14.3	8.4
Japan	14.3	5.9	4.8	3.3	4.7	5.9	6.4	1.3	1.5	2.1	1.1
Korea	—	2.0	0.6	0.1	1.6	1.3	1.5	0.1	8.5	4.1	1.9
China (Taiwan)	—	0.1	0.1	1.1	1.5	2.2	2.7	4.1	10.0	8.2	5.4
South Atlantic	30.0	26.6	19.8	27.8	34.6	29.8	31.9	41.6	22.5	19.8	21.3
—Longline	28.9	25.8	19.1	26.7	34.2	29.3	31.4	41.4	22.4	19.5	21.2
Japan	28.3	21.0	7.7	11.9	6.4	5.9	3.7	2.6	0.7	0.4	0.7
Korea	0.5	4.7	9.7	7.2	14.4	8.7	10.0	13.5	0.0	1.1	4.2
China (Taiwan)	0.1	0.1	1.7	7.6	13.4	14.7	17.7	25.3	21.7	18.0	16.1
Mediterranean	0.5	0.5	0.5	0.5	0.7	0.6	0.5	0.7	0.5	0.5	0.5
Unclassified	0.1	0.1	0.1	0.7	0.9	0.6	0.9	1.5	4.3	0.5	0.1

— Source of data: Statistical Bulletin, Vol. 6 (1975).
— Breakdown consists of major fisheries only.
— Spanish gear breakdown is provided by I.E.O., Spain, and adjusted according to the official statistics by the Secretariat.
— 1965 French gear breakdown is provided by CNEXO, France.

Table 7. Catch and effort, Atlantic albacore fisheries by ICCAT subareas and gear (Source: SCRS/76/30 and SCRS/76/59)

	Subarea N-1 Longline		*Subarea N-2 Longline*	
Year	*Catch*	*Effort*	*Catch*	*Effort*
	$\times 10^3$ MT	$\times 10^6$ hooks	$\times 10^3$ MT	$\times 10^6$ hooks
1956	0.0	0.0	0.0	0.0
1957	.1	.07	0.0	0.00
1958	.9	1.06	0.0	0.00
1959	.6	1.77	0.0	0.00
1960	1.1	1.52	0.0	0.00
1961	.4	.72	0.0	0.00
1962	5.7	13.01	0.0	0.00
1963	14.0	24.64	.5	.89
1964	14.4	41.94	1.4	4.52
1965	10.6	26.89	3.9	14.52
1966	5.5	18.22	2.7	10.00
1967	3.6	9.17	1.9	7.38
1968	4.5	14.12	1.2	4.88
1969	6.0	15.00	1.9	5.56
1970	9.0	26.92	2.8	17.98
1971	6.4	26.07	4.4	23.14
1972	4.9	20.46	4.5	20.34
1973	12.3	42.50	5.9	24.92
1974	8.8	32.50	5.0	25.67

Table 7. (Continued)

Year	*Subarea N-2 Surface*		*Subarea S-1 Longline*		*Subarea S-2 Longline*	
	Catch	*Effort*	*Catch*	*Effort*	*Catch*	*Effort*
	$\times 10^3$ MT	$\times 10^3$ days	$\times 10^3$ MT	$\times 10^6$ hooks	$\times 10^3$ MT	$\times 10^6$ hooks
1956	40.9	?	0.0	0.03	0.0	0.00
1957	41.9	67.3	.7	.38	0.0	0.00
1958	51.2	94.1	1.0	.96	0.0	0.00
1959	49.1	81.7	3.0	4.87	0.0	0.00
1960	50.3	74.0	10.5	9.08	0.0	0.00
1961	41.4	62.6	10.3	12.92	.1	.12
1962	51.8	74.6	16.4	27.02	.7	.64
1963	41.4	81.9	15.5	18.97	1.2	.91
1964	48.0	78.1	22.0	37.74	3.3	3.20
1965	44.6	71.2	17.6	28.40	12.4	22.31
1966	38.9	87.8	13.0	31.35	13.5	37.47
1967	48.0	103.8	11.5	25.48	8.3	18.24
1968	36.9	87.9	14.1	31.62	13.1	39.80
1969	31.6	74.8	20.5	43.47	14.8	46.33
1970	29.6	54.9	14.0	41.28	13.8	42.80
1971	39.0	72.0	15.2	53.15	17.3	60.00
1972	33.6	61.8	16.1	51.50	22.8	87.25
1973	26.2	54.7	11.3	47.20	17.2	71.56
1974	32.7	44.3	8.5	34.41	12.2	52.52

Table 8. Bluefin catches (MT) by country, gear and area, 1974, 1975 and 1976 with average catch 1970-74, 1971-74, 1972-74, and 1973-74

Fishery		1976	1975	1974	1973-74	1972-74	1971-74	1970-74
WESTERN ATLANTIC								
Subtotal [5]		2,603	3,585	2,782	2,622	2,656	3,124	3,501
Canada	Large	475 [1]	350	664		419	366	379
	Small (PS)	331	291	103	369	333	483	619
U.S.A.	Large	766 [1]	964	731	537	470 [2]	392 [2]	314 [2]
	Small (PS)	981 [P]	1,760	804	877	1,185	1,641	1,979
	Sport	50	122	322	192	128 [2]	96 [2]	77 [2]
TOTAL NORTH ATLANTIC								
Subtotal [5]			4,468	3,292	2,335	1,783	2,508	2,043
Taiwan	LL	...	32	136	154	131	128	124
Japan	LL	...	4,413	3,100	2,120	797	1,582	1,281
Korea	LL	...	23	56	61	51	1,064	638
EAST ATLANTIC								
Subtotal [5]		1,497	6,442	5,016	4,820	4,614	5,283	5,605
France	Surf	269	778	550	546	664	698	719
Morocco	BB	...	2,624	590	551	544	416	414
	Trap	...	0	7	4	43	48	96
Norway	UNCL	...	900	800	450	333	400	400
Portugal	BB	...	176	1	11	7	5	4
Spain	BB - Can.	641 [P]	932	546	726	484 [2]	783 [2]	627 [2]
	BB - NE	587	891	1,009	1,254 [2]	1,236 [2]	1,477[2,3]	1,840[2,3]
	Trap	...	—	13	258	256	342	573
MEDITERRANEAN								
Subtotal [5]		8,372	11,081	13,620	9,382	8,168	7,386	6,662
France			1,500	2,500	1,489	1,326	1,444	1,336
Italy	Trap	650	1,000	1,000	658	495	557	581
	PS	7,720 [4]	6,500	6,000	4,100	3,500	2,625	2,200 [2]
	UNCL	...	500	500	500	500	500	500
Japan	LL	...	1,260	2,195	1,200	851	638 [2]	511 [2]
Libya		...	—	500	450	400	450	460
Malta		...	37	21	10	7	5	4
Morocco	Trap	...	—	7	4	15	20	16
	BB	...	40	2	1	1	11	9
Spain	UNCL	2 [1]	23	300	400	333	342	417
Tunisia		...	—	245	261	307	354	367
Turkey		...	—	—	—	8 [2]	11 [2]	36 [2]
Yugoslavia		...	155	317	270	247	267	231
TOTAL		12,472	25,581	24,710	19,161	17,222	18,302	17,816

[1] Estimate.
[2] No fishery, or data available for some years.
[3] 1971 surface catch assigned 2,000 MT to BB, 1,197 MT to Troll - NE.
[4] Three quarters only.
[5] Breakdown consists of major fisheries only.
[P] Preliminary.

Table 9. Atlantic bluefin tuna effort and CPUE — 1970-75

	1970		*1971*		*1972*		*1973*		*1974*		*1975*	
GEAR & MEASURE												
Longline (1,000 hooks and fish/100 hooks)												
Japan (north of 20° N — adjusted effort)	773	(0.06)	6,890	(0.12)	3,260	(0.09)	5,190	(0.09)	28,370	(0.10)		
Taiwan (All Atlantic)	36,208	(0.01)	52,787	(0.00)	51,979	(0.00)	62,356	(0.00)	53,414	(0.00)		
Purse Seine (days and tons/day)												
Canada					100	(1.9)	54	(11.8)	18	(5.7)	21	(13.9)
U.S.A.											98	(6.8)
Baitboat (days × number of fishermen)												
France/Spain					3,009	(21.9)	3,389	(34.7)	2,258	(40.7)	3,034	(38.0)
Canaries (to be provided by Santos at a later stage)												
Trap (days and tons/day)												
Canada											895	(0.16)
Morocco					339	(0.52)	325	(0.00)	68	(0)		
Spain	206	(5.63)	215	(1.14)	197	(1.63)	192	(1.74)	196	(0.37)	167	(0.13)

Table 10. Age composition of catches in small fish fishery — By areas

Year	*1976*		*1975*		*1974*		
Age	*Western Atlantic (U.S.)* [1]	*Bay of Biscay* [2]	*Western Atlantic (US-Canada)* [1]	*Bay of Biscay* [2]	*Western Atlantic* [1]	*North Atlantic* [1]	*Bay of Biscay* [2]
	PS		*PS*		*PS*	*(all fisheries)*	
1	1 % *	1 %	15 %	11 %	30 %	8 %	—
6.4 kg							
2	17 %	76 %	75 %	74 %	29 %	71 %	38 %
3	82 %	16 %	3 %	8 %	27 %	8 %	53 %
4		3 %	6 %	5 %	9 %	5 %	7 %
5		2 %	—	1 %	2 %	2 %	1 %
6		1 %	1 %	—	2 %	2 %	1 %
7		—			—	1 %	—
8						1 %	
9						1 %	
10						—	
Total tonnage	981 MT	857 MT	2,053 MT	1,669 MT	≈900 MT		1,558 MT
Number of fish	60,640	60,053		115,437	59,777	274,066	91,950

* Taken intentionally during U.S. tagging.

[1] Data provided by Woods Hole Oceanographic Institution — National Marine Fisheries Service, USA.

[2] Data provided by J. L. Cort and F. X. Bard, SCRS/76/83.

Table 11. Bigeye tuna length frequency distributions by major fishing fleets

		SURFACE			LONGLINE	
		Spanish BB	*Tema-based BB*	*US Purse Seiners*		
	Approx. age at length (1)	*Canary Is.* *1975* (2)	*Central Gulf of Guinea 4th qtr - 1975* (3)	*Whole Gulf of Guinea 1974* (4)	*N. and S. Atlantic 1975* (5)	*South Brazil 1975* (6)
30		0	0	0	0	
40		0	45,921	291	0	
50	1 year	0	1,290,634	5,426	545	
60		557	157,099	12,709	687	
70		7,173	70,090	21,295	2,631	
80	2	31,483	2,400	7,984	12,169	1
90		30,262	0	14,777	18,806	6
100	3	17,474	0	7,623	38,571	14
110		2,471	0	4,416	45,622	49
120		892	0	11,725	76,728	174
130	4	1,762	0	2,631	131,060	363
140		7,050	0	3,343	92,631	452
150	5	11,840	0	7,292	72,024	426
160	6	7,691	0	543	71,064	378
170		5,901	0	95	61,655	202
180	7+	4,304	0	624	8,709	37
190		3,031	0	0	1,801	
200		194	0	0	0	
210		0	0	0	142	
Corresponding catches (tons)		7,000+ 5,200 (Port.) (7)	3,200 (1974) 730 (1975) (8)	2,000+ 4,000 (FIS) (9)	36,000	150

(1) From Champagnat and Pianet, 1973.
(2) From Santos (SCRS/76/49).
(3) Fishery Research Unit, Tema (SCRS/76/26).
(4) Data Record, Vol. 8.
(5) ICCAT data — SCRS/76/7.
(6) SCRS/76/56.
(7) 5,800 T caught around Madeira and Azores, assumed to have same length distribution.
(8) 1975 catch estimate based on Puerto Rico and Tema samples.
(9) 4,000 T caught by FIS fleet, assumed to have similar length composition with relatively more 40 and 50 cm. size classes.

Table 12. Catch, effective effort and fishing intensity of bigeye tuna caught by the longline fleet in the Atlantic Ocean, 1956-1974 (Source: SCRS/76/34)

	Basic data (Japan and Taiwan combined)					*Whole longline fleet*		
Year	*Catch in number (10^3) (A)*	*Yield in weight (10^3 tons) (B)*	*Effective hooks (10^6) (C)*	*Intensity per 5° square (10^3 hooks) (D)*	*Hook rate (A)/(C)×100*	*Yield in weight (10^3 tons) (E)*	*Effective hooks (10^6) (E)/(B)×(C)*	*Intensity per 5° square (10^3 hooks) (E)/(B)×(D)*
1956	0.2	0.0	0.1	0.5	0.27	0.0	0.1	0.5
1957	8.7	0.5	2.6	17.1	0.34	0.5	2.6	17.1
1958	14.8	0.5	5.7	37.7	0.26	0.5	5.7	37.7
1959	44.8	1.5	11.1	74.0	0.40	1.5	11.1	74.0
1960	70.6	2.9	15.0	101.3	0.47	3.0	15.6	104.8
1961	243.7	11.0	29.0	197.2	0.84	11.2	29.6	200.8
1962	367.9	15.7	51.6	350.8	0.71	15.9	52.3	355.7
1963	285.3	14.5	45.9	313.3	0.62	14.7	46.7	318.5
1964	343.7	17.3	58.9	399.8	0.58	17.6	59.7	405.5
1965	648.3	28.5	113.5	779.4	0.57	29.0	115.4	793.1
1966	232.1	17.6	45.5	313.1	0.51	19.0	49.1	337.8
1967	188.3	10.7	31.8	213.3	0.59	11.4	33.9	227.6
1968	341.4	15.3	60.5	408.9	0.56	16.8	66.3	448.0
1969	430.2	16.2	69.3	469.3	0.62	19.2	82.4	558.0
1970	332.2	15.6	63.5	431.3	0.52	24.6	99.9	678.0
1971	533.2	27.7	124.8	848.7	0.43	38.2	172.4	1,172.1
1972	430.4	22.2	111.3	758.0	0.39	30.0	150.5	1,024.4
1973	575.6	22.9	111.7	750.2	0.52	34.1	166.3	1,116.7
1974	551.2	24.6	106.9	716.5	0.52	36.3	158.1	1,059.7

Remark: Taiwanese data are comprised of those from 1967 to 1974.

Table 13. Amount of catch of bigeye tuna in the Atlantic Ocean, 1964-1975 (in 1,000 tons) (Source: SCRS/76/34)

		1964	*1965*	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
Grand total		20.6	29.2	19.0	12.0	18.2	24.1	28.2	45.1	35.2	42.5	52.4	51.0
Longline	Sub-total	(17.6)	(29.0)	(19.0)	(11.4)	(17.1)	(20.9)	(25.5)	(36.9)	(31.3)	(35.2)	(36.3)	34.0
	Argentine	0.2	0.4	0.2	0.1	0.3	0.2	0.1	—	—	0.0	0.0	0.1
	Brazil	—	—	—	—	—	—	—	—	—	0.1	0.2	0.1
	Cuba	—	0.1	0.3	0.3	0.9	1.0	4.1	3.2	2.0	2.6	2.4	1.9
	Japan	17.3	28.5	17.6	8.5	10.3	10.3	9.0	20.8	18.5	20.2	21.4	17.7
	Korea	—	—	0.3	0.3	0.3	1.9	4.7	7.4	5.7	5.8	7.4	10.2
	Panama	—	—	—	—	—	—	—	—	0.1	2.7	1.8	
	Taiwan	0.0	—	0.6	2.2	5.3	7.5	2.6	5.5	5.0	3.8	3.1	4.0
Surface	Sub-total	(3.0)	(0.1)	(0.0)	(0.5)	(1.1)	(3.3)	(2.7)	(8.2)	(3.9)	(7.2)	(16.2)	17.0
	France (FIS)	2.8	—	—	—	—	1.6	1.2	0.5	0.3	2.5	1.3	1.4
	Japan	0.0	0.1	0.0	0.5	1.1	0.5	0.1	0.2	0.3	0.2	0.7	0.3
	Korea	—	—	—	—	—	—	—	—	—	—	—	1.8
	Panama	—	—	—	—	—	—	—	—	—	—	1.0	1.1
	Portugal	—	—	—	—	—	—	—	—	—	—	9.1	4.8
	Spain	—	—	—	—	—	1.1	1.2	7.0	3.1	4.4	3.2	7.2
	South Africa	0.2	—	—	—	—	—	—	—	—	—	—	—
	U.S.	—	—	—	—	0.0	0.1	0.2	0.5	0.2	0.1	0.9	0.1
	Ghana	—	—	—	—	—	—	—	—	—	—	—	0.3

Source of data: ICCAT Stat. Bull., Vol. 6 (1975).

Table 14. Annual catches (metric tons) of billfishes in the Mediterranean and Atlantic (Source: ICCAT Statistical Bulletin Vol. 6)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
Argentina	0	0	0	0	0	0	0	0	60	0	0
Brazil	0	0	0	120	120	120	120	240	56	131	131
China (Taiwan)	0	274	859	2,191	3,380	3,212	2,804	2,443	1,822	1,327	932
Cuba	600	500	1,700	1,300	600	600	500	300	1,000	2,300	1,400
Ghana	0	0	0	0	0	0	0	0	2	8	22
Japan	12,853	8,217	2,419	3,004	2,261	2,302	2,880	1,122	878	889	1,242
Korea	0	0	0	0	0	0	0	0	0	0	947
Panama	0	0	0	0	0	0	0	0	650	0	0
USA	0	0	0	0	0	0	0	75	62	53	0
USSR	0	0	—1	—1	—1	—1	—1	100	300	1,200	25
Venezuela	0	0	0	360	480	480	600	600	0	92	61

Table 15. Annual catches (metric tons) of swordfish in the Mediterranean and Atlantic (Source: ICCAT Statistical Bulletin Vol. 6)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
Algeria	0	0	0	0	0	.....	.....	2	100	196	500
Argentina	400	200	100	300	500	400	100	100	48	0	10
Brazil	240	240	120	120	240	120	0	120	137	348	318
Canada	4,700	4,400	4,800	4,400	4,300	4,800	0	0	0	0	21
China (Taiwan)	0	0	0	0	0	0	0	750	1,092	821	928
Cuba	100	100	200	0	0	0	0	0	0	0	0
Italy	0	0	1,900	1,400	2,000	1,800	2,900	3,700	2,700	1,500	1,500
Japan	2,870	1,958	754	1,121	2,273	3,175	1,685	2,023	1,186	1,486	1,626
Korea	0	0	0	0	0	0	0	0	0	0	451
Libya	200	200	300	500	—1	—1	100	.....	.....	.....	0
Malta	—1	—1	—1	—1	—1	100	200	200	200	171	191
Mexico	0	0	0	0	0	0	0	2	4	3	0
Morocco	324	253	204	240	270	231	360	273	201	211	133
Norway	—1	300	300	200	600	400	200	.....	.....	.....	0
Panama	0	0	0	0	0	0	0	167	445	0	0
Poland	0	0	0	0	0	0	—1	0	100	0	0
Spain	2,600	3,000	2,700	3,600	3,500	3,200	3,400	3,200	8,390	2,800	3,836
Tunisia	0	0	0	0	0	—1	—1	—1	—1	5	0
Turkey	100	300	98	0	119	88	76	76	—1	—1	0
USA	1,226	616	474	274	171	287	35	246	406	0	0
USSR	0	0	—1	—1	100	200	200	200	0	1,400	263
Venezuela	240	240	360	0	120	0	0	0	0	0	0

Table 16. Small tunas: Annual catches (thousand tons) in the Atlantic and Mediterranean for the period 1965 to 1975 (Source: ICCAT Statistical Bulletin, Vol. 6)

	1965	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
BLACKFIN TUNA *(Thunnus atlanticus)*	112	62	96	183	153	152	175	395	496	339	92
ATLANTIC LITTLE TUNA *(Euthynnus alletteratus)*	4,998	8,113	8,941	8,108	9,024	13,405	10,478	7,645	7,347	6,864	401
ATLANTIC BONITO *(Sarda sarda)*	31,412	29,214	49,057	31,816	61,470	28,661	21,505	16,464	12,172	13,370	6,187
FRIGATE TUNA *(Auxis thazard)*	9,431	7,162	9,322	9,463	10,980	12,625	10,787	12,789	9,521	11,018	6,648
KING MACKERAL *(Scomberomorus cavalla)*	10,583	11,351	12,367	12,413	12,414	11,850	11,871	13,026	16,455	10,153	7,999
SPOTTED SPANISH MACKERAL *(Scomberomorus maculatus)*	6,334	6,995	6,377	7,943	8,952	10,706	6,013	11,305	14,001	5,985	2,340
OTHERS [1]	27,903	21,117	28,362	20,793	26,739	27,265	20,978	28,212	23,614	17,322	17,045
TOTAL	90,773	84,014	114,522	90,719	129,732	104,664	81,807	89,836	83,606	65,061	40,712

[1] Includes unclassified big tunas and billfishes.

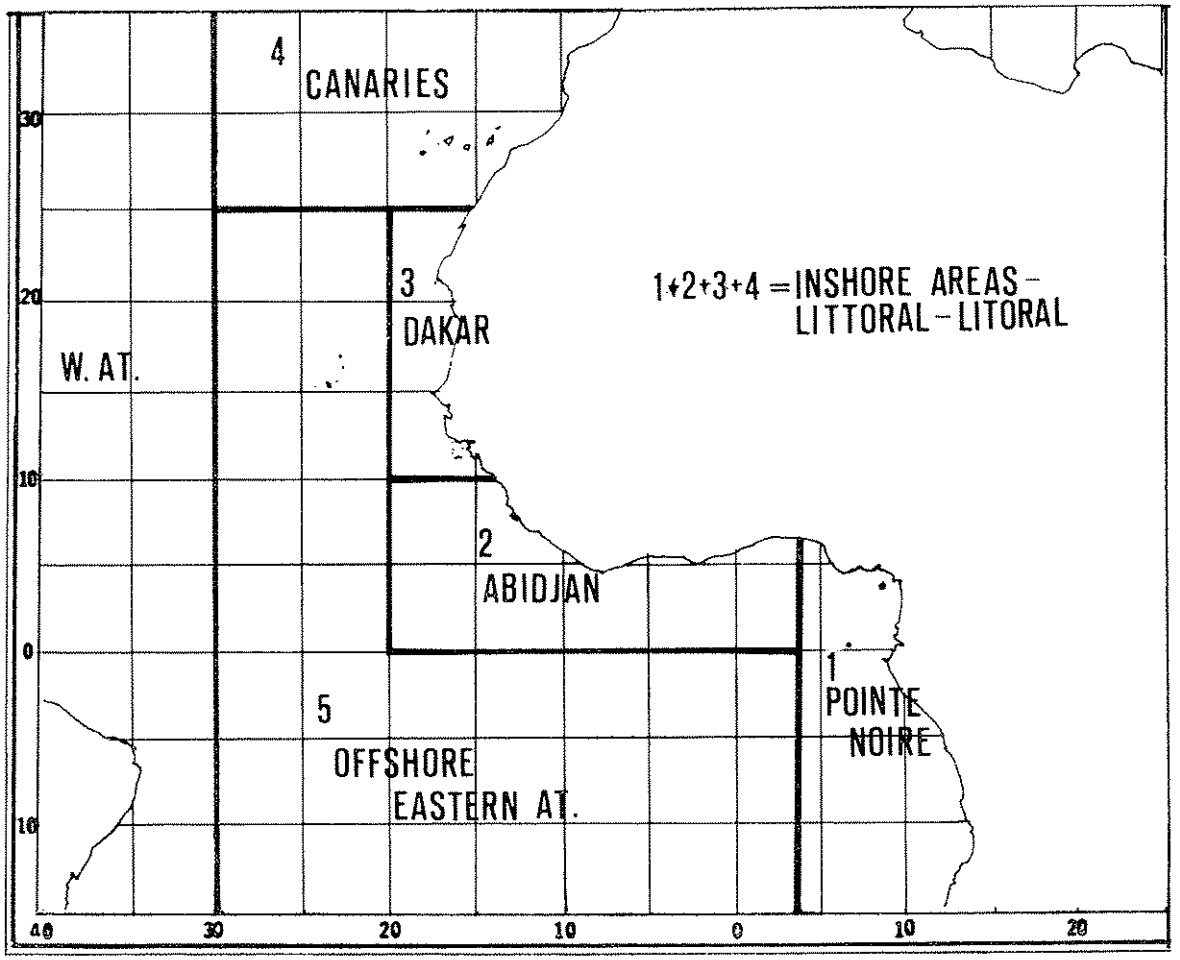

Fig. 1. Yellowfin surface fishery areas.

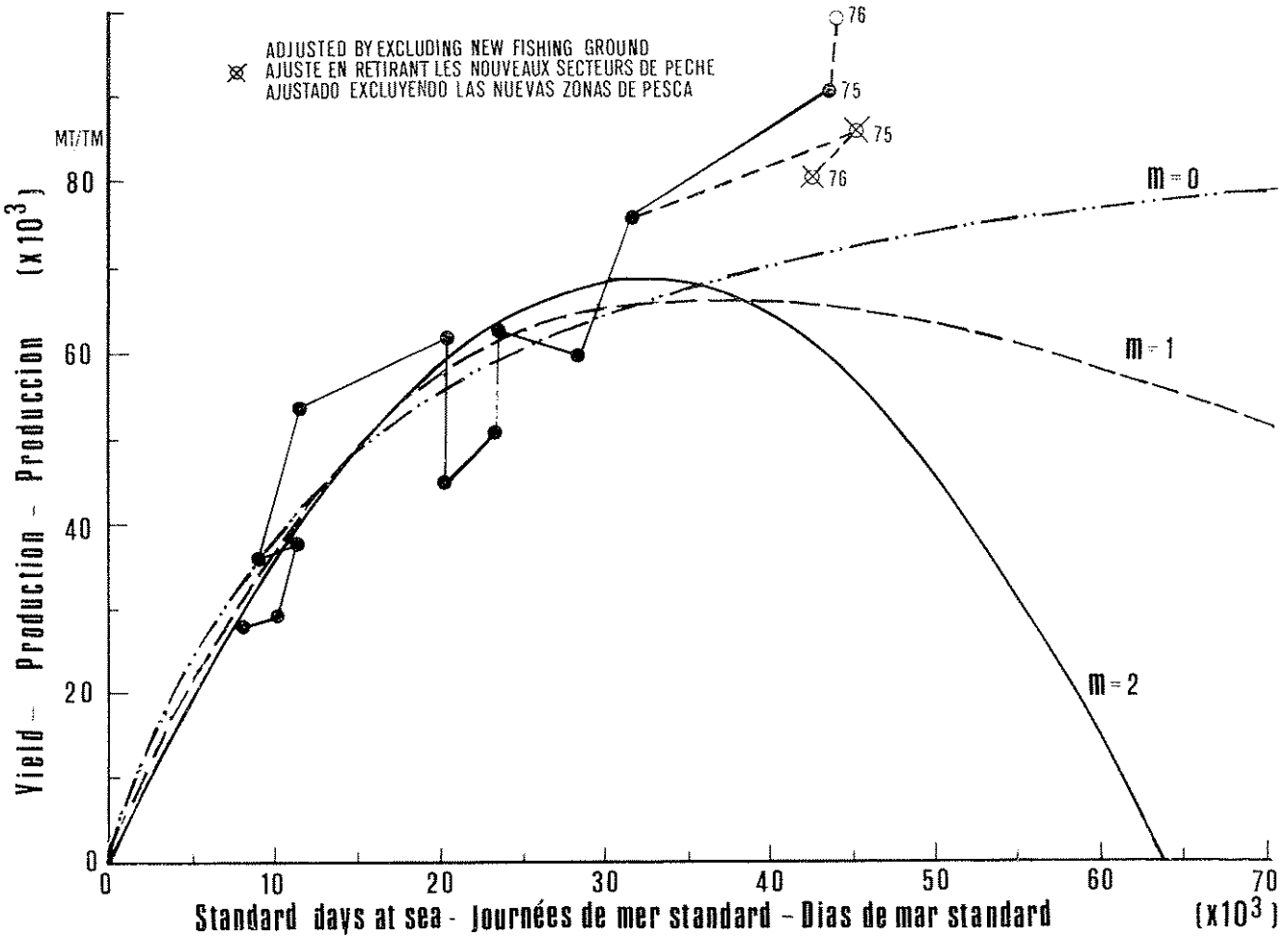

Fig. 2. Sustainable average yield curves and observed data, 1964-1975, for the eastern Atlantic yellowfin tuna surface fishery. (Source: SCRS/76/70).

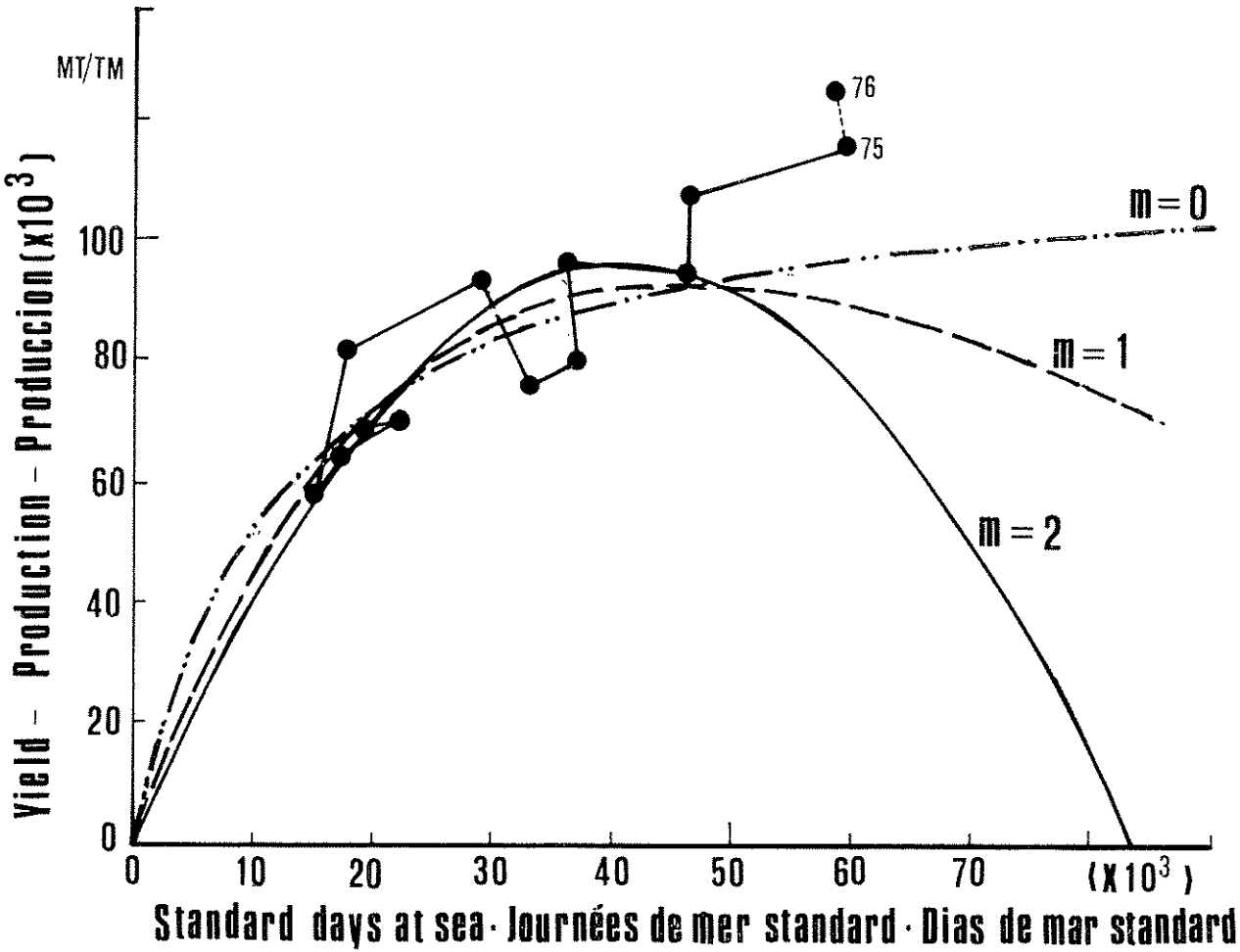

Fig. 3. Sustainable average yield curves and observed data, 1964-1975, for the total Atlantic yellowfin tuna fishery. (Source: SCRS/76/70).

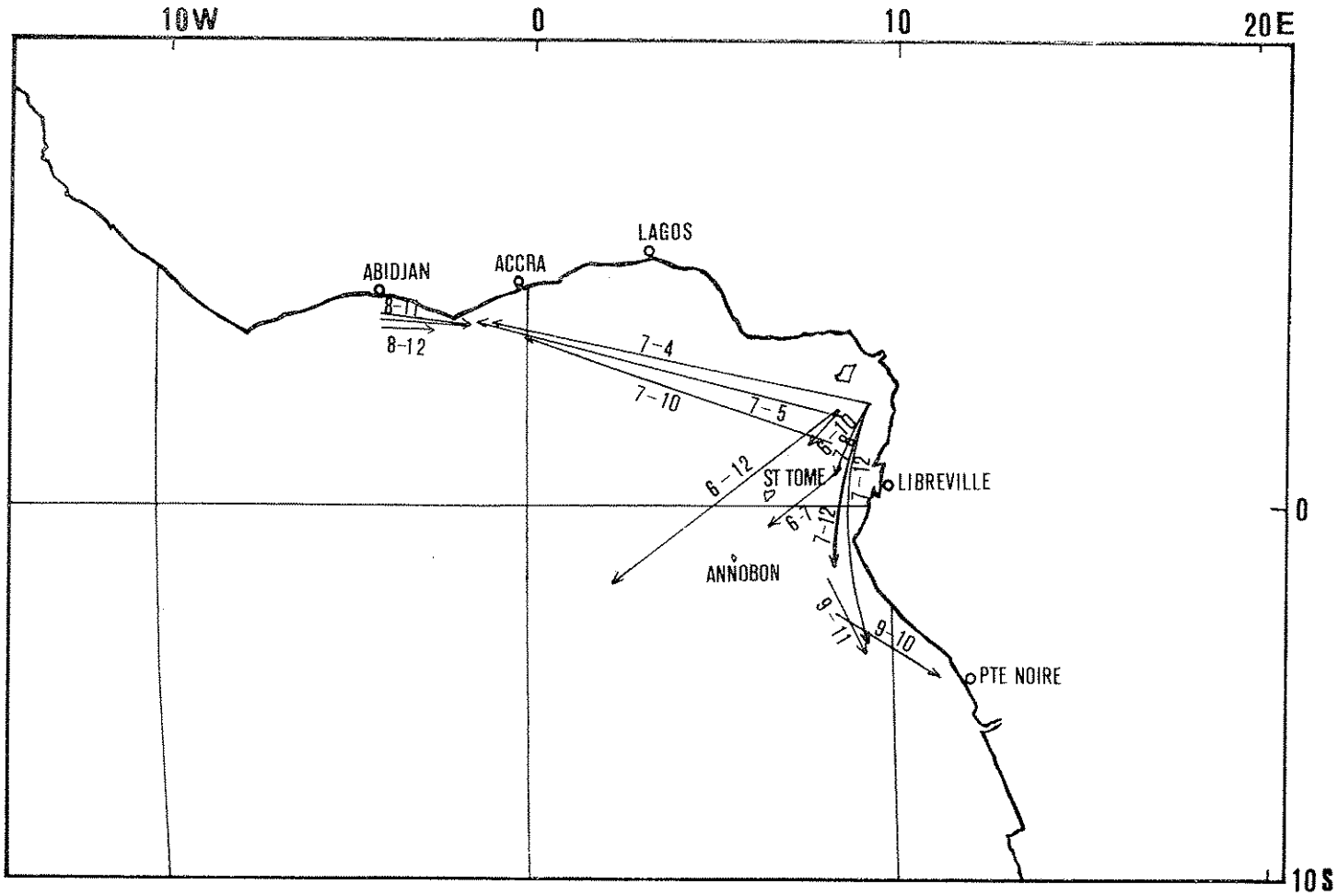

Fig. 4. Skipjack migration observed from tagging. Each arrow indicates migration over 100 miles; the figures represent the months of tagging and those of recapture.

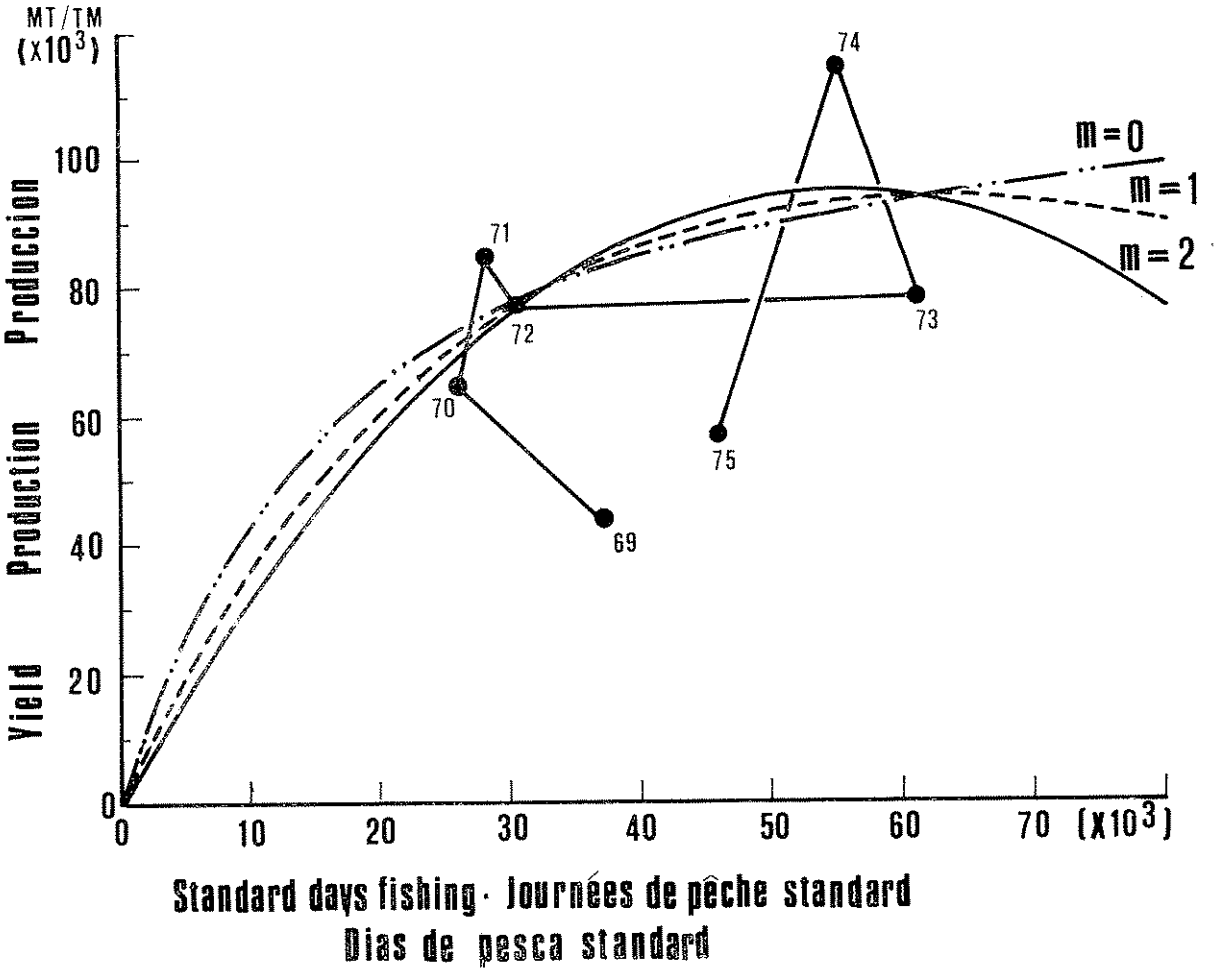

Fig. 5. Relation between catch and standardized fishing effort for skipjack tuna of the eastern Atlantic Ocean. Average sustainable yield curves for three special cases of the production model with the asumption of two significant year classes are shown.

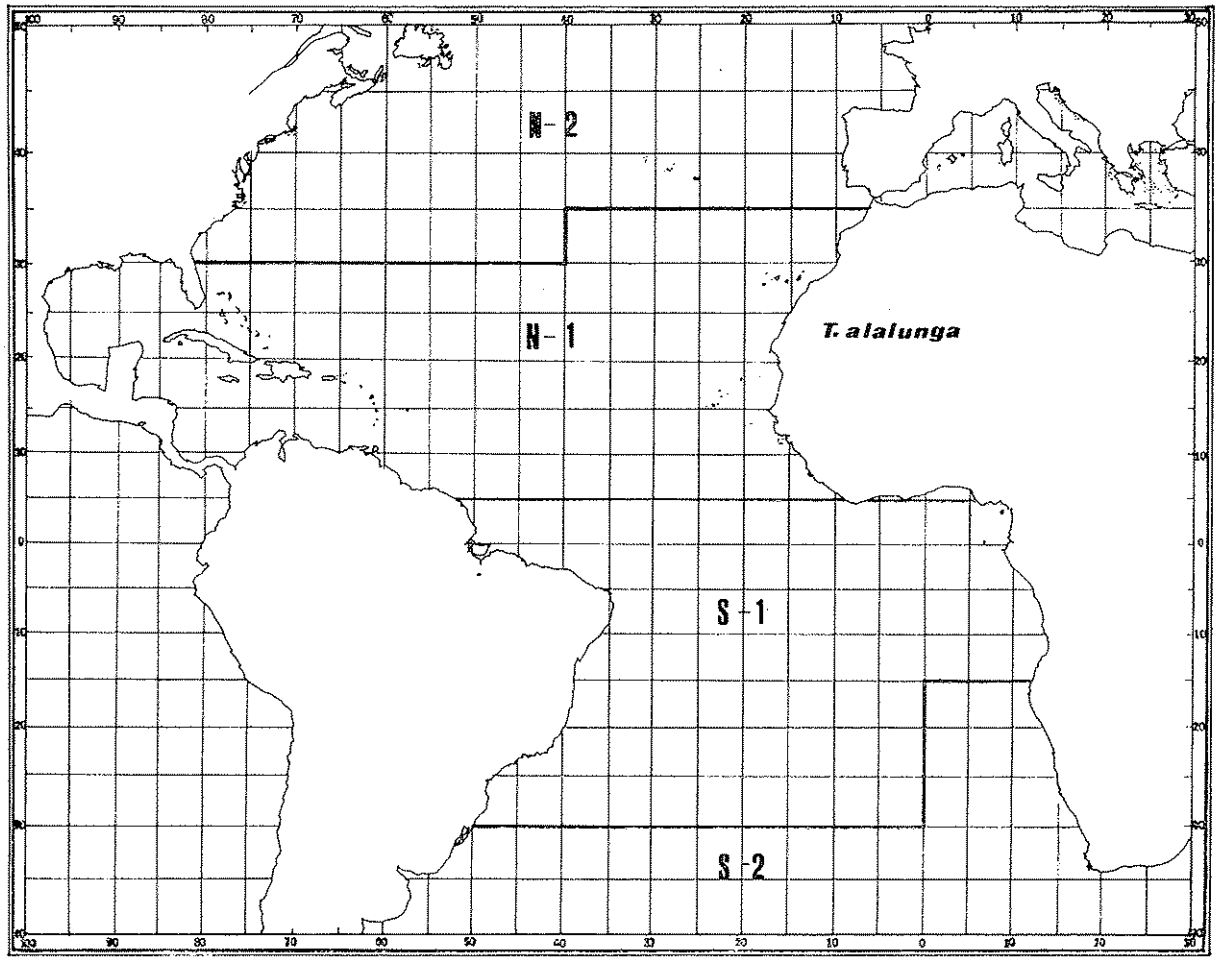

Fig. 6. ICCAT Subareas, Atlantic albacore fisheries.

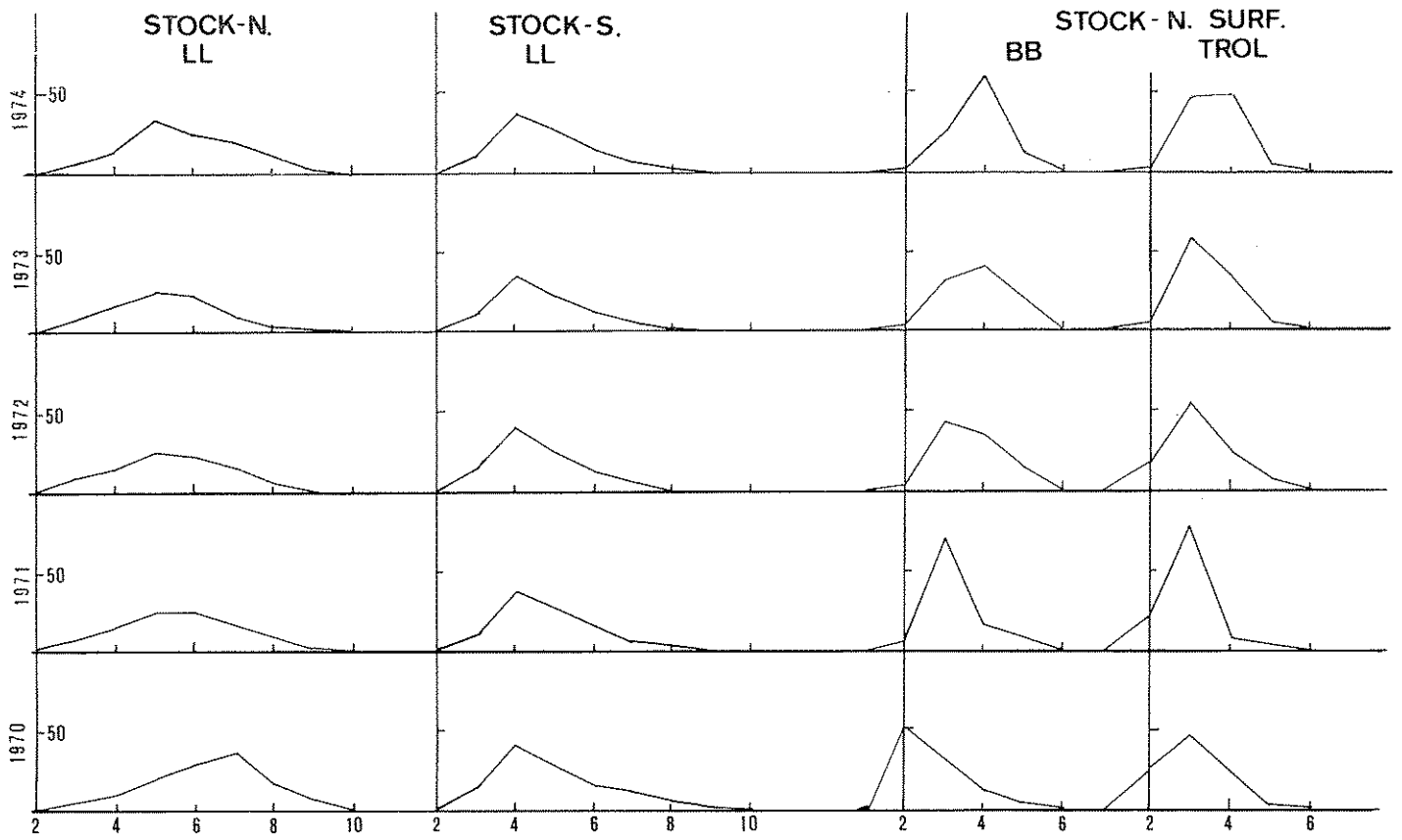

Fig. 7. Estimated age composition of Atlantic albacore catches: 1970-1974.

7.1. Northern longline fishery.
7.2. Southern longline fishery.
7.3. Baitboat fishery.
7.4. Trolling fishery.

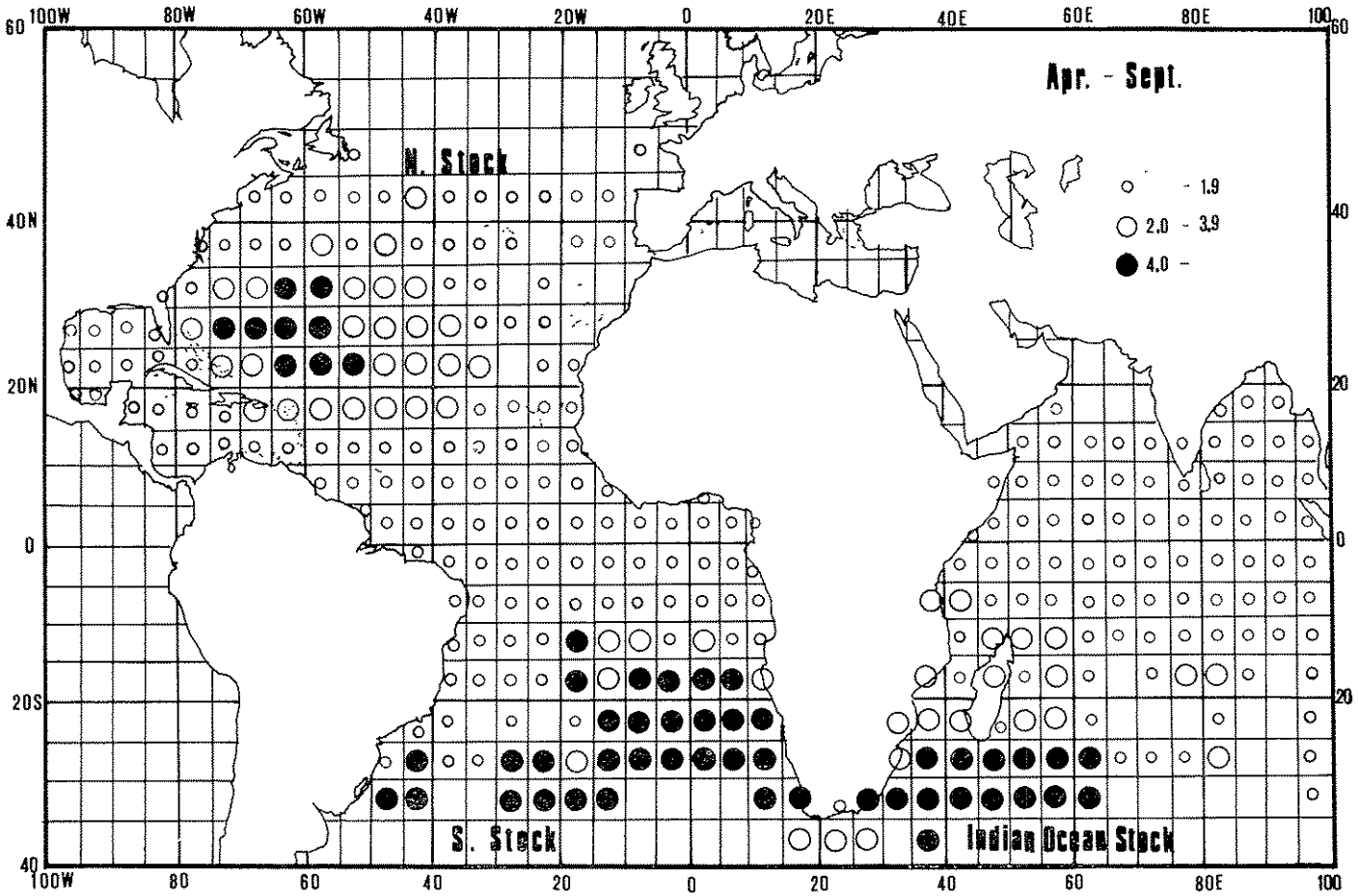

Fig. 8. Distribution of hook-rates, Japanese Atlantic albacore longline fishery, in the N. Atlantic, S. Atlantic and Indian Oceans. (Source: Koto, 1969).

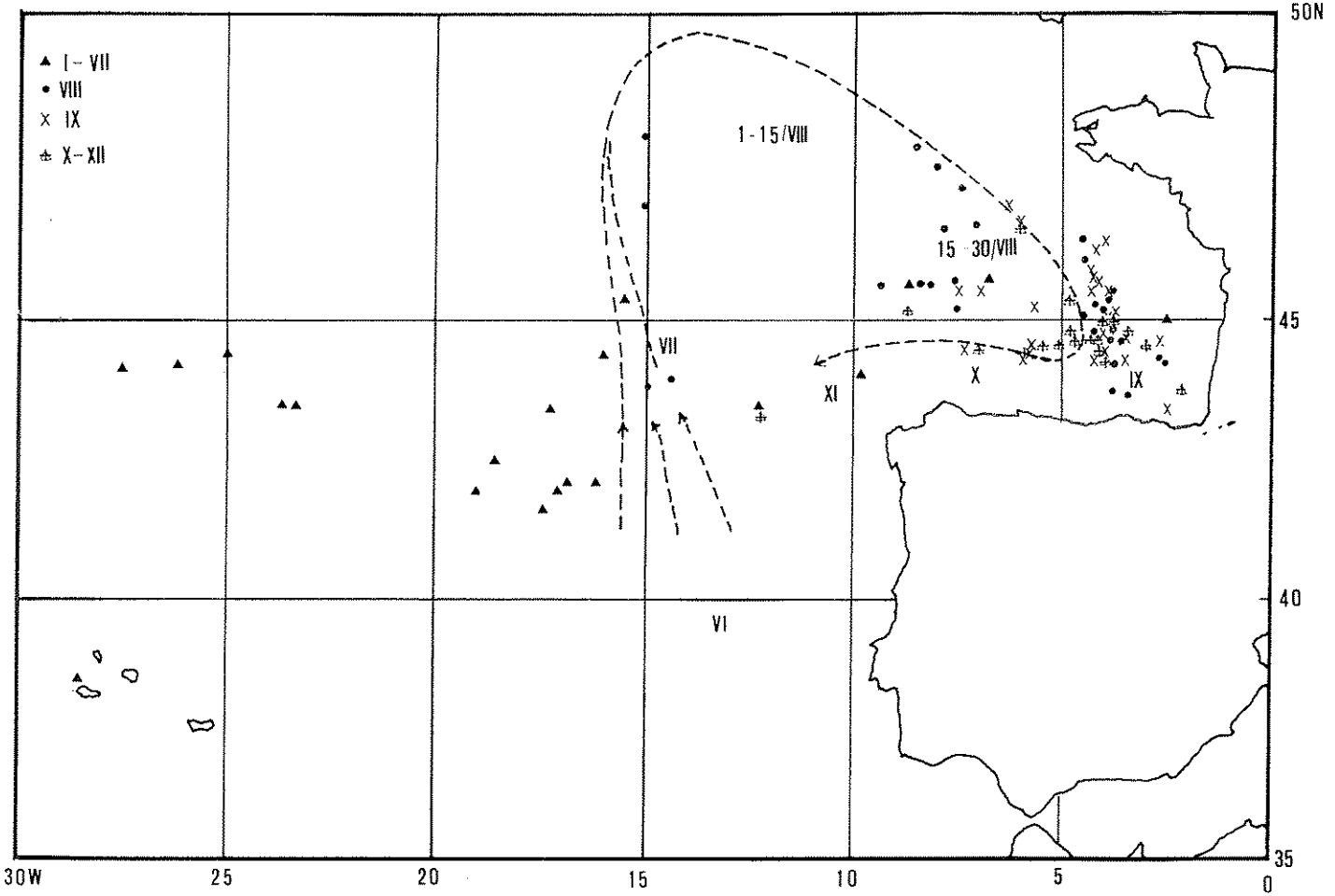

Fig. 9. Monthly distribution of recaptures (1968-75) of tags released in the N.E. Atlantic fishery and migratory routes.

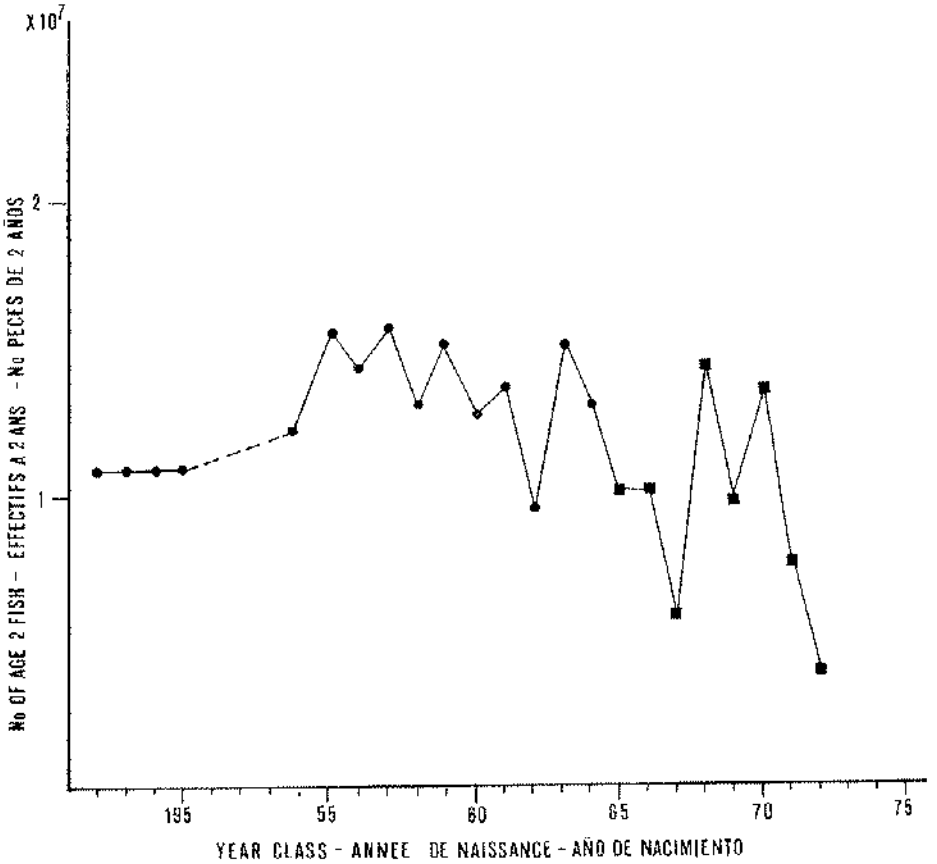

Fig. 10. Recruitment of age 2 albacore to the North Atlantic surface fishery, 1949-1975. (Source: SCRS/76/59).

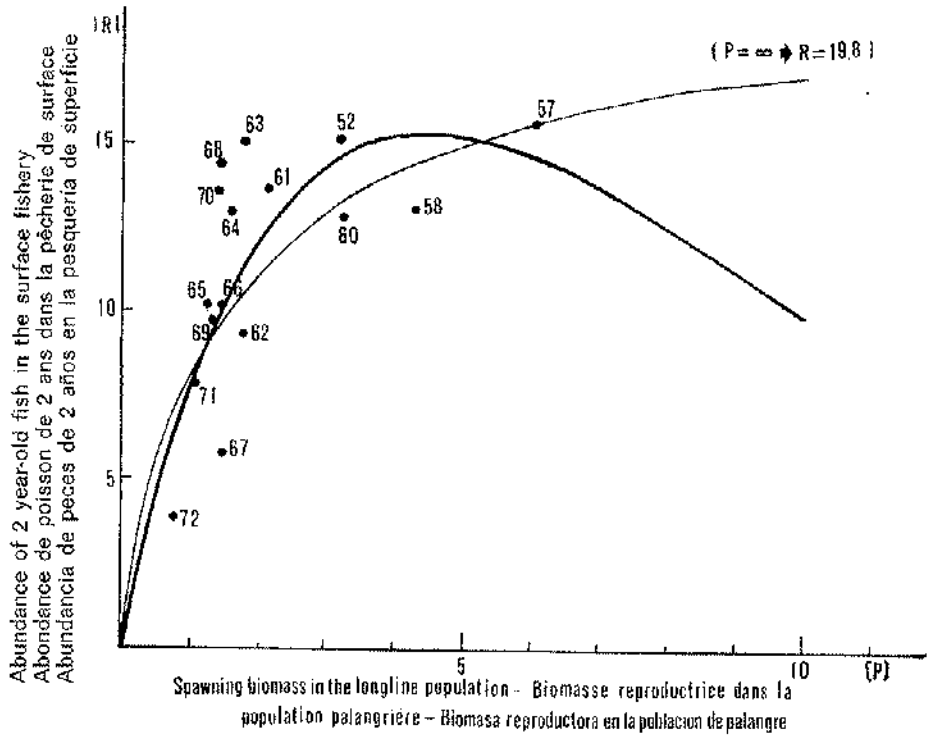

Fig. 11. Suggested stock recruitment relation for the N. Atlantic alcabore.

A = Beverton & Holt model $\begin{cases} \alpha = .05052 \\ \beta = .0783 \end{cases}$ $r = .84$

B = Ricker model $\begin{cases} \alpha = 9.393 \\ \beta = .2238 \end{cases}$ $r = -.76$

(P = Shiohama index; R = Bard index (from SCRS/76/59).)

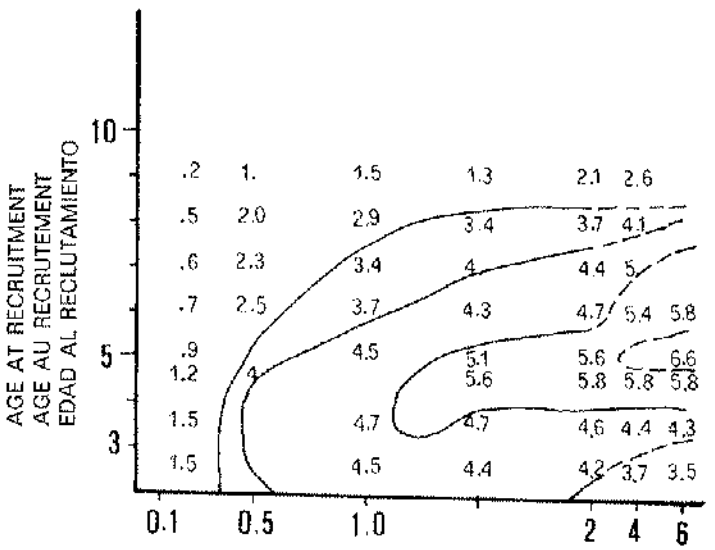

Fig. 12. Equilibrium Y/R North Atlantic albacore fishery. (Source: SCRS/74/34).

Fig. 13.1. Northern area (Committee analysis).

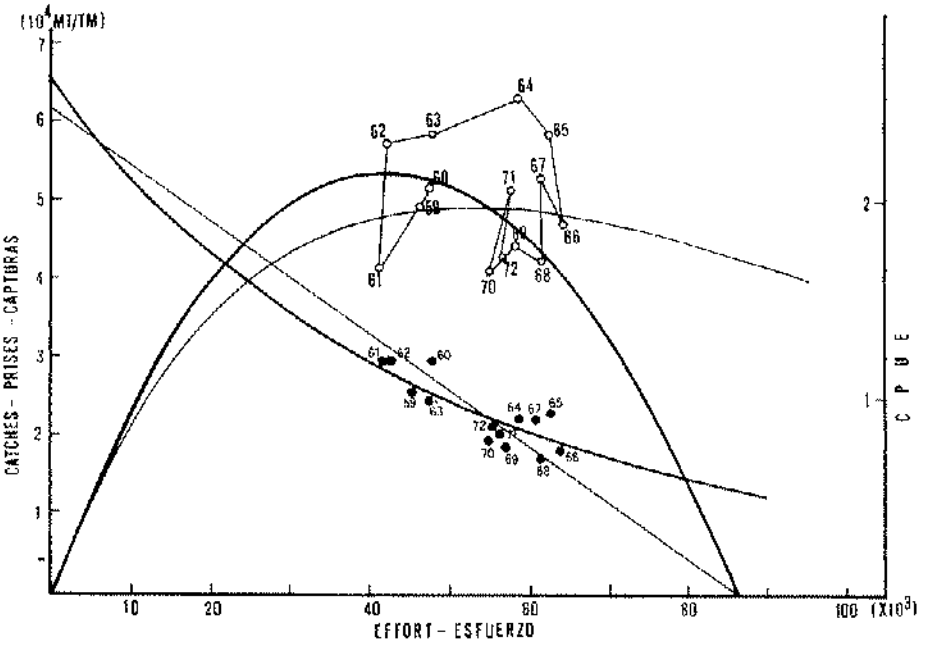

Fig. 13.2. Southern area (SCRS/76/31).

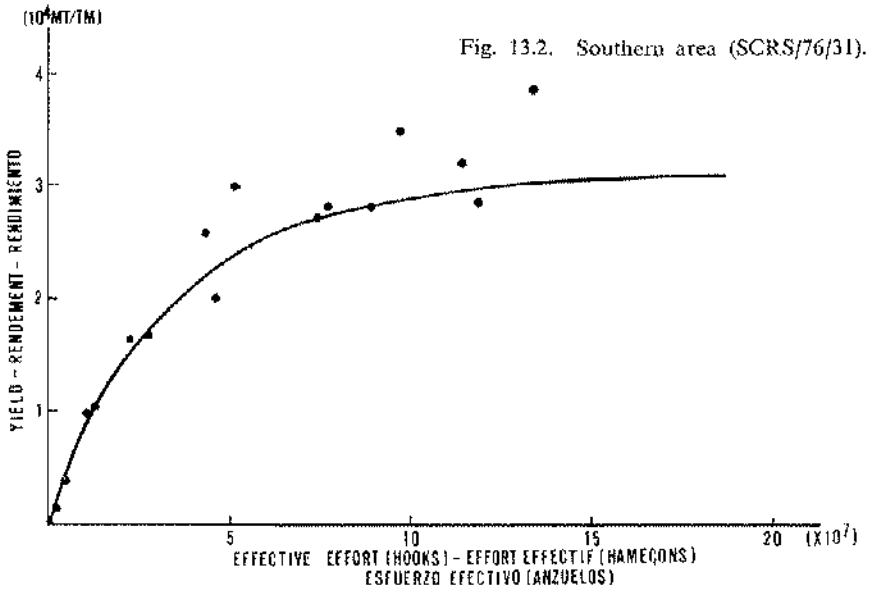

Fig. 13. Production model fitted to Atlantic albacore fishery data.

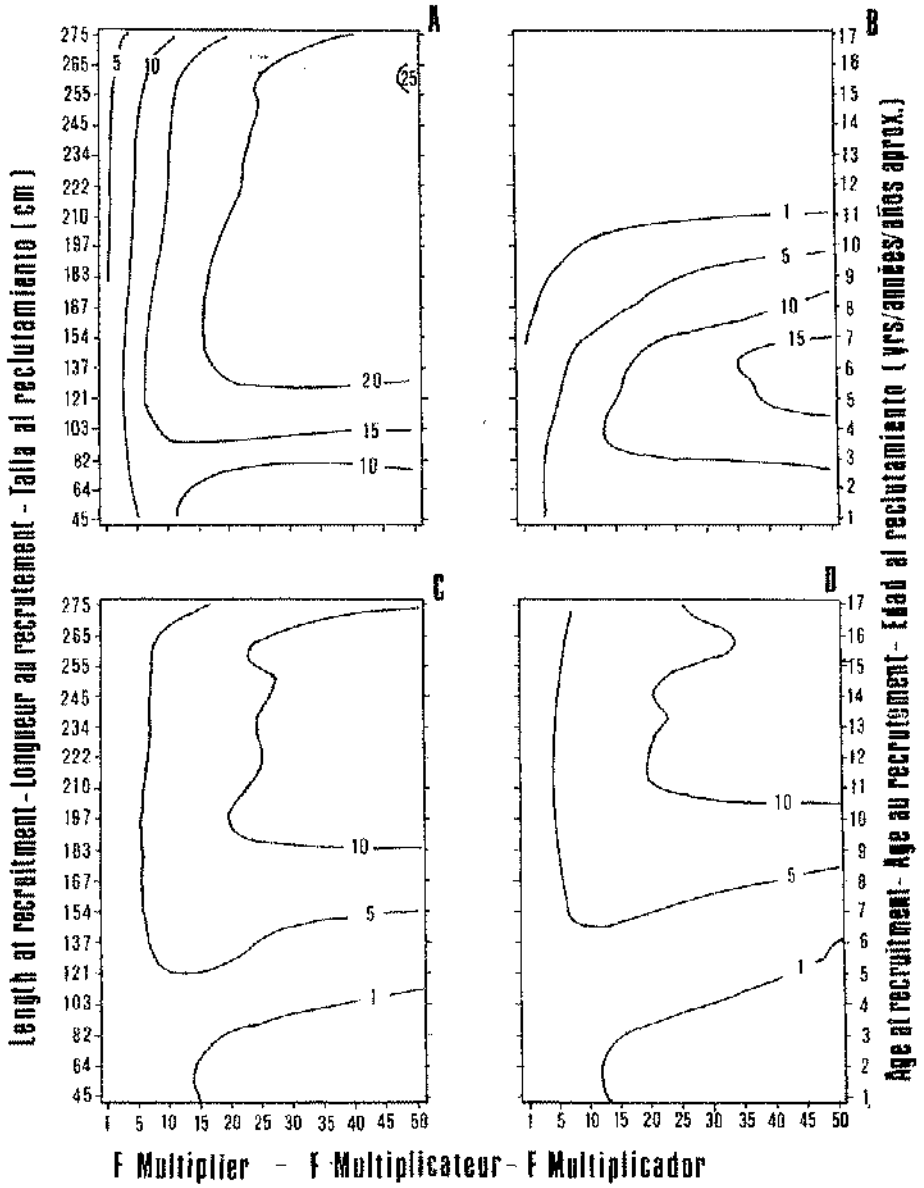

Fig. 14. Isopleths of equilibrium Y/R, Atlantic system, M = 0.2.
A: system view; B: fishery view; C: fishery 2 view; D: fishery 3 view.
(Source: SCRS/76/61).

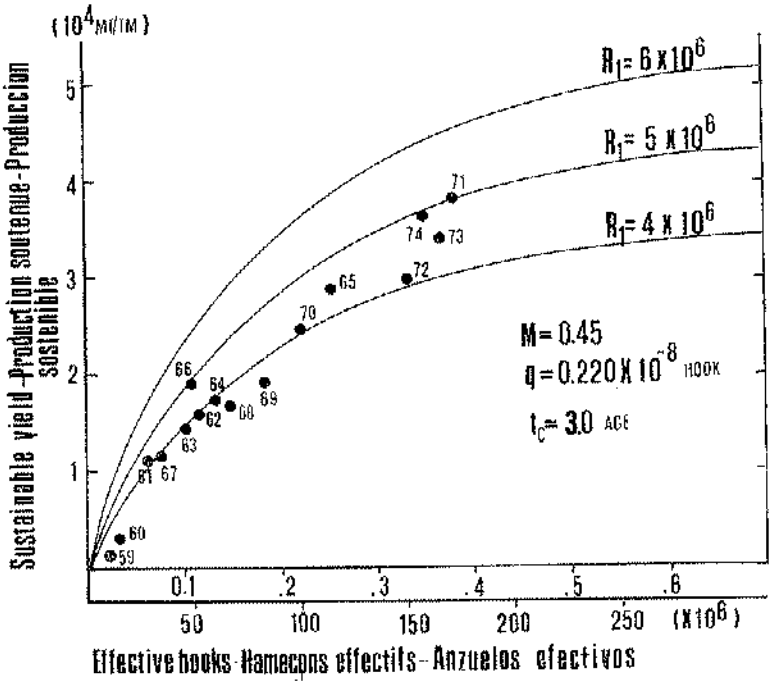

Fig. 15. Yield curves for Atlantic bigeye tuna estimated by Y/R model analysis. Observed annual catches and efforts were incorporated for 1959-1974.
R_1 = Recruitment in number of fish at age 1.
(Source: SCRS/76/41).

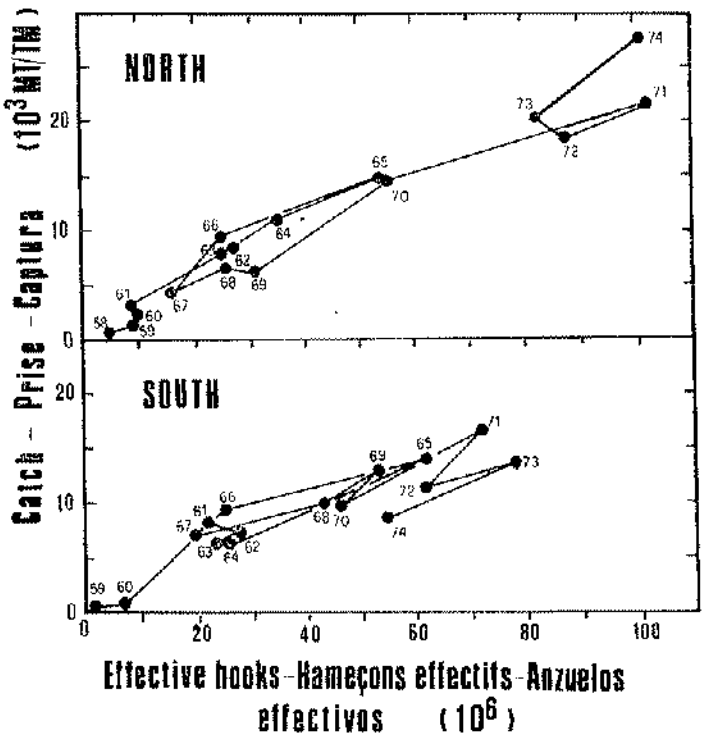

Fig. 16. Relationship between catch and effective hooks on bigeye tuna in the North and South Atlantic. (Source: SCRS/76/41).

Appendix 1 to Annex 8

AGENDA FOR THE STANDING COMMITTEE ON RESEARCH AND STATISTICS (SCRS)

1. Opening of the meeting
2. Adoption of 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 the Sub-Committee on Statistics
10. Review of the progress made in statistics by the national offices and the Secretariat
11. Review of SCRS research programs and consideration of future plans
12. Cooperation with other organizations
13. Scientific publications
14. Other matters
15. Recommendations
16. Date and place of next meeting
17. Adoption of Report
18. Adjournment

Appendix 2 to Annex 8

REPORT OF THE AD HOC GROUP ON ADMISSION OF SCRS DOCUMENTS

1. The Ad Hoc Group, chaired by Mr. J. N. N. Adjetey (Ghana), reviewed the procedures recommended during the 1975 SCRS meetings (Appendix III to Annex 8 to the Proceedings — Report for the Biennial Period, 1974-75, Part II (1975)).

2. It was noted that there was a need for the procedures to be more flexible to accommodate special documents. The Ad Hoc Group, therefore, *agreed* to add a proviso to Rule 3, to accommodate documents that arrive late but are judged to be necessary to the proceedings of the SCRS.

The new rules with these proposed amendments will read as follows:

i) The titles of the documents to be presented to the SCRS meeting should be received by the Secretariat, with an accompanying summary, one month before the date of the meeting.

ii) Those delayed documents must be received by the Secretariat at least 48 hours before the opening of the meeting, and should be accompanied by a minimum of 60 copies of the paper.

iii) Any paper which does not meet the above-mentioned criteria will not be admitted for presentation to the SCRS, unless such a paper has been found by the Ad Hoc Group on Admission of SCRS Documents to be absolutely necessary to the proceedings of SCRS.

3. The Ad Hoc Group felt that National Reports should not be subjected to existing criteria as such reports are obligatory for member countries and are to be included in the Biennial Reports.

Appendix 3 to Annex 8

LIST OF DOCUMENTS

SCRS/76/1 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. V (1) / Recueil de Documents Scientifiques, Vol. V (1) / Colección de Documentos Científicos, Vol. V (1).

4 Collective Volume of Scientific Papers, Vol. V (2) / Recueil de Documents Scientifiques, Vol. V (2) / Colección de Documentos Científicos, Vol. V (2).

5 Data Record, Vol. 7 / Recueil de Données, Vol. 7 / Colección de Datos, Vol. 7.

6 Data Record, Vol. 8 / Recueil de Données, Vol. 8 / Colección de Datos, Vol. 8.

7 Statistical Series - 1 / Séries Statistiques - 1 / Series Estadísticas - 1.

8 Report of the 1975 meeting of the SCRS / Rapport de la réunion de 1975 du SCRS / Informe de la reunión de 1975 del SCRS (CON/76/8).

9 Statistical Bulletin, Vol. 6 / Bulletin Statistique, Vol. 6 / Boletín Estadístico, Vol. 6 (CON/76/9).

10 1976 SCRS Report (available at the end of the 1976 SCRS meeting) / Rapport SCRS 1976 (disponible à la fin de la réunion de 1976 du SCRS) / Informe SCRS 1976 (disponible al terminar la reunión de 1976 del SCRS) (CON/76/10).

11 Secretariat Report on Statistics and Coordination of Research / Rapport du Secrétariat sur les statistiques et la coordination de la recherche / Informe de la Secretaría sobre estadísticas y coordinación de la investigación (CON/76/11).

12 A progress report on a comprehensive review of the Atlantic-wide tuna sampling strategy — W. E. Schaaf.

— Annex to SCRS/76/12 — W. E. Schaaf.

13 Estimate on the carrying capacity of the Atlantic tuna fleets. — P. M. Miyake.

14 Identification problem of young fish (yellowfin vs bigeye). — P. M. Miyake.

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16 Possible alternative solutions for establishing ICCAT Data Center(s). — P. M. Miyake.

17 Compendium of statistical and sampling schemes of various international organizations. — P. M. Miyake.

18 Results of United States cooperative tagging of Atlantic bluefin tuna, October 1975 through October 1976. — J. M. Mason, R. E. Baglin.

19 Results of United States tagging of Atlantic billfishes, October 1975-October 1976. — J. M. Mason, C. C. Buchanan.

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21 Les opérations de marquage de germons à l'ISTPM depuis août 1968.

22 Summary report on Italian tuna fisheries in the Adriatic Sea. — D. Levi.

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39 Revised catch and effort statistics by area on Taiwanese tuna longline fleets in the Atlantic, 1967-1974. — M. Honma, Z. Suzuki.

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42 Catch and fishing intensity of billfish species caught by the Atlantic longline fisheries, 1956-1974. — S. Kikawa, M. Honma.

43 A review of the Japanese Atlantic longline fishery for bluefin tuna and the consideration on the present status of the stock. — C. Shingu, K. Hisada.

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50 Resultados preliminares de las pesquerías canarias de túnidos en 1976. — Al. Santos Guerra.

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52 Producción de las almadrabas españolas mediterráneas durante el año 1975. — J. C. Rey, J. Crespo, J. A. Camiñas.

53 Datos sobre las pesquerías de túnidos y afines en el Mediterráneo durante 1975. — IEO, Málaga, Palma y Mar Menor, IIP Castellón.

54 Datos biológicos del atún rojo *Thunnus thynnus* (L.) del Golfo de Vizcaya y resultado de las campañas de 1975 y 1976 en el puerto de Fuenterrabía. — J. L. Cort.

55 South African national report. — C. S. de V. Nepgen.

56 Parámetros y distribución del Patudo (*Thunnus obesus*) en el sur del Brasil (1969 - Agosto 1976). — L. A. Zavala Camin.

57 Parámetros y distribución del atún blanco (*Thunnus alalunga*) en el sur del Brasil (1969-1975). — L. A. Zavala Camin.

58 Migrations de thon rouge (*Thunnus thynnus*) à travers la pêcherie de surface du germon (*Thunnus alalunga*) dans le Nord Atlantique. — F. X. Bard.

59 Commentaires sur l'état du stock de germon (*Thunnus alalunga*) nord-atlantique. — F. X. Bard.

60 Canadian national report 1975-1976. — T. D. Iles, C. D. Burnett.

61 Cohort and equilibrium yield-per-recruit analyses for the Atlantic bluefin tuna fisheries system accounting two system configurations and two natural mortality models. — W. W. Parks.

62 A further note on Atlantic bluefin tuna spawning. — W. J. Richards.

63 Review of new US scientific evidence pertaining to the biology and the status of bluefin tuna stocks and bluefin tuna fisheries. — J. Tyler, R. E. Baglin, F. H. Berry, W. W. Parks, L. R. Rivas.

64 Age composition, seasonal distribution of age groups, and longevity of the Western North Atlantic bluefin tuna (*Thunnus thynnus*). — L. R. Rivas.

65 Age composition anomalies as evidence for transoceanic migrations by intermediate age groups of the North Atlantic bluefin tuna (*Thunnus thynnus*). — L. R. Rivas.

66 Population fecundity of western and eastern North Atlantic bluefin tuna (*Thunnus thynnus*). — R. E. Baglin, L. R. Rivas.

67 Age estimates in Atlantic bluefin tuna — An objective examination and an intuitive analysis of rhythmic markings on vertebrae and in otoliths (Title revised to: "Progress in Atlantic Bluefin Tuna Ageing Attempts"). — F. H. Berry, D. W. Lee, A. R. Bertolino.

68 El desove de *Thunnus thynnus thynnus* en el Golfo de México — Estimado preliminar de la magnitud de la población en desove a partir de la abundancia de larvas. — M. Montolio, M. Juárez.

69 State of the bigeye tuna stocks of the Atlantic Ocean from production model analysis, 1957-1975. — G. T. Sakagawa.

70 A production model analysis of the status of yellowfin tuna in the Atlantic Ocean, 1964-1975. — A. L. Coan, W. W. Fox.

71 A review and evaluation of estimates of natural mortality rates of tunas. — T. C. Murphy, G. T. Sakagawa.

72 Size and species composition of Atlantic tunas in import landings of Puerto Rico, 1975-1976. — G. T. Sakagawa, A. L. Coan, E. P. Holzapfel.

73 Length and age composition of yellowfin tuna from the Atlantic Ocean, 1966-1975. — A. L. Coan.

74 Incidental catches made by American tuna seiners in the Atlantic Ocean. — 1967-1975. — G. T. Sakagawa.

75 Factors affecting tuna purse seine fishing effort. — P. R. Greenblatt.

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77 Remote sensing: with applications to the exploitation and management of Atlantic tuna stocks. — R. H. Evans.

78 State of the skipjack tuna stocks of the Atlantic Ocean from production model analysis, 1969-1975. — G. T. Sakagawa, A. L. Coan.

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83 Estimation des captures franco-espagnoles de thon rouge *Thunnus thynnus*, 1972-1976. — F. X. Bard, J. L. Cort.

84 Données préliminaires sur la pêche au thon rouge au filet tournant en Méditerranée française. — H. Farrugio.

85 Estudios preliminares de algunos aspectos biológicos del *Thunnus albacares* — Maduración sexual. — S. Valle.

86 Apparent age and growth, based on otolith analysis, of giant bluefin tuna (*Thunnus thynnus thynnus*) in the 1975-1976 Canadian catch. — M. J. A. Butler, J. F. Caddy, C. A. Dickson, J. J. Hunt, C. D. Burnett.

87 Canadian tagging and recapture data of large pelagic fish for the period 1970-76. — C. D. Burnett, M. J. A. Butler, C. A. Dickson, T. D. Iles.

88 The trap (mackerel) and impoundment (bluefin) fishery in St. Margaret's Bay, Nova Scotia: its development. — M. J. A. Butler.

89 Rapport du Groupe de Travail sur le Listao Atlantique, Dakar, 22-27 mars 1976.

90 Comments on the establishment of an ICCAT data bank / Commentaires sur la création d'une banque de données de l'ICCAT / Comentarios sobre la creación de un banco de datos de ICCAT. — A. Fonteneau.

91 Japanese fisheries and research activities on tunas and tuna-like fishes in the Atlantic Ocean, 1974-1976. — S. Kume.

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94 Statistiques de pêche de la flottille franco-ivoiro-sénégalaise au 30 septembre 1976. — F. Barbe, J. Marcille.

95 Situation de la pêcherie d'albacore de l'Atlantique de l'Est au 30 septembre 1976. — A. Fonteneau, J. Marcille, F. Barbe.

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Appendix 4 to Annex 8

REPORT OF THE WORKING GROUP ON AN INTENSIFIED ATLANTIC-WIDE SKIPJACK RESEARCH PROGRAM

1. The Working Group met on Wednesday, November 10, and on Saturday, November 13, and was chaired by Dr. B. J. Rothschild (U.S.A.). Mr. J. N. N. Adjetey (Ghana) and Mr. R. H. Pianet (Senegal) had presided over the Ad Hoc Sub-Groups on Organizations and on Research Programs, respectively.

2. The Working Group reviewed the Report of the Dakar Working Group on the Status of Skipjack Stocks in the Atlantic Ocean (SCRS/76/89). It also reviewed specific assignments to individual scientists (1975 SCRS Report). It noted that some of these assignments had been completed but a few were yet to be undertaken.

3. The Working Group felt that to get the program underway, a full-time coordinator must be employed eventually by ICCAT.

4. The Working Group again identified possible research projects, noted on-going national programs and *agreed* that these programs must be expanded both in scope and content in order to pave the way for an "International Skipjack Year" which will involve a multi-ship field investigation of skipjack distribution and dynamics.

5. The on-going programs include tagging, sampling, compilation and analysis of existing catch, effort and size composition data, larval and gonad index studies (Table 1).

5.a. The tagging program will provide information on the stock structure which is important in population dynamics studies. Information will also be obtained on migration, availability of fish, growth and level of exploitation. Not much data are expected on natural mortality. The most favorable areas and periods for these tagging programs are: Angola (September-March), Ghana (all year round), Cap Vert (September-October), and Canary Islands (July-September).

5.b. Routine sampling must be intensified by the national laboratories to provide a better coverage of all the landings. These studies will lead to a better estimation of size and age composition for population dynamics studies.

5.c. The analysis of all available data on length may provide new information on stock structure, growth, recruitment and migration. Data are to be obtained from FIS, USA, Tema-based baitboats, Cuban and Spanish fleets.

5.d. CPUE data are required for production model analysis. There are, however, some difficulties in estimating adequate effort for the skipjack fishery. The two main problems are: (i) the skipjack-yellowfin interaction (linked with seasonal availability of fish), and (ii) the standardization of effort (respective fishing efficiencies of different gears and interaction between gears). The necessary data are to be obtained from FIS, USA, Tema-based boats, the Cuban fleet and the Spanish fleet.

5.e. Larval data collected in Dakar have been summarized. The main observation is that, although fishing is seasonal, spawning is wide, both in time and space. Two explanations may be given: (a) either one multi-spawning stock, or (b) several stocks. This needs further study.

5.f. Data on gonad index are rather scanty, and the available data have not yet been analyzed. There is a need to intensify these studies. Data are to be collected by Ivory Coast, Ghana, Senegal, Spain and Cuba for analysis.

5.g. Examination of otoliths for growth rings will commence when collection of otoliths starts. Ivory Coast, Ghana, Senegal and Brazil are to collect these otolith samples. The analyses are to be undertaken either in France (COB, Brest) or in the U.S.A. (La Jolla).

6. The Working Group agreed that plans must be clearly and firmly developed for the proposed intensified research activity. The following projects were identified: tagging (leading to information on natural mortality), biochemical genetics, stock structure and migrations, acoustic and aerial surveys, super-sampling, spacial distribution, larval and gonad index studies, and exploratory fishing.

6.a. A multi-ship field investigation is to be mounted on skipjack distribution and dynamics. This multi-ship investigation will provide a wide range of data covering the projects listed in paragraph 6.

7. The Working Group felt that the precise formulation of specific proposals and detailed planning, programming, costing and funding of the entire project should be undertaken by a Program Planner employed by ICCAT. The future of the program is very much dependent on the work of the Program Planner who will compile and analyze all available information and present the final program to the ICCAT Secretariat.

8. The Working Group also felt that a Technical Advisory Group should be appointed by the SCRS Chairman to assist and advise the Program Planner in his duties. The members of this Technical Group are to be selected from participating as well as interested countries.

9. The Program Planner will have the following duties:

a) Develop a detailed Program Plan along lines of priorities determined by the SCRS.

b) Estimate cost and funding of the Program, which should operate for no more than three years.

c) Prepare task activities for countries, national laboratories and international organizations.

d) Advise on the implementation of the Program and suggest names for the selection of the Program Coordinator.

10. The ICCAT Secretariat will:

a) Solicit cooperation from national laboratories, administrators and international organizations.

b) Recruit a Program Planner.

c) Circulate the Project Plan prepared by the Program Planner to competent authorities for comment.

d) Submit final Project Document to Commissioners for their reaction before the next Regular Meeting.

11. Commissioners will make a decision on the Program and funding at the next Regular Meeting, i. e., November, 1977.

12. *Recommendations*

(i) Due to the magnitude of the Program and the need to ensure its success, a Program Planner who will examine the whole scheme in its entirety must be recruited by ICCAT.

(ii) A Technical Advisory Group must be established to provide the necessary assistance and advice, e. g. feasibility and design of tasks, priorities, etc., to the Program Planner.

(iii) The Program Planner should complete the Project Document by May, 1977.

(iv) The ICCAT Secretariat should obtain comments on the Project Document and submit it to the Commissioners by August, 1977.

(v) Should Commissioners approve the Project Document, the ICCAT Secretariat should implement the recommendations.

Table 1. Summary of skipjack proposed projects

Country	ON GOING				
	Tagging	*Routine sampling*	EXISTING		
			Length	*CPUE*	*Repro* *Larvae*
Brazil	No	Yes, Zavala	No	No	No
Cuba	No	Yes, Carrillo	Yes, (data) Carrillo	Yes, (data) Carrillo	No
France					
Ghana	Yes, 1977 cooperation Ghana-IC	Yes, Ansa-Emmim	Yes, (data) Ansa-Emmim	Yes, (data)	No
Ivory Coast	And Congo Aunobon area G-Ansa-Emmim IC-Caverivière	Yes, Marcille	Yes, (data) Marcille	Yes, (data) Marcille	Yes, 1977 Caverivière
Japan	No	Yes, Kume	Yes, (data) Kume	Yes, (data) Kume	No
Korea	No	Yes, B. A. Kim	Yes, (data) B. A. Kim	Yes, (data) B. A. Kim	No
Senegal	Yes, 1977 Cap Vert area, Pianet	Yes, Pianet	Yes, data & processing, 1977	Yes, data & proces-sing, 1977	Yes, 1977 Conaud
Spain	Yes, ? Canaries, Al. Santos	Yes, Fernández	Yes, scarce data, Fernández	Yes, scarce data, Fernández	No
U.S.A.	Yes, some tagging in N.W. Atlantic	Yes, Sakagawa	Yes, data & processing, Sakagawa/ Coan	Yes, data & proces-sing, Sakagawa/ Coan	No

PROJECTS			FUTURE PROJECTS		
DATA					
duction GI	Physic	*Otolith growth*	*Tagging*	*Super-sampling*	*Acoustic survey*
No	No	Yes, sample Zavala	No	—	—
Yes, Carrillo	No	No	No	—	—
		Yes, interpretation, Le Gall	No		
Yes, Ansa-Emmim	No	Yes, samples Ansa-Emmim	Yes	—	—
Yes ?	If possible, 1st analysis (Marcille)	Yes, samples Marcille	Yes	—	—
No	No	No	Yes	—	—
No	No	No	Yes, B. A. Kim	—	—
Yes, Bour 1977	No	Yes, samples Pianet	Yes	Yes, but with collaboration, 1978-79	Yes, with collaboration, 1st survey, 77; others, ?
Yes, Canaries Al. Santos	No	No	Yes	—	—
No	Yes, 1st analysis, Sakagawa	Yes, interpretation, Sakagawa	Not directly	—	—

In cooperation

Appendix 5 to Annex 8

REPORT OF THE WORKING GROUP ON AGING OF BLUEFIN TUNA

At the 1975 meeting of the SCRS, a request was made that a Working Group be organized to coordinate age and growth work on bluefin tuna through correspondence, with Dr. G. Beardsley (U.S.A.) as coordinator. During the past year, considerable progress has been made. However, there is still some disagreement over the interpretation of circuli and other features on vertebrae and otoliths of bluefin tuna. All members of the Working Group are in agreement over the assignment of ages 1 through 5. These age classes can readily be identified through size frequencies. Beyond age 5, however, assignment of bluefin tuna to various age classes becomes increasingly subjective and requires the interpretation of annular markings on vertebrae and otoliths. The Working Group has not, as yet, been able to agree on a single, uniform age classification for Atlantic bluefin tuna. Canadian scientists have presented the results of analyses of otoliths and vertebrae of giant tuna (SCRS/75/78) and (SCRS/76/86). The other major effort at aging bluefin is by the U.S. and a 1976 report to SCRS reviews its work and presents new hypotheses and differences in interpretation from other analyses.

The Group requests that it be allowed to continue through 1977. Otolith samples have been exchanged between Canada, Japan and the United States, and the Group anticipates that many of the present differences in interpretation will be resolved in 1977.

It is intended, for instance, that Canadian and U.S. scientists will conduct joint age analysis during early 1977.

Appendix 6 to Annex 8

REPORT OF THE SUB-COMMITTEE ON STATISTICS

1. Opening of the meeting

The meeting was opened by the Convener, Mr. A. Fonteneau.

2. Adoption of Agenda and arrangements for the meeting

The Agenda was adopted without modification (Addendum 1). Mr. J. Marcille (Ivory Coast) was nominated Rapporteur for the meeting of the Sub-Committee.

3. Review of general progress made by national offices

Efforts of the national offices in furnishing statistics and biological information to the Commission were reviewed by the delegates.

Brazil: Development of Brazilian fisheries is still relatively slow. Statistical data of longliners have been furnished to the Commission, as in the past. However, some difficulties still exist in obtaining information on the 1975 total Brazilian catches. A data processing system is being reorganized that will allow statistics to be more accurately compiled.

Canada: Task II (effort) statistics were obtained from the sport fishing fleet through introduction of a logbook system. All sectors of the tuna fisheries are now covered for Tasks I, II and biological data.

Cuba: Data concerning Task I have been submitted to the Secretariat. Task II data have been sent to the Secretariat for the first time and are included in ICCAT Data Record, Vol. 8. Biological data have been obtained on yellowfin. Great progress has also been made in obtaining biological data for skipjack caught by baitboats.

France: Statistics are collected for albacore, yellowfin and skipjack, and Tasks I, II and biological data have been submitted to the Secretariat. However, a problem exists in obtaining the Mediterranean bluefin catch statistics. This fishery is practiced on an artisanal basis, and is very dispersed. Statistics are difficult to obtain with accuracy.

Ghana: Task I and biological data have been collected from the Ghanaian fleet as well as from the foreign fleets that transship their catches at Ghana. Task II data were obtained for the seven Ghanaian vessels, but logbooks of foreign vessels are very difficult to obtain.

Great progress has been made in the sampling of the catches, and a special effort will be made in the coming years to solve the problem of the proper identification between small yellowfin and bigeye catches. The problem is still serious, especially because it is difficult to sample catches of foreign vessels that transship at sea.

Ivory Coast: Tasks I, II and biological data have been collected for the FIS tropical tuna fleet. Data made available to the Secretariat in November 1976 cover the entire catch and effort, up to September 30, 1976. Biological data are also collected from Asian longliners and the Spanish purse seine fleet.

Japan: Some statistical problems have been solved. All data from 1969 to 1975 have been submitted to ICCAT. Data for 1975 were sent to ICCAT in July, 1976. Concerning the Tema-based baitboat fleet, Task II data for the years 1969, 1973-75 have been sent to the Secretariat.

Korea: Longline data (Task I) have been sent to ICCAT. As far as Task II are concerned, about 19 % of the logbooks of the Korean longliners have been obtained. An expert was sent for two months to Tema, Abidjan and Tenerife in order to improve the statistical system of the Korean baitboats and longliners. Besides, a report on the surface fishery has been made available at this time.

Morocco: Task I data were obtained and submitted to the Secretariat. Tropical tuna boat catches of Morocco will be included with the FIS fleet statistics, to simplify reporting, since those vessels usually transship their catches in Abidjan or Dakar.

In Morocco, bluefin are sometimes caught by sardine boats and it is very difficult to obtain data for Task II statistics. It is also difficult to obtain samples from those boats during unloading time.

Senegal: Tasks I, II and biological data were collected and are included with FIS statistics. Considerable progress was made in skipjack research during the year with the aid of the Skipjack Working Group which met in Dakar in March, 1976 (SCRS/76/89).

Spain: The logbook survey system for yellowfin has been considerably improved compared to previous years. Sampling of catches is done in active collaboration with the laboratories of several African countries. Task II have been collected but there is a problem with automated data processing. It is expected, however, to be solved during the next year. Problems still exist for Mediterranean bluefin statistics. A statistical collection system is very difficult to establish in all small Mediterranean ports because the catches are made by many small boats. Catches made by traps and longliners in the Mediterranean are being collected.

U.S.A.: Progress in the collection of Task statistics was made in 1975 and 1976. Mainly, sampling continued in Puerto Rico in order to determine the percentage of bigeye in the yellowfin tuna catches. More precise Task II statistics were collected for bluefin and billfishes and they will be sent shortly to ICCAT. Progress was also made on the assessment of incidental catches of small tuna by the tropical tuna fleet (SCRS/76/74), as was recommended by the Committee in 1975.

Non-members

Taiwan: Task I and II data have been sent to ICCAT. Task II statistics cover about 30 % of the catches and the coverage should improve in the years to come. A biological sampling program will be established in January, 1977.

Italy: Relations between Italy and ICCAT have been recently reinforced. Data concerning fishing effort directed towards bluefin tuna presently do not exist, and data collection in Italy is very difficult due to the fact that landings occur at widely scattered ports. However, progress was made in obtaining statistics on the fishery in the Adriatic and a report on this subject was submitted to the Secretariat.

4. Examination of the Secretariat's statistical programs in 1976

4.1. The Secretariat reported on the progress made in collecting statistics through national offices in 1976, statistical activities directly executed by the Secretariat, as well as on biostatistical work done by the Secretariat. Evaluation of the availability of present data is also presented (SCRS/76/11).

4.2. Table 1 (SCRS/76/11) shows that this year most countries submitted their nominal catch statistics sooner than in previous years. By the end of June, almost all member countries had submitted their catch figures. However, it is noted that there still exists the problem of obtaining statistics from minor tuna fishing countries on a timely basis. Table 2 indicates that the submission of data for Task II was more timely for 1975 data than for 1974 data. The quality also improved considerably. Table 3 indicates a continual improvement in biological data during 1976, but not as significantly as in the case of catch/effort data.

Significant progress is noted in the size frequency data from Cuban longliners and in the statistics compiled by the Secretariat covering Oriental longliners transshipping in Atlantic ports. The United States has also measured a great number of fish caught by foreign vessels and transshipped to Puerto Rico.

4.3. Since 1975, with the authorization of the SCRS and the Commission, the Secretariat started abstracting logbooks and measuring fish at five transshipment ports in the Atlantic. This program is described in detail in document SCRS/75/9 (Data Record, Vol. 7). The material gathered in 1975 is summarized in the ICCAT Statistical Series - 1. The program continued in 1976. Table 4 shows the number of biological samples as well as the number of logbooks checked in each port in 1975 and 1976 (up to the end of August, 1976).

4.4. Since 1972, the Secretariat has collected statistics on international fleets which are not sufficiently covered by the national offices.

This work decreased in 1976 due to the fact that the local statistical networks have expanded. Most of the Panamanian longline data are now included in Korean national statistics.

4.5. The Secretariat reported on work done in 1975-1976 by the biostatistician. This work, done by Dr. W. E. Schaaf (U.S.A.), consisted of the following:

(i) Requesting all the countries to provide the Secretariat with basic data for a data inventory system.

(ii) Designing a data management system for a sampling data inventory.

(iii) Completing the matrix (as was suggested by the SCRS) to show the trans-atlantic sampling strategy.

(iv) Circulating this matrix among the scientists for comments and completing the data inventory accordingly.

(v) Making an analysis so as to develop a sampling scheme which minimizes the effort and the cost and yet adequately covers all the existing fisheries.

In reality, considerable progress was made in steps (i) through (iii); step (v) has been initiated. Details of the study are reported separately as document SCRS/76/12.

Without going into the technical details of the report by the biostatistician, the following are recommendations suggested by him:

— A permanent biostatistician at the Secretariat is needed.
— The sampling data inventory should be updated.
— Precise advice for each fleet, port and country in order to improve and complete the sampling stratification is needed.
— New methods to compare the different sampling techniques and evaluate their efficiency should be investigated (the simple study of variance proved to be inadequate to compare polymodal distributions).
— Species should be more carefully identified, especially in order to estimate the catches of young yellowfin and bigeye.
— Data should be reported in a format as standardized as possible.
— It is absolutely necessary to have a data processing center and, above all, a centralized data bank.

It was mentioned that many international commissions now have a computerized data bank. This last point is fundamental and an *ad hoc* group was formed to study the conditions of installation of such a bank.

4.6. The Committee endorsed the above recommendations. It also insisted upon the necessity of improving the sampling techniques in the different landing ports. This could be partly attained through more frequent trips by the biostatistical experts to these ports.

It also appears necessary that the experts be in close contact with the scientists of the different countries.

4.7. The problem of weighting the samples by total catches was discussed. The results, in effect, can be very different according to the weighting techniques being used. Besides, it appears indispensable to consider the number of areas/countries/gears/period strata to be sampled.

5. Overall review of present sampling scheme

5.1. The Committee appreciated the progress which has been noted for the longline fleets of Korea, Panama and Taiwan.

The Committee confirmed that an extensive sampling program was started for the Spanish purse seine fleet in 1976, with the assistance of various local institutes at the landing ports.

5.2. However, the Committee underlined the fact that these samples appear to be insufficient for certain species, particularly for bigeye and bluefin.

5.3. It is necessary to update the gear/species/port/period matrix in order to specify what strata have been correctly sampled and for what strata a special effort

must be made. Consequently, the Committee *recommended* that each country update its own sampling system. It was recognized that the work of assembling the information of the countries would be one of the tasks of the biostatistician to be hired. The Data Bank would be essential for this work.

6. Review of criteria for sampling

6.1. The length measurement techniques currently used (i. e. LD_1 or FL) do not present any major problem inasmuch as in each case direct conversion into age can be made.

An attempt should be made to increase the number of samples and to decrease the number of fish in each sample, at least for the surface fisheries.

6.2. A revision of the ICCAT Field Manual should be done, keeping in mind the remarks stated in SCRS/76/12. It is suggested that the chapter concerning sampling could be revised with the latest criteria so that it is technically more precise.

7. Examination of present major problems in regard to quality of statistics

7.1. The Sub-Committee noted that considerable progress has been made on the Tema statistics, especially for the Ghanaian and Japanese fleets. However, Korean Task II statistics for baitboats remain incomplete.

7.2. As for the Spanish statistics, considerable progress has been achieved in regard to Task II. The Sub-Committee noted that progress would be achieved by Spain in its automated data processing system which, in 1977, will permit statistics to be available by month, area and gear.

7.3. Some progress has been made in regard to Mediterranean bluefin tuna statistics. According to the French and Spanish delegates, however, it appears very difficult to further improve these statistics soon, due to the fact that landing ports are widely scattered. Italy is also faced with this same problem.

7.4. The Sub-Committee was concerned about a possible deliberate false reporting of undersized yellowfin tuna catches as bigeye tuna catches. Consequently, special attention to the problem of species identification was *recommended*.

7.5. The Sub-Committee requested that a study on the problem of obtaining accurate and timely catch statistics from Angola and Cap Vert (even though such catches are small) be made and that the authorities be notified of the importance of these statistics. Since Angola is a member country, this should not present too much of a problem. The Secretariat indicated that it is in contact with representatives of these countries. The Sub-Committee felt, however, that a visit by the Secretariat to Angola and Cap Vert could prove useful.

8. Examination of problems regarding compiling and disseminating data

This problem has been studied during the meeting of the Ad Hoc Working Group on the Data Bank (attached as Addendum 2).

9. Future plans for improving the statistical and sampling program for Atlantic tunas

and

10. Recommendations to SCRS

The recommendations contained in this report are summarized below:

— The Sub-Committee *recommended* that a computerized data bank system be created and set up by the Secretariat as soon as possible, according to the suggestions of the Ad Hoc Working Group (Addendum 2).

— The Sub-Committee *recommended* that the Secretariat pursue and develop its sampling of the longline fishery, in connection with the national scientists and persons in charge of longline fisheries on the scientific as well as on commercial levels.

— The Sub-Committee *recommended* that all efforts be made in establishing a distinction between yellowfin and bigeye in catches as well as in biological samples (especially for the FIS fleet, Spanish purse seiners and the Tema-based baitboats).

— The Sub-Committee *recommended* that preliminary estimates of catches and size samplings concerning the current year be made available during the SCRS meeting for *all* major fleets. Data on the first six months of the year should be disseminated by September 15th, and the third quarter data during the meeting.

— The Sub-Committee *recommended* a modification of the statistical areas previously used for the yellowfin surface fisheries. This modification consists in setting up an offshore area off the three zones previously selected, in order to identify the traditional inshore fishing areas from new offshore areas. The map of the new fishing zones is shown in Figure 1 of the SCRS Report.

— The Sub-Committee *recommended* that a permanent biostatistician be hired in order to develop the analysis of the problems concerning overall sampling strategy (Nantes Report). This biostatistician will be able to participate actively in establishing the ICCAT Data Bank and use such data for his analyses.

— The Sub-Committee *recommended* that the Field Manual published by ICCAT be reviewed and revised, keeping in mind the specific problems of the various landing ports. The Secretariat should make available a temporary version of this Manual during the next meeting of the Sub-Committee on Statistics.

— The Sub-Committee realized that execution of a certain number of the above recommendations will require extra expenses for the Commission. Therefore, it requested SCRS to assign priorities between the various goals in relation to financing them by the Commission.

— The Sub-Committee *recommended* again that the long-term or specific statistical problems be analyzed; whether the right type of data are currently being collected; whether current data will be adequate in the future; the cost, benefit and effectiveness of current and future sampling schemes; contingency plans to deal with changing fleet composition; fishing areas and species exploited; and other such problems.

11. Other matters

The Sub-Committee requested the national administrations to insist upon the importance of collecting statistics on small tunas for which the available data do not permit any accurate estimate of present catch or estimates of potential catch.

12. Adoption of Report

The Report was adopted.

13. Adjournment

The meeting was adjourned.

Table 1. Progress made during 1976 in the collecting of Task I data fo 1975

Country	*Receipt of Data*	*Type of Data*							*Remarks*
		Catch	*Landings*	*Effort*	*By Gear*	*By Species*	*Preliminary*	*Final*	
Angola									
Brazil	May 3 (May 12)		×	×	×	×		×	LL data only.
Canada	April 2 (May 12)	×		×	×	×		×	
China (Taiwan)	April 21 (July 10)		×	×	×	×	×		
Cuba	Aug. 25 (Aug. 14)	×		×	×	×		×	
France	March 8 (Aug. 4)		×	×	×	×		×	BF and ALB only.
	March 12 (June 3)		×	×	×	×		×	Tropical fisheries only.
Ghana	March 11 (April 14)		×	×	×	×		×	Only large commercial fisheries. Also reported foreign flag landings.
	June (May 21)		×	×	×	×		×	Local artisan fisheries.
Italy	May 24	×			×	×		×	
Ivory Coast	March 12 (June 2)		×		×	×		×	
Japan	March 9 (April 1)	×		×	×	×		×	PS only.
	June 22 (July 14)	×		×	×	×	×		BB, LL.
	August 10	×		×	×	×		×	BB.
Korea	May 25 (March 4)	×		×	×	×		×	
Mexico	March 16 (June 16)		×			×		×	
Morocco	June 30 (June 10)		×		×	×	×		BB only.
Portugal	April 20 (Aug. 26)		×	×	×	×	×		
Senegal	March 12 (June 3)		×	×	×	×		×	Combined with Ivory Coast and France.
South Africa	April 26 (April 23)	×		×	×	×		×	
Spain	April 1 (April 25)		×			×	×		Major species only.
	July 20 (July 21)	×	×		×	×			
Trinidad & Tobago	July 26	×		×	×	×			1974-75.
U.S.A.	March 8 (March 11)	×		×	×	×	×		PS. Major species.
	April 20 (July 4)	×	×		×	×	×		All gears. All species.
	June 25 (July 14)	×		×	×	×	×		Revision PS.
Venezuela	June 30 (April 7)		×		×	×		×	Also reported foreign flag landings.
	Aug. 27		×		×	×		×	

Note: Date in parentheses indicates when data were received in 1975.

Table 2. Progress made in the collecting of Task II data during 1976

Country	*Date Received*	*Species*	*By Gear*	*By Month*	*By 1°×1° Area*	*By 5°×5° Area*	*By Larger Area*	*Effort*	*Weight*	*No. of fish*		*Remarks*
Angola												
Brazil	May 3 (May 12)	All	×	×		×		×	×		1975	LL only.
Canada	Apr. 2 (Aug. 26)	BF	×	×	×			×	×		1975	
China (Taiwan)	Apr. (Nov. 10)	All	×	×		×		×	×	×	1970	LL.
	Nov. 9	All	×	×		×		×	×	×	1975	LL.
Cuba	Aug. 25	All	×	×		×		×		×	1975	LL.
France	Mar. 30 (July 30)	BF, Alb.	×	×			×		×		1975	
	Oct. 11 (Nov. 10)	BF, Alb.	×	×	×			×		×	1975	
FIS	Mar. (Nov. 9)	YF, SJ	×	×	×	×		×	×		1974-75	Revised.
Ghana												
Japan	Mar. 9 (Oct.)	YF, SJ, FrT	×	×	×			×	×		1975	PS only.
	Aug. 10	YF, SJ	×	×	×		×	×	×		1969, 1973-75	BB only.
	Aug. 20 (Sept.)	All	×			×		×		×	1975	LL, by quarter. - Preliminary.
Korea	May 25 (Oct. 9)	All	×	×		×		×	×		1974	Revised.
	Nov. 2	All	×	×		×		×	×		1975	
Morocco	June 30 (June 10)	All	×	×	×				×		1975	
Portugal	Oct. 6 (Aug. 26)	All	×	×	×	×			×		1975	
South Africa	Apr. 26 (Apr. 23)	All	×	×	×			×	×		1975	
Spain	July 20 (Nov. 5)	Alb.	×	×	×			×		×	1975	
	July	All	×	×				×	×		1975	Canary Islands.
U.S.A.	Feb. 9	SJ	×	×			×	×	×		1975	Preliminary.
	Mar. 8 (Mar. 11)	Major species	×	×	×	×		×	×		1975	Preliminary.
	June 25 (July 14)	Major species	×	×	×	×	×	×	×		1975	Revision.
Venezuela	June 30 (Aug. 6)	All	×	×	×			×	×		1975	Foreign flag landings.

Note: Date in parentheses indicates when data were received in 1975.

Table 3. Progress made in the collecting of Biological Data during 1976

Country	*Date Received*	*Species*	*Gear*	*Area*	*Month*	*Actual Size Frequency*	*Weighted Size Freq.*	*Year*	*Remarks*
Angola									
Brazil									
Canada	July 20 (May 12)	BF	PS, Sport	Specific	Monthly	×	×	1975	
China (Taiwan)		YF, Alb., BE	LL	ICCAT area	Quarterly	×	×	1974-75	ICCAT Port Sampling Program
Cuba	Sept. 21 (Oct. 8)	YF	LL	General	Monthly	×		1975	
	Nov. 9	SJ	BB	General	Monthly	×		1974-75	
France	Mar. 30 (Nov.)	Alb.		Specific	Monthly	×		1975	
FIS	June (Nov. 9)	YF, SJ	BB, PS	Regions	Quarterly		×	1975	
Ghana	Nov. 2	YF, SJ	BB	1°×1°	Monthly	×		1974-75	
Italy	June 30	BF	PS, Trap	Specific	Monthly	×		1958-68, 1975	

Japan	Mar. 9 (July 8)	YF, SJ	PS	Specific	Monthly	×		1975	
	March	All	PS, LL	5°×10° or 10°×20°	Monthly	×		1973-74	
	Aug. 20	All	LL	5°×10° or 10°×20°	Quarterly	×		1974-75	Preliminary
Korea		YF, Alb., BE	LL	ICCAT area	Quarterly	×	×	1974-75	ICCAT Port Sampling Program
	Nov. 2 (Oct. 4)	YF, Alb., BE	LL	5°×10°	Quarterly	×		1975	
Morocco									
Portugal									
South Africa									
Spain									
U.S.A.	Feb. 9	SJ	PS	Specific	Monthly		×	1968-75	1975 Preliminary
	Mar. 8 (Mar. 11)	Trop.	PS	Regions	Monthly		×	1975	Preliminary
	March 8	All	PS, BB, UNCL.	Regions	Quarterly	×		1975	Preliminary. Foreign landings transshipped to Puerto Rico
	March 16	BF	PS, Misc.		Weekly	×		1975	Preliminary
	June 25	All	PS	Specific	Monthly		×	1975	Revision
Venezuela	Nov. 2 (Aug. 6)	SJ	BB	Specific	Monthly	×		1973, 1975	Foreign flag landings

Note: Date in parentheses indicates when data were received in 1975.

Table 4. Summary of port sampling executed by the Secretariat in 1975 and 1976

			Tenerife and Las Palmas		*Abidjan*		*Cape Town*		*St. Maarten*		*Total*	
			1975	*1976*	*1975*	*1976*	*1975*	*1976*	*1975*	*1976*	*1975*	*1976*
No. of logbooks abstracted		(1)	95	141	67	31	—	—	9	35	171	207
		(2)	72	100	6	0	36	102	2	13	116	215
		(1) + (2)	167	241	73	31	36	102	11	48	287	422
No. of samples	YF	(1)	45	99	87	39	—	—	2	29	134	167
		(2)	11	3	11	4	—	—	1	13	23	20
		(1) + (2)	56	102	98	43	—	—	3	42	157	187
	BE	(1)	35	103	67	31	—	—	—	—	102	134
		(2)	13	11	19	5	—	—	—	—	32	16
		(1) + (2)	48	114	86	36	—	—	—	—	134	150
	ALB	(1)	23	66	13	7	—	—	2	32	38	105
		(2)	43	89	13	17	36	99	1	13	93	218
		(1) + (2)	66	155	26	24	36	99	3	45	131	323

	TOTAL	(1)	103	268	167	77	—	—	4	61	274	406
		(2)	67	103	43	26	36	99	2	26	148	254
		(1) + (2)	170	371	210	103	36	99	6	87	422	660
No. of fish sampled	YF	(1)	2,300	5,162	4,206	2,290	—	—	96	1,119	6,602	8,571
		(2)	459	116	389	251	—	—	50	459	898	826
		(1) + (2)	2,759	5,278	4,595	2,541	—	—	146	1,578	7,500	9,397
	BE	(1)	1,587	5,192	3,265	1,692	—	—	—	—	4,852	6,884
		(2)	498	571	821	280	—	—	—	—	1,319	851
		(1) + (2)	2,085	5,763	4,086	1,972	—	—	—	—	6,171	7,735
	ALB	(1)	1,175	3,470	493	264	—	—	97	1,750	1,765	5,484
		(2)	2,602	4,967	694	1,050	1,825	5,085	51	716	5,172	11,818
		(1) + (2)	3,777	8,437	1,187	1,314	1,825	5,085	148	2,466	6,937	17,302
	TOTAL	(1)	5,062	13,824	7,964	4,246	—	—	193	2,869	13,219	20,939
		(2)	3,559	5,654	1,904	1,581	1,825	5,085	101	1,175	7,389	13,495
		(1) + (2)	8,621	19,478	9,868	5,827	1,825	5,085	294	4,044	20,608	34,434

(1) Korea + Panama.
(2) China (Taiwan).

Addendum 1 to Appendix 6 to Annex 8

Agenda for the Sub-Committee on Statistics

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Review of general progress made by national offices (Particular emphasis on achievements made in respect to the commitments made at the 1975 meetings — Working Group on Statistics)
4. Examination of the Secretariat's statistical programs in 1976:
   - Task I statistics
   - Catch/effort statistics collected at ports by the Secretariat
   - Biological sampling program carried out by the Secretariat.
   - Study on overall sampling strategy
5. Overall review of present sampling scheme
6. Review of criteria for sampling (frequency of sampling, sample size, size classes, conversion, etc.)
7. Examination of present major problems in regard to *quality* of statistics
8. Examination of problems regarding *compiling* and *disseminating* data
9. Future plans for improving the statistical and sampling program for Atlantic tunas
10. Recommendations to SCRS
11. Other matters
12. Adoption of Report
13. Adjournment

Addendum 2 to Appendix 6 to Annex 8

Report of the Ad Hoc Working Group on the Data Bank

The Group discussed the subject of a computerized data bank. The Group considers that its creation is a necessity in order to pursue and accomplish the tasks of the Commission.

The basic data which will constitute the input to this bank, will be Task I, II and biological data, i. e. catch, effort and length in an adequate spacial-temporal stratum.

At present, it is estimated that about 60 % of the data collected in the various countries is already stored on computer cards or magnetic tapes. However, it should

be noted that the spacial-temporal strata in which data are stored vary greatly from one laboratory to another. Therefore, it will be necessary to adopt a system that is flexible enough to accept all input data as they are submitted from various sources. While processing, the largest spacial-temporal unit in the input data will be the limiting factor to the detailedness of the output. Very likely, such limitations will only apply to past data. As a matter of fact, establishing such a computerized system will motivate a progressive standardization of input data as detailed as the local collecting method permits.

Such a system which accepts large or heterogeneous input data is presently in operation in Los Angeles (U.S.A.) and other major cities of the world. It is accessible through the international telex network. By setting up a telex unit at each pertinent laboratory, all input and output data and all the programs can be communicated with the central computer of the bank.

The system is called "INFONET". The Los Angeles system is presently utilized by the NMFS, La Jolla laboratory for Atlantic tuna data; the system operates on a UNIVAC computer. It utilizes a new language ("Data Management Language"), and the system may be available in Madrid where the system has an affiliated vender.

If this system were adopted, all input and output could be made by all laboratories, directly through their telex, or otherwise, more economically, through the mail to ICCAT. A certain number of basic printouts would be assembled and distributed by ICCAT on a routine basis.

It should be noted that establishing such a system would result in many changes in the working data system of the Commission.

Upon the Group's request, contact was made by the Secretariat with the ENTEL IBERMATICA Company which represents the "INFONET" system in Madrid. A discussion took place between the Group and the representatives of this company. The representatives indicated that access to the Chicago (U.S.A.) or even the Los Angeles center from Spain is available, but it is also expected that a computer will become available for direct access in Madrid in February, 1977, and possibly linked with the international telex network some time in the future. The annual cost for using the system was estimated by ICCAT at about U.S. $ 20,000, based on an extrapolation of the cost for the system at La Jolla.

The company will also provide ICCAT with consultants and with a training course for the Secretariat expert.

The Group thus requested the Secretariat to pursue this matter and try out the system.

The Group considers that the preparation of the ICCAT data bank should take place with close contacts with NMFS, La Jolla, where the system has already been widely and successfully used for many data on Atlantic tuna.

For this purpose, the Group recommended that the ICCAT Statistical and Computer Expert take the course of the ENTEL IBERMATICA Company in Madrid, then be sent to La Jolla for a certain period in order to prepare the bank and ensure the transfer of this bank to Madrid with the least delays and best conditions. An alternative to the above is to invite Mr. A. L. Coan who uses this system in La Jolla to visit Madrid for the same purpose.

The Group indicated that the first objective would be to establish and test the system and then assemble all yellowfin measurements from 1955 to 1975 in a uniform standardized format. The data should possibly be weighted by total catches by area, gear, country and quarter. The results should be distributed in perhaps two volumes: first volume, digital data, and the second volume, histograms. The magnetic tape of the output should be made available by request. These results should be planned to be available by the next SCRS meeting.

Appendix 7 to Annex 8

EVALUATION OF THE PROGRESS MADE ON ASSIGNMENTS OF THE 1975 MEETINGS

General

[1] Fishing effort — Pilot studies on relation between fishing time and searching time (begun) . . .	U.S.A.
[1] Validity of units of fishing effort and catchability (need to identify)	U.S.A., FAO, ACMRR studying
[1] Naturality	U.S.A.
[2] Application of cohort analysis to the fisheries . .	U.S.A.
[2] Papers on methods of estimating yield from multiple species fishery	U.S.A.
[1] Correspondence with ICNAF by Secretariat . . .	Secretariat

Yellowfin

[1] Production models (updated)	U.S.A.
[1] Yield per recruit analysis	Ivory Coast, U.S.A.
[1] Table on age structure	Ivory Coast, U.S.A., Japan (longline), Secretariat
[2] Cohort analysis (including effects of year-class change)	U.S.A.
[2] Stock structure paper	Senegal
[2] Simulation to investigate variability of recruitment .	Ivory Coast, U.S.A.

[1] Totally or partially achieved.
[2] Not yet done.

[3] Effects on fisheries of management actions (e. g. reducing or increasing effort, etc.)	Canada, Ivory Coast, Japan, U.S.A.
[2] Feasibility of regulations	Canada, U.S.A.
[1] Separation of YF from BE in catch (FIS and Spanish surface fishery to be sampled)	
[1] Study proportions of undersized yellowfin caught by each national fleet	

Skipjack

[1] Production models (updated)	U.S.A.
[1] Table on age structure	Ivory Coast, U.S.A., Secretariat
[1] Cohort analysis	Senegal
[2] Relations between CPUE and E (theoretical) . . .	U.S.A.
[1] Size distribution	Canada, Ghana, Japan, ORSTOM, Spain, U.S.A. collaborate. Should be organized by the Secretariat

New skipjack research to be commenced

[1] Collection of W. Atlantic size data — (Carrillo, Sakagawa, Ramos — Summary by Secretariat)

[1] Compilation of E. Atlantic catch, effort, size data by gear, month and by meaningful area — (Senegal, Pianet; Japan, Kume; Spain, Pereiro and Fernández; U.S.A., Sakagawa — Summary by Secretariat)

[2] Feasibility study of tagging for stock separation — (U.S.A., Fox)

[1] Analysis of previous E. Atlantic tagging studies — (Senegal, Pianet)

[1] Monthly charts of catch, effort, hooking rates — (Japan, Kume)

[2] Interview fishermen for school sighting — (Brazil, Japan, Korea, Taiwan, Senegal, Ivory Coast, Spain, U.S.A., Secretariat)

[1] Report of aerial spotting results — (Brazil, Zavala; U.S.A., Fox; Senegal, Pianet)

[2] Review previous research vessel surveys — (Senegal, Pianet)

[2] Compare E. and W. Atlantic size frequencies — (Senegal, Pianet; Venezuela, Ramos)

[2] Compare SJ and YF recruitment indices — (Senegal, Pianet)

[2] Review possibility of fishing vessel surveys — (FAO, Rosa)

[2] Study definition of fishing effort — (U.S.A., Fox)

[2] Review feasibility of otoliths for growth — (France, Le Gall)

[1] Review airborne and satellite possibilities — (Senegal, Pianet; U.S.A., Fox)

[1] Complete age and growth studies and separate E. Atlantic catch by cohorts — (Senegal, Pianet)

Bluefin

[1] Production models (new or updated)	Canada, U.S.A.
[1] Yield per recruit analysis	Canada, U.S.A.
[2] Table on age structure	Canada ?, U.S.A., Japan, (longline)
[1] Cohort analysis	Canada, U.S.A.
[1] Stock structure paper	U.S.A.
[2] Simulation to investigate increased recruitment	Japan
[1] Age determination	Beardsley and small working group
[2] Sport fishery survey	U.S.A.
[1] Year class strength study	Japan
[2] Tagging young bluefin in the Bay of Biscay	U.S.A., Spain, France, Morocco, Secretariat
[1] Catch and biological data from Mediterranean fishery (including Italy, Algeria, Tunisia)	Secretariat through FAO, etc.

Albacore

[1] Production models (updated)	France
[1] Yield per recruit (integrated with C/E per age)	France, Japan ?
[1] Table on age structure	France ?, Japan ?
[1] Cohort analysis	France
[2] Stock structure paper	France
[1] Recruitment for longline (N.E. Atlantic)	Japan
[1] Study on historical data (North stock — longline and surface)	
[1] Size composition data (new or historical — South)	Japan (historical data)

Bigeye

[1] Production models (updated)	U.S.A., Japan
[1] Yield per recruit analysis	Japan

[2] Table on age structure	Japan
[2] Cohort analysis	Japan
[1] Stock structure paper	Japan
[1] Size data	Japan (longline)
[1] Separation of statistics by north-south	Japan
[2] Separation of bigeye catch from yellowfin (FIS and Spanish surface fishery to be sampled)	
[2] Catch by USSR	Secretariat

Billfishes

[1] Production models	Japan, Canada
[2] Table on age (size) structure	Japan, U.S.A.

Small tuna species

[1] Secretariat to request experience of field workers and observations of taxonomists	Secretariat
[1] Study the methods to improve statistics Task I, II and biological	All national offices
[2] Study a system to estimate rejects by fishing boats	

Statistics and Sampling

[1] Synopsis of sampling schemes by time, area, gear, species strata	All national offices; to be summarized by the Secretariat
[1] Catch and effort by time, area, gear, species strata	All national offices; to be summarized by the Secretariat
[1] Overall view of current status and cost effectiveness of Atlantic sampling program	Secretariat
[2] Strata substitutions for length frequency compilations	All national offices
[1] Estimate carrying capacity for major fisheries	Secretariat
[1] Promptness of Task II data	All national offices
[1] Systematic sampling of Spanish intertropical purse seine fishery	
[1] Processing of Japanese baitboat data	Japan

ASSIGNMENTS FOR THE FUTURE

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) * Fonteneau (France)	* Pianet (Senegal) Fernández (Spain)	* Bard (France) * G.-Garcés (Spain)	* 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)	* Kume (Japan) * Al. Santos (Spain)	
3. Size/Age composition of catch by fisheries (in Table)	* Fox (USA) Marcille (I. C.) Fernández (Spain)	* Pianet (Senegal) Fernández (Spain)	G.-Garcés (Spain) * Le Gall (France) Kume (Japan)	* Tyler (USA) Kume (Japan) * Bard (France)	* Kume (Japan) * Al. Santos (Spain) Marcille (I. C.)	* Beardsley (USA) Kume (Japan) Beckett (Canada) Rey (Spain)

4. Yield per recruit	* Fox (USA) * Fonteneau (France)	* 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 (France)	* Pianet (Senegal)	* Le Gall (France)	Beckett (Canada) * Tyler (USA) Cort (Spain) * Bard (France) 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 (France) B. A. Kim (Korea)			* Tyler (USA) Rey, Cort (Spain) * Bard (France)	* Fox (USA) Ansa-Emmim (Ghana) Fonteneau (France) 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.)

B. *SPECIAL ITEMS OF WORK TO BEGIN — OR COMPLETE — BY THE 1977 SCRS MEETING*

B-I. *Statistics and Sampling*

1. Establishment of a computerized data center . .	Secretariat
2. Sampling manual for each sampling port (revision of Field Manual)	Secretariat
3. Advice on adequacy of sampling for each fishery/species/gear/port/flag	Secretariat
4. Continue sampling and logbook abstract from foreign vessels transshipping the catches at Atlantic ports	Secretariat
5. Separation of yellowfin and bigeye catches . . .	Ansa-Emmim (Ghana), Marcille (Ivory Coast)
6. Fundamental planning for Atlantic-wide skipjack project	Secretariat and Advisory Committee
7. Improvement of catch statistics by minor tuna fishing countries	Secretariat
8. Study a system to estimate rejects by fishing boats	Ansa-Emmim (Ghana)
9. Organize a training course on statistics and sampling or a mission to train local statistical people to be sent to each major sampling port .	Secretariat

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	

B-III. *General Problems Specific to Species to be Undertaken in 1977*

Tasks	*Yellowfin*	*Skipjack*	*Albacore*	*Bluefin*	*Bigeye*
1. Analysis of stock structure	Zavala (Brazil)	*	Bard (France) Kume (Japan)	Tyler (USA)	**
2. Investigation of variability of recruitment on yield	Fox (USA) Fonteneau (France)	*	Bard (France) Kume (Japan)	Tyler (USA) Bard (France)	Kume (Japan)
3. Age determination	**	Fox (USA) Le Gall (France)	**	Tyler (USA)	*
4. Interaction of multi-gear fisheries	Fonteneau (France)	*	Bard (France) Kume (Japan)	Tyler (USA) Kume (Japan)	Kume (Japan)
5. Analysis of recruitment indices	Fox (USA)	Pianet (Senegal)	Kume (Japan) South. Alb.	Tyler (USA) N. W. - BF Bard (France) N. E. - BF	*
6. Estimation of effective effort in multi-species fishery	Fox (USA) Fonteneau (France) Kume (Japan)	*	Bard (France) Kume (Japan)	Tyler (USA) Kume (Japan)	Kume (Japan)

* Studies needed but not planned for 1977.

** Studies completed and information adequate. No additional studies are planned for 1977.

B-IV. *Special Activities for 1977*

1. Yellowfin: Relations of fish caught in offshore and inshore areas of the eastern tropical Atlantic (Fonteneau, France).
2. Skipjack: Growth rate by sex (See Appendix 5).
3. Albacore: Analysis of catch rates and biological data to determine mixing between stocks (Kume, Japan).
4. Bluefin: Tagging of young fish in the eastern Atlantic and Mediterranean (Secretariat).
5. Bigeye: Analysis of spacial distribution of effort and catch on sizes of fish caught (Kume, Japan).
6. Swordfish: Analysis of catch and effort data of Canadian fishery (Beckett, Canada).

Appendix 9 to Annex 8

PREPARATION OF SUMMARY TABLES OF STATISTICS BEFORE EACH SCRS MEETING

Before the Species Rapporteurs start their work prior to the SCRS meeting, the ICCAT Secretariat should prepare tables, including the most recent (annual summaries) statistics available.

The format should be in accordance with the specifications below:

Species: Yellowfin, skipjack, bigeye, albacore, bluefin, southern bluefin, white marlin, blue marlin, swordfish.

Period of time covered: The 10 previous years and as many quarters as available for the current year.

Kinds of statistics: Total catch, CPUE (effort and corresponding catch), if possible, size compositions.

Main fisheries defined by: Countries/gear/current ICCAT statistical areas.

Appendix 10 to Annex 8

REVIEW OF THE EFFECT OF BLUEFIN TUNA REGULATIONS 1975 - 1976

In 1974, the Commission *recommended* that member countries adopt regulations governing their bluefin tuna fisheries. These regulations are:

"FIRST. That the Contracting Parties take the necessary measure to prohibit any taking and landing of bluefin tuna (*Thunnus thynnus thynnus*) weighing less than 6.4 kg.

Notwithstanding the above regulation, the Contracting Parties may grant tolerances to boats which have incidentally captured bluefin weighing less than 6.4 kg., with the condition that this incidental catch should not exceed 15 % of the number of fish per landing of the total bluefin catch of said boats or its equivalent in percentage by weight.

"SECOND. That as a preliminary step, 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 to recent levels for a period of one year."

These new regulations have been in effect for two fishing seasons and it seems appropriate to review the catches of the various fisheries while operating under these regulations, and to make some preliminary estimates of the effect of these regulations on the status of the stocks.

1. Minimum size of 6.4 kilograms

In general, fisheries on both sides of the North Atlantic have been successful in limiting their catch of undersized bluefin to acceptable levels. For example, the percentage (in number) of undersized bluefin (less than age 2) in the catch of both the Bay of Biscay and the western Atlantic surface fisheries in 1976 was only 1 % of the total number landed. This is a substantial reduction from levels in some previous years. There is still some question, however, about catches of very small bluefin (age 0) in the Mediterranean. The reduction in numbers of undersized bluefin taken will result in an increase in yield-per-recruit and, if F is restricted to recent levels, will mean an increase in escapement from the surface fisheries and a subsequent increase in recruitment to the medium size group.

2. Limitation of fishing mortality to levels of recent years

A. *EASTERN ATLANTIC SURFACE FISHERY*

1. *Bay of Biscay*

The catches of the baitboat fishery in 1975 were 7 % above 1974 levels; however, 1976 catches were 49 % less than 1975 catches. Indices of abundance of fish taken by this fishery have remained relatively constant over the period 1974-76. This implies that F has decreased.

2. *Ibero-Moroccan Gulf*

The 1975 catch of small fish appears to be comparable to catches in recent years. If we assume a constant level of abundance, then F has remained constant. The 1975 catch of large fish apparently is greater than the 1974 catch. No population estimates are available. If F has remained constant in this large-fish fishery, abundance would have to have increased.

B. *WESTERN ATLANTIC SURFACE FISHERY*

Catches in 1975 were 140 % above 1974 levels; however, a strong 1973 year-class contributed significantly to this increase. No estimate of trends in F from 1974 to 1975 were made; however, evidence indicates that F in the surface fishery in 1976 declined more than 40 % from that of recent levels defined as 1969-72.

C. *MEDITERRANEAN LARGE-FISH FISHERIES*

Information on size composition and catch rates in the Mediterranean is limited, but it is noted that total catches have increased substantially since the early 1970's. It is also noted that CPUE in the Japanese longline fishery from 1972-74 shows no significant trend. This implies that F has increased somewhat between 1972-74.

D. *WESTERN ATLANTIC LARGE-FISH FISHERY*

Catches in 1974 and 1975 were approximately 4,500 fish. The 1976 catch was approximately 3,700 fish, a decrease of about 18 %. Estimates indicate that the population of bluefin available to this fishery has declined substantially and that F has increased approximately 200 % from the average F of recent years, defined as the period 1969-72.

E. *ATLANTIC LONGLINE FISHERY*

The 1974 catch was 3,292 metric tons; the 1975 catch was 4,455 MT, a 26 % increase. The size frequencies of fish, in the western Atlantic at least, appear to have shifted slightly toward larger fish, so no conclusive statement can be made as to whether the 1975 catch in number has increased or decreased compared to that of 1974. CPUE for recent years has remained relatively constant, implying that F has remained constant. It is noted that the catch in numbers increased substantially in 1974 over the previous several years although this total included the Mediterranean.

CHAPTER III

NATIONAL REPORTS

REPORT ON THE INVESTIGATION AND FISHING OF TUNA AND TUNA-LIKE SPECIES IN BRAZIL, 1975-1976

by

L. A. ZAVALA CAMIN

A. Situation of the fisheries

In 1975, the three longliners which operate in the south of Brazil caught 1,130 MT (gilled and gutted weight) of tuna and tuna-like species, using 842,140 hooks. This represents a 10.3 % increase in the catch and a 16.2 % increase in the number of hooks, as compared to 1974.

Production by species, 1975 (longline)

Species	*MT (gilled and gutted)*
Yellowfin	425.7
Swordfish	264.6
Bigeye	113.7
Albacore	93.1
Sailfish	73.7
White marlin	26.0
Blackfin	6.1
Other	116.8
	1,129.5

In 1976, an additional longline vessel operated.

Original report in Spanish.

B. Research programs

Biology

Biological studies are conducted principally on yellowfin; observation of the patterns and examination of the gonads indicate that, in the south of Brazil, this species migrates at approximate six-month intervals (SCRS/76/25).

Statistics

By converting gilled and gutted weight to size, size frequencies were obtained from 1969 up to the present for albacore, bigeye and swordfish. In 1976, the Institute responsible for fisheries development in Brazil, the "Superintendência do Desenvolvimento da Pesca" (SUDEPE), initiated a national program for fishery statistics. At the major landing ports of all the coastal States, schemes to control landings have been or are being set up. These will permit obtaining better catch information, especially for small tunas.

C. Programs for expansion of tuna fishing in Brazil

Research

In the area northeast of Brazil, a program of exploratory fishing with live bait will be carried out in 1977. In this same area, the fishing vessel "Riobaldo" conducted three cruises, which lasted an average of 12 days each, using multiple trolling lines (9 lines) and a small longline. It was observed that the multiple trolling lines could increase by 100 % the efficiency of the artisanal system currently used in this area.

Incentive to catch tunas

SUDEPE has established a system of contracting foreign vessels for the catch of tunas. The contracts will be for a one-year period and are renewable.

D. Scientific documents presented to SCRS in 1976

AMORIM, A. F.

MS "Informe preliminar sobre las investigaciones del pez espada (*Xiphias gladius*) en el Sudeste Sur del Brasil, en el período de 1971-1976."

ZAVALA-CAMIN, L. A.

MS a. "Hipótesis sobre la estructura de población del rabil (*Thunnus albacares*) basada en el estudio de los estados de maduración sexual y de la frecuencia de tallas en ejemplares capturados en el Sur del Brasil."

MS b. "Parámetros y distribución del patudo (*Thunnus obesus*) en el Sur del Brasil (1969 - Agosto 1976)."

MS c. "Parámetros y distribución del atún blanco (*Thunnus alalunga*) en el Sur del Brasil (1969-1975)."

CANADIAN NATIONAL REPORT 1975-1976

by

T. D. ILES and C. D. BURNETT

A. Status of the fisheries

1. *Swordfish*

The landings of swordfish in Canada for 1975 were approximately 21 metric tons (MT).

2. *Tunas*

Canadian catches of Atlantic tunas in 1975, all bluefin from the north-western ocean, amounted to 641 MT by all methods, a decrease of 127 MT below 1974.

The purse seine fishery for juveniles off the eastern coast of the United States accounted for 291 MT, an increase of 188 MT but within a domestic quota. Incidental catches of bluefin in the St. Margaret's Bay, N.S., mackerel traps amounted to 144 MT, a decline of 116 MT that may have been due to the reduced presence of mackerel in the Bay, since the species is the principal food of tuna in that area. Thus some 400 tuna were taken in the traps during June and July, compared to approximately 680 in 1974. The sports fishery catches at 206 MT, were only half those in 1974, due in part to reduce availability and in part to restrictions imposed on the fishery. Seasons of 10 weeks were established for various localities within the Gulf of St. Lawrence, licences were limited to those who had fished in 1974, and no movement was permitted between the areas with different seasons. A catch limit of 2 fish per day was established and the completion of log records made compulsory.

B. Special research studies

1. *Swordfish*

In 1975, two experimental longline cruises were carried out along the edge of the Gulf Stream, from the northern edge of Georges Bank to the southern edge of Banquereau Bank. Fish were sampled for weight, length, and sex and portions

Original report in English.

kept for study of mercury content, while vertebrae and pectoral fin rays were taken for age determination.

Seventeen swordfish, 31 blue sharks and 3 mako sharks were tagged and released.

Recapture of two tagged swordfish was reported, one of which had been released in 1969 from a longline and the other tagged by harpoon in 1970. As with other swordfish recaptures, neither fish was retaken more than 200 miles from the release point.

A manuscript report on some factors relevant to management of the swordfish fisheries was prepared (Caddy, 1976).

2. *Tunas*

Weight data were obtained for 942 fish, virtually all the large bluefin taken off the Canadian coast in 1975, with additional data for some; sex (250 fish), morphometric measurements (249), otoliths (188), and stomach contents (121).

The average size of the bluefin showed considerable increase, when compared to the previous year, whilst maintaining the normal pattern of variation in the average size between different areas and methods of capture. Bluefin taken in the Gulf of St. Lawrence averaged 340 kg in 1974, and 389 kg in 1975, while the average weight of St. Margaret's Bay trap-caught fish increased from 297 kg to 319 kg. Western Nova Scotia sports-caught tuna averaged 351 and 380 kg in the two years while eastern Newfoundland fish averaged 294 and 314 kg, respectively.

Juvenile bluefin taken in the purse seine fishery were sampled for size with a total of 1,412 length measurements recorded. The fish ranged from 50-195 cm with the majority being two years old.

Tagging operations resulted in the release of 20 fish after capture by rod and reel in the Bay of Chaleur (Gulf of St. Lawrence) and 148 fish from traps in St. Margaret's Bay. Recoveries in the Gulf of St. Lawrence, in 1975, included 4 fish released from traps in St. Margaret's Bay, 3 in 1975 and one in 1971, whilst a fifth recovery had been tagged in the Gulf in 1974, after capture by rod and reel. A single recovery from the 1973 juvenile tagging programme off New Jersey was reported from the same general area.

An experimental otolith sampling programme for age determination of tuna was initiated in 1975. Otoliths were sectioned at 0.2 mm through the sulcus, using a macrotone with carborundum blade, and examined in oil of cloves. Good agreement was noted between age determinations for smaller fish using this method and counts of vertebral rings. For larger fish the vertebral rings were difficult to read and appeared to underestimate age as judged from otolith sections, which seemed to be in the range 18-24 years (Caddy & Butler, 1975). Preliminary data indicated good agreement between the age composition of large bluefin in the East and West Atlantic in 1974.

In St. Margaret's Bay a tuna ranch was established by commercial interests using two impoundment nets, each 94 metres in diameter and 30 metres deep. Fifty-five large fish were transferred from the traps to the ranch in towed cages and were fed at least 3 % of their body weight of mackerel and herring each day for

a period of three to four months. At the end of this period the fish were harvested in premium condition.

A preliminary programme of sonic tagging to determine depth and body temperature of the tuna in the tuna ranch was frustrated by equipment malfunction.

C. Preliminary Report for 1976

The regulations established for 1975 for the various Canadian bluefin fisheries were continued in 1976. Provisional figures for the purse seine fishery show 331 MT of small bluefin, 183 MT of yellowfin with some bigeye, and 171 MT of skipjack.

The 1976 catches of large bluefin will be slightly higher than those in 1975, from both sport and trap fisheries. The average size of the fish appears to be continuing to increase and the world rod and reel size record has apparently been broken at least 5 times with the largest fish exceeding 544 kg. Collection of size and biological data, including otoliths, is being continued for the various fisheries.

Publications

CADDY, J. F., and M. J. A. BUTLER

1975 Recent catch trends and age composition in Canadian coastal fisheries for giant bluefin tuna (*Thunnus thynnus*) and their relevance to assessment of the Northwest Atlantic large fish stocks. ICCAT SCRS/75/78.

CADDY, J. F.

1976 A review of some factors relevant to management of Swordfish Fisheries in the Northwest Atlantic. Canada, Fisheries and Marine Service Tech. Report No. 633, 35 pp.

CUBAN NATIONAL REPORT — 1975

by

CUBAN DELEGATION - 1976

Introduction

The Cuban tuna fishery in the Atlantic began to develop since 1964, with the acquisition of a fleet of five Japanese longline vessels. In the beginning, this fishery developed in the western Atlantic (Gulf of Mexico and the Caribbean Sea), until 1969, when almost the entire fleet shifted its operations to the eastern Atlantic (from tropic to tropic).

The annual catches, by species, have been as follows:

Unit: Thousand tons.

Species	*1965*	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
Bluefin	0.1	0.5	2.4	1.2	0.5	0.2	—	—	—	—	—
Yellowfin	—	—	1.2	0.8	1.6	0.7	1.7	3.6	4.9	3.8	2.6
Albacore	0.2	0.3	0.1	0.3	—	—	—	0.1	—	—	0.1
Bigeye	0.1	0.3	0.1	0.2	0.8	0.9	3.2	2.0	2.6	2.4	1.9
Skipjack	1.0	1.0	1.1	1.7	1.2	1.4	1.5	0.1	1.5	1.9	2.6
Marlins	0.7	0.6	1.5	1.0	0.5	0.3	0.3	0.3	1.0	2.3	1.4
"Carita-Sierra"	1.6	1.3	1.1	0.8	0.8	0.9	0.8	—	0.7	0.6	0.6
Others	—	—	—	—	—	—	—	0.6	1.1	0.3	1.0
TOTAL	3.7	4.0	7.5	6.0	5.4	4.4	7.5	6.7	11.8	11.3	10.2

The composition of the Cuban catch, by species, is shown in the above table. As can be noted, yellowfin is the most important species in the Cuban catches.

Fisheries

During 1975, the Cuban fleet was distributed in the entire Atlantic. The fishing operations carried out in the western Atlantic were in the Gulf of Mexico, the Caribbean Sea and the Bahamas.

Original report in Spanish.

The fleet operated using 22 longline vessels, one purse seiner and 44 baitboats; the catches increased to 10.2 thousand tons.

Research activities

Research was continued on larvae and eggs of *T. thynnus* and *K. pelamis* in the western Atlantic. Biological sampling was conducted for *T. albacares* (200 samples — a total of 4,500 specimens), and studies were made on sexual maturity and feeding. Samples were also collected for age studies.

A conversion factor was determined for live weight vs. gilled and gutted weight for yellowfin (in the western Atlantic). The result is the following equation:

$$Y = -0.4320 + 1.1071\,X, \qquad r = 0.95$$

(Y = Live weight, X = Gilled and gutted weight).

RESEARCH REPORT FOR 1975 — FRANCE

by

H. ALONCLE [1]

Status of fishing in France

Tuna catches taken off the coast of France and on the high seas in 1975 are estimated at about 57,000 tons; 25 % of the catches are destined for fresh fish consumption.[2]

Species	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*
Albacore	10.0	6.6	9.8	9.8	6.0	7.5	5.6
Yellowfin	28.9	26.0	25.9	35.6	32.3	31.5	38.
Skipjack	8.5	14.0	19.5	20.5	12.7	24.5	11.4
Bigeye	1.6	1.2	0.5	0.3	2.5	0.5	0.04
Bluefin	2.4	2.5	3.4	2.8	1.5	2.3	2.3
THOUSAND TONS	50.8	49.5	58.3	68.1	54.5	66.3	57.34

Along the French Atlantic coast, 204 trollers and 30 baitboats were equipped for albacore fishing. In 1974, 256 vessels were equipped (trollers and baitboats).

Albacore cruise in the N.E. Atlantic — 1971 — Monthly production

Month	*Catches in MT*	*No. of trips*	*Monthly catch per trip*
June	146.5	48	3.05
July	1,039	192	5.41
August	1,620.5	185	8.75
September	1,709	205	8.33
October	755	174	4.33
November	16.5	5	3.3
TOTAL	5,286.5	809	6.53

[1] "Institut Scientifique et Technique des Pêches Maritimes", rue de l'Ile d'Yeu — B.P. 1049. 44037 NANTES CEDEX (France).

[2] Statistics from the "Comité Central des Pêches Maritimes".

Original report in French.

Research

1. *Research carried out by ISTPM*

During the 1975 fishing season, the ISTPM conducted four research cruises on-board the vessels, "La Pélagia" and "Cryos".

"La Pélagia" explored the area North of the Azores and the Bay of Biscay.

"Cryos" conducted an exploratory cruise during the period between the end of May and the early part of July, between the 57° W meridian and the Azores.

Albacore were found along almost the entire route, especially at 42° N - 57° W and in the area between 40° N - 42° N and 39° W - 46° W.

In October, on its round trip between St. Pierre and Miquelon, the vessel "Cryos" found fish near 43° N - 46° W and 42° N - 52° W.

During several of these missions, 871 specimens of albacore, 12 of bigeye, three of bluefin and two of skipjack were measured. Also, 1,168 albacore specimens were measured on land. Studies were continued on yield of lines, different types of lures, and mid-water towing.

When the cruises are completed, the balance of tagging operations would be as follows:

Albacore	509
Bigeye	29
Bluefin	5
Bonito	2

Between December 17-31, 1975, the ISTPM received 10 recovered tags, which correspond to:

3	albacore	tagged	in	1972
2	"	"	"	1973
3	"	"	"	1975
1	bigeye	"	"	1973
1	"	"	"	1974

2. *ORSTOM (tropical tunas)*

Research on tropical tuna species was carried out due to the efficient collaboration between France and various African countries. The research was done by ORSTOM scientists stationed at the national laboratories. Details of the results of the research are shown in the national reports of these countries. Various ORSTOM scientists attended the meeting of the Skipjack Working Group, called by Senegal, and held in Dakar in March, 1976.

Studies of the mechanisms causing tuna concentrations off Cape López were carried out as in previous years, through the coordination of CNEXO and with the participation of various laboratories. During the cruise, important methods were used such as, oceanographic vessels, an airplane equipped with an infrared radiometer, and a photo-satellite receiver.

3. *CNEXO/COB*

Our work deals with two species: albacore and bluefin tunas. With respect to albacore, the activity develops in two phases. The first is the annual task of sampling of surface fishery catches, in order to make a short-term prediction of the possible annual production in relationship to the annual variations in recruitment. The second phase is to perform a long-term perspective study on the population dynamics of the North Atlantic stock, and to give necessary consideration on the action of the North Atlantic longline fishery. Also a detailed analysis of catches by age of albacore for the Japanese and Taiwanese fleets is maintained and updated.

Apart from the age structure and dynamics studies, technical and operational assistance to the albacore fleet was maintained in 1976 in order to pursue the study of mechanical hauling (hydraulic winch) and of understanding the fishing conditions in real time basis.

Concerning bluefin, the similar effort of analysis and sampling from the surface fisheries has been maintained. In this year, a special effort was given to the estimation of variations of the recruitment and to the migrations of bluefin throughout the concentration of the N.E. Atlantic albacore fishery from Azores to the Bay of Biscay.

Publications

ALONCLE, H., et F. DELAPORTE

1975 Marquages de germons par l'ISTPM - 1967-1974. *ICCAT* SCRS/75/20.

1975 Nouveles observations sur les rythmes alimentaires et circadiens chez le germon (*Thunnus alalunga*) dans l'Atlantique N.E. *ICES* - C. M. 175/J: 6.

1975 Comportement du germon sur les lignes de Maine. *La Pêche Maritime*, n.° 1171, octobre 1975.

1975 Une étude de l'ISTPM: la couleur des leurres dans la capture du germon. *France-Pêche*, février 1975.

1975 Recherches sur le germon. Campagne 1974 de "La Pélagia" aux Açores et premières observations sur le rendement des lignes. *Science et Pêche, Bull. Institut des Pêches Marit.*, n.° 243, janvier 1975.

In collaboration with HAMRE, RODRÍGUEZ-RODA, TIEWS, Bluefin Tuna Working Group, ICES, 1975, Sub-Committee Pelagic Fish - South.

NATIONAL REPORT — TUNA FISHERIES 1975 — GHANA

1. Tuna fleet

Thirty-two foreign vessels and five Ghanaian tuna vessels fished from Tema during 1975.

The Ghanaian fleet was comprised of one purse seiner (104 GRT) and four baitboats (215-284 GRT). These were as follows:

Vessel	*Flag*	*Gear*	*GRT*
Joy	Ghanaian	Baitboat	253.88
Truth	"	"	215.96
Leader	"	"	215.90
No Catch No Pay	"	"	284.73
Boreal	"	Purse seiner	104.00

Details of the foreign flag vessels that operated are as follows:

Flag	*Gear*	*No.*	*Range in GRT*
Japanese	Baitboat	20	192.499
"	Purse seine	1	499. 66
Korean	Baitboat	6	188.250
"	Longline	1	265. 77
Panamanian	Baitboat	4	192.457

In addition to the industrialised tuna fleet, Ghanaian artisanal fishermen were also catching tunas and related species.

2. Landings

The following are the landings (in metric tons) of the foreign and Ghanaian flag vessels during the year.

Original report in English.

Species	*Foreign Flag*	*Ghanaian Flag*	*Ghana Artisanal*	*Total*
Yellowfin	2,879.873	566.662	—	3,446.535
Skipjack	10,690.929	1,425.801	4,518.370	16,635.100
Bigeye	2,926.642	279.817	—	3,206.459
Little tuna	372.954	138.021	—	510.975
Frigate tuna	—	—	6,000.589	6,000.589
Others	236.593	360.716	133.700	731.009
TOTAL	17,106.991	2,771.017	10,652.659	30,530.667

There was a decrease in tuna landings during the year, as compared to those of 1974. This has been attributed to suspension of fishing in 1975 by most of the Tema-based baitboats. The total catch of the Ghanaian flag vessels increased from 2,004.4 metric tons in 1974 to 2,771.02 metric tons in 1975.

A sudden rise in the landings of small bigeye tunas was noticed in the second quarter of the year. However, it is believed that a substantial quantity of the bigeye landings are small yellowfin tuna. Young yellowfin were being reported as bigeye tuna by the fishermen. Since the beginning of 1976, the Fishery Research Unit has been working on this problem. The proportion of yellowfin in the landings of bigeye tuna is yet to be estimated.

3. Research

Research into the biology and population dynamics of the tropical tunas continued during the year.

3.1. *Biological sampling*

Sampling of yellowfin, skipjack and bigeye tunas continued during the year. A total of 3,700, 4,500 and 800 specimens of yellowfin, skipjack and bigeye tunas, respectively, were measured during the year. The length frequency distributions have been published separately for the benefit of other scientists working in the area. The predominance of young tunas off Ghana is reflected in the length frequency distribution.

Work on other biological parameters, e. g. maturity and stomach content analysis, was continued.

3.2. *Tagging*

The offer by the Nichiro Fishing Company of Japan to provide a vessel for the tagging programme of the Fishery Research Unit was not pursued during the year because most of the baitboats stopped fishing due to economic reasons.

Ghana, however, continued to be involved in the cooperative tagging programme of ICCAT. Two tags were recovered and transmitted to ICCAT headquarters.

3.3. *Cooperation in Research*

Ghana continued cooperating in the field of tuna research with the "Centre de Recherches Oceanographiques" of Abidjan, Pointe Noire and Dakar, and also with the Southwest Fisheries Centre of La Jolla, U.S.A. The cooperation involved exchange of scientific data, use of computer facilities and cooperative investigations.

3.4. *Yellowfin Tuna Regulation*

An administrative circular was issued in June, 1975, to all tuna fishing companies, prohibiting the catching and landing of yellowfin tuna weighing less than 3.2 kg. The circular also provides for the landing of incidental catch of young yellowfin tuna not exceeding 15 % of the number of fish per landing of the total yellowfin catch of said boats.

4. Research Programme for 1976

Research into the population dynamics of tropical tunas will be continued. In addition to yellowfin and skipjack, work will also be done on the small tunas — *Auxis thazard* and *Euthynnus alletteratus*. These will include biological sampling, monitoring of catch and effort, stomach content analysis and reproduction.

The offer made by the Nichiro Fishing Company of Japan, to provide a tagging vessel will be pursued. A cooperative tagging programme between the "Centre de Recherches Océanographiques", Abidjan, and the Fishery Research Unit of Ghana will be conducted.

The Fishery Research Unit will initiate a biological sampling programme on-board commercial tuna vessels. This programme is geared towards further understanding of the dynamics of tropical tunas, especially the occurrence of the small fish off the Ghanaian coast.

4.1. *Exchange of Scientific Data*

The arrangement for the exchange of scientific data between the "Centre de Recherches Océanographiques", Abidjan, and the Fishery Research Unit, Ghana, will be vigorously pursued. The Fishery Research Unit will continue to assist the Tema-based tuna fleet in the identification of young tunas, especially yellowfin and bigeye.

REPORT FROM THE IVORY COAST ON TUNA FISHERIES AND RESEARCH, 1975-1976

1. Tuna fishing

The purse seine fleet of the Ivory Coast increased in 1975-76 in the number of vessels and the catches. The number of seiners is now seven, four of which have a capacity of over 400 tons. The catches reached 11,000 tons.

The complete statistics of the Ivorian fleet are included in the FIS statistics (Task I, Task II and measurements). The landings and transshipments of foreign tuna fleets increased, and in 1975, 60,000 tons of tuna were transshipped at Abidjan.

2. Tuna research

In 1975-76, studies were continued on fishery statistics, biology, ecology and population dynamics at the "Centre de Recherches Océanographiques" (CRO).

The CRO, Abidjan, collects the logbooks and effects sampling for size for all the surface fleets which unload at Abidjan, especially for the FIS fleet. Also, the CRO centralizes and computer processes the statistics of all FIS landings (SCRS/76/24 and SCRS/76/94).

Obtaining longline fishery statistics is very difficult. On the contrary, sampling of Chinese (Taiwanese) and Korean catches is carried out quite satisfactorily, due to the ICCAT-CRO contract.

Studies on population dynamics were carried out, as well as an analysis of the present situation of the yellowfin fishery (Fonteneau, Marcille and Barbe, SCRS/76/95).

A detailed study on yellowfin fecundity has recently been completed. (See list at the end of the text.)

The program on tuna ecology and infra-red radiometry was pursued in 1975-76 and an overall review has been presented. This program will allow short-term forecasts of fishing areas.

Original report in French.

List of papers presented by the CRO, Abidjan, at the 1976 SCRS Meeting, and other studies

Reference	*Title*	*Author(s)*
SCRS/76/24	Statistiques de pêche de la flottille franco-ivoiro-sénégalaise, année 1975	F. Barbe A. Fonteneau J. Marcille
SCRS/76/29	Problèmes relatifs à l'échantillonnage de la flottille FIS à Abidjan	J. Marcille
SCRS/76/90	Commentaires sur la création d'une banque de données de l'ICCAT	A. Fonteneau
SCRS/76/94	Statistiques de pêche de la flottille franco-ivoiro-sénégalaise au 30 septembre 1976	F. Barbe J. Marcille
SCRS/76/95	Situation de la pêcherie d'albacore de l'Atlantique de l'est au 30 septembre 1976	A. Fonteneau J. Marcille F. Barbe
Doc. Scient. CRO, Abidjan, vol. VII, n.° 2	Distribution et abondance des larves de thonidés dans l'Atlantique Tropico-Oriental. Étude des données de 1963 à 1974	A. Caverivière F. Condand E. Suisse de Sainte-Claire
Thèse 3.ème cycle, Paris VII	La reproduction de l'albacore (*Thunnus albacares*, Bonnaterre 1788) dans le golfe de Guinée	J. J. Albaret
(à paraître)	Température de surface et pêche thonière dans la zone frontale du Cap Lopez (Atlantique Tropical Oriental) en juin et juillet 1972, 1974 et 1975	J. M. Stretta

JAPANESE FISHERIES AND RESEARCH ACTIVITIES ON TUNAS AND TUNA-LIKE FISHES IN THE ATLANTIC OCEAN, 1974-1976

by

SUSUMU KUME

Far Seas Fisheries Research Laboratory

1. Fishing activities

In 1975, the Japanese catch of tunas and tuna-like fishes in the Atlantic amounted to about 42,000 tons (preliminary figure), about 44 % less than that of the previous year and one third of those of the middle 1960's when the fisheries were on the peak level (Fig. 1). The respective catch of each type of fishery decreased compared to the previous year. In particular, the surface fisheries experienced a sharp decline in the catch which amounted to about 20 % of the 1974 catch, due to the essential suspension of activities in the Atlantic (Table 1). The operational pattern of the longline fishery was affected to some extent by the closure of the bluefin fishing ground in a certain fishing season and by the catch quota generated by the ICCAT regulatory measure on the species.

In 1976, the Japanese tuna fleet in the Atlantic showed some decrease in the number of longliners, an increase in the pole-and-line fleet and no participation of any purse seiners.

1.1. *Longline fishery*

The catch of the longline fishery in 1975 was estimated to be about 36,000 tons, which is 15 % less than the previous year and corresponds to 85 % of the total 1975 catch. The characteristics of the Japanese longline operation in 1975 were almost identical to those of the previous year, namely: (1) a continuing high catch level of bigeye tuna representing more than half of the total longline catch and about 5,700 tons of the bluefin tuna catch, and (2) the reduced catches of albacore and yellowfin tuna combined, which amounted to only 7,700 tons or 21 % of the total longline catch (Table 3 and Fig. 2). Thus, in 1975, the Japanese longline fleet again directed its species preference to bigeye and bluefin for domestic fresh consumption. This operational pattern is distinctively different in fishing strategy from other longline fleets directed mainly at albacore and yellowfin tuna.

The longline boats which operated in the Atlantic in 1975 numbered 230,

Original report in English.

including two deckloaded motherboats. They were based exclusively in Japan (Table 2). The number of boats in Table 2 is overestimated since many boats fishing for southern bluefin tuna in the area off southern Africa move frequently from the Atlantic to the Indian Ocean and vice versa. Recently, it has been noted that gradually increasing numbers of longliners move from the Atlantic to the Pacific Ocean before the boats are fully loaded.

In 1976, the longline operation decreased with regard to the number of boats, as compared to the previous year. This may be partly related to the regulatory measures taken on bluefin by the ICCAT.

1.2. *Pole-and-line fishery*

The tuna production of this fishery in 1975 declined remarkably from 30,000 tons in 1974 to only 5,900 tons, which equals 14 % of the total Japanese tuna catch in the Atlantic (Table 1). The respective catches of skipjack and yellowfin tunas in 1975 were 4,100 tons (70 % of the total baitboat catch) and 1,270 tons (22 %) (Table 4). In 1975 (up to February), the Japanese baitboat fleet totaled 24 boats (Table 2); after February, only a couple of boats operated.

The pole-and-line operation in the area north of Venezuela had been initiated in October, 1973, but ceased activity in February, 1975. A number of baitboats operated in this fishing ground and the catches (logged amount: MT) of skipjack and yellowfin tuna were as follows:

	1973	*1974*	*1975*
Number of boats	1	5	2
Yellowfin tuna	105	1,196	204
Skipjack tuna	212	1,080	319

Since the end of 1975 and onwards, the number of Japanese pole-and-line boats in the Gulf of Guinea has been gradually increasing, and 13 boats were operating as of July, 1976. The estimated catch for the period from January to May, 1976, amounted to about 300 tons of yellowfin tuna, 4,300 tons of skipjack and 500 tons of bigeye tuna. There is a marked decrease in the proportion of yellowfin tuna in the total catch.

1.3. *Purse seine fishery*

Only one purse seiner operated during the first two months of 1975, and 291 tons of tunas, almost equal amounts of yellowfin and skipjack tuna, were harvested (Table 5). Thereafter, no Japanese purse seiner was engaged in fishing in the Atlantic.

1.4. *Reaction of the fisheries to the regulatory measures*

In regard to the yellowfin minimum size regulation, the Japanese pole-and-line fleet has continued its effort to avoid catching very small-sized yellowfin tuna

by staying away from the fishing grounds where young yellowfin are abundant. Consequently, the species composition of the baitboat catch in the Gulf of Guinea resulted in a lesser proportion of yellowfin tuna in the catch (20 % in 1975 and less than 10 % in the first half of 1976).

Prior to the ICCAT regulatory measures on bluefin tuna, which became effective in August, 1975, the Japanese Government exercised pertinent jurisdiction over their fishermen in April, 1975. It included the closure of the Mediterranean bluefin fishing ground during the main fishing season, from May 21 to June 30, and a catch quota which prohibited taking bluefin in quantities exceeding 10 % of the total catch (after the catch of the species attained a certain level). As a result, the catch of bluefin tuna in 1975 was about 5,670 tons, similar to that of the previous year. In 1976, the same enforcement has been in effect on Japanese fishermen, and up to now the catch of bluefin tuna has not reached the level at which unrestricted bluefin fishing should be terminated. Due to the ICCAT bluefin tuna regulation, some of the Japanese fleet relinquished fishing operations in the Atlantic; consequently, the longline activity in the Atlantic has been decreasing.

During the closed period of the Mediterranean fishing ground in both 1975 and 1976, the Fisheries Agency dispatched a patrol boat to enforce compliance of the bluefin regulatory measures. In addition, in 1976, government officials were sent to the base port of the baitboat fleet in Tema, Ghana, to inspect the status of the implementation of the yellowfin minimum size regulation and give relevant direct guidance to the fishermen.

2. Research activities

During the period from 1975 to 1976, noticeable progress has been made, especially in statistical accomplishments.

2.1. *Catch and effort statistics*

General catch statistics (Task I):

The 1974 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. The Fisheries Agency compiled similar data corresponding to 1974 and 1975 for the Atlantic purse seine fishery. 1975 catch statistics were estimated by the Far Seas Fisheries Research Laboratory (FSFRL), as preliminary figures as of July, 1976.

Detailed statistics (Task II):

The Fisheries Agency and its research laboratories have continuously collected detailed catch records from major tuna fisheries. These data are adequate enough to prepare Task II statistics. The annual report on 1974 longline catch and effort statistics by area was published in March, 1976 (Fisheries Agency 1976). Compilation of 1975 data is now under way and the provisional statistics were prepared for submission to the ICCAT Secretariat by July, 1976. The catch and effort statistics by area for the pole-and-line fishery were made available for four years, 1969 and 1973-1975, by the FSFRL. Task II statistics on the purse seine fishery in 1975 were completed and made available in late 1975.

2.2. *Length statistics (Biological sampling)*

In 1975, length composition data, taken in 1974 and reported to the FSFRL by the end of September, 1975, were compiled for tunas and billfishes. The resultant size statistics from the Atlantic Ocean were tabulated and sent to the ICCAT Secretariat in February, 1976. The old length data of bigeye tuna caught by the Japanese longline fishery, 1965-1974, were compiled and submitted to the Secretariat.

Since April, 1975, in conjunction with the internal bluefin regulatory action, an on-board survey program for length measurement has been extended to most of the tuna boats operating in the Atlantic. Because of this intensified sampling scheme, the Japanese biological data have been progressively improved. Provisional tabulation on length measurements in 1975 was made utilizing the data collected up to June, 1976, and was immediately submitted to the Secretariat.

2.3. *Stock assessment*

To substantiate cooperative studies within ICCAT, the staff of the FSFRL calculated the overall fishing intensity of the Japanese and Taiwanese longline fisheries for albacore, yellowfin, bigeye and Atlantic blue and white marlins for 1956 through 1974, together with the catch by length class for yellowfin tuna (Shiohama MS, Honma and Suzuki MS, Kume MS, and Kikawa and Honma MS). One notable achievement made in the aforementioned calculation was that Taiwanese longline catch and effort statistics, 1967-1974, which were revised by Honma and Suzuki (MS), are included in the analyses.

Several studies on Atlantic tuna resources made in 1976 include: the review of the Japanese Atlantic longline fishery for bluefin tuna and the stock assessment on the same resource, including the estimation of the recruitment of the medium- and large-sized bluefin which are mostly vulnerable to the longline gear (Shingu and Hisada MS), the production model analysis on Atlantic albacore stocks (Shiohama MS), the approximate estimation of population parameters of South Atlantic albacore (Morita MS) and the stock structure of Atlantic bigeye tuna (Kume and Morita MS) and its recent stock condition (Kume MS).

3. References

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1976. "Annual Report of Effort and Catch Statistics by Area on Japanese Tuna Longline Fishery, 1974". 267 p.

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MS a. Overall fishing intensity, catch, catch by size and spawning indices of yellowfin tuna in the Atlantic longline fishery, 1956-1974.

MS b. Revised catch and effort statistics by area on the Taiwanese tuna longline fleet in the Atlantic, 1967-1974.

KIKAWA, S. and M. HONMA

MS Catches and fishing intensity of billfish species caught by the Atlantic longline fisheries, 1956-1974.

KUME, S.

MS a. Overall fishing intensity of Atlantic longline fishery for bigeye tuna, 1956-1974.

MS b. Recent status of bigeye tuna in the Atlantic Ocean.

MS c. Some biological information on skipjack caught by the Japanese longline fishery in the Atlantic Ocean.

MS d. Recent change in catch per unit of effort of skipjack and yellowfin tuna in the Japanese pole-and-line fishery in the eastern equatorial Atlantic.

KUME, S. and Y. MORITA

MS On the stock structure of bigeye tuna in the Atlantic Ocean.

MORITA, S.

MS a. Estimated age composition of the albacore harvest by Japanese and Taiwanese longline fisheries in the Atlantic Ocean.

MS b. Approximate estimation of population parameters utilizing effort and catch data of the South Atlantic albacore stock.

SHINGU, C. and K. HISADA

MS A review of the Japanese Atlantic longline fishery for bluefin tuna and the consideration on the present status of this stock.

SHIOHAMA, T.

MS a. Overall fishing intensity and yield by the Atlantic longline fishery for albacore, 1956-1974.

MS b. Stock assessment of Atlantic albacore by production model analysis.

UEYANAGI, S.

MS Some information on the growth and maturity of Pacific bluefin tuna reared in captivity.

Table 1. Japanese catch (in metric tons) and percentages (in *italics*) of tunas and tuna-like fishes by types of fisheries, Atlantic, 1961, 1966, 1973, 1974 and 1975

Type of fishery		*1961*	*1966*	*1973*	*1974*	*1975*
TOTAL		69,247	96,220	64,302	75,048	42,093
Longline*	Subtotal	69,247 *100*	83,078 *86*	38,008 *59*	42,454 *57*	35,843 *85*
	Deckloaded motherboat	—	36,536 *(44)*	450 *(1)*	—	276 *(1)*
	Homeland-based boat	—	—	37,059 *(98)*	42,454 *(100)*	35,567 *(99)*
	Foreign-based boat	69,247 *(100)*	46,542 *(56)*	499 *(1)*	—	
Purse seine	Subtotal	—	6,563 *7*	3,348 *5*	1,918 *3*	291 *1*
	Single-boat seiner	—	—	2,751 *(82)*	1,918 *(100)*	291 *(100)*
	Double-boat seiner	—	6,563 *(100)*	597 *(18)*	—	—
Pole-and-line		—	6,579 *7*	22,947 *36*	30,676 *41*	5,890 *14*

Source of data: Statistics and Information Department for the longline and pole-and-line fisheries, and the Fisheries Agency and Far Seas Fisheries Research Laboratory for the catch of the purse seine fishery.

Percentages without parentheses are those of the total of the annual catch, and those within parentheses are of gear subtotals.

* The bluefin catch in the Mediterranean is included, which is as follows:

1973	246 tons
1974	2,192 tons
1975	1,260 tons

Table 2. Number of Japanese tuna boats which operated in the Atlantic Ocean, 1961, 1966, 1973, 1974 and 1975

Type of fishery		*Size class* *	*1961*	*1966*	*1973*	*1974*	*1975*
Longline	Deckloaded motherboat	Total	—	35	1	—	2
		201- 500	...	7	1	—	1
		501-1,000	—	28	—	—	1
		1,001-	—		—	—	—
	Homeland-based boat	Total	—	—	199	221	228
		51- 200	—	—	—	—	—
		201- 500	—	—	199	221	228
		501-1,000	—	—	—	—	—
	Foreign-based boat	Total	88	121	2	—	—
		51- 200	...	20	—	—	—
		201- 500	...	96	2	—	—
		501-1,000	...	5	—	—	—
		1,001-	...		—	—	—
Purse seine	Single-boat seiner	Total	—	—	2	2	1
		201-400	—	—	1	1	1
		401-	—	—	1	1	—
	Double-boat seiner **	Total	—	3	3	—	—
		51-150	—	3	3	—	—
Pole-and-line		Total	—	6	22	24	24
		151-	—	6	22	24	24

Source of data: Statistics and Information Department for longline and pole-and-line fisheries, and Fisheries Agency and Far Seas Fisheries Research Laboratory for purse seine fishery.

* Size for single-boat seiners is expressed in carrying capacity, while that for others is given in gross tonnages.

** Number of double-boat purse seiners is given in terms of a fishing unit that comprises two net-boats and several carriers.

Table 3. Catch (in MT) and catch permillage (in *italics*) of tunas and tuna-like fishes taken by the Japanese Atlantic longline fishery, 1961, 1966, 1973, 1974 and 1975

	1961 *	*1966* *	*1973*	*1974*	*1975*
TOTAL	69,247	83,078	38,008	42,454	35,843
Albacore	9,273	26,883	2,154	2,448	1,766
	134	*324*	*57*	*58*	*49*
Bigeye tuna	11,044	17,576	20,243	21,356	17,664
	159	*212*	*533*	*503*	*494*
Bluefin tuna **	577	2,521	1,387	5,295	5,673
	8	*30*	*36*	*125*	*158*
Southern bluefin tuna	—	339	7,533	6,397	1,690
		4	*198*	*151*	*47*
Yellowfin tuna	42,609	22,123	4,189	4,296	5,958
	615	*266*	*110*	*101*	*166*
Youngs	—	231	—	—	—
		3			
Skipjack	4	32	0	0	1
	0	*0*	*0*	*0*	*0*
Swordfish	319	1,958	1,186	1,486	1,626
	5	*24*	*31*	*35*	*45*
Blue and black marlin	3,768	3,370	368	310	641
	54	*41*	*10*	*7*	*18*
White marlin	692	3,002	366	441	449
	10	*36*	*10*	*10*	*13*
Sailfish	361	1,845	144	138	152
	5	*22*	*4*	*3*	*4*
Unclassified and others	600	3,198	438	287	223
	9	*38*	*12*	*7*	*6*

Source of data: Statistics and Information Department.

* Figures up to 1970 are of landings.

** Bluefin tuna catch in the Mediterranean Sea is included, see note for Table 1 as to annual catch.

Table 4. Catch (in MT) and percentage (in *italics*) of tunas and tuna-like fishes taken by the Japanese Atlantic pole-and-line fishery, 1966, 1973, 1974 and 1975

	1966	*1973*	*1974*	*1975*
TOTAL	6,579	22,947	30,676	5,890
Bigeye tuna	2	190	606	328
	0	*1*	*2*	*6*
Yellowfin tuna	479	8,068	9,518	1,270
	7	*35*	*31*	*22*
Skipjack	4,354	13,401	19,798	4,100
	66	*58*	*65*	*70*
Frigate tuna	409	1,237	461	17
	6	*5*	*2*	*0*
Unclassified and others	1,335	51	293	175
	20	*0*	*1*	*3*

Source of data: Statistics and Information Department.

Table 5. Catch (in MT) and percentage (in *italics*) of tunas and tuna-like fishes taken by the Japanese Atlantic purse seine fishery, 1966, 1973, 1974 and 1975

	1966	*1973*	*1974*	*1975*
TOTAL	6,563	3,348	1,918	291
Albacore	—	3	—	—
		0		
Bigeye tuna	—	18	115	—
		1	*6*	
Yellowfin tuna	4,812	1,542	868	145
	73	*46*	*45*	*50*
Skipjack	1,448	1,544	910	143
	22	*46*	*47*	*49*
Frigate tuna	—	216	25	3
		6	*1*	*1*
Unclassified and others	303	25	—	—
	5	*1*		

Source of data: Fisheries Agency and Far Seas Fisheries Research Laboratory.

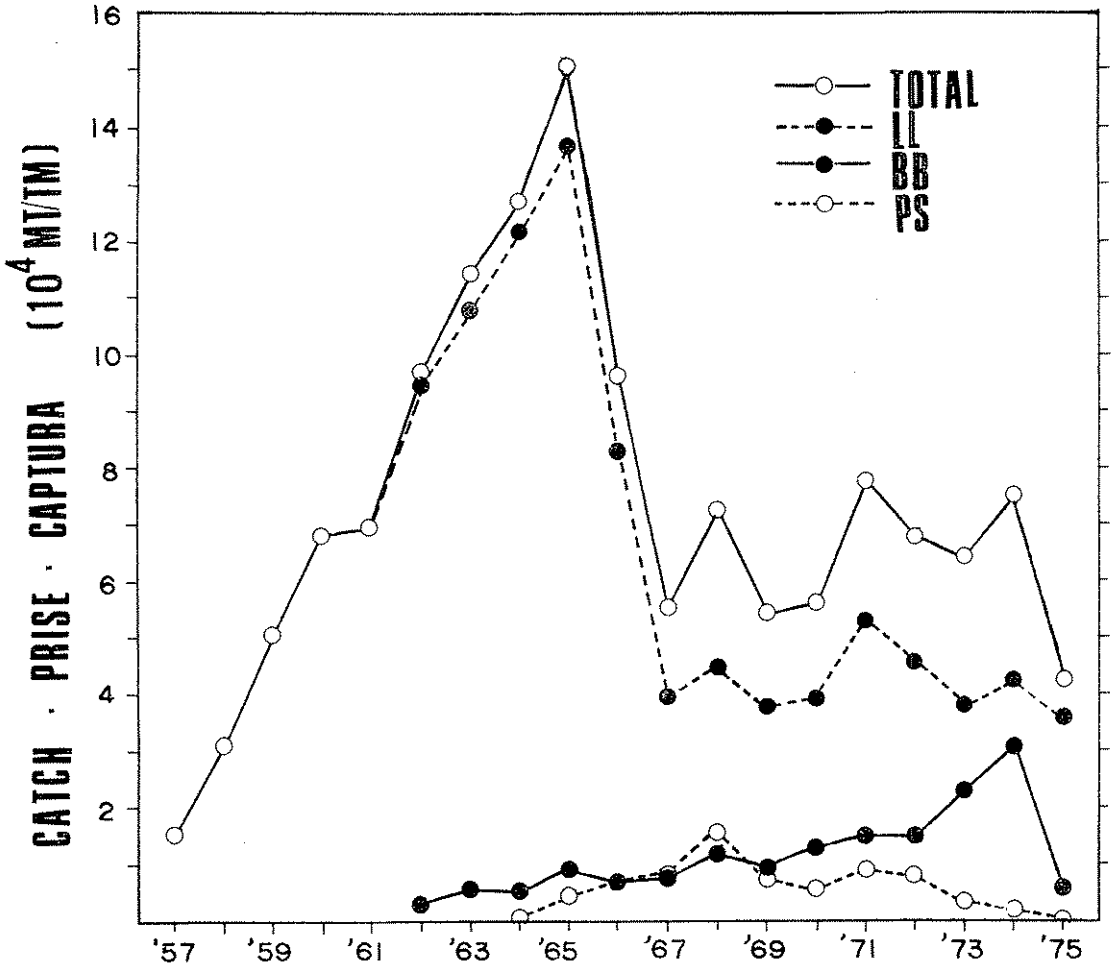
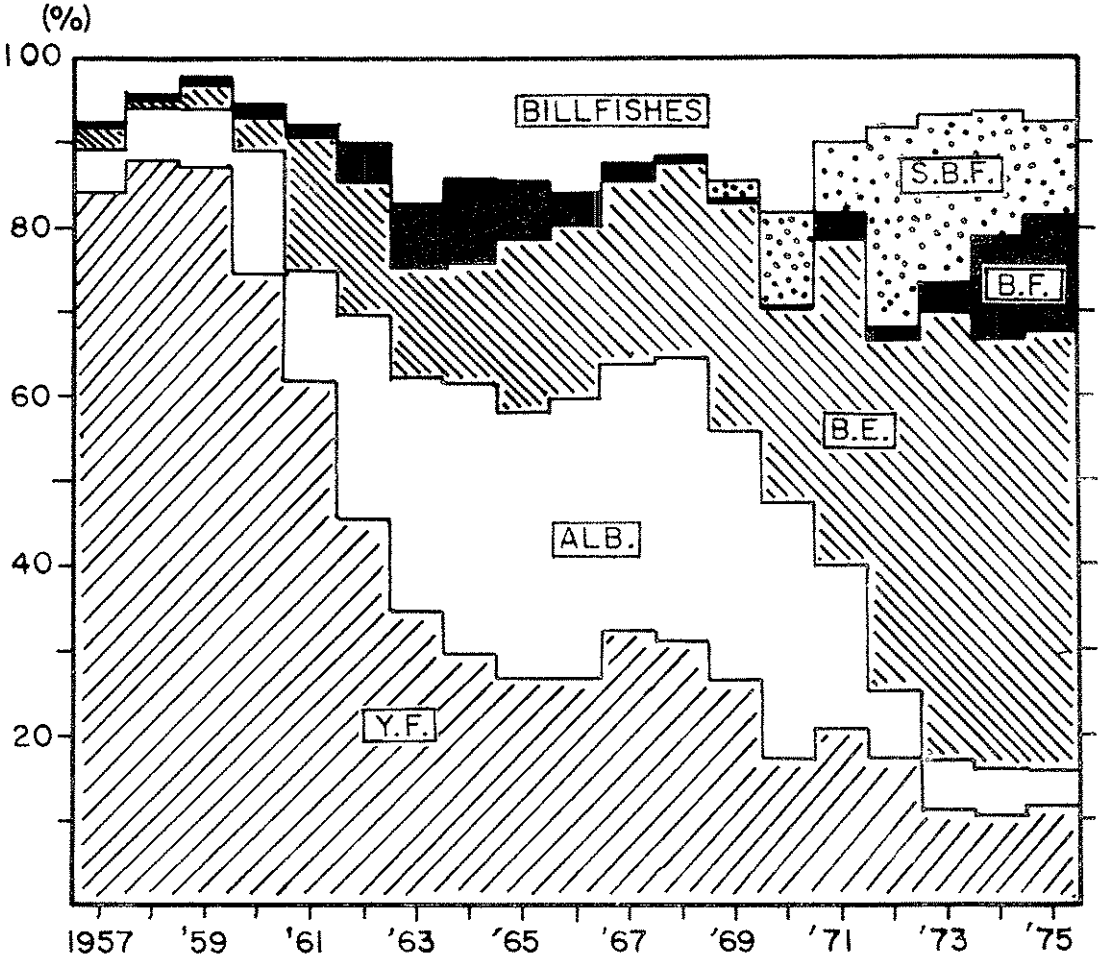


Fig. 1. Annual yield of Japanese tuna fisheries in the Atlantic Ocean, 1957-1975.



BF: Bluefin tuna
SBF: Southern bluefin tuna
ALB: Albacore
BE: Bigeye tuna
YF: Yellowfin tuna

Fig. 2. Annual change in species composition in the Japanese longline catch in the Atlantic Ocean, 1957-1975.

KOREAN FISHERIES AND RESEARCH ACTIVITIES ON TUNA AND TUNA-LIKE FISHES IN THE ATLANTIC OCEAN IN 1975

1. Introduction

The number of Korean tuna fishing boats that operated in the Atlantic in 1975 totaled 126 and their catch was 46,949 metric tons. A breakdown of the total by type of fishing gear is: 118 longliners caught 39,296 metric tons of tunas and 8 baitboats caught 7,653 tons. Table 1 shows the trends in number of boats and their landings since 1964 up to the present. Despite the decrease of 6 boats in 1975 compared with the previous year, the total catch increased to a great extent.

Table 1. Number of Korean tuna boats and the landing statistics in the Atlantic Ocean, since 1964

Year	*Number of boats*			*Landing (MT)*		
	Longliner	*Baitboat*	*Total*	*Longliner*	*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	57	—	57	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

2. Fishing boats

Table 2 gives number of tuna boats by type of fishing gear and boat size. The longliners which operated in 1975 were as follows: 11, 100 gross ton class; 74, 200 gross ton class; 29, 300 gross ton class, and 4, 400 gross ton class. It is obvious that large boats were replaced by smaller boats. As for baitboats, there were no changes in 1975.

Original report in English.

Table 2. Number of Korean tuna boats by type and size of boats

Year	*Longline (gross tons)*						*Baitboat (gross tons)*				*Grand Total*
	100-	200-	300-	400-	500-	Total	100-	200-	300-	Total	
1971	11	62	29	1	14	117	—	—	—	—	117
1972	9	58	24	—	14	105	2	—	—	2	107
1973	6	63	23	3	1	106	2	1	—	3	109
1974	6	80	33	5	—	124	4	4	—	8	132
1975	11	74	29	4	—	118	4	4	—	8	126

3. Landing statistics

Landing figures are shown in Table 3. Total landings by longliners and by baitboats have been continuously increasing since 1971.

The bluefin catch has decreased continuously. While a steady increase in yellowfin catches leveled off and even dropped slightly in 1975, albacore reversed its decreasing trend in 1975. Bigeye and skipjack show a continuous increase.

By type of fishing, the total longline catch increased by 5,400 metric tons, despite the withdrawal of six boats in 1975, which can be attributed to the increase in albacore, bigeye and other tuna-like species.

The total baitboat catch in 1975 amounted to 7,653 metric tons, an increase of 3,237 metric tons over the 1974 catch, with the same number of boats.

Table 3. Landing statistics of Korean Atlantic tuna fisheries, in metric tons

Year	*Gear*	*Blue-fin*	*Yellow-fin*	*Alba-core*	*Big-eye*	*Skip-jack*	*Other tuna-like species*	*Shark*	*Total*
1971	LL	3,039	9,901	11,539	7,353	47	4,858	405	37,142
1972	LL	30	11,078	13,577	5,730	45	5,267	609	36,345
1973	LL	66	12,844	8,525	5,829	—	4,787	587	32,638
	BB	—	900	—	—	922	—	—	1,822
	Total	66	13,744	8,525	5,829	922	4,787	587	34,460
1974	LL	56	15,518	5,216	7,372	116	5,286	346	33,910
	BB	—	2,169	—	4	2,123	120	—	4,416
	Total	56	17,687	5,216	7,376	2,239	5,406	346	38,326
1975	LL	23	15,344	6,073	10,162	196	7,021	477	39,296
	BB	—	1,259	—	1,750	4,469	175	—	7,653
	Total	23	16,603	6,073	11,912	4,665	7,196	477	46,949

4. Research activities

Korean research was not active due to the country's remote location from the fishing ground, the poor cooperation of fishing firms and also for budgetary reasons. However, by sending two scientists in 1975 and one scientist in 1976 to the Atlantic area, it was possible to prepare reports of Task II and biological statistics. On the other hand, as the Government took strong measures this year, fishing firms began to cooperate by submitting their logbooks.

A survey team will be dispatched to the ICCAT area in 1977 to carry out research on bait resources for the skipjack fishery as discussed at the 1975 SCRS Meeting.

Tables 4 and 5 show summarized Task II and biological data.

Table 4. Catch per unit effort of the Korean tuna longline fishery in 1975

Catch per boat (year)		*Catch per day*		*Hook rate (per 100 hooks)*	
No. of fish	*Weight (MT)*	*No. of fish*	*Weight (MT)*	*No. of fish*	*Weight (kg)*
8,970	374	45	1.85	1.5	62.7

Table 5. Biological measurement data sampled from the Korean tuna longline fishery

		1st quarter	*2nd quarter*	*3rd quarter*	*4th quarter*
Albacore	Average weight (kg)	22.6	23.9	22.4	24.4
	Mode	18-22	22-26	16-18	18-20
	No. of samples	79	15	72	1,660
Yellowfin	Average weight (kg)	45.9	51.3	53.0	38.4
	Mode	34-42	50-58	66-74	25-34
	No. of samples	1,120	296	1,766	702
Bigeye	Average weight (kg)	47.8	47.3	43.1	29.3
	Mode	34-42	26-34	34-42	26-34
	No. of samples	639	202	626	1,620

TUNA FISHING IN PORTUGAL — 1975

1. The Fishery

Portuguese tuna vessels operate only in Madeira and Azores waters. Catches made off the coast of the continent are incidental.

a) *Production*

The main fishing method used is live bait (98 % of the catches). Trolling is also used.

In 1975, 6,728 tons of tuna were landed (which represents a value of 74×10^6 Escudos). Of the total catches, 4,845 tons were bigeye.

Approximately 75 % of the landings were made off Madeira. The species composition has been almost the same as that of the last few years. The total 1975 catch is below the average of the last 10 years (8,000 tons).

The following table shows the breakdown by species of the landings effected in 1974 and 1975.

Year	*Type of vessel*	*Total*	*BF*	*YF*	*ALB*	*BE*	*SJ*
1975	Baitboat	6,594	317	54	1,033	4,715	475
	Trolling	134	2	—	—	130	1
	Total	6,728	319	54	1,033	4,845	476
1974	Total	12,320	1	1,253	1,246	9,079	741
Comparison 1975/74	Quantity	—5,592	+318	—1,199	—213	—4,234	—265
	%	—45	+31,860	—96	—17	—47	—37

The total production has decreased by 45 % as compared to 1974.

Breakdown of the production by fishing zone: The following table shows baitboat landings effected off the islands in 1974 and 1975.

Original report in French.

Year	Islands	Total		Bluefin		Yellowfin		Albacore		Bigeye		Skipjack	
		Wt.	%	Wt.	%	Wt.	%	Wt.	%	Wt.	%	Wt.	%
1974	General total	10,726	100	1	100	448	100	1,246	100	8,382	100	648	100
	T. Madeira	4,847	45	1	100	—	—	126	10	4,720	56	—	—
	T. Açores	5,879	55	—	—	448	100	1,120	90	3,662	44	648	100
	Sta. Maria	47	0	—	—	24	5	—	—	—	—	23	4
	S. Miguel	1,386	13	—	—	—	—	—	—	1,384	17	2	0
	Terceira	1,204	11	—	—	—	—	444	36	599	7	161	25
	Pico	2,457	23	—	—	—	—	504	40	1,596	19	357	55
	Faial	784	7	—	—	424	95	172	14	83	1	105	16
1975	General total	6,594	100	317	100	54	100	1,033	100	4,715	100	475	100
	T. Madeira	4,975	75	3	1	1	3	754	73	3,793	80	424	89
	T. Açores	1,619	25	314	99	53	97	279	27	922	20	51	11
	Sta. Maria	11	0	—	—	0	0	11	1	0	0	0	0
	S. Miguel	416	7	8	3	53	97	202	20	150	3	3	1
	Terceira	518	8	248	78	—	—	13	1	223	5	34	7
	Pico	611	9	39	12	—	—	47	5	516	11	8	2
	Faial	64	1	19	6	—	—	6	0	33	1	6	1

b) *The fleet*

The fleet which operates off Madeira consists of 50 small tuna vessels, with a crew of 15-21 fishermen on each vessel. These vessels are 3-52 GRT and 7-370 HP. The fleet which operates off the Azores comprises 50 medium and small vessels; each carries a crew of 15-21 fishermen.

c) *The fishing seasons*

Tuna are present off the coast of the Azores and Madeira throughout the year, but surface at different times of the year according to the species.

Madeira:

Bigeye: from mid-March to mid-July, and in lesser abundance from mid-August to the end of January.

Albacore: from mid-August to the end of January.

Skipjack: from July to January but more abundantly during August.

Bluefin: from April to June.

Azores:

Bigeye: from April-May to July, and from September to November.

Albacore: from July to November.

Skipjack: from September to November.

Yellowfin: from July to October.

2. Research

No tuna research programs were carried out in Portugal in 1975, due to priorities in other sectors of activities.

TUNA FISHERIES IN DAKAR (SENEGAL) — 1975-1976

Introduction

An analysis of the fishery was made by landings of the Senegalese and French fleets in the port of Dakar in 1975 and 1976. For 1976, since figures were available only up to September 30, total figures were extrapolated to compare them to those of 1975. In some cases, for a better comparison, the situation was analyzed up to September 30 for a series of years.

Results

TABLE 1 shows the landings in tons for the three species (yellowfin, skipjack and bigeye) by gear for the last three years.

Baitboats

Up to September 30, 1976, 28 baitboats with iced wells and four freezer baitboats had landed 7,308 tons of tunas, a figure exceeding that of 1974. This represents an improvement over the low production of 1975, even though the 1976 fishing season started late. The baitboats operated mainly after the month of April. Yellowfin catches are increasing, while those of skipjack and bigeye remain stable. The poor skipjack catches suspected for 1975 were confirmed.

Purse seiners

Only small and medium seiners were taken into account. The fleet is comprised of 14 Senegalese seiners (SOSAP) and three French seiners. The situation up to September 30 shows an important decrease in the total catches, due to SOSAP's economic difficulties in 1976. Later in this report a notable decrease in the number of trips can be seen.

The total catches (extrapolated for 1976) also indicate an increase in the baitboat catches (compared to 1975). However, due to the decline in purse seine catches, we cannot expect the year-end results for the 1976 total catch to show an improvement with respect to 1975, which was generally considered as a very poor year.

The particularly low skipjack catches should be pointed out. This is a very

Original report in French.

important problem, which was brought up at the time of the ICCAT annual meeting.

TABLE II permits a comparison of the catches and the yields per trip for the last two years. An analysis is made of the actual situation up to September 30 for each year.

Baitboats

The number of vessels has not changed; the number of trips decreased slightly (—16 %), although yellowfin catches improved and represent a 50 % increase in yield per trip with respect to last year.

Skipjack production improved slightly, while that of bigeye has remained stable. In brief, there was an overall improvement in baitboat performance (+39 %). This year's season was not hampered by the problem of tuna feeding on anchovies and therefore not taking the bait, as occurred in the previous year.

Purse seiners

The number of purse seiners has remained stable, but due to the economic situation and financial problems of SOSAP, the number of trips dropped by more than 50 %; there is a tendency for the number of trips to continue to decline from now until the end of the year, pending the reorganization of the "Armement Sénégalais".

This is a regrettable situation since a study of the yields per trip shows a considerable increase in yellowfin (+20 %) and skipjack (+17 %) catches, as compared to 1975.

On the other hand, bigeye yield per trip has not improved; there were no bigeye tuna in the landings until July. It is hoped that the level of catches will be maintained during the last quarter of the year.

The combined catches of the two gear types gave similar results for the first three quarters of 1975 and 1976. The 1976 fishing season will be almost as poor as that of 1975.

TABLE III analyzes the development of Senegalese fishing for the last 10 years. It is noted that the fleet, which was modernized in 1975 when the baitboats were converted to purse seiners, has shown a continual decrease in the number of vessels. Since 1974, the number of trips has also declined. In observing the percentage of each species in the catches, a drop in yellowfin, in favor of the catch of skipjack, can be noted. This is also the case for the other fleets. The scarcity of yellowfin tuna has favored an increase in the skipjack for the last three years.

If there had been a normal development of the SOSAP purse seine season, and taking into account a 25 % increase in the average yield per trip, the total catch extrapolated for the Senegalese tuna vessels could have been 7,060 tons, practically the same as that of 1974.

Table I. Landings by gear and by species in 1974 - 1975 - 1976

		Landings up to September 30 (in tons)				*Landings up to December 31 (in tons)*			
		Yellowfin	*Skipjack*	*Bigeye*	*Total*	*Yellowfin*	*Skipjack*	*Bigeye*	*Total*
Baitboats	1974	3,482	3,814	332	6,949	4,329	4,306	402	9,037
	1975	2,800	1,532	1,016	5,348	2,800	1,886	1,155	5,840
	1976	4,738	1,765	805	7,308	4,738 *	2,173	915 *	7,826 *
Purse seiners	1974	1,670	1,362	75	3,107	2,433	1,917	96	4,446
	1975	2,614	1,653	180	4,447	3,035	2,693	334	6,062
	1976	1,630	977	78	2,685	2,124 *	1,769 *	184 *	4,077 *
TOTAL	1974	5,152	5,176	407	10,056	6,762	6,223	498	13,483
	1975	5,414	3,185	1,196	9,795	5,834	4,579	1,498	11,902
	1976	6,368	2,742	883	9,993	6,862 *	3,942 *	1,099 *	11,903 *

* Data extrapolated.

Table II. Catches and yields per trip by gear and by species in 1975 and 1976 (comparison of the two years up to September 30)

				Yellowfin		*Skipjack*		*Bigeye*		*Total*	
Gear	*Year*	*No. of boats*	*No. of trips*	*Catch in tons*	*Catch in tons/trip*	*Catch in tons*	*Catch in tons/trip*	*Catch in tons*	*Catch in tons/trip*	*Catch in tons*	*Catch in tons/trip*
Baitboat	1975	32	419	2,800	6.6	1,532	3.7	1,016	2.4	5,348	12.8
	1976	32	348	4,738	13.6	1,765	5.0	805	2.3	7,308	21.0
	%	—	—16	+40	+50	+13	+26	—20	—4	+26	+39
Purse seine	1975	17	115	2,614	22.7	1,653	14.4	180	1.6	4,447	38.7
	1976	17	56	1,630	29.1	977	17.4	78	1.3	2,685	47.9
	%	—	—51	—37	+21	—40	+17	—56	—18	—39	+19
Total	1975	49	534	5,414	10.1	3,185	5.9	1,196	2.2	9,795	10.3
	1976	49	404	6,368	15.7	2,742	6.7	883	2.2	9,993	24.7
	%	—	—24	+15	+35	—14	+12	—26	—	+4	+25

Table III. Development of the Senegalese tuna fishery during 10 years (SOSAP — Independent)

Year	Gear		Total no. of trips	Catch by species						Total catch in tons
	BB	PS		YF	%	SJ	%	BE	%	
1966	4	—	47	1,419	79	367	21	—	—	1,786
1967	5	—	64	3,096	82	685	18			3,781
1968	5	—	63	3,233	84	453	12	170	4	3,856
1969	5	—	72	2,436	72	671	20	278	8	3,385
1970	8	4	108	4,040	65	1,915	31	238	4	6,193
1971	8	8	171	5,203	59	3,378	38	197	3	8,778
1972	7	9	169	7,037	63	4,089	37	4		11,130
1973	—	16	149	6,793	72	2,551	27	82	1	9,426
1974	1 *	18	166	4,306	54	3,678	46	15	—	7,999
1975	2 *	14	152	2,837	52	2,441	45	154	3	5,432
1976	2 *	14	104 **	2,902 **	51	2,685	47	61	2	5,648

* Independent Senegalese baitboats.
** Extrapolated up to December 31, 1976.

Conclusions

It must be noted that the 1976 season will be a poor one, similar to that of 1975. The reasons are essentially economic, but there is also the problem of low skipjack production, which has not improved over that of 1975. However, recent conclusions indicate that the stock is standing against an exploitation, which is near the maximum sustainable level.

NATIONAL REPORT — SOUTH AFRICA

by

C. S. de V. NEPGEN

1. *The fishery*

There was no marked change in the tuna fishing during 1975 and the total catch, consisting mainly of albacore, was well below 1,000 metric tons. Catches were mostly made in the region of the Cape of Good Hope by 38 sport fishing boats, three baitboats and two boats equipped with purse-seine nets.

2. *Biological sampling*

Regular sampling was done of tuna transshipped by foreign boats in Table Bay Harbour.

3. *The environment*

Monthly environmental surveys were done in the Cape of Good Hope area where most of the tuna were caught.

4. *Statistics*

Catch statistics were collected and supplied to ICCAT.

Original report in English.

SPANISH NATIONAL REPORT — 1976

The Spanish tuna fisheries in 1976 remained at a level similar to that of previous years, although the catches in general decreased somewhat, with the exception of albacore and yellowfin.

Albacore: During 1976, about 26,000 MT of albacore were caught, compared to 21,000 MT in 1975; this represents a very slight increase. 20,000 MT correspond to immature fish and 6,000 MT to adult fish.

An increase can be noted in the catch of young individuals, which had dropped considerably in 1975. This year, the catches and effort with live bait were maintained as in the previous year, but increased with the trolling.

A tagging cruise was carried out in the Bay of Biscay in August-September and 240 fish were tagged. Also, size sampling was carried out on 10,000 fish at various ports of the Peninsula.

Bluefin: Due to the high temperatures observed in the Bay of Biscay, the fishing season began late. These high temps resulted in the tuna not taking the bait of the baitboats. The bluefin fishing season ended in early October.

Due to the short season, there was an important decrease in the total catch and in the effort for this species. However, the CPUE was maintained at the same level as that of previous years, with a tendency to increase.

Data collection continued as in other years and studies have been expanded with regard to the biological aspects.

Swordfish: Catches of this species have increased, due to the fact that catches in the south of Spain doubled, while those of the north were reduced somewhat. This is due to the increase in effort in the south, where more medium size vessels (40-80 GRT) operated than in previous years. On the other hand, good albacore catches in the north during the summer induced the vessels to catch this species instead of directing fishing towards swordfish. 1976 catches were about 5,000 MT.

Mediterranean: An increase in fishing effort was noted in the areas studied. Also, in the south Mediterranean area swordfish effort was doubled. With regards to bluefin of the south Mediterranean, the catch also doubled, although fishing in this zone is incidental.

Concerning the trap fishery, two traps were set this year, a reduction by one trap compared to the previous year.

Original report in Spanish.

At any rate, information is available only for some zones of the Mediterranean and not for the Mediterranean as a whole. Effort is being made to complete Task I data for this area.

Canary Islands: In 1976, tuna fishing in the Canary Islands was carried out during the first six months of the year. Catches and effort were similar to those of the same period of the previous year.

During the second quarter, the catches were not significant and as a result effort was decreased considerably.

The tonnage of the tuna fishing fleet remained stable, after a rapid increase noted in the 1970-74 period.

Throughout 1976, sampling of the various species fishery continued. Also, the first tagging experiments were carried out.

Tropical tuna fisheries: This year, the yellowfin catch increased slightly (approx. 10 %), whereas the skipjack catch decreased to a great extent (about 60 %) compared to 1975.

It was noted that there was a tendency of the fleet to expand its traditional fishing areas. Fishing effort increased with the addition of three new large seiners.

REVIEW OF UNITED STATES FISHERIES AND RESEARCH ACTIVITIES ON TUNA AND TUNA-LIKE FISHES OF THE ATLANTIC OCEAN FOR 1975-1976

by

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE [1]

Review of fisheries

The United States commercial catch of tuna and tuna-like fishes from the Atlantic Ocean declined in 1975 to about 27,700 metric tons (MT) from the record high of about 35,600 MT in 1974 (Table 1). Much of the decline was due to lower catches of Spanish (*Scomberomorus maculatus*) and king (*S. cavalla*) mackerels and skipjack (*Katsuwonus pelamis*) and bigeye (*Thunnus obesus*) tunas. Part of the decrease was offset by increases in catches of bluefin (*T. thynnus*) and yellowfin (*T. albacares*) tunas. In 1975, the tropical tunas (yellowfin, skipjack and bigeye) contributed about 79 % of the total catch (Table 1).

Tropical tunas

In 1975, 32 American purse seiners participated in the tropical tuna fishery of the Atlantic Ocean. The fleet caught 14,335 MT of yellowfin tuna, 7,565 MT of skipjack tuna, 67 MT of bigeye tuna, 67 MT of little tuna and 19 MT of unclassified species (Table 1). As in previous years, most of the catch was made in the eastern tropical Atlantic. Average catch rates were 5 MT of yellowfin tuna/day's fishing and 2.6 MT of skipjack tuna/day's fishing in the eastern tropical Atlantic (Table 2).

This year, American participation is down and there appears to be little interest among American tuna captains to partake in the Atlantic fishery. As of September 1, only three American seiners were fishing for tropical tunas in the Atlantic, as compared to about 27 boats in September 1975. Many factors, including high fuel cost, prospects of a good skipjack tuna season in the eastern tropical Pacific and uncertainty of fishery-zone jurisdictions of African countries, are keeping the American boats in the Pacific and out of the tropical Atlantic tuna fishery. The es-

[1] Prepared by staff members of the Southwest Fisheries Center, La Jolla, California, and the Southeast Fisheries Center, Miami, Florida.

Original report in English.

timated 1976 catch as of September 1, is 598 MT of yellowfin tuna and 1,126 MT of skipjack tuna.

Temperate tunas

Northern Atlantic bluefin tuna is caught in the Atlantic by U.S. commercial fishermen exclusively in the northwest Atlantic with purse seine, handline, harpoon and trap. In 1975, the catch was 2,723 MT. The purse seine catch was 1,762 MT of age 1-5 bluefin tuna and 267 MT of age 6+ (large) bluefin tuna. The handline, harpoon and trap fishery landed 694 MT of large fish. Preliminary estimates indicate that the 1976 catch will be substantially lower than in 1975. Approximately 1,154 MT of bluefin tuna were taken in 1976 by the purse seine fishery, of which 173 MT were large bluefin tuna. The harpoon, handline and trap fishery landed approximately 520 MT.

The sport angling catch of small bluefin tuna for 1975 was 122 MT. Preliminary estimates of the sport fish catch of small bluefin tuna are significantly less than the 1974 and 1975 catches, suggesting that the 1975 year class was substantially smaller than the 1973 and 1974 year classes.

During the 1976 season the United States bluefin tuna fishery operated under catch and size regulations recommended by ICCAT in 1975. This resulted in closure of the seine fishery for small fish on June 29 and the harpoon, handline and trap fishery on September 16.

Review of research

United States research activities on tuna and tuna-like fishes of the Atlantic Ocean were conducted in 1975-76 by the Southwest Fisheries Center (SWFC), La Jolla Laboratory and the Southeast Fisheries Center (SEFC), Miami Laboratory of the National Marine Fisheries Service and the Woods Hole Oceanographic Institute (WHOI). SEFC and WHOI were responsible for research activities on northern bluefin tuna and billfishes. SWFC was responsible for research activities on all other tuna species, particularly tropical tunas.

Tropical tunas

United States research activities on tropical tunas of the Atlantic continued on many fronts. Fishery and biological data were collected from U.S. tuna fisheries and biological data were collected from import landings in Puerto Rico. A data management system was designed and established for easy, fast retrieval and analysis of tuna data. The focus of activities was on assessing the state of the yellowfin, skipjack and bigeye tuna stocks of the Atlantic by production model analysis. Considerable effort was also made to fulfill tasks assigned by the Working Group on an Intensified Atlantic-wide Skipjack Research Program.

Temperate tunas

Research continued on the status of stocks, fecundity, spawning, age and growth, and stock identification of bluefin tuna. An analysis of the status of stocks

by the method of cohort analysis was completed treating the Atlantic as a whole, as well as the western Atlantic stock as separate from that of the eastern Atlantic. Otoliths and vertebrae are being studied for annular marks which may provide a firm assessment of age and growth. Historical records continue to be analyzed for differential year-class and transatlantic migratory patterns. Females collected in the Florida Straits are being studied for maturity and fecundity. A tagging cruise was conducted in July in cooperation with the New England purse seine fleet, and 2,172 bluefin tuna were tagged and released. An additional 292 bluefin tuna were tagged by cooperating recreational fishermen.

Reports discussing preliminary results are contained in our documents. Research contracts were negotiated to survey the sport fishery for bluefin tuna off the U.S. and aerial survey flights were continued off the Bahamas to observe the spring spawning run.

Billfishes

Research on the population dynamics and biology of billfishes in the Atlantic continued in 1975. Over 40,000 fishing hours were recorded at five landing areas in the Gulf of Mexico and at 45 big-game fishing tournaments in the Gulf, western North Atlantic, and Caribbean Sea. Catch rates were higher in 1975 for sailfish and white marlin but lower for blue marlin compared to 1974 values. Work is also continuing on age and growth of white and blue marlin using dorsal spines.

Titles of documents submitted to ICCAT

BAGLIN, RAYMOND E.

Maturity, fecundity and sex composition of the white marlin, *Tetrapturus albidus*.

BAGLIN, RAYMOND E. and LUIS R. RIVAS

Population fecundity of western and eastern North Atlantic bluefin tuna, *Thunnus thynnus*.

BERRY, F. H., D. W. LEE and A. R. BERTOLINO

Age estimates in Atlantic bluefin tuna — An objective examination and an intuitive analysis of rhythmic markings on vertebrae and in otoliths. (Title revised to: "Progress in Atlantic bluefin tuna ageing attempts".)

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Results of United States cooperative tagging of Atlantic bluefin tuna, October 1975 through October 1976.

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MURPHY, TED C. and GARY T. SAKAGAWA
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PARKS, WESLEY W.
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A further note on Atlantic bluefin tuna spawning.

RIVAS, LUIS R.
a) Age composition, seasonal distribution of age groups, and longevity of the western North Atlantic bluefin tuna (*Thunnus thynnus*).
b) Age composition anomalies as evidence for transoceanic migrations by intermediate age groups of the North Atlantic bluefin tuna (*Thunnus thynnus*).

SAKAGAWA, GARY T.
a) State of the bigeye tuna stocks of the Atlantic Ocean from production model analysis, 1957-1975.
b) Incidental catches made by American tuna seiners in the Atlantic Ocean, 1967-1975.

SAKAGAWA, GARY T. and ATILIO L. COAN
State of the skipjack tuna stocks of the Atlantic Ocean from production model analysis, 1969-1975.

SAKAGAWA, GARY T., ATILIO L. COAN and EUGENE P. HOLZAPFEL
1976 Size and species composition of Atlantic tunas in import landings of Puerto Rico, 1975-1976.

TYLER, JAMES C., RAYMOND E. BAGLIN, FREDERICK H. BERRY, WESLEY W. PARKS and LUIS R. RIVAS
Review of new U.S. scientific evidence pertaining to the biology and the status of bluefin tuna stocks and bluefin tuna fisheries.

Table 1. Catch and landing (metric tons) of Atlantic tunas and tuna-like fishes by United States fishermen, 1967-75[1]

Year	*Bluefin*	*Yellowfin* [2,3]	*Albacore*	*Bigeye* [2]	*Little tunny*	*Skipjack* [2]	*Bonito*	*Swordfish*	*Spanish mackerel*	*King mackerel*	*Unclassified*	*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 [4]	1,857	5,621	12	865	42	19,973	73	—	4,395	2,715	—	35,553
1975 [4]	2,845	14,335	1	67	67	7,565	76	—	1,467	1,280	19	27,700

[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 and the Netherlands.

[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

		Yellowfin		*Skipjack*	
Year	*Number of seiners*	*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

[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.