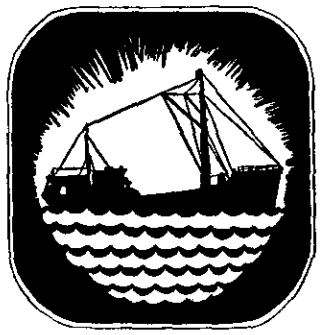
INTERNATIONAL COMMISSION

FOR THE

NORTHWEST ATLANTIC FISHERIES



ANNUAL PROCEEDINGS

Vol. 15

for the year

1964-65

Issued from the Headquarters of the Commission

Dartmouth, N. S., Canada

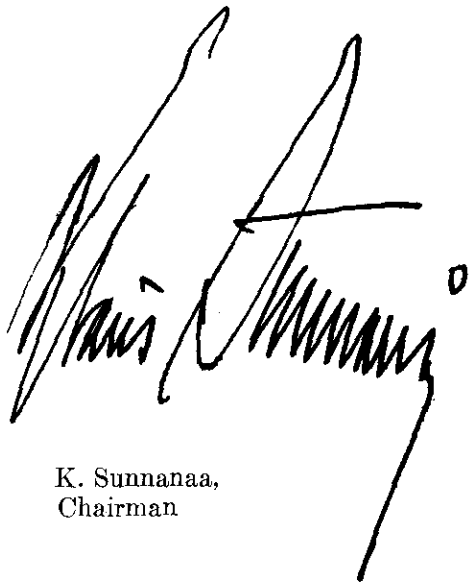
1965

LETTER OF TRANSMITTAL

The Chairman of the International Commission for the Northwest Atlantic Fisheries presents his compliments to the Governments signatory of the International Convention for the Northwest Atlantic Fisheries signed at Washington under date of 8 February 1949, and to the Commissioners and observers representing those Governments and has the honour to transmit herewith annual proceedings of the International Commission for the Northwest Atlantic Fisheries for the year 1964–65.

This is the fifteenth annual report of proceedings of the Commission and is an authoritative record of its activities and achievements during the period 1 July 1964 to 30 June 1965. The report contains an account of the activites of the Commission's Secretariat, an account of the Fifteenth Annual Meeting, summaries of research carried out in each of the five Convention subareas, a review of possible conservation actions for the Commission area and a list of scientists and laboratories engaged in the Commission's work.

This report is prepared and transmitted in conformity with the requirements of Article VI (1) (f) of the International Convention for the Northwest Atlantic Fisheries and Rules 8 (g) and 22 (a) of the Rules of Procedure of the Commission.



K. Sunnanaa,
Chairman

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PART 1

Administrative Report for the Year Ending 30 June 1965

1. The Commission's Officers

Chairman of Commission	—	Mr K. Sunnanaa (Norway)
Vice-Chairman of Commission	—	Mr F. P. Briggs (USA)
Chairman of Panel 1	—	Mr G. Möcklinghoff (Federal Republic of Germany)
Chairman of Panel 2	—	Mr H. Gardner (UK) (to November 1964)
Chairman of Panel 3	—	Mr V. Kamentsev (USSR)
Chairman of Panel 4	—	Captain T. de Almeida (Portugal)
Chairman of Panel 5	—	Mr W. C. MacKenzie (Canada)

These officers were elected at the 1963 Annual Meeting to serve for a period of 2 years.

Chairman of Standing Committee on Research and Statistics	—	Dr W. Templeman (Canada)
Chairman of Standing Committee on Finance and Administration	—	Mr R. Green (USA)

These officers, were elected at the 1964 Annual Meeting to serve for a period of 1 year.

2. Panel Memberships for 1964–65

Panel	1	2	3	4	5	Total
Canada		+	+	+	+	4
Denmark	+					1
France	+	+	+	+		4
Germany	+	+				2
Iceland	+					1
Italy			+	+		2
Norway	+					1
Poland	+	+	+			3
Portugal	+	+	+	+		4
Spain	+	+	+	+		4
USSR	+	+	+	+	+	5
UK	+	+	+			3
USA			+	+	+	3
TOTAL	10	8	9	7	3	37

3. The Commission's Office Accommodation

Through the kindness of the Department of Mines and Technical Surveys of the Canadian Government, the Commission has occupied office space in the Bedford Institute of Oceanography since 1 August 1963.

As a result of representation from the 1964 Annual Meeting of the Commission, the Canadian Government approved a recommendation, effective 18 June 1964, that the space leased in the Bedford Institute of Oceanography to the Commission be occupied by the Commission free of any rental charges to 1 August 1966, the remainder of the period of lease.

Effective 26 April 1965, the Secretariat vacated 240 sq ft of office space to allow the Bedford Institute of Oceanography to meet, in part, its need to accommodate a rapid increase in staff toward full complement.

4. The Commission's Secretariat

Permanent members of the Secretariat were:

Executive Secretary	—	L. R. Day
Statistician and Accounts Officer	—	B. F. C. DeBaie (to 15 March 1965)
Editorial Assistant	—	W. H. Champion
Secretary	—	Miss Jean Maclellan
Clerk-Typist	—	Miss Gertrude Schrader
Clerk	—	Mrs Barbara MacKenzie

Part-time typing assistance was provided by:

Mrs Margaret Crickard
Miss Mabel Parker

Since the 1964 Annual Meeting, the Executive Secretary discussed the presentation of proposals to Depositary Government from the 1964 Annual Meeting for changes to paragraphs 7 and 8 of Article VIII of the Convention and for changes in the ICNAF trawl regulations with Mr Wm. Sullivan of the Office of the Special Assistant in Fish and Wildlife to the Under Secretary of State (22–23 June 1964); discussed

job description with the Classification Branch of the Canadian Civil Service Commission with a view to certification of salary levels appropriate to the positions in the Commission's Secretariat and discussed Commission matters with personnel of the Canadian Department of Fisheries and The Fisheries Research Board of Canada in Ottawa (26–28 October 1964); participated in a meeting of Canadian and US scientists to discuss common problems in research and management of commercial species particularly sea scallops, silver hake and haddock in ICNAF Subareas 4 and 5; represented ICNAF, in company with the Chairman of the Statistics Subcommittee, Mr R. Hennemuth, at the Fourth Session of the FAO/ICES/ICNAF Continuing Working Party on Fishery Statistics in the North Atlantic Area (CWP) at FAO in Rome (9–12 March 1965) and discussed the form of presentation of proposals to Depositary Government from the 1965 Annual Meeting with the office of the Special Assistant in Fish and Wildlife to the Under Secretary of State (27 June 1965).

The Commission's Statistician planned implementation of the statistics proposals from the 1964 Annual Meeting with the Chairman of the Statistics Subcommittee at the Wood's Hole, Mass., Laboratory of the U.S. Bureau of Commercial Fisheries (8–10 September 1964).

The Editorial Assistant reviewed editorial procedures for scientific publications with the Editor of Publications for the Fisheries Research Board of Canada, Dr J. C. Stevenson and his assistant, Mr R. MacIntyre, in Ottawa (5–7 August 1964).

5. The Commission's Publications

The 1964 *Meeting Proceedings* (66 p.) was distributed in July 1964. It contains the reports of the Plenary Sessions and of meetings of the Panels, Commissioners, the Standing Committee on Finance and Administration and the *ad hoc* Committee on Trawl Regulations held in connection with the Commission's Fourteenth Annual Meeting at the Federal Institute for Fisheries Research, Hamburg-Altona, from 1 to 6 June 1964.

The *Redbook* 1964 was issued in three parts. Part I (one book of 84 p.) contains the proceedings of the 1964 meetings of the Standing Committee on Research and Statistics and its Subcommittees and working groups. It was distributed in October 1964. Parts II and III (one book of 150 p.) contains the reports by member countries on research conducted in the Convention Area in 1963 and selected scientific papers presented to the 1964 meetings. Parts II and III were distributed in November 1964.

The *Statistical Bulletin* Vol. 12 for the year 1962 (75 p.) was distributed in November 1964. It contains the quantities of fish caught by species, by ICNAF Division, by month, by type of gear and vessel for the calendar year 1962.

The *Statistical Bulletin* Vol. 13 for the year 1963 (87 p.) was distributed in June 1965. This is 5 months earlier than previous volumes have been printed and distributed.

The *Annual Proceedings* Vol. 14 for the year 1964–65 (43 p.) was distributed in January 1965. It contains the Administrative Reports with financial statements for the year ending 30 June 1964 prepared by the Executive Secretary, the Report of the Fourteenth Annual Meeting, 1964, by the Chairman of the Commission and Summaries of Research carried out in each Subarea of the Convention Area in 1963.

The *Research Bulletin* of ICNAF No. 1 (110 p.) was distributed in December 1964. This new serial publication contains 12 scientific papers on fisheries research important to the work of the Commission.

The *Sampling Yearbook* Vol. 8 for the year 1963 (173 p.) was distributed in February 1965. The volume contains the length and age frequencies and age/length keys and frequencies for the main ICNAF species sampled in ICNAF Divisions in 1963 by the research agencies of member countries.

The *Research Bulletin* of ICNAF No. 2 (about 80 p.) contains 13 scientific contributions to the knowledge of fisheries in the Northwest Atlantic. Papers are now in page proof stage at the printers. The number will be distributed in October 1965.

The ICNAF *Handbook*, formerly the ICNAF Directory (Blue Book) has been revised and it will be ready for distribution about November. It contains the Articles of the International Convention for the Northwest Atlantic Fisheries, the Commission's Rules of Procedure and Financial Regulations, the Rules of Procedure for the Panels, the Commission's Trawl Regulations, Protocols to the Convention, the Statistical

Divisions of the Convention Area and other useful items.

The ICNAF *Special Publication* No. 6 (about 950 p.) contains the Chairman's Introduction, 9 Section Summaries, 3 Review Papers and 91 Scientific Contributions to the ICNAF Environmental Symposium held at FAO, Rome, 27 January–1 February 1964. Preparation of this publication for offset reproduction is almost complete and it will be available for distribution about December 1965.

6. Newsletter

To date (14 May 1965) two Newsletters have been distributed, No. 46 covering the period July – September 1964 and No. 47 covering the period October – December 1964. Issue No. 46 highlighted the results of the Fourteenth Annual Meeting. Issue No. 47 provided a short summary of the Commission's accomplishments to date and outlook for the future.

7. Cooperation with Other International Organizations

The Secretariat has continued to maintain a close contact with other international organizations.

Statistics on the catch and effort in the northern ICNAF areas have been supplied to the Organization for Economic Cooperation and Development (OECD) for use in an economic study of developments in North Atlantic fisheries. In addition, the Secretariat has provided data for the OECD multilingual nomenclature of fish and fishery products.

Reports of the Statistical Committees of ICES and ICNAF were exchanged. A review of possible conservation actions in the ICNAF area prepared by the Chairmen of ICNAF's Research and Statistics Committee and the Assessments Subcommittee was sent to ICES for consideration and possible use by the ICES Liaison Committee in their report to NEAFC in May 1965. Preparation has continued on the joint ICES/ICNAF Special Meeting on Sampling to be held in October 1965.

Proposals for preparation of an index of North Atlantic publications by FAO/ICES/ICNAF are being discussed.

Plans for sharing the expense and work of a joint FAO/ICES/ICNAF Symposium on Food Chains are being pursued.

Close cooperation with FAO and ICES was maintained in the development of adequate statistical procedures for the North Atlantic through participation by the Executive Secretary and the Chairman of the ICNAF Statistics Subcommittee, at the Fourth Session of the FAO/ICES/ICNAF Continuing Working Party on Fishery Statistics in the North Atlantic held in March 1965.

Cooperation in developing FAO's role in world fisheries was effected through representation by Dr A. W. H. Needler (Canada) on behalf of this Commission's Chairman at meetings of the *ad hoc* Committee on FAO Conference Resolution 8/63 in March 1965.

Dr J. L. McHugh (USA) will represent the Commission at the Second Session of the FAO Working Party for Rational Utilization of Tuna Resources in the Atlantic Ocean (WPUTR) to be held in July 1965 at FAO, Rome.

The Chairman of the ICNAF Environmental Subcommittee represented the Commission at the Third Session of the Intergovernmental Oceanographic Commission (IOC) in June 1964, the executive meeting of the Scientific Committee on Oceanic Research (SCOR) in June 1964 and the Seventh Meeting of SCOR in November–December 1964 to ensure coordination of the environmental studies of the Commission with these agencies which have world-wide responsibility for oceanographic studies.

Meeting reports were exchanged between NEAFC and ICNAF in an effort to assist each other in the solution of common problems in connection with the fisheries of the North Atlantic. Mr G. Möcklinghoff (Federal Republic of Germany) represented ICNAF at the Third Meeting of NEAFC in May in Moscow.

8. Cooperation with Non-Member Countries

The exploratory fishing activities of Japanese fishing vessels in the Convention area resulted in larger catches in 1964. The Government of Japan has again submitted catch and effort statistics in the form required by the Commission, An invitation extended to the Government of Japan to send an observer to the Fifteenth Annual Meeting in Halifax, Nova Scotia, has been accepted.

The Government of Belgium notified the Commission that it had not fished in the Convention Area in 1964.

The development of Rumanian fishing interest in the Convention Area has resulted in the Secretariat having fulfilled a request for information on the Commission's organization, function, work, and for its publications.

9. Programmes and Reports of Research

Projected research programmes for 1965 for each member country were submitted to the Secretariat for duplication and distribution.

National research reports were received from all member countries except Italy, who had no vessels fishing in the Convention Area in 1964. The research reports have been prepared as Research Documents for consideration by scientists from the member countries at the 1965 Annual Meeting.

Considerable progress has been made toward completion of the text and figures of the sections of the Environmental Survey: NORWESTLANT 1-3, April-June 1963. Basic oceanographic data are being forwarded to the Canadian Oceanographic Data Centre (CODC) for storage and publication.

10. Statistics

The statistical service to the Commission continues to improve.

The time required to compile and publish the Statistical Bulletin of ICNAF has been reduced to 12 months in the Secretariat. As a consequence, the **complete** published statistics of the fishery in 1963 in the Convention Area (Statistical Bulletin Vol. 13 for 1963) was available for use at the Commission's scientific meetings held in May, 1965.

With the help of FAO and the use of the new FAO/ICNAF statistical reporting form STANA 1W by all member countries except Canada and USA, 1964 catches by species, country and division (Table 1 of Statistical Bulletin Vol. 14 for 1964) and by species and subareas (Table 3 of Statistical Bulletin Vol. 14 for 1964) were available prior to the 1965 Annual Meeting.

Member countries were requested to submit returns on quantities of fish discarded and used for industrial purposes and on qunatities of redfish taken at various depth zones.

Reports on the conversion and yield factors used by member countries in the ICNAF countries were requested for study at the 1965 Annual Meeting.

A detailed study of the form STANA 1W for ICNAF purposes has resulted in a number of improvements to the instructions issued for its use.

11. Otolith Exchange Program

Completion of the cod otolith exchange program designed to compare age-reading techniques has allowed Mr R. Hennemuth (USA) to undertake an analysis of results for presentation to the 1965 Annual Meeting.

A new program of otolith exchange to compare silver hake age-readings using Canadian, USA and USSR scientists has been forwarded.

12. Changes in the Convention

Proposed changes to paragraphs 7 and 8 of Article VIII of the International Convention for the Northwest Atlantic Fisheries to provide less time-consuming procedures for effecting requlatory measures, adopted by the Commission 6 June 1964, was forwarded to the Depositary Government 30 June 1964. A draft protocol was circulated by Depositary Government to Member Governments 5 October 1964.

13. International Regulation of Trawl Fisheries

Amendments to regulations to meet the growing and widespread use of synthetic fibres and to meet the different legal and administrative problems in Member Countries with regard to measurement of the size of the mesh for enforcement purposes in Subareas 1, 2, 3, 4, and 5, adopted by the Commission 6 June 1964, were forwarded to Depositary Government 30 June 1964.

14. Review of Conservation Actions

In accordance with requirements of the 14th Annual Meeting, the Chairman of Research and Statistics Committee, Dr W. Templeman (Canada) and the Chairman of the Assessments Subcommittee, Mr J. Gulland (UK) met in the Secretariat in mid December 1964 and completed a joint report entitled "Review of possible conservation actions for the ICNAF area." The

report was circulated in late January 1965 to Commissioners and their Advisers in Member Countries for study prior to consideration at the Fifteenth Annual Meeting of the Commission in June 1965 at Halifax.

15. Inspection of Regulated Fisheries

Reports of infringements to the ICNAF trawl regulations having to do with mesh size, mesh obstruction and excess landings were received from Member Countries and summarized for consideration at the Fifteenth Annual Meeting.

16. Meetings

Subject co-ordinators and national correspondents concerned with the collection, analysis and publication of the material from the ICNAF Environmental Survey (NORWESTLANT 1–3) met on 25–26 September 1964 at Copenhagen under the Chairmanship of Mr A. Lee (UK). Plans for co-ordinating and publishing the subject material in the ICNAF Special Publication series were discussed.

Financial Statement for the Fiscal Year ending 30 June 1965

The accounts of the Commission for the year ending 30 June show an assessment against Member States for ordinary expenses of $74,000 and an authorized advance of $7,500 to the General Fund from the Working Capital Fund to finance the Special Environmental Project.

Obligations incurred during the year totalled $72,442 which was $9,058 less than the total $81,500 appropriated by the Commission.

The audit of the Commission's finances was made by the office of the Auditor General of Canada in July 1965.

The report of the Auditor General reads, in part, as follows:

EXHIBIT I

Statement of Budget Appropriations, Obligations Incurred, and Balances of Appropriations for the year ended 30 June 1965

(Expressed in Canadian Dollars)

Purposes of Appropriation	Appropriated by Commission	Obligations Incurred	Surplus or Deficit (–) Balances of Appropriations
Personal Services —			
Salaries	$41,300	$38,821	$ 2,479
Superannuation	1,200	854	346
Additional help	1,200	608	592
Medical plan	300	237	63
Travel	3,500	2,786	714
Transportation	500	201	299
Communications	2,000	2,512	– 512
Publications	11,300	9,450	1,850
Other contractual services	5,200	3,159	2,041
Materials and supplies	3,000	2,181	819
Equipment	1,500	1,702	– 202
Annual Meeting	3,000	2,431	569
Totals, ordinary budget	74,000	64,942	9,058
Special Environmental Project	7,500	7,500	—
	81,500	72,442	9,058

EXHIBIT II

Statement of Income and Expenditure for the year ended 30 June 1965

(with comparative figures for the year ended 30 June 1964)

(Expressed in Canadian Dollars)

		1965		1964
Income:				
Members' contributions assessed —				
Canada	$ 7,530		$ 7,145	
Denmark	2,277		2,181	
France	7,530		7,145	
Germany, Federal Republic	4,028		3,836	
Iceland	2,277		2,181	
Italy	4,028		3,836	
Norway	2,277		2,181	
Poland	5,779		5,490	
Portugal	7,530		7,145	
Spain	7,530		7,145	
Union of Soviet Socialist Republics	9,282		8,797	
United Kingdom	5,779		5,490	
United States of America	5,779		5,490	
		$71,626		$68,062
Miscellaneous Income —				
Bank interest	678		782	
Sales of publications	2,611		4,116	
Refund of previous years' expenditures	1,808		145	
Cancelled prior year obligations	1,276		—	
		6,373		5,043
		77,999		73,105
Obligations incurred (Exhibit I)		72,442		74,209
Excess of income over obligations incurred carried to surplus account		5,557		- 1,104

EXHIBIT III

Statement of Assets and Liabilities as at 30 June 1965

(with comparative figures as at 30 June 1964

(Expressed in Canadian Dollars)

Assets	1965	1964
GENERAL FUND		
Cash on deposit	$31,163	$ 6,055
Accounts receivable	250	350
	31,413	6,405
WORKING CAPITAL FUND		
Cash on deposit	$ 2,500	$10,000
Advance to General Fund for Special Environmental Project	7,500	—
	10,000	10,000

Liabilities		1965	1964
Unliquidated obligations		$ 6,642	$ 3,853
Advances on future contributions		9,340	178
Advance from Working Capital Fund for Special Environmental Project		7,500	—
Surplus Account:			
Surplus as at 1 July 1964	$2,374		3,478
Add: Excess of income over obligations incurred	5,557		–1,104
		7,931	2,374
		31,413	6,405
Principal of Fund		$10,000	$10,000
		10,000	10,000

PART 2

Report of Fifteenth Annual Meeting

of the

International Commission for the Northwest Atlantic Fisheries

Halifax, Nova Scotia 7–12 June 1965

BY THE CHAIRMAN MR K. SUNNANAA

1. Introduction

The International Commission for the Northwest Atlantic Fisheries (ICNAF), under the terms of a Convention signed in 1949, is responsible for the investigation, protection and conservation of the fisheries of the Northwest Atlantic in order to make possible the maintenance of a maximum sustained catch from those fisheries. Based on the results of scientific investigations promoted and co-ordinated by the Commission, measures to ensure wise use of the stocks of commercial fish are recommended to member governments.

The Commission has five panels, each one reviewing the fisheries and recommending conservation measures in a geographic subarea of the Convention Area (Subarea 1, off West Greenland; Subarea 2, off Labrador; Subarea 3, off south and east Newfoundland; Subarea 4, the Gulf of St. Lawrence and Nova Scotian Banks; and Subarea 5, the Gulf of Maine).

2. Time and Place of Meeting

The Fifteenth Annual Meeting of the International Commission for the Northwest Atlantic Fisheries was held in the Nova Scotian Hotel, Halifax, Nova Scotia, Canada, from 7 to 12 June 1965 under the chairmanship of Mr K. Sunnanaa.

Previous to the plenary sessions of the Commission, meetings of the various subcommittees and working groups of the Standing Committee on Research and Statistics were completed between 28 May and 4 June under the general chairmanship of Dr W. Templeman of Canada. The Subcommittee on Fishery Assessments met on 28 and 29 May 1965 and at intervals during the following week under the chairmanship of Mr J. Gulland of the United Kingdom. The Subcommittee on Herring and Other Pelagic Species met 29 May 1965 under the chairmanship of Mr B. Skud of USA. The Steering and Publications Subcommittee met on 30 May 1965 and at intervals during the week under Dr W. Templeman of Canada. During the week following, the Subcommittee on Statistics met under Mr R. Hennemuth of USA, the Subcommittee on Environmental Studies under Mr A. Lee of the United Kingdom, the Subcommittee on Gear and Selectivity under Dr H. Bohl of the Federal Republic of Germany, the Subcommittee on Sampling under Mr S. A. Horsted of Denmark, the Subcommittee on Ageing Techniques under Mr E. Bratberg of Norway and the Working Group on Tagging under Dr E. M. Poulsen of Denmark. Scientific Advisers to each of the five panels met on 6 June 1965.

Between 7–12 June 1965, the Commission considered agenda items in Plenary Session, and heard reports and recommendations from meetings of Commissioners, an *ad hoc* Committee on Trawl Regulations, meetings of each of the five panels and a joint meeting of panels, in addition to meetings of the Standing Committee on Research and Statistics and the Standing Committee on Finance and Administration.

3. Participants (Appendix I)

The 13 member countries were represented by their Commissioners, advisers and experts. In addition, the Food and Agriculture Organization of the United Nations (FAO), the International Council for the Exploration of the Sea (ICES), the North-East Atlantic Fisheries Commission (NEAFC) and the Scientific Committee on Oceanic Research of the International Council of Scientific Unions (SCOR) had, at the invitation of the Commission, sent observers to the meeting.

The Commission was honoured to have participating for the second time observers from the Government of Japan.

Accredited participants are listed in Appendix I to this Report. The organization and officers of the Commission for the year 1965–66 are presented on the inside of the front cover of these Proceedings.

4. Opening of the Meeting (Agenda Item 1)

The opening session was convened in the Nova Scotian Hotel, Halifax on 7 June 1965. The Chairman of the Commission presided over the session. Among the many guests welcomed by the Chairman were the Hon. Hedard Robichaud, Minister of Fisheries for Canada; Dr A. W. H. Needler, Deputy Minister of Fisheries for Canada; Dr H. D. Smith, President of the Nova Scotia Research Foundation, representing the Province of Nova Scotia; His Worship Mayor Charles A. Vaughan of the City of Halifax; Dr H. D. Hicks, President of Dalhousie University and representatives from governmental and fisheries organizations in the Maritime Provinces. Also present were Commissioners and their advisers, consuls and trade commissioners from the member countries and observers from other international organizations.

The Chairman welcomed the guests, observers and delegates and introduced the Hon. Hedard Robichaud, who spoke as follows:

"It is a great honour and privilege for me to have this opportunity to welcome all members of the visiting delegations to Canada on the occasion of the Fifteenth Annual Meeting of the International Commission for the Northwest Atlantic Fisheries. I had the pleasure of meeting many of you here in Halifax 2 years ago and I look forward to meeting the new delegates and visiting with all of you at an informal gathering this evening.

"The Annual Meeting of the Commission must be an occasion when, among other things, you review achievements, assess current programs and plans for the future. At this meeting you will look back on the results of 15 years' coordinated research and international cooperation in the field of fisheries management. What has been accomplished during this period? The publications of the Commission show very clearly that a major contribution has been made by the scientists in that knowledge of the resources in the care of the Commission has been greatly augmented. Not only has the fund of knowledge related to the general biology of the species and the physical environment been increased, but also valuable information has been acquired on how and why the stocks react as they do to such things as intensification of fishing operations. As a result, it is possible to predict with some confidence what will happen to the fish and the fisheries under certain conditions which may prevail in the future. This in itself shows that significant progress is being made towards realization of the objectives of the Convention under which your Commission is established.

"In my view, the value of the new scientific knowledge that has resulted from the promotion and the co-ordination of research programs under the Commission's auspices is out of all proportion to the financial contributions made by each member government to support the Commission's activities.

"Progress, however, is being made in other directions as well — but perhaps at a slower rate. The ultimate objective of maintenance of a maximum sustained catch in the Convention Area implies rational management of the fishery resources of common interest and this requires regulation of fishing — not merely study of its effects. Obtaining agreement among our respective countries on what regulations are required and how these should be enforced could be expected to present certain difficulties because social and economic considerations differ from country to country and because the conclusions of fisheries science will always be surrounded with a degree of uncertainty. I am of the opinion that such difficulties will be overcome as mutual trust and understanding and commitment to the common objective are more firmly established. A significant forward step has been taken by the Commission this year with the exchange of enforcement officers on the vessels of ertain member nations. There can be no doubt that such exchanges will do a great deal to develop mutual trust and respect with regard to the application of essential regulations in the complex international fisheries of the Convention Area.

"Although the Commission has established an enviable record in scientific endeavour and international cooperation, it has not been so successful in convincing the respective member governments of the urgency associated with

consideration and decision with respect to recommendations adopted by the Commission. For example, although the Commission unanimously adopted a recommendation to bring the conservation of harp and hood seals within the responsibilities of the Commission at the Annual Meeting in 1961, it has not yet been possible to obtain full ratification of the necessary protocol to the Convention. This matter is of particular concern to Canada and the other member nations whose fishermen participate in the seal fishery, and I hope that the Commission soon will be in a position to give immediate consideration to this problem.

"I can assure you that the government and the fishing industry of Canada support the work of the Commission to the fullest extent. As I stated in my remarks to you at the opening of the Thirteenth Annual Meeting, the fisheries of the rich banks off the east coast of Canada provided the basis for the earliest European settlement in the Atlantic region of this country. These fisheries have declined in relative importance in the regional economy, but current plans for general industrial development in that area are associated very closely with increased utilization of the fishery resources.

"As you reflect on the contribution you have made to world fisheries during the last 15 years, I think you will look on your record with justifiable pride, but the number and complexity of the items on your agenda indicate that all the problems have not been solved and that there is still much important work to do. I wish you success in your deliberations and wish to express my confidence in your ability to find acceptable and effective measures which will ensure continuation of the orderly development of established and of new fisheries.

"I hope you will have an opportunity during your stay in Canada to visit other areas and obtain more intimate knowledge of our country and its people. I know the members of the Canadian delegation will be glad to assist in any possible way to make your visit a pleasant one."

Dr H. D. Smith brought greetings and good wishes from the Premier and the Province of Nova Scotia. His Worship Mayor Charles A. Vaughan noted the centuries-long connection of the City of Halifax with the fisheries in the Northwest Atlantic, welcomed the guests and delegates to the city and wished the Commission success in its deliberations.

The Chairman thanked the speakers for their words of welcome and encouragement and declared the Fifteenth Annual Meeting of the International Commission for the Northwest Atlantic Fisheries officially opened.

Following adjournment of the opening session, the first Plenary Session was convened by Chairman Sunnanaa. Second, third and fourth Plenary Sessions were convened on 10, 11, and 12 June 1965 respectively. During these meetings the following business of the Commission was conducted.

5. **The Agenda** (Item 2, Appendix II)

The agenda, as circulated 60 days in advance of the meeting in accordance with Rule 12 of the Commission's Rules of Procedure, was adopted by the Commission.

6. **Publicity for the Meeting** (Item 3)

The Commission agreed that, in accordance with past practice, the Chairman of the Commission and the Chairmen of the Standing Committees on Research and Statistics and Finance and Administration should constitute a committee to control policy regarding public relations. Canada kindly provided the services of Mr G. J. Gillespie and Mr M. S. Ronayne, Information Officers with the Department of Fisheries, as press officers for the meeting.

7. **Review of Panel Membership** (Item 4)

The Commission reviewed panel memberships as required under Article IV(2) of the Convention. There were no applications for new membership to panels during the year 1964–65. All Contracting Governments were already represented on panels on the basis of their current substantial exploitation of ICNAF species of fishes. Panel memberships for the year 1965–66 remain as follows:

Panel	1	2	3	4	5	Total
Canada		+	+	+	+	4
Denmark	+					1
France	+	+	+	+		4
Germany	+	+				2
Iceland	+					1
Italy			+	+		2
Norway	+					1
Poland	+	+	+			3
Portugal	+	+	+	+		4
Spain	+	+	+	+		4
USSR	+	+	+	+	+	5
UK	+	+	+			3
USA			+	+	+	3
TOTAL	10	8	9	7	3	37

8. Consideration of Administrative Matters

(a) Reports by the Secretariat

The following reports were submitted to the Commission by the Executive Secretary:

(i) Auditor's Report for the fiscal year ending 30 June 1964 (1964 Annual Proceedings, Vol. 14, Part I, Item 16);

(ii) Administration and Financial Report for the fiscal year ending 30 June 1965 (complete to 14 May 1965) (1965 Commissioners' Document No. 2);

(iii) Budget estimate for the fiscal year ending 30 June 1966 (Appendix 1 to the 1965 Agenda for the Standing Committee on Finance and Administration);

(iv) Budget forecast for the fiscal year ending 30 June 1967 (Appendix II to the 1965 Agenda for the Standing Committee on Finance and Administration).

(b) Report of the Standing Committee on Finance and Administration (Items 4, 5, 6, 7, 8, 9, 10, 11, 26 and 28)

At its first Plenary Session, the Commission assigned all financial and administrative items on its agenda (Items 4, 5, 6, 7, 8, 9, 10, 11, 26, and 28) to the Standing Committee on Finance and Administration for consideration. These items were dealt with by the Committee at meetings held on 8, 10, and 11 June 1965. Reports of the Committee were presented to the Commission at its second Plenary Session on 10 June 1965 and at its fourth Plenary Session on 12 June 1965. The Commission adopted the following Committee **recommendations:**

(i) that the accounts of the Commission showing appropriations of $Can. 71,540 and expenditures totalling $Can. 74,209 and the report of the Auditor General of Canada for the fiscal year ending 30 June 1964, be adopted;

(ii) that the provisional Administrative Report prepared by the Executive Secretary for the fiscal year ending 30 June 1965 with financial statement to 1 May 1965 (1965 Commissioners' Document No. 2) be adopted;

(iii) that each Contracting Government be billed by the Commission for payments due under the 1965–66 administrative budget of the Commission in accordance with Article XI of the Convention, on 1 August 1965;

(iv) that the kind invitation of the Government of Spain to hold the Sixteenth Annual Meeting of the Commission in Spain, at a place to be named later, from 6 to 11 June 1966, be accepted;

(v) that the kind invitation of the Government of the United States of America to hold the Seventeenth Annual Meeting of the Commission in Boston, Massachusetts, from 5 to 10 June 1967, be accepted;

(vi) that the position of Statistician in the Commission Secretariat be reclassified to Assistant Executive Secretary;

(vii) that, based on an appraisal by the Classification Branch of the Civil Service Commission of Canada, the position classifications for staff

members of the Commission's Secretariat be Senior Officer 1 for the Executive Secretary, Administrative Officer 7 for the Assistant Executive Secretary, Editor 2 for the Editorial Assistant, Clerk 4 for the Senior Secretary, Clerk 3 for the Clerk Stenographer and Clerk 2 for the Clerk Typist;

(viii) that the 1964 National Research Reports again be published in the Redbook and that the Commission review the matter at the 1966 Annual Meeting;

(ix) that the following United States proposals for changes in the Financial Regulations of the Commission be adopted and the Regulations as amended be applied to the preparation of the 1965–66 and subsequent budgets of the Commission:

1) Change the last sentence of Regulation 4.3 to read: "The balance of the appropriations shall be placed in the Working Capital Fund;"

2) Change the first sentence of Regulation 4.4 to read: "At the end of the 12-month period provided in Regulation 4.3 above, the then remaining balance of any appropriations retained shall be added to the Working Capital Fund;"

3) Amend Regulation 5.2(b) by adding after 'account' and before the semi-colon: , "except from sale of publications;"

4) Delete Regulation 5.2(d);

5) Amend Regulation 6.1 by adding after "income," "except from sale of publications;"

6) Amend Regulation 6.2 by changing the period after 'budget' to a comma and adding "and the sale of publications;"

7) Amend Regulation 7.1 by adding "(d) Funds derived from the sale of publications;"

8) Amend Section VI by adding a new Regulation 6.6: "During the course of each Annual Meeting, the Commission shall review the amount of funds available in the Working Capital Fund. Insofar as possible, the Commission shall attempt to anticipate capital and special expenditures over the succeeding three years and shall attempt to provide for such expenditures from the Working Capital Fund rather than through annual assessments on Members. However, the Working Capital Fund shall be maintained at a level, determined by the Commission, sufficient to finance appropriations in accordance with Regulations 5.1 and sufficient for use in an emergency."

(x) that the Commission appropriate a sum of $ Can. 84,730 from Contracting Governments to meet Ordinary Expenditures and $ Can. 11,000 from the Working Capital Fund for a Special Environmental Project (remaining cost of publishing the Environmental Symposium, ICNAF Special Publication No. 6, and the cost of publishing the Environmental Survey, ICNAF Special Publication No. 7) for the fiscal year ending 30 June 1966, the appropriations to be used for the following purposes:

1.	Personal Services	
	(a) Salaries	$45,030
	(b) Superannuation	1,200
	(c) Additional help	1,200
	(d) Medical plan	300
2.	Travel	5,000
3.	Transportation	500
4.	Communications	2,500
5.	Publications	11,000
6.	Other Contractual Services	5,500
7.	Materials and Supplies	3,500
8.	Equipment	2,000
9.	Annual Meeting	6,000
10.	Contingencies	1,000
	Total Ordinary Expenditures	$84,730
	Total Special Environmental Project	$11,000

(xi) that the Contracting Governments note for consideration at the Sixteenth Annual Meeting the following advance budget estimate of $ Can. 87,010 to meet the administrative expenditures for the fiscal year ending 30 June 1967:

1.	Personal Services	
	(a) Salaries	$46,310
	(b) Superannuation	1,200
	(c) Additional help	1,200
	(d) Medical plan	300
2.	Travel	5,500
3.	Transportation	500
4.	Communications	3,000
5.	Publications	15,500
6.	Other Contractural Services	4,000
7.	Materials and Supplies	3,500
8.	Equipment	1,000
9.	Annual Meeting	4,000
10.	Contingencies	1,000
	Total Ordinary Expenditures	$87,010

(xii) that the Commission record its appreciation of the financial relief provided by Canada through exemptions from Federal Sales Tax and Nova Scotia Hospital Tax on certain of the Commission's publications, and by the Federal Republic of Germany in absorbing expenses in connection with the 1964 Annual Meeting of the Commission in Hamburg;

(xiii) that the Commission accept the Canadian offer to explore further the possibility of financial relief for the Commission in the Canadian income tax field;

(xiv) that the Commission note the unanimous re-election of Mr R. W. Green of the United States as Chairman of the Committe for the year ending 30 June 1966.

9. Report of the *ad hoc* Committee on Trawl Regulations (Items 12, 13, 15)

The Commission, at its first Plenary Session, assigned agenda items 12, 13, and 15 to the Committee under the chairmanship of Mr A. J. Aglen of the United Kingdom. The Committee met on 7, 10, and 11 June 1965. Recommendations of the Committee adopted by the Commission are summarized below:

(i) that the Annual Returns of Infringements to the ICNAF Trawl Regulations for 1964 by member countries be accepted;

(ii) that the results of selectivity experiments by USSR and Poland using new-type topside chafing gear be reported to the 1966 Annual Meeting;

(iii) that paragraph 1 of the amended version of the Trawl Regulations for groundfish in Subarea 1 adopted at the Fourteenth Annual Meeting (1964 Annual Proceedings Vol. 14, p. 16) be replaced by the following with the understanding that paragraphs 1(a) and 1(b) will follow and remain part of the new regulation:

"1. The Contracting Governments take appropriate action to prohibit the taking of cod (*Gadus morhua* L.); haddock (*Melanogrammus aeglefinus* (L.)); redfish (*Sebastes*); halibut (*Hippoglossus hippoglossus* (L.)); witch (*Glyptocephalus cynoglossus* (L.)); American plaice (*Hippoglossoides platessoides* (Fab.)); and Greenland halibut (*Reinhardtius hippoglossoides* (Walb.)) in Subarea 1 by persons under their jurisdictions with trawl nets having in any part of the net meshes of dimensions less than 114 mm or 4½ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of sicentific advice, approve not more than two alter-

native gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions."

(iv) that paragraph 1 of the amended version of the Trawl Regulations for groundfish in Subarea 2 adopted at the Fourteenth Annual Meeting (1964 Annual Proceedings Vol. 14, p. 16) be replaced by the following with the understanding that paragraphs 1(a) and 1(b) will follow and remain part of the new regulation:

"1. The Contracting Governments take appropriate action to prohibit the taking of cod (*Gadus morhua* L.); haddock (*Melanogrammus aeglefinus* (L.)); redfish (*Sebastes*); halibut (*Hippoglossus hippoglossus* (L.)); witch (*Glyptocephalus cynoglossus* (L.)); American plaice (*Hippoglossides platessoides* (Fab.)); and Greenland halibut (*Reinhardtius hippoglossoides* (Walb.)) in Subarea 2 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 mm or $4\frac{1}{2}$ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of scientific advice, approve not more than two alternative gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions."

(v) that paragraph 1 of the amended version of the Trawl Regulation for groundfish in Subarea 3 adopted at the Fourteenth Annual Meeting (1964 Annual Proceedings Vol. 14, p. 16) be replaced by the following with the understanding that paragraphs 1(a) and 1(b) will follow and remain part of the new regulation:

"1. The Contracting Governments take appropriate action to prohibit (except as provided in paragraphs 2 and 3) the taking of cod (*Gadus morhua* L.); haddock (*Melanogrammus aeglefinus* (L.); redfish (*Sebastes*); halibut (*Hippoglossus hippoglossus* (L.)); witch (*Glyptocephalus cynoglossus* (L.)); yellowtail flounder (*Limanda ferruginea* (Storer)); American plaice (*Hippoglossoides platessoides* (Fab.)); Greenland halibut (*Reinhardtius hippoglossoides* (Walb.)); pollock (saithe) (*Pollachius virens* (L.)); and white hake (*Urophycis tenuis* (Mitch.)) in Subarea 3 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 mm or $4\frac{1}{2}$ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of scientific advice, approve not more than two alternative gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions."

(vi) that paragraph 3 of the pending Trawl Regulations for groundfish in Subarea 3 adopted at the Eleventh Annual Meeting (1961 Annual Proceedings Vol. 11, p. 15 – 17) be substituted by the following:

"3. In order to avoid impairment of fisheries conducted primarily for redfish (genus *Sebastes*) in the area specified in paragraph 2 and which take small quantities of cod, haddock and other regulated species incidentally, the Contracting Governments permit persons under their jurisdictions to take these species with nets having a mesh size less than that specified in paragraph 1 so long as such persons do not have in possession on board a vessel fishing primarily for redfish with small-meshed nets for each of (a) cod (b) haddock and (c) other species mentioned in paragraph 1 taken together quantities in excess of 5,000 lb. or 2,268 kg or 10% by weight of all fish on board such vessel whichever is greater, or so long as such persons do not catch with trawl nets having a mesh smaller than that specified in paragraph 1 in any period of 12 months (a) cod, (b) haddock or (c) other species mentioned in paragraph 1 taken together in excess of 10% by weight for each of (a), (b) and (c) of all the fish taken by such persons with such trawl nets in that period of 12 months."

(vii) that paragraph 2 of the pending Trawl Regulations for cod, haddock and flounder in Subarea 4 adopted at the Eleventh Annual Meeting (1961 Annual Proceedings Vol. 11, p. 17–18) be substituted by the following:

"2. In order to avoid impairment of fisheries conducted primarily for other species and which take small quantities of cod, haddock and flounders incidentally, the Contracting Governments permit persons under their jurisdictions to take cod, haddock and flounder with nets having a mesh size less than that specified in the preceding paragraph, so long as such persons do not have in possession on board a vessel fishing primarily for other species cod, haddock and flounders in amounts in excess of 5,000 lb. or 2,268 kg for each or 10% by weight for each of all fish on board such vessels whichever is the greater; or so long as such persons do not catch with trawl nets having a mesh smaller than that specified in paragraph 1 in any period of 12 months, cod, haddock and flounders in excess of 10% by weight for each of all the fish taken by such persons with such trawl nets in that period of 12 months."

(viii) that paragraph II of the Trawl Regulations for cod and haddock in Subareas 3 and 4 adopted at the Fifth Annual Meeting (1955 Annual Proceedings Vol. 5, p. 11–12) and now in force, be substituted by the following:

"II. In order to avoid impairment of fisheries conducted primarily for other species and which take small quantities of cod and haddock incidentally, the Contracting Governments permit persons under their jurisdiction to take cod and haddock with trawl nets having a mesh size less than that specified in the preceding paragraphs so long as such persons do not have in possession on board a vessel fishing primarily for other species cod, or haddock in amounts in excess of 5,000 lb. or 2,268 kg for each or 10% by weight for each of all the fish on board such vessel, whichever is the greater; or so long as such persons do not catch with trawl nets having a mesh smaller than that specified in paragraph 1 in any period of 12 months, cod or haddock in excess of 10% by weight for each of all the fish taken by such persons with such trawl nets in that period of 12 months."

(ix) that the Trawl Regulations for Subareas 1, 2, 3, and 4 proposed by the Commission at the 1961 Annual Meeting (1961 Annual Proceedings Vol. 11, p. 15–18) with the amendments recommended at subsequent Annual Meetings

(1963 Annual Proceedings Vol. 13, p. 16; 1964 Annual Proceedings Vol. 14, p. 16–17; and 1965 Meeting Proceedings No. 13, 19, and 20) be recommended to Contracting Governments in full as follows to supercede all previous recommendations which have not yet been given effect under the present procedure:

Subarea 1

"1. The Contracting Governments take appropriate action to prohibit the taking of cod (*Gadus morhua* L.); haddock (*Melanogrammus aeglefinus* (L.)); redfish (*Sebastes*); halibut (*Hippoglossus hippoglossus* (L.)); witch (*Glyptocephalus cynoglossus* (L.)); American plaice (*Hippoglossoides platessoides* (Fab.)); and Greenland halibut (*Reinhardtius hippoglossoides* (Walb.)) in Subarea 1 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 mm or $4\frac{1}{2}$ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of scientific advice, approve not more than two alternative gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions.

(a) In the codend of the net, the average of the measurements of any 50 consecutive meshes running parallel to the long axis of the codend, beginning at the after end of the codend, and being at least 10 meshes from the lacings, or, if the codend is less than 50 meshes in length, the average of the measurements of the meshes running the full length of the codend, parallel to the long axis of the codend and at least 10 meshes from the lacings, such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg and

(b) In any part of the net other than the codend, the average of the measurements of the meshes in any series of 20 consecutive meshes, such series to be at least 10 meshes from the lacings, and such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg.

"2. The Contracting Governments prohibit the use, by any person to whom this proposal would apply, of any means or device, other than those described in paragraph 3, which would obstruct the meshes of the nets or which would otherwise, in effect, diminish the size of the nets, provided that devices may be attached to the upper side of the codend in such a manner that they will not obstruct the meshes of the codend. Any such device must have the approval of the Commission based on scientific advice that the attached devices do not obstruct the meshes or reduce significantly the selectivity of the codend. Any approval so given may be withdrawn at any time on giving not less than

12 months' notice to the Contracting Government.

"3. The Contracting Governments permit any canvas, netting or other material to be attached to the underside only of the codend of a net to reduce and prevent damage."

Subarea 2

"1. The Contracting Governments take appropriate action to prohibit the taking of cod (*Gadus morhua* L.); haddock (*Melanogrammus aeglefinus* (L.)); redfish (*Sebastes*); halibut (*Hippoglossus hippoglossus* (L.)); witch (*Glyptocephalus cynoglossus* (L.)); American plaice (*Hippoglossoides platessoides* (Fab.)); and Greenland halibut (*Reinhardtius hippoglossides* (Walb.)) in Subarea 2 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 mm or $4\frac{1}{2}$ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of scientific advice, approve not more than two alternative gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions.

(a) In the codend of the net, the average of the measurements of any 50 consecutive meshes running parallel to the long axis of the codend, beginning at the after end of the codend, and being at least 10 meshes from the lacings, or, if the codend is less than 50 meshes in length, the average of the measurements of the meshes in any series of consecutive meshes running the full length of the codend, parallel to the long axis of the codend and at least 10 meshes from the lacings, such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg.

(b) In any part of the net other than the codend the average of the measurements of the meshes in any series of 20 consecutive meshes, such series to be at least 10 meshes from the lacings, and such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg.

"2. The Contracting Governments prohibit the use, by any person to whom this proposal would apply, of any means or device, other than those described in paragraph 3, which would obstruct the meshes of the nets, or which would otherwise, in effect, diminish the size of the nets, provided that devices may be attached to the upper side of the codend in such a manner that they will not obstruct the meshes of the codend. Any such device must have the approval of the Commission based on scientific advice that the attached devices do not obstruct the meshes or reduce significantly the selectivity of the codend. Any approval so given may be withdrawn at any time on giving not

less than 12 months' notice to the Contracting Government.

"3. The Contracting Governments permit any canvas, netting or other material to be attached to the underside only of the codend of a net to reduce and prevent damage."

Subarea 3

"1. The Contracting Governments take appropriate action to prohibit (except as provided in paragraphs 2 and 3) the taking of cod (*Gadus morhua* L.); haddock (*Melanogrammus aeglefinus* (L.)); redfish (*Sebastes*); halibut (*Hippoglossus hippoglossus* (L.)); witch (*Glyptocephalus cynoglossus* (L.)); yellowtail flounder (*Limanda ferruginea* (Storer)); American plaice (*Hippoglossoides platessoides* (Fab.)); Greenland halibut (*Reinhardtius hippoglossoides* (Walb.)); pollock (saithe) (*Pollachius virens* (L.)); and white hake (*Urophycis tenuis* (Mitch.)) in Subarea 3 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 mm or $4\frac{1}{2}$ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of scientific advice, approve not more than two alternative gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions.

(a) In the codend of the net, the average of the measurements of any 50 consecutive meshes running parallel to the long axis of the codend, beginning at the after end of the codend, and being at least 10 meshes from the lacings, or, if the codend is less than 50 meshes in length, the average of the measurements of the meshes in any series of consecutive meshes running the full length of the codend, parallel to the long axis of the codend and at least 10 meshes from the lacings, such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg and

(b) In any part of the net other than the codend, the average of the measurements of the meshes in any series of 20 consecutive meshes, such series to be at least 10 meshes from the lacings, and such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg.

"2. The prohibition set out in paragraph 1 shall not apply to the taking of redfish (genus *Sebastes*) in the statistical Divisions 3N, 3O and 3P of Subarea 3.

"3. In order to avoid impairment of fisheries conducted primarily for redfish (genus *Sebastes*) in the area specified in paragraph 2 and which take small quantities of cod, haddock and other regulated species incidentally, the Contracting Governments permit persons under their jurisdictions to take these species with nets having a mesh size less than

that specified in paragraph 1 so long as such persons do not have in possession on board a vessel fishing primarily for redfish with small meshed nets for each of (a) cod (b) haddock and (c) other species mentioned in paragraph 1 taken together quantities in excess of 5,000 lb. or 2,268 kg or 10% by weight of all fish on board such vessel whichever is greater, or so long as such persons do not catch with trawl nets having a mesh smaller than that specified in paragraph 1 in any period of 12 months (a) cod, (b) haddock, or (c) other species mentioned in paragraph 1 taken together in excess of 10% by weight for each of (a), (b), and (c) of all the fish taken by such persons with such trawl nets in that period of 12 months.

"4. The Contracting Governments prohibit the use, by any person to whom this proposal would apply, of any means or device, other than those described in paragraph 5, which would obstruct the meshes of the nets or which would otherwise, in effect, diminish the size of the nets, provided that devices may be attached to the upper side of the codend in such a manner that they will not obstruct the meshes of the codend. Any such device must have the approval of the Commission based on scientific advice that the attached devices do not obstruct the meshes or reduce significantly the selectivity of the codend. Any approval so given may be withdrawn at any time on giving not less than 12 months' notice to the Contracting Government.

"5. The Contracting Governments permit any canvas, netting or other material to be attached to the underside only of the codend of a net to reduce and prevent damage."

Subarea 4

"1. The Contracting Governments take appropriate action to prohibit (except as provided in paragraph 2) the taking of cod, *Gadus morhua* L.); haddock, *Melanogrammus aeglefinus* (L.); and flounders (witch), *Glyptocephalus cynoglossus* (L.); yellowtail flounder, *Limanda ferruginea* (Storer); winter flounder, *Pseudopleuronectes americanus* (Walb.); and American plaice, *Hippoglossoides platessoides* (Fabr.) in Subarea 4 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 mm or $4\frac{1}{2}$ inches as measured by the ICNAF gauge specified in paragraphs (a) and (b) below. These mesh sizes relate to manila twine netting when measured wet after use or the equivalent thereof when measured dry before use. The Commission may, on the basis of scientific advice as to selectivity equivalents, determine the appropriate mesh sizes when trawl nets made of materials other than manila are used or when seine nets are used. The Commission may also, on the basis of scientific advice, approve not more than two alternative gauges, by defining the gauges, together with approved methods for their use and with accepted scales of equivalent mesh dimensions.

(a) In the codend of the net, the average of the measurements of any 50 consecutive meshes running parallel to the long axis of the codend, beginning at the after end of the codend, and being at least 10 meshes from the lacings, or, if the codend is less than 50 meshes in length, the average of the measurements of the meshes in any series of consecutive meshes running the full length of the codend parallel to the long axis of the codend and at least 10 meshes from the lacings, such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm,

inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg and

(b) In any part of the net other than the codend, the average of the measurements of the meshes in any series of 20 consecutive meshes, such series to be at least 10 meshes from the lacings, and such measurements to be made with a flat wedge-shaped gauge having a taper of 2 cm in 8 cm and a thickness of $\frac{3}{32}$ inch or 2.3 mm, inserted into the meshes under a pressure of not less than 10 lb. or 4.5 kg nor more than 15 lb. or 6.8 kg.

"2. In order to avoid impairment of fisheries conducted primarily for other species and which take small quantities of cod, haddock and flounders incidentally, the Contracting Governments permit persons under their jurisdictions to take cod, haddock and flounder with nets having a mesh size less than that specified in the preceding paragraph, so long as such persons do not have in possession on board a vessel fishing primarily for other species, cod, haddock and flounders in amounts in excess of 5,000 lb. or 2,268 kg for each or 10% by weight for each of all fish on board such vessels whichever is the greater; or so long as such persons do not catch with trawl nets having a mesh smaller than that specified in paragraph 1 in any period of 12 months, cod, haddock and flounders in excess of 10% by weight for each of all the fish taken by such persons with such trawl nets in that period of 12 months.

"3. The Contracting Governments prohibit the use, by any person to whom this proposal would apply, of any means or device, other than those described in paragraph 4, which would obstruct the meshes of the nets or which would otherwise, in effect, diminish the size of the meshes of the nets, provided that devices may be attached to the upper side of the codend in such a manner that they will not obstruct the meshes of the codend. Any such device must have the approval of the Commission based on scientific advice that the attached devices do not obstruct the meshes or reduce significantly the selectivity of the codend. Any approval so given may be withdrawn, at any time, on giving not less than 12 months' notice to the Contracting Government.

"4. The Contracting Governments permit any canvas, netting or other material to be attached to the underside only of the codend of a net to reduce and prevent damage."

10. Report of the Meetings of Commissioners (Items 14, 16, 17, 18, 19, 24)

The Commissioners met 7, 8, 10, and 11 June 1965 under the chairmanship of Mr K. Sunnanaa of Norway to consider items 14, 16, 17, 18, 19, and 24 assigned at the first Plenary Session. Reports of the Commissioners were adopted by the Commission at its final Plenary Session.

(a) Uniform Requirements for North Atlantic Fisheries

The Commissioners **noted** that, while uniformity of minimum mesh regulations for the whole of the North Atlantic would have advantages of ease of operation and ease of enforcement for European vessels, the scientific assessment of the state of the stocks and of the need for conservation upon which regulation, at present and as far as practicable, are based, vary greatly. Only if all stocks reacted in a uniform way to the fishing and natural mortality to which they were subjected could uniformity of regulation then be secured.

In addition, the Commissioners, mindful of the difficulty of legal acceptance in court proceedings of spring-loaded methods of measuring meshes of nets and the need for precision for scientific purposes, was pleased to **note** that the Special Committee on International Control of

the NEAFC would be looking into the practicability of introducing a method of measuring meshes which would meet the requirements of the fishery scientists and administrators.

Further, the Commissioners noted the practical difficulties involved in the use of many new synthetic materials for the manufacture of nets and in establishing selectivity differentials for each.

(b) International Control

The Commissioners, having heard the reports of the USSR–USA and the Canada–USA exchange of enforcement officers carried out in May 1965, unanimously **recommended**

(i) that the Commission draw the attention of all member countries to the great value, for future consideration of possible international inspection systems, of arranging further bilateral exchanges of inspection teams as a means of gaining experience of each other's enforcement procedures and problems

and, recognizing that the Fisheries Policing Conference, NEAFC, and ICNAF were all exploring the possibilities of international inspection, and, noting that NEAFC had established in 1964 a Special Committee on International Control, **recommended**

(ii) that the Commission ask NEAFC to arrange for representation from Canada, Italy, and USA, the non-NEAFC member countries, to take part in further deliberations by the NEAFC Special Committee on International Control on proposals for international measures of control on the high seas.

(c) Possible Conservation Actions

The Commissioners, mindful of the increasing fishing activity in the Convention Area and aware that the fishing intensity on the main cod and haddock stocks is already approaching or even beyond the level giving the maximum sustained yield despite mesh regulations, gave careful consideration to the review of possible conservation measures for the Convention Area (see Part 4) prepared by the Chairman, Research and Statistics, and the Chairman, Assessments, at the request of the 1964 Annual Meeting. The report made it clear that it was not sufficient to rely on mesh regulations as long as fishing went on increasing and that some limitations of effort or catch were required. The Commissioners noted that although the setting of catch quotas seemed to be the most feasible system of regulation under the present terms of the Convention, it posed considerable scientific problems due, in particular, to the changes in stock abundance through sharp fluctuations in year-class strength. In addition, any introduction of a system of catch limitation in the ICNAF area would give serious practical difficulties. In this regard, it was pointed out that any effort beyond that required by member countries to meet ICNAF catch limitations might be diverted to the Northeast Atlantic where NEAFC, although it recognized the beneficial results of some regulation of effort or catch, was not in a position at present to make specific proposals to this effect. It was also felt that catch quotas would tend to introduce an undersirable rigidity in the fishing industries of all countries and the industry would not be able to adapt to changes in demand and supply factors.

It was suggested that perhaps the most urgent requirement was to obtain more knowledge of the economic implications of current and anticipated changes in the resource and marketing situations in member countries. It was further suggested that regulatory bodies, if they were to consider the economic aspects of managing the exploitation of fish stocks, must have economic indicators of the yields from such exploitation and of its economic efficiency under various management practices just as they have indicators of physical yield and of the effects of management measures on the stocks.

Consequently, the Commissioners **recommended**

that the Commission accept an invitation, when extended by FAO, to send a representative, at Commission's expense, to a meeting of a small group of experts in the autumn of 1965 to examine FAO outlines of the kind of studies and investigations that should be carried out to develop economic indicators and methods of using them in economic assessment of fishery management.

The Commissioners, recognizing the importance of further consideration of the subject on a national level so that the views of all concerned with the fisheries can be known, **recommended**

(i) that member countries stimulate discussion of possible conservation measures, particularly among their industry members, administrators and at the political level, and also among international organizations such as FAO, NEAFC, and OECD and

(ii) that any information available on the subject be presented to the Commission for study at the 1966 Annual Meeting.

(d) Cooperation

The Commissioners noted a letter from Dr Sen of FAO proposing closer cooperation between the Commission and FAO, and **recommended**

that the Commission, through the Chairman, forward a letter to Dr Sen of FAO, expressing its pleasure in agreeing to the FAO proposals for closer working relationships in fisheries activities.

11. Report of the Standing Committee on Research and Statistics (Items 19, 21, and 25)

The Committee, under the chairmanship of Dr W. Templeman of Canada and with Mr B. B. Parrish of the United Kingdom as rapporteur, met during the week 31 May–4 June 1965. The Subcommittee on Fishery Assessments met earlier on 28 and 29 May and the Subcommittee on Herring and Other Pelagic Species on 29 May. Further meetings of the Standing Committee on Research and Statistics were held on 8, 10, and 11 June.

The report of the Committee is contained in Part I of the ICNAF Redbook for 1965. The report was adopted by the Commission at its final Plenary Session and is summarized below:

(a) Assessments

The Committee approved the report of the Assessment Subcommittee and **noted**

(i) that trends in landings and fishing activity in the ICNAF area between 1956 and 1963 have been toward higher exploitation in the traditional fisheries for cod and haddock, rapidly fluctuating exploitation in the redfish fisheries, and, in the southern regions, the extension of fishing to silver hake, herring and other species which were previously of relatively minor importance. Major increases in catches in the ICNAF area since 1960 have come from the expansion of fishing on these, hitherto, lightly fished stocks.

(ii) that assessments of the relation between catch and fishing intensity in the main ICNAF fisheries show that the fishing intensity on the main cod and haddock stocks, except possibly the cod in Subarea 2, is approaching or even beyond the level giving maximum sustained yield. Therefore any substantial sustained increases in fishing intensity would not be expected to result in any major increases in average catch. For redfish, the wide fishing fluctuations make assessments difficult. However, it appears that any substantial sustained increases in fishing intensity will result in decreases in catch-per-unit fishing intensity. For silver hake, the present scant data show that a larger mesh size than 2 inches would cause a large immediate loss of catch and probably no subsequent long-term gain.

(iii) that the reliability of assessments of long-term effects of conservation measures should be improved through study of the relationship of the variation of the natural population processes — recruitment, growth and natural mortality — with changes in abundance and composition of exploited fish stocks due to fishing and environmental factors.

(iv) that catch quotas, as a possible conservation action for the ICNAF area, pose considerable scientific

problems, in particular the estimation of changes in stock abundance through fluctuation in year-class strength.

(v) that active participation by economists should be sought in consideration of effects of fishing regulations involving changes in fishing intensity.

(vi) that, in order to determine the effects of the salmon fishery in Greenland waters on the salmon fisheries in North American and European waters, increased research will be carried out in the West Greenland area involving catch and effort statistics, length, weight and age sampling, tagging and studies of biological stock characters.

(vii) that members of the Subcommittee will hold a mid-term meeting in Rome on 29–30 September 1965 to discuss in greater detail some of the long-term and theoretical problems in fishery assessment.

(b) Environmental Studies

The Committee **noted** (i) that the 1964 Environmental Symposium will be published as ICNAF Special Publication No. 6 in September 1965; (ii) the 1963 Environmental Survey (NORWESTLANT 1–3) will be published as ICNAF Special Publication No. 7 early in 1966 with the generous cooperation of the Canadian Oceanographic Data Centre; (iii) that USA and USSR will draw up a plan for an environmental survey of the Georges Bank area, in relation to the recruitment of the commercial fish stocks, for consideration by member countries before discussion at the 1966 Annual Meeting; (iv) that ICNAF should act with FAO and ICES as co-sponsor of a Symposium on Food Chains in the Sea, to be held in the autumn of 1968.

(c) Gear and Selectivity

The Committee approved the report of the Subcommittee and **noted** that new information for polypropylene, e.g. ulstron, fibres suggests the difference in selectivity between them and manila is clearly less than 10%; that further data on meshing of redfish is required and that countries should continue to report, annually, summary data of codend mesh size by subarea, main species fished, typed and material of trawl and relevant information on topside chafers.

(d) Sampling

The Committee **noted** that the ICES/ICNAF Special Meeting on Sampling would be held in Rome 1–2 October 1965 immediately before the Fifty-Third Meeting of ICES and approved a **recommendation** that member countries make every effort to send representatives to the sampling meeting and that the representatives be prepared to discuss for each relevant species, alternative sampling methods and to state which proposals their laboratories would be willing to accept.

(e) Statistics

The Committee approved the report of the Statistics Subcommittee and noted that it drew attention to the effectiveness of the ICES/ICNAF/FAO Continuing Working Party (CWP) in co-ordinating North Atlantic statistical activities; dealt with the adequacy and completeness of factors for converting the statistics of fishery products landed to their round, fresh weight equivalent (nominal catch); requested that accurate information on the quantities of fish discarded at sea be summarized annually, for member countries; **recommended** that the classification and grouping of ICNAF species in the Statistical Bulletin should be related to scientific needs and not used for purposes of legal reference and expressed its appreciation to the Secretariat, FAO and the member countries for improvements in timeliness of processing and printing statistics.

(f) Tagging and Ageing Techniques

The Committee noted that an appraisal made by the Working Group on Tagging shows an emigration of mature cod from West Greenland to Iceland for spawning, mainly from ICNAF Divisions 1E and 1F, but the return migration is of negligible proportions. However, there is recruitment to West Greenland of larvae from the spawning at Iceland. Emigration from West Greenland to Iceland has apparently been smaller in postwar years. The Committee noted with pleasure that FAO has translated into French and Spanish the introduction and review sections of the ICNAF Tagging

Symposium (ICNAF Special Publication No. 4). The Committee also noted that studies to increase the accuracy of age interpretation will be continued for cod and extended to include redfish and silver hake.

(g) Herring and Other Pelagic Species

The Committee approved the report of the Subcommittee which expressed its keen interest in an ICES proposal to hold a Symposium on the Biology of the Early Stages of Herring and on the Recruit Mechanism in 1967 or later and asked to be kept informed of developments in its plans.

(h) Publications

The Committee recommended the following items on publications from the various subcommittees:

(i) that the Commission contribute two-thirds of the cost of publication of the papers submitted to the proposed FAO/ ICES/ ICNAF Symposium on Food Chains in the Sea, to be held in 1968;

(ii) that the Executive Secretary include an item in the ICNAF Newsletter each year inviting papers for the ICNAF Research Bulletin on subjects of importance to the Commission;

(iii) that the Commission assume one-third (about $200) of the cost of preparation and publication by FAO of a Joint Index of North Atlantic Publications;

(iv) that an ICNAF map suitable for distribution to fishermen and containing the more important information included in the new ICNAF Handbook be prepared by USSR and the Secretariat for review at the 1966 Annual Meeting;

(v) that the 1963 Environmental Survey (NORWESTLANT 1–3) be published in four parts as ICNAF Special Publication No. 7; Part I, Text, and Part II, Figures, to be printed in 1,300 copies and Part III, Basic Oceanographic Data, and possibly Part IV, Basic Biological Data, to be printed in 900 copies.

(i) Other Matters

The Committee **recommended**

(i) that all member countries with small-meshed trawl fisheries for unregulated species, in which bycatches of regulated species are taken, should report to each Annual Meeting, data for each regulated species on (a) the quantities caught for each fishery; (b) the length and age composition of the catches;

(ii) that the Assessment Subcommittee meet 27–28 May 1966, the Steering and Publications Subcommittee meet on 29 May 1966 and the Standing Committee on Research and Statistics meet 30 May–3 June 1966 prior to the 1966 Annual Meeting;

(iii) that Mr A. J. Lee of the United Kingdom, Chairman of the Environmental Subcommittee, represent the Commission at the forthcoming meetings of the Scientific Committee on Oceanic Research (SCOR) and the Intergovernmental Oceanographic Commission (IOC) and Mr S. Olsen of Norway, represent the Commission at the 1965 meeting of ICES.

The Committee unanimously re-elected Dr W. Templeman of Canada as its chairman for the ensuing year.

12. Reports of the Meetings of Panels
(Items 4, 19, 21, and 27)

The Commission received the reports of Panels 1–5. Each panel reviewed the status of the fisheries, the research carried out and plans for future research based on reports by its group of scientific advisers.

(a) **Panel 1.** The panel, under the Chairmanship of Mr G. Möcklinghoff of the Federal Republic of Germany, considered the Danish proposal to close

Store Hellefiske Bank to trawling in order to protect the small cod and **recommended**

(i) that the Standing Committee on Research and Statistics be requested to examine the desirability of further protection for small cod at West Greenland, and in particular in this connection the effects of a closure of Store Hellesfiske Bank and

(ii) that facilities be provided, if required, for a meeting of a small working party of experts to examine the matter.

The panel welcomed the proposals from the Assessment Subcommittee regarding research into the effects of the salmon fishery at West Greenland (see Section 10(a) (vi) above) and referred to the Report of the Working Group on Tagging regarding the appraisal of the interchange of the cod stocks between Greenland and Iceland (see Section 10(f)).

(b) **Panel 2.** The panel, under the chairmanship of Mr A. J. Aglen of the United Kingdom, **noted** that landings of cod had declined over 10,000 tons to 204,000 tons and redfish landings had almost trebled to over 17,000 tons from 1963. Catch per man in the inshore cod fishery had declined since 1959 coincident with the increased deep-sea cod fishery. Water temperatures in 1964 were lower than in 1963 and hard ice hampered the fisheries. The cold polar current was the most intensive for the last 4 years. The panel **noted** from the Assessment Subcommittee report that the fishing intensity of the major cod fisheries in the ICNAF area, except possibly in Subarea 2, is approaching or even beyond the level giving the maximum sustained yield.

(c) **Panel 3.** The panel, under the chairmanship of Mr W. MacKenzie of Canada, **noted** that the 1964 cod catch of 583,000 tons was the largest yet taken in the subarea and that the dominant year-classes of cod were the same in Subareas 1, 2, and 3. The panel referred the Canadian proposal to introduce further exemption provisions for regulated species taken in the non-regulated redfish fishery in Division 3NOP and the ambiguity of the term "groundfish" in trawl regulations to the *ad hoc* Committee on Trawl Regulations (see Section 9 (v) (vi) (viii)). The panel noted that appropriate data for assessment purposes would be collected from the exempted fisheries (see Section 11 (i)). The panel agreed that the chairman of Scientific Advisers to the panel, Dr H. W. Graham of United States, should prepare the report on the status of fisheries and researches during 1965 incorporating certain changes proposed by the United States for review by the panel at its 1966 meeting.

(d) **Panel 4.** The panel, under the chairmanship of Captain T. de Almeida of Portugal, discussed exemption regulations proposed by Canada and referred the matter for resolution to the *ad hoc* Committee on Trawl Regulations (see Section 9 (vii) (viii)). The panel agreed that reports on quantities and sizes of species caught in exempted fisheries should be given annually (see Section 11 (i)). The panel noted that there is no indication of decline in the heavily fished silver hake stock and that the research recommended on the salmon fishery in West Greenland (see Section 11 (vi)) would be complemented by data obtained from research in salmon home waters in Subarea 4.

(e) **Panel 5.** The panel, under the chairmanship of Mr W. MacKenzie of Canada, noted that the Georges Bank haddock stock is being exploited beyond the estimated sustained yield of 100 million pounds

(50,000 metric tons) per year and that the yields from the Georges Bank scallop fishery might be increased by advancing the age of capture or reducing fishing effort. However, no recommendations for regulation were made. The panel approved a proposal that the USA and USSR draw up plans for an environmental survey of the Georges Bank-Gulf of Maine area for review at the 1966 meeting.

(f) **Joint Meeting of Panels 1–4.** At a joint meeting of panels 1, 2, 3, and 4 held on 12 June 1965 under the chairmanship of Mr A. J. Aglen of the United Kingdom, each panel agreed to recommend to the final Plenary Session proposals from the *ad hoc* Committee on Trawl Regulations (see Section 9) (i) to replace the term "groundfish" with the names of the fish species intended in pending trawl regulations in Subareas 1, 2, and 3; (ii) for clarifying the by-catch exemption in Divisions 3NOP; (iii) for adding a trip and annual by-catch exemption for Subarea 4; (iv) for annual by-catch exemption to regulations now in force in Subarea 3 and 4 and (v) for codification of all outstanding regulations proposed from 1961 to 1965.

13. Conservation of Seals (Item 20)

At the 1961 Annual Meeting, the Commission adopted a resolution to bring harp and hood seals under the provisions of the International Convention for the Northwest Atlantic Fisheries. The Executive Secretary informed the Commission in Plenary Session that, of the 13 member countries, Italy and Poland had yet to deposit letters of ratification or adherence of the protocol. Consequently, no formal action could yet be taken to establish a panel for studies leading to possible conservation measures for harp and hood seal stocks in the Northwest Atlantic.

14. Fishing and Navigational Practices (Item 22)

The Commission at its second Plenary Session heard the report of the Fisheries Policing Conference held in London from 6 to 9 April 1965. The conference was to exchange views on a convention for regulating the policing of the fisheries and embodying a modern code for the conduct of fishing practices in the North Atlantic. The Commission noted that delegates agreed on the need for a modern system of rules which would help to ensure that different fishing methods could be used without difficulties. The Conference will meet again in 1966. The Commission agreed to support the objectives of the Conference.

15. Relations with Other International Organizations (Items 23 and 24)

The Commission received and distributed as meeting documents reports of the FAO Fisheries Division, the FAO/ICES/ICNAF Continuing Working Party on Statistics, the ICES Liaison Committee to NEAFC, the *ad hoc* Committee on FAO Conference Resolution 8/63 (Fisheries Development), the Fisheries Policing Conference, Third Meeting of NEAFC, Third Session of IOC, Annual Meeting of INPFC and the 1964 Meeting of ICES.

The Commission decided that Mr A. J. Lee of the United Kingdom would act as Commission observer at the 1965 meetings of IOC and SCOR; Mr S. Olsen of Norway would act at the 1965 meetings of ICES and Dr L. McHugh of United States at the Second Session of the FAO Working Party on Rational Utilization of Tuna Resources in the Atlantic (WPUTR), July 1965.

The Commission was pleased to provide catch and effort statistics to the Organization for Economic Cooperation and Development (OECD) for an economic study of North Atlantic fisheries.

16. Election of Chairman and Vice-Chairman (Item 30)

The Commission unanimously elected Mr T. Fulham of USA as Chairman and Mr V. Kamentsev of USSR as Vice-Chairman of the Commission for the 1965–66 and 1966–67 sessions.

17. Acknowledgement and Adjournment (Items 29 and 31)

The Chairman acknowledged the observers for NEAFC, ICES, FAO, and Japan, who expressed their thanks for the invitation to attend

the Commission meeting and their best hope for its future work.

The Chairman thanked the Canadian and Nova Scotia Governments, the City of Halifax and National Sea Products for their cooperation and hospitality, the Nova Scotia Fish Packers' Association and the Canadian Atlantic Salt Fish Exporters' Association for transportation to visit the National Sea Products plant in Lunenburg, Nova Scotia. He thanked all officers, participants and observers for their contributions to the success of the meeting.

The new Chairman, Mr Fulham of United States, thanked the Commission for the honour and referred to the high standard of service and efficiency set by the former Chairman of the Commission, Mr K. Sunnanaa.

There being no other business, the Chairman declared the Fifteenth Annual Meeting of the Commission adjourned at 11:30 a.m., 12 June 1965.

APPENDIX I
LIST OF PARTICIPANTS

CANADA

Commissioners:

Mr W. C. MacKenzie, Department of Fisheries, Ottawa, Ontario.
Mr H. D. Pyke, Lunenburg Sea Products, Lunenburg, Nova Scotia.
Mr P. P. Russell, Bonavista Cold Storage, St. John's, Newfoundland.

Advisers:

Mr L. E. Baker, Department of Fisheries, Halifax, Nova Scotia.
Mr H. Bradley, Department of Fisheries, St. John's, Newfoundland.
Dr N. J. Campbell, Department of Mines & Technical Surveys, Marine Sciences Branch Ottawa, Ontario.
Mr R. S. Collie, Department of Fisheries, Halifax, Nova Scotia.
Dr L. M. Dickie, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Mr J. B. Estey, National Sea Products Ltd., Halifax, Nova Scotia.
Mr A. M. Fleming, Fisheries Research Board of Canada, St. John's, Newfoundland.
Dr J. L. Hart, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Mr V. M. Hodder, Fisheries Research Board of Canada, St. John's, Newfoundland.
Mr R. E. S. Homans, Department of Fisheries, Halifax, Nova Scotia.
Dr Yves Jean, Department of Industry & Commerce, Quebec, P.Q.
Dr L. M. Lauzier, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Mr J. H. LeBreton, Robin, Jones and Whitman, Ltd., Paspebiac, P.Q.
Dr A. Marcotte, Marine Biological Station, Grande-Rivière, P.Q.
Mr A. W. May, Fisheries Research Board of Canada, St. John's, Newfoundland.
Mr D. Monroe, Fisheries Products Co. Ltd., St. John's, Newfoundland.
Dr F. D. McCracken, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Dr P. M. Powles, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Mr C. D. Sauer, Department of Mines & Technical Surveys, Marine Sciences Branch, Ottawa, Ontario.
Dr R. L. Saunders, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Dr W. M. Sprules, Department of Fisheries, Ottawa, Ontario.
Dr W. Templeman, Fisheries Research Board of Canada, St. John's, Newfoundland.
Mr S. N. Tibbo, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
Mr E. B. Young, Department of Fisheries, Ottawa, Ontario.

DENMARK

Commissioners:

Dr P. M. Hansen, Grønlands Fiskeriundersøgelser, Charlottenlund.
Mr H. J. Lassen, Ministry for Greenland, Copenhagen.
Mr K. Løkkegaard, Ministry of Fisheries, Copenhagen.

Advisers:

Mr Sv. Aa. Horsted, Grønlands Fiskeriundersøgelser, Charlottenlund.
Mr E. Hulgaard, Danish Consulate, 280 Park Avenue, New York.
Dr E. M. Poulsen, Danmarks Fiskeri - og Havundersøgelser, Charlottenlund Slot, Charlottenlund.

FRANCE

Commissioners:

Mr R. H. Letaconnoux, Institut des Pêches Maritimes, Paris.
Mr J. Rougé, Ministère de la Marine Marchande, Paris.

Adviser:

Mr R. Lagarde, Ministère de la Marine Marchande, Paris.

FEDERAL REPUBLIC OF GERMANY

Commissioners:

Dr G. Meseck, Bundesministerium für Ernährung, Landwirtschaft und Forsten, Bonn.

Mr G. Möcklinghoff, Bundesministerium für Ernährung, Landwirtschaft und Forsten, Bonn.

Advisers:

Dr H. Bohl, Institut für Fangtechnik, Bundesforschungsanstalt für Fischerei, Hamburg.

Dr J. Genschow, German Trawler Owners' Association, Box 540, Cuxhaven.

Dr A. Meyer, Instiut für Seefischerei, Bundesforschungsanstalt für Fischerei, Hamburg.

ICELAND

Commissioner:

Dr J. Jónsson, University Research Institute, Reykjavik.

ITALY

Commissioner:

Dr G. Cannone, Ministero de la Marina Mercantile, Rome.

NORWAY

Commissioners:

Mr Carl Bjorge, Ministry of Fisheries, Oslo.

Mr K. Sunnanaa, Directorate of Fisheries, Bergen.

Advisers:

Mr E. Bratberg, Institute of Marine Research, Bergen.

Mr L. Gronnevet, Norges Fiskarlag, Trondheim.

POLAND

Commissioner:

Dr F. Chrzan, Sea Fisheries Institute, Gdynia.

PORTUGAL

Commissioner:

Captain Tavares de Almeida, Comissão Consultiva Nacional das Pescarias do Noroeste do Atlantico, Lisbon.

Adviser:

Dr R. Monteiro, Instituto de Biologia Maritima, Ministerio da Marinha, Lisbon.

SPAIN

Commissioners:

Dr O. Rodriguez Martin, Direccion General de Pesca Maritima, Madrid.

Dr L. Villegas, Ministerio Ajuntos Exteriores, Madrid.

Adviser:

Mr J. L. Arambarri, Delegado do PYSBE, St. John's, Newfoundland.

UNION OF SOVIET SOCIALIST REPUBLICS

Commissioners:

Dr A. S. Bogdanov, All Union Research Institute of Marine Fisheries and Oceanography (VNIRO), Moscow.

Dr S. A. Studenetsky, Atlantic Research Institute of Marine Fisheries and Oceanography (ATLANTNIRO), Kaliningrad.

Advisers:

Mr G. A. Semin, State Industrial Fisheries Committee, Moscow.

Mr A. A. Volkov, State Industrial Fisheries Committee, Moscow.

UNITED KINGDOM

Commissioners:

Mr A. J. Aglen, Fisheries Secretary for Scotland, St. Andrew's House, Edinburgh.

Dr H. A. Cole, Fisheries Laboratory, Lowestoft.

Advisers:

Mr J. A. Gulland, Fisheries Laboratory, Lowestoft.

Mr A. J. Lee, Fisheries Laboratory, Lowestoft.

Mr B. B. Parrish, Marine Laboratory, Aberdeen.

Mr B. Sealey, Chr. Salvesen & Co. Ltd., Grimsby.

UNITED STATES OF AMERICA

Commissioners:

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Mr T. A. Fulham, 220 Northern Avenue, Boston, Massachusetts.

Mr R. W. Green, Department of Sea and Shore Fisheries, Augusta, Maine.

Advisers:

Mr J. D. Ackert, Atlantic Fishermen's Union, Boston, Massachusetts.
Mr S. A. Cain, Assistant Secretary for Fish & Wildlife, Department of the Interior, Washington, D.C.
Mr J. J. Dykstra, Point Judith Fishermen's Coop, Assoc. Inc., Narragansett, Rhode Island.
Mr J. Gharrett, Bureau of Commercial Fisheries, Gloucester, Massachusetts.
Dr H. W. Graham, Bureau of Commercial Fisheries, Woods Hole, Massachusetts.
Mr R. C. Hennemuth, Bureau of Commercial Fisheries, Woods Hole, Massachusetts.
Mr R. Kershaw, Gloucester Whiting Association, Gloucester, Massachusetts.
Mr D. L. McKernan, Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C.
Mr J. A. Posgay, Bureau of Commercial Fisheries, Woods Hole, Massachusetts.
Mr H. Poulsen, Bowery Beach Road, Cape Elizabeth, Maine.
Mr J. B. Skerry, Bureau of Commercial Fisheries, Gloucester, Massachusetts.
Mr B. E. Skud, Bureau of Commercial Fisheries, Boothbay Harbour, Maine.
Mr J. A. Slater, Office of International Relations, Department of the Interior, Washington, D.C.
Mr W. L. Sullivan, Office of the Special Assistant for Fisheries and Wildlife to the Under Secretary, Department of State, Washington, D.C.

JAPAN

Observers:

Mr T. Emata, Taiyo Fishery Co. Ltd., Chiyoda-ku, Tokyo.
Mr T. Isogai, Embassy of Japan, Ottawa, Ontario.
Mr H. Yamashita, Taiyo-California, Inc., Boston, Massachusetts.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Observers:

Mr L. K. Boerema, Fisheries Division, FAO, Rome.
Mr L. P. D. Gertenbach, Fisheries Division, FAO, Rome.
Mr F. E. Popper, Fisheries Division, FAO, Rome.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

Observer:

Dr H. A. Cole, Fisheries Laboratory, Lowestoft, England.

NORTH-EAST ATLANTIC FISHERIES COMMISSION

Observer:

Mr G. Möcklinghoff, Bundesministerium fur Ernährung, Landwirtschaft und Forsten, Bonn.

SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH

Observer:

Mr A. J. Lee, Fisheries Laboratory, Lowestoft, England.

SECRETARIAT

Mr L. R. Day, Executive Secretary.
Mr W. H. Champion, Editorial Assistant.
Miss J. Maclellan, Secretary.
Miss G. Schrader, Clerk-Stenographer.
Mrs B. MacKenzie, Clerk-Typist.

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Mrs B. Barrett, Halifax, Nova Scotia.
Mrs V. Caton, Halifax, Nova Scotia.
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Miss M. Smith, Department of Fisheries, Halifax, Nova Scotia.

PUBLIC RELATIONS

Mr G. Gillespie, Department of Fisheries, Halifax, Nova Scotia.
Mr M. Ronayne, Department of Fisheries, Ottawa, Ontario.

CONSULTANT

Mr B. F. C. DeBaie, Department of Fisheries, Province of Nova Scotia, Halifax, Nova Scotia.

APPENDIX II
AGENDA

1. Opening by the Chairman
2. Adoption of Agenda
3. Policy regarding publicity for the Annual Meeting
4. Review of Panel Memberships
5. Report on staff matters, with presentation of the Administrative Report for 1964–65 and preliminary financial statements for 1964–65
6. Presentation of Auditor's Report for the fiscal year ending 30 June 1964 (vide Annual Proceedings Volume 14, p. 9–10)
7. Budget estimate for the fiscal year ending 30 June 1966
8. Budget forecast for the fiscal year ending 30 June 1967
9. Office accommodation for Commission headquarters
10. Consideration of USA proposed amendment to Financial Regulations
11. Consideration of proposal to reclassify position of Statistician to Assistant Executive Secretary
12. Infringements to ICNAF trawl regulations
    (a) Annual Returns of Infringements
    (b) Annual Returns form
13. Topside codend protection
14. Uniform minimum mesh requirements for the trawl fisheries in the North Atlantic area
15. Exemptions provisions in ICNAF trawl regulations
    (a) Definition of "groundfish" (see paragraph 1 and 6 of 1961 proposal for ICNAF trawl regulations in Subareas 1, 2, and 3 in Annu. Proc. Vol. 11, p. 15–16)
    (b) Clarification of exemption clause (see para. 2 and 3 of 1961 proposal for ICNAF trawl regulations in Subareas 1, 2, and 3 in Annu. Proc. Vol. 11, p. 16)
    (c) Extension of exemption provisions
16. Joint enforcement system for ICNAF trawl regulations
    (a) Report on national enforcement procedures
    (b) Report on exchange of national enforcement officers
    (c) Report on national views regarding the form an international system should take
17. Status of recommendations adopted by Commission
    (a) For changes in Convention
    (b) For regulation of fisheries
18. Procedures for bringing into effect proposals adopted by the Commission
19. Review of possible conservation actions for the ICNAF area
20. Conservation measures for harp and hood seals in the ICNAF area
21. Conservation requirements
    (a) Mesh size regulation in Divisions 3NOP for redfish
    (b) Mesh size regulation in Subarea 4 for species other than cod, haddock and flounder, particularly redfish
    (c) Regulations in Subarea 5 for scallop fishery
    (d) Mesh size regulations in Subarea 5 for species other than cod and haddock
22. Fishing and navigational practices in the ICNAF area
23. Reports by Commission observers on meetings of other organizations
24. Cooperation with other international organizations
25. Report of Standing Committee on Research and Statistics
26. Report of Standing Committee on Finance and Administration
27. Report of Panels 1–5
28. Date and place of 1966 Annual Meeting of Commission
29. Other business
30. Election of Chairman and Vice-Chairman for the 2 ensuing years
31. Adjournment

PART 3

Summaries of Research and Status of Fisheries by Subareas, 1964

The following summaries were prepared from the research reports and other pertinent documents submitted to the 1965 Annual Meeting of the Commission from each member country. The summaries were prepared by the Chairmen of the Groups of Scientific Advisers to the Panels administering the work of the Commission in the subareas. These Chairmen were:

for Subarea 1 — P. M. Hansen (Denmark)

for Subarea 2 — A. S. Bogdanov (USSR)

for Subarea 3 — H. W. Graham (USA)

for Subarea 4 — J. L. Hart (Canada)

for Subarea 5 — S. A. Studenetsky (USSR)

Subarea 1

Reports on researches in 1964 were submitted by the following member countries: Denmark, Germany, Iceland, Norway, USSR and UK.

1. Work Carried Out

a. Denmark: R/Vs *Dana* and *Adolf Jensen*, Faroese commercial trawler *Skalaberg*. Oceanographic observations in Davis Strait and fixed inshore stations year round. Cod eggs collected in Godthaab Fjord and in coastal area around Godthaab, January to end July. Distribution, length and age of young and commercial-sized cod. Cod tagging. Redfish growth studies and tagging in Godthaab Fjord. Studies on age and growth of salmon. Tagging of Greenland halibut, wolffish, herring, and prawns.

b. Germany: R/V *Walther Herwig* and commercial trawlers. Oceanographic work off West, South and Southeast Greenland in June–July and November. Length and age composition of cod and tagging experiments with cod West and East Greenland.

c. Iceland: Commercial trawlers. Cod age and size compositions in West and East Greenland. Cod tagging off East Greenland.

d. Norway: R/V *Johan Hjort*. Oceanographic observations (similar to NORWESTLANT 1, 1963) off West and East Greenland. Fishing experiments with line and trawl. Cod age and size compositions. Distribution of cod eggs.

e. USSR: Four exploratory and research vessels. Completed oceanographic work in Davis Strait in January, May, and July–September. Collection of plankton. Age and length compositions of cod. Redfish research with fine-meshed trawl and mid-water trawl. Serological studies on redfish.

f. UK: No research vessels in Subarea 1. Continuous plankton recorder survey maintained and developed. Sampling cod from landings of freezer trawlers and aboard Fairtry factory vessels for age and length.

2. Hydrography and Plankton

Temperatures in the winter were very low in inshore as well as in offshore waters. Surface temperature, in April, was below normal. In May the temperatures increased rapidly but were still low over the top of the banks. Unusually high temperatures were found on the slopes of the banks below about 200 m in July, and later in November they were still higher, which indicate strong development of the warm Irminger Current. Low temperatures in the surface layers were probably caused by the large masses of drift ice in Davis Strait and low air temperatures in the winter 1963–64. Samples of phytoplankton and zooplankton were collected.

3. Eggs and Larvae

In inshore waters and in the fjords cod eggs were a little more abundant than in the two previous years. In Davis Strait very few cod eggs were taken by the Norwegian research vessel.

Probably the low surface temperatures in spring killed the eggs.

Cod larvae were found in July in still lesser numbers than in 1963. The largest number caught in 2 m stramin net was 13 taken on the middle of Fylla Bank. The total number of larvae in all 35 hauls with stramin net was 53.

4. Cod

a. Age-groups 1, 2, and 3

Age-group 3 (year-class 1961) seems to be a strong year-class which will be of importance in the commercial catches for the first time in 1966 especially in ICNAF Statistical Divisions 1B, 1C, and 1D. In 1F the three young age-groups are represented in equal amounts.

b. Commercial stock

In inshore waters cod occurred in very small amounts. In the pound net fishery mostly small cod of the 1960 and 1961 year-classes were caught.

The rich 1956 and 1957 year-classes were still ot some importance but both had decreased. The 1958 year-class has only been of some importance in 1E and 1F. Samples from Dohrn Bank and Angmagssalik off East Greenland show a clear dominance of the 1956, 1957, and 1958 year-classes, which also were abundant in the Icelandic spawning stock the same year. The same year-classes were represented in September samples along with quantities of the 1961 year-class. The latter year-class seems to be dominant in the Icelandic stock of cod.

From studies on the relative abundance of the 1956 and 1957 year-classes and from tagging experiments, German scientists found that, in 1964, a large number of cod belonging to the 1956 year-class migrated from Southwest Greenland to East Greenland and to Iceland, and that a substantial part of the 1957 year-class migrated to East Greenland, but did not reach Iceland.

c. Tagging

Tagging experiments were carried out by Denmark, Germany, and Iceland. Denmark tagged a total of 3,109 cod in all Divisions except 1A. Germany tagged 765 cod off West and East Greenland, while Iceland tagged 202 off East Greenland. A total of 917 recaptures of cod tagged in West and East Greenland waters by Denmark was reported in 1964. Of this total, seven cod tagged off East Greenland and 63 cod tagged off West Greenland were recaptured in Iceland waters.

From 1959 to 1964, 2,932 cod were tagged by Germany with 200 recoveries reported to March 1965. The recaptures off East Greenland and Iceland were more numerous in 1964 than in preceding years. A total of 49 were recaptured from East Greenland and Iceland waters. Most of these recaptures were from Iceland waters.

5. Redfish

USSR fished for small redfish with trawl with fine meshed flappers and with mid-water trawl in May and September. South of 64°N, catches up to 400 one-summer old fish were caught with mid-water trawl in depths from 200 to 300 m. Danish studies on growth of redfish in Godthaab Fjord continued in 1964. A total of 5,053 small redfish were caught with shrimp trawl in different months and measured. In Godthaab Fjord, 293 big redfish caught in pound nets were tagged in May. In 1964, 92 recaptures of redfish tagged in 1960, 1962–64 were reported; 86 were recaptured at the tagging location, 4 at other places in the fjord and 2 on the southern offshore banks. Off Southeast Greenland 57 redfish taken in 100 m depths with handline were tagged and released.

6. Atlantic Salmon

Atlantic salmon occurred in 1964 in larger numbers than in previous years. A total of 37 recaptures of tagged salmon was reported; 13 of these recaptures had been tagged in America and 24 in Europe. A total of 64 recaptures of tagged salmon have been reported since 1956.

7. Other Fishes

Two porbeagle sharks were caught by salmon gill net off West Greenland in 1964. One was taken in the inner part of Ikertoq Fjord (1B), and the other was caught near Napassoq (1C). In coastal waters in 1F, haddock and pollock occurred in larger numbers than usual. There was also plenty of herring in 1F in August–September.

8. Status of the Fisheries

The total catch of cod in Subarea 1 in 1964 was over 335,000 metric tons which is about 76,000 tons less than in 1963. All countries fishing commercially, except Norway and Spain, had

smaller catches than in 1963. The inshore fishery by the Greenlanders decreased more than 8,000 tons to 22,000 tons. The pound net fishery in spring gave mostly small cod, and the occurrence of large cod in the coastal region was poor. The decrease in the Greenlanders' cod fishery may, to some degree, be ascribed to an increasing interest in the prawn and salmon fisheries which give more money with less work. The Faroese catch decreased about 12,000 tons to 66,000 tons. Germany caught 100,000 tons or about 40,000 tons less than in 1963. The catch in 1964 was the poorest the German fishing fleet has had in Subarea 1. On the other hand, the German fishing increased considerably off East Greenland where over 29,000 tons of cod were taken mostly during the spawning season. Iceland fished mainly in 1D and 1E. The catches per 100 hr were about the same in both Divisions, but in 1E the output was smaller than in 1963. The French catch was about 35,000 tons or 1,400 tons less than in 1963. The Norwegian catch was about 35,000 tons, an increase from the previous year. Poland took only 95 tons. Portugal had a decrease from 63,000 tons in 1963 to 53,000 in 1964. Spain took under 1,000 tons, a small increase from 1963. UK took about 27,000 tons in 1E and 1F. The catch per 100 hr remained steady. USSR research vessels took under 1,000 tons. Denmark, Norway and USSR have forecast the cod fishery. All agree that the 1960 year-class will be of importance to the fishery in the coming years. Denmark and USSR consider the 1961 year-class as an important one, while the USSR expects a good fishery in the next 2 and 3 years as a result of the rich 1960 and 1961 year-classes. Norway predicts a further decrease of the 1957 and 1958 year-classes. Denmark expects that year-classes older than 1956 will almost disappear and that the 1956 year-class will decrease but still retain some importance in 1F. The 1957 and 1958 year-classes will still occur in 1D and 1E. Rather small cod will constitute a high percentage in the catches in 1965. No rich year-classes have appeared since 1961.

The German catch of redfish dropped from 42,000 tons in 1963 to 21,000 tons in 1964. During the last 6 years the catch per fishing day has decreased steadily from 12.5 tons to 3.7 tons. According to the German research report the stock of redfish, since 1960, has diminished to such a degree that the catch of redfish must be considered as a by-catch. Off East Greenland the German fishery for redfish was important. However, the stock is decreasing and it must be assumed that in future the catches off East Greenland will continue to decrease. The catch of redfish per fishing day off Southeast Greenland dropped from 23.1 tons in 1962 to 15 tons in 1964. Iceland landed about 2,000 tons from all Divisions except 1A and 1C. The best fishery was carried out in 1D but the catch per unit of effort has decreased since 1963. UK, Greenland, and Norway also caught a few hundred tons.

A gill-net fishery for salmon was carried out in inshore water by the Greenlanders. The catch increased from 420 tons in 1963 to about 1,500 tons in 1964.

Subarea 2

Reports on researches were submitted by the following member countries: Canada, Germany, Iceland, Poland, Portugal, Spain, USSR, and UK.

1. Work Carried Out

a. Canada: R/Vs *A. T. Cameron* and *Marinus*. Research from laboratories in St. John's, Newfoundland, and Montreal, P.Q. Oceanographic section off Seal Island and Hamilton Inlet Bank. Cod, redfish, American plaice and witch size and age composition.

b. Poland: R/T *Wieczno*. Oceanographic studies on Hamilton Inlet Bank. Cod and redfish size and age composition.

c. Portugal and Spain: Commercial trawlers. Cod size and age composition.

d. USSR: Five research and exploratory vessels. Oceanographic and planktonic studies. Sampling of cod and redfish stocks.

e. UK: Sampling commercial landings of cod. Plankton studies with continuous plankton recorder.

2. Hydrography

Studies carried out by USSR showed slight warming of water masses in the beginning of 1964 in comparison with 1963. However, 1964 should be considered as a cold year. During the summer

months the flow of cold polar waters increased. The cold polar current observed off the Cumberland peninsula in September was the most intensive for the last 4 years. The Canadian investigations conducted in July–August also showed that on the line of stations from Seal Island to Hamilton Inlet Bank and on the deep water slopes the water temperature in 1964 was lower than in 1963.

3. Plankton

UK continued studies of plankton, obtaining records of plankton distribution throughout the whole ICNAF area. (The recording vessels covered in total about 28,000 miles, of which 6,566 miles were covered within Subarea 2.) Along with the studies of hydrological conditions, the USSR research vessels conducted observations on quantity and species composition of plankton.

4. Cod

Canadian surveys showed no pre-spawning and spawning concentrations on the southeast part of Hamilton Inlet Bank in late March and early April, whereas in 1963 great concentrations were observed within this area. Because of comparatively high temperature cod were thought to have retreated northward.

Exploratory fishing from the *A. T. Cameron* showed that the best catch was 960 kg of male cod (mainly immature, average wt 0.5 kg) in 238 m at 3.4°C when temperatures were almost a degree higher than in 1963. Cod were larger (average wt 1.0 kg) and scarcer (290 kg and 165 kg) at 279 m (3.1°C) and 319 m (3.3°C) respectively. The catch was 120 kg of smaller cod (average wt 0.6 kg) in 362 m at 3.5°C and 7 kg (average wt 2.6 kg) in 459 m at 3.5°C. No cod were taken in 551, 638, and 737 m at 3.4° to 3.5°C.

Canadian investigations showed that by early April 62% of the mature female cod examined had spawned. By mid-May almost all had spawned. USSR investigation found cod eggs along the whole length of the continental slope in the Subarea in March, April, and early May with greatest numbers being taken in 2G.

Cod (1,920) were tagged from R/V *A. T. Cameron* in May off Hamilton Inlet Bank in 183–241 m. Over one-half of the recaptures were made in the inshore fisheries in Labrador and Newfoundland.

Size and age sampling by Canadian, Portuguese, Spanish, and Soviet scientists of the offshore stocks show that the 1959–1956 year-classes are dominant.

5. Redfish

Canadian R/V *A. T. Cameron* repeated a redfish survey southeast of Hamilton Inlet Bank in early April at depths from 238 to 737 m. *Mentella*-type and *marinus*-type redfish were found 140 m and 180 m, respectively, deeper than their summer-autumn levels. The *mentella*-type was found down to 737 m. No *marinus*-type specimens were taken below 551 m. USSR investigations also showed that mature redfish were absent from great depths. However, there was evidence of redfish concentrations at depths of 200–500 m and 600 m. Studies were carried out on the distribution of young redfish and on the year-class strength of the *mentella* - type redfish. Results suggest that cold years produce poor year-classes while warm years result in the appearance of rich year-classes.

6. American Plaice

In the *A. T. Cameron* sets southeast of Hamilton Inlet Bank, 2–4 April, as described for redfish, the largest catch of American plaice (*Hippoglossoides platessoides*) per half-hour tow was 1,670 kg (average weight 1.1 kg) at 278 m. The only other significant catch was 205 kg (average weight 1.0 kg) at 551 m. At other depths from 238 to 459 m catches ranged from 5 to 40 kg and average weights from 0.3 to 0.4 kg. Only one plaice was caught at 638 m and none at 737 m. These American plaice had opaque eggs and were at least 1 month and possibly 1½ months or more from the beginning of spawning.

7. Witch

In the *A. T. Cameron* half-hour tows, 2–4 April southeast of Hamilton Inlet Bank, described above, a large catch of 3,320 kg of witch, *Glyptocephalus cynoglossus*, (1.4 kg average weight) was taken at 551 m. In April 1963 catches of 1,180 and 670 kg were obtained at 549 and 640 m, but in 1964 the witch flounder were much more concentrated, and only 11 and 3 kg were obtained in the sets immediately above and below 551 m — at 459 and 638 m. As in 1963 the females possessed small opaque eggs, usually less than 0.5 mm diam, and were at least 1 to 1½ months from the beginning of spawning.

8. Status of the Fisheries

The total catch of all species was 255,000 tons as compared with 223,000 tons in 1963. Canada took 16,000 tons (25,000 in 1963), Denmark (Faroes) 300 tons (nil in 1963), France 37,000 tons (40,000 in 1963), Federal Republic of Germany 9,000 tons (2,000 in 1963), Iceland 500 tons (nil in 1963), Poland 7,000 tons (2,000 in 1963), Portugal 41,000 tons (73,000 in 1963), Spain 45,000 tons (55,000 in 1963), USSR 68,000 tons (25,000 in 1963), UK 2,000 tons (600 in 1963) and non-member countries 28,000 tons (5 in 1963).

Cod catch decreased to 204,000 tons from 216,000 tons in 1963. Landings from the Labrador inshore cod fishery by Canada in spite of some increase in effort, fell about 40%. There has been a decline in catch per man since 1957 coincident with increasing offshore cod fishing especially in winter and spring.

Redfish catch increased to 17,000 tons from 6,000 tons in 1963. Catches in 2J varied from 101 tons per 100 hr trawling by Polish trawlers to 341 tons per 100 hr trawling by Icelandic trawlers. USSR reported dense concentrations of 90% *mentella*-type redfish off central Labrador in 300–450 m. Stern trawlers (BMRT) caught 700–800 tons per 100 hr trawling.

Subarea 3

Reports on researches were submitted by Canada, France, Iceland, Poland, Portugal, Spain, USSR, UK, and USA.

1. Work Carried Out

a. Canada: R/Vs *A. T. Cameron*, *Investigator II* and other research vessels. Hydrographic sections (5) across the Labrador current and continental shelf from Bonavista to the southern Grand Bank. Sampling of inshore and offshore cod fishery. Surveys for small cod inshore. Offshore surveys for cod, haddock, and redfish. Gear studies.

b. France: R/T *Colonel Pleven II*. Experiments with large vertical mouth trawl.

c. Iceland: R/T *Thorsteinn Thorskabitur*. Size and age composition of cod.

d. Poland: R/T *Wieczno*. Biological observations on cod, redfish, haddock and other species. Hydrographic and plankton observations in relation to fishing.

e. Portugal: Commercial trawlers. Size, age and maturity of cod.

f. Spain: R/T *Virazon* and *Aquilon*. Biology of cod.

g. USSR: Research and exploratory vessels (5). Hydrographic and plankton studies. Young cod and haddock surveys.

h. UK: Sampling commercial landings of cod, haddock and pollock. Plankton studies with continuous plankton recorder.

i. USA: Hydrographic observation by International Ice Patrol (US Coast Guard).

2. Hydrography

Canada reported that temperatures and salinity conditions on the continental shelf from Bonavista to the southern Grand Bank were generally not different from those in 1963.

The US Coast Guard, as part of the International Ice Patrol Program, made its usual oceanographic surveys in the area. An instrumented buoy was successfully moored on the eastern slope of the Grand Bank in 340 m of water where it recorded temperatures and pressure at 50 m below the buoy. The season was characterized by a normal amount of sea ice and icebergs along the east Newfoundland coast. The Labrador Current was about 0.3°C colder than normal, above 100 m for the entire season, and less saline down to 500 m by 0.05–0.10‰. The Atlantic Current intruded to the northwest more than normal, giving severe horizontal temperature and salinity gradients as far north as 45° 30′N. In January, 1964 the US Coast Guard initiated the first of the long-term time series on oceanographic observations planned for all ocean stations by taking six three-week patrols on Ocean Station "Bravo." The ocean stations were also used to study the seasonal variation in flow and characteristics of the Labrador Current. This study was begun in November, 1964. Spain investigated reports of unusually low temperatures on the bottom in the Avalon Channel. Thirty to 40 miles off the Avalon Peninsula bottom temperatures were between 0.5° and 1°C. At 15 miles south-east of Witless Bay in August, the temperatures dropped as low as –0.5°C. USSR reported a slight warming in the first half

of 1964. In the spring in the section along 47°N, the mean temperature of the 0–100 m layer was 1.14°C higher and that of the 0–500 m layer 0.15°C higher than in the spring of 1963.

3. Plankton

UK reported that continuous plankton recorders were towed about 14,000 miles as a part of the Edinburgh plankton program. USSR conducted its annual quantitative survey of euphausids off Labrador and Newfoundland in January–February.

4. Cod

Canada continued sampling the inshore cod fishery using various gears. The length and age composition varied with type of gear and locality. The annual inshore survey to estimate the abundance of small fish up to 2 years of age indicates poor survival of the 1964 year-class but good survival of the 1963 year-class. Research vessel surveys were conducted on Grand Bank, St. Pierre Bank, and Flemish Cap. Catches seldom exceeded 450 kg per half-hour tow. Maturity studies were carried out on Funk Island Bank (Ritu Bank). Canada also reported on an analysis of cod catch by gear in the inshore fishery of Newfoundland. Six types of gear are used: trap, gillnet, linetrawl, longline, handline, and jigger. The type of gear varies with area and season. The age and length distributions are different for different gears. Portugal reported on length and age composition, stage of maturity and age at first maturity. In 3K lengths ranged from 37 to 91 cm with relatively small variation during the months sampled (March–September). In 3L lengths ranged from 40 to 91 cm. In 3K the 1957 year-class was dominant, followed by the 1959, 1958, and 1956 year-classes. The 1960 and 1961 year-classes appeared, for the first time, during May and August respectively. In 3L 1958 and 1957 year-classes were dominant. Spawning in 3K was most intense from March to June, while in 3L with data from May and June only, spawning occurred mainly during June. Spain confirmed the dominance of the 1958 and 1959 year-classes. The 1957 year-class was a very large one and is still contributing substantially to the fishery. Studies of stomach contents showed that majority of stomachs were empty, but that sand eels and capelin were common articles of diet.

5. Haddock

Canada made an analysis of the Grand Bank haddock fishery since 1940. The stock fluctuates widely due to variations in recruitment. It is at present too low to support a large fishery and there is no evidence of future recruitment. However, the Polish research vessel reported remarkable concentrations of haddock on the southwest slope of the Grand Bank.

6. Redfish

Polish researches showed that the largest redfish occurred on Ritu Bank (average length 36.8 cm) and that size decreased southwards. USSR reported that year-classes of "beaked redfish" can be distinguished by length frequencies of immature fish which occurred in depths of 200–300 m in the northern local stock and in depths of 50–250 m in the southern local stock. Good year-classes are associated with a wider distribution of warm rich water of Atlantic origin. A rise of temperature in the Labrador and Newfoundland area is usually associated with a fall of temperature in the Icelandic area and the year-class strengths in the two areas show a similar inverse relationship. USSR reported catches ranging up to 5 tons per 2 hr trawling in 600–700 m northeast of Ritu Bank. Biological studies of this stock indicate that it is isolated from stocks at lesser depths and possibly unable to reproduce itself. No specimens showed ripening of gonads. The USSR investigation raises the question whether this stock represents sterile hybrids of a cross between *marinus*-type and *mentella*-type but leaves open the question whether they may be a form of the common beaked redfish which ripens later. USSR reported on the distribution of young *mentella*-type in the Labrador–Newfoundland area, analysing the length and ages at maturity in different areas and different depths. In the Flemish Cap area (3M) the immature portion of this stock consists of males and females with lengths to 25 cm and ages to 7 years, on the southwestern slope of the Newfoundland Bank (3O)and the St. Pierre Bank (3P) the males and females with length of up to 20 cm and at the age of up to 6 years form the immature portion. The greatest concentrations of immature fish tended to concentrate at particular depths according to the area. Normally heavy fishing does not occur at these depths except in the Flemish Cap area where immature fish occur at depths of 250–300 m. This report

also relates the hydrographic conditions to the age at maturity and depth distribution emphasizing particularly the effect of the warm Atlantic water on the Flemish Cap area.

7. Status of the Fisheries

Commercial fishing was carried out by Canada, Denmark, France, Federal Republic of Germany, Portugal, Spain, USSR, UK, and two non-member countries.

Total landings of cod increased from 466,000 tons in 1963 to 583,000 tons in 1964 with over 65% of the catch coming from 3L and 3K. Canada landed about 166,000 tons but reported that the inshore fishery in all parts of the Newfoundland coast declined over 1963. This decline applied to the new gillnet fishery as well as the trap fisheries. Denmark landed 23,000 tons (14,000 tons in 1963). France 63,000 tons (40,000 tons in 1963). Germany about 2,000 tons and Iceland less than 1,000 tons. Norway took about 7,000 tons and Poland 9,000 tons. Poland reported the greatest abundance of cod was found in 3K where the catch per 100 hr of tow was 56 tons. Portugal landed about 103,000 tons (81,000 in 1963), and Spain 117,000 tons (95,000 in 1963). More than half the Spanish catch was taken with pair trawlers. Her large trawlers fished mostly in 3L and the pair trawlers in 3K. USSR landed 56,000 tons (40,000 tons in 1963). Big deep-freeze trawlers fished for cod mainly on Flemish Cap in March and on the northern Newfoundland Bank from February to April. Side trawlers fished on northern Newfoundland Bank in March and June and on Flemish Cap throughout the entire second half of the year. UK landed 17,000 tons (12,000 in 1963). Non-member countries landed about 19,000 tons.

Total landings of haddock were 12,000 tons, down from the 14,000 tons landed in 1963. The record year was 1955 when 105,000 tons were landed. Over half the catch was taken from 3O. Of the total, Canada landed about 7,000 tons, Spain and the USSR each about 2,000 tons and other countries minor amounts.

Total landing of redfish were 93,000 tons, up from 69,000 tons in 1963. The record year for redfish was 1959 when 246,000 tons were landed. Highest landings (23,000 tons) were from 3K as in 1963. Otherwise there was a shift in pattern over last year. In 1963 substantial landings came from 3N and 3P whereas in 1964 larger amounts were taken from 3M and 3O. Canada took 16,000 tons, Germany 3,000 tons, Iceland 2,000 tons, Poland 17,000 tons, USSR 31,000 tons, the USA 5,000 tons and other countries smaller amounts. Poland fished mostly in 3K where the catch per 100 hr trawling was 118 tons.

Total landings of halibut were 1,600 tons, an increase of 300 tons from the 1963 catch.

Total landings of flounders in 1964 were over 49,000 tons, up from 34,000 tons in 1963. Most of this was taken by Canada who reported an increased effort for plaice because of the scarcity of haddock and of some diversion of effort from redfish. Canada also reported that the recent downward trend in catch per unit of effort was reversed in 1964.

Canada landed 327 tons of shucked meats of sea scallops (2,710 tons, live weight) from St. Pierre Bank (3P) in 1964. Except for small landings in 1963, virtually no effort had been expended here since 1958.

Canada took 71,000 harp seals in 1964, up from 55,000 in 1963; and about 700 hood seals, the same as in 1963.

Subarea 4

Reports on researches carried out in 1964 were submitted by the following member countries: Canada, Poland, Spain, USSR, UK, and USA.

1. Work Carried Out

a. Canada: *A. T. Cameron* and other research vessels. Oceanographic conditions at coastwise stations and along established sections. Detailed bottom topography for restricted areas. Benthos and plankton studies in 4T. Egg and larva studies. Cod populations in 4T. Cod feeding habits. Haddock year-class strength. Effects of cod grazing on American plaice. Age and growth of witch. Herring lengths and ages. Tagging cod, halibut, witch, and herring. Species association studies. Estimates of harp seal population. Studies on argentines, silver hake, sea scallops, and fishing discards.

b. Poland: R/T *Wieczno.* Hydrography. Sampling research trawler catches in 4WX. Sampling herring in 4W. Length, age and maturity studies, and catch per unit effort for argentines.

c. Spain: Commercial otter trawler *Aquilon.* Length, age and studies of age, and size at first maturity in cod.

d. USSR: Five hydrographic cruises by research exploratory vessels with standard sections and studies of conditions in fish concentrations. Length and age composition of silver hake.

e. UK: Sampling cod, haddock and pollock from factory trawlers for length and age. Continuous plankton recorder surveys.

f. USA: *Albatross IV* in 4X. Haddock fishery in 4X. Surveys in 4X to determine distribution of groundfishes and year-class abundance of haddock. The 1963 year-class was well represented. Cooperative studies of the commercial fishery were continued in collaboration with Canada.

2. Hydrography

Canadian observations showed surface temperatures to be generally lower than average, especially from the Scotian Shelf (4VW) to the Bay of Fundy (4X). Bottom temperatures in the Bay of Fundy and along the Halifax monitoring section (4W), run seven times, were also lower than average. In these areas water temperatures were generally lower than in 1963. Five cruises by USSR also showed water temperatures lower than in 1963 attributed to increased influence of cold Labrador water of the previous year. Canada continued the study of non-tidal drift at both surface and bottom.

3. Plankton

Canada studied daily patterns of plankton and fish vertical movements in Chaleur Bay (4T). Zooplankton volumes there seemed lower than in 1963 and 1962. Continuous plankton recorder surveys were continued in 1964 by the UK. Egg and larva surveys were carried out by Canada in 4TVW.

4. Benthos

Canada has begun a study of the relationships between bottom sediments and the abundance of certain benthic organisms.

5. Cod

Using echo sounding and otter trawls, Canada studied distribution and abundance of cod in 4Vn in relation to depth, fish size, age, and feeding. Maturity studies in 4T indicated the spawning period as from May to October with a peak in June. Computer analyses of stomach contents showed cod to change diet with growth from crustacea, to molluscs and echinoderms, to fishes. Cod samples from commercial catches were taken by Canada, Spain, and UK. Canada tagged cod in 4RST.

6. Haddock

Canadian predictions that 1957 and 1959 year-classes would be relatively strong on the Scotian Shelf and that 1958 and 1960 relatively weak were borne out by samples of 1964 landings. Differences between day and night trawl catches were studied and the results of exhaustion caused by capture in trawls measured. UK and USA sampled commercial catches.

7. Silver Hake

Canada analysed information on silver hake obtained in surveys from previous years. Observations in 1964 in 4W showed spawning to take place mainly in September and October. Examination of USSR catches for length and age showed most of the catch composed of 3- and 4-year-olds. Catches were mainly 3-year-old males and 4-year-old females which had attained maturity for the first time at a mean length of about 30 cm.

8. Halibut

Canada tagged 174 halibut in the subarea and collected age composition material.

9. Flounders

Analyses of cod stomach contents in 4T by Canada showed that cod grazing significantly affects the mortality rate among young American plaice.

Fishing records were studied by Canada to show the most productive areas for witch. Best catches were usually deeper than 200 m. Age distribution and growth rate in relation to sex and location were based on otolith examinations. Canada carried out tagging in 4V and the eastern part of 4W.

10. Herring

Routine sampling for length and age and sexual state of herring in southwest 4X off Nova Scotia and in Passamaquoddy Bay was continued by Canada. Poland also reported sampling herring in 4WX and compiled records of frequency of occurrence of herring on the Scotian Shelf. Herring in 4X tagged with spaghetti tags by Canada were found to produce about 10 times as high a proportion of recoveries as opercular tags. Canada also explored length and weight losses in samples of herring preserved in different ways.

11. Argentines

Canadian exploratory fishing for argentines found them absent in the Bay of Fundy (4X) and scarce in the Gulf of St. Lawrence (4T) but available in quantity in 4VWX. Extensive work by Poland studied argentine sizes, yields on different fishing grounds and at different depths, and ages and sexual condition. On Browns Bank (4X) fish taken on deeper grounds were larger and older with a higher proportion of males.

12. Other Research

Canada carried out other studies of ICNAF interest. Mackerel sampled for age and length in 4X showed younger fish entering the fishery with the advance of the season. Laboratory studies on growth of sea scallops were continued. Photographic surveys of harp seals on the ice in 4T and tagging recovery calculations of abundance gave different but comparable estimates of the population (95,000 and 120,000) for the area studied. Cod discard studies in September in 4TR showed that all fish caught were landed. Species association studies were begun to determine the way in which one kind of fish affects others in the same area. UK sampled commercial landings of pollock off Nova Scotia.

13. Status of the Fisheries

Commercial fishing was carried out in Subarea 4 by the following 10 countries which reported landings: Canada, East Germany, France, Federal Republic of Germany, Iceland, Portugal, Spain, USSR, UK, and USA.

Total groundfish landings fell slightly to 520,000 from 531,000 metric tons in 1963 as a result of reduced landings of silver hake. Herring landings increased to 135,000 metric tons from 109,000 metric tons in 1963.

Cod catches increased to 231,000 metric tons, although Canadian landings from 4T were down somewhat. USA landings from 4X were up about 8%. Cod sizes showed little change from previous years throughout the subarea. Spain, France, and Portugal had productive fisheries in the subarea.

Haddock landings increased again to 60,000 tons. Canadian catches in 4X were up by 25% when effort was diverted from 4W. USA landings, almost entirely from 4X, increased to 8,600 tons in response to increased effort and improved catch per day. A decline in abundance is anticipated in 4X until the 1962 and 1963 year-classes are recruited in 1967. USSR landings were up by about 50% to 5,500 tons.

Canadian redfish landings were up 7% and were made mainly from 4RST by exploiting the 1956 year-class. USA landings from the subarea increased to nearly three times the 1963 landings because of a shift in effort from Subarea 3 to 4RST. USSR catches were down to 4,000 tons from 12,000 tons. Total landings from the subarea were little changed at about 52,000 metric tons.

Flounder landings increased to 32,000 tons. Canadian landings continued to increase. Discards of American plaice continued high in 4T.

USSR landings of silver hake declined from 123,000 tons to 81,000 tons attributed to unfavourable fishing conditions resulting from low water temperatures during the fishing season.

Canadian herring catches were up by about 23% to 141,000 tons due to good catches in the Bay of Fundy section of 4X a record catch of 84,000 tons was produced. USSR landings were little changed from 1963. Catch per unit effort of all species combined by USSR factory trawlers increased to 2.97 tons per hour fished in 1964 from 2.94 tons per hour in 1963 and 2.15 tons per hour in 1962.

Subarea 5

Reports on researches were submitted by the following member countries: Canada, Poland, USSR, UK, and USA.

1. Work Carried Out

a. Canada: Various research vessels. Research from laboratories at St. Andrews, N. B. and Halifax, N. S. Studies of non-tidal drift in Bay of Fundy and Gulf of Maine. Studies of cod, haddock, herring, swordfish, tunas, and sea scallops.

b. Poland: R/T *Wieczno*. Sampling haddock, herring, alewife, and argentine for biological studies. Hydrographic and plankton studies.

c. USSR: Exploratory and commercial trawlers. Hydrographic and plankton studies. Sampling of silver hake and herring stocks.

d. UK: Sampling commercial landings of haddock and pollock. Plankton studies with continuous plankton recorder.

e. USA: R/Vs *Albatross IV* and *Delaware*. Studies on haddock, silver hake, redfish, yellowtail and winter flounders are being continued. Benthic and environmental studies throughout Gulf of Maine.

2. Hydrography

A cooperative Canada-USA program has resulted in the publication of a study of the surface circulation in the subarea in Folio 7 of Serial Atlas of the Marine Environment. Decreased river runoff appears to have resulted in higher seasonal salinities.

3. Plankton

Analysis of 567 plankton samples taken by USSR in the area of Georges Bank suggests that, during the spring months, the plankton abundance was higher in 1964 than in 1963. Lower temperatures apparently resulted in poorer specific composition of zooplankton in 1964 than in 1963. Silver hake eggs were taken in mid-August on the southern slopes of Georges Bank. After mid-September single larva were taken in samples. Zooplankton volumes taken by USA from the Maine inshore waters were highest in the western region, moderate in the central area, and low in the eastern sector of the coast.

4. Benthos

USA investigators found that the density of individual invertebrates is much higher than in areas farther south, although the biomass is the same from north to south.

5. Silver Hake

USSR observations confirmed the 1963 conclusions that the catch consisted of 3- (1961 year-class) and 4-year-old fish. Apparently hake over 4 years of age are subject to high natural mortality. A total of 55 tagged fish were recaptured from 5,200 fish tagged on Georges Bank between the middle and end of August. Canada, USSR, and USA exchanged silver hake otoliths in an attempt to further ageing studies. USA are collecting data in order to validate ageing procedures. USA experiments on the selectivity of 30–73 mm nylon nets indicate that the 50 mm nylon codend in present use allows satisfactory escapement of small silver hake (less than 25 cm). Codends 73 mm allow excessive escapement of fish 25–35 cm which form the bulk of the fishery.

6. Herring

USSR made observations on length and age composition and on the distribution of herring in relation to the environment. Masses of herring eggs were discovered in early October over about 50 sq km in temperatures ranging from 6° to 12°C. Sampling by Canada, USSR, and USA showed that the 1960 year-class was dominant on Georges Bank. USA sampling in the coastal waters of the Gulf of Maine showed that the older year-classes were dominant in the spring and the 1960 year-class was dominant in the summer and autumn. USA continued behaviour studies. Serological and biochemical studies were performed as a means of identifying herring populations in the Gulf of Maine and on Georges Bank. Poland collected data for studies of length and age composition.

7. Haddock

USA investigators are re-examining the data on commercial catch and effort which cover

the early phase of the exploitation of the Georges Bank stocks (1916–31) for information on the relation between abundance effort and yield. The 1962 year-class, with its relatively low index of abundance, is the main contributor to the fishery. Research vessel surveys suggest that the 1963 year-class will contribute strongly to the fishery.

8. Redfish

USA studies of methods of estimating abundance from commercial catch and effort data were begun. These studies impinge upon the more general problems of measuring relative abundance in a mixed-species fishery.

9. Flounders

USA investigators, using data collected from 1955 to 1964, have found small growth rate differences in three individual stocks of yellowtail flounder. About 9,000 winter flounders were tagged by USA investigators on Massachusetts inshore grounds, on Nantucket Shoals and on Georges Banks to provide data for studies of possible stock differences, exploitation rates and distribution, movements and abundance.

10. Large Pelagic Fish

Canadian research showed that silver hake, redfish, barracudinas, lanternfish, and cephalopods are important food items for swordfish. During the year 28 swordfish and 103 tuna of various species were tagged.

11. Sea Scallops

Canadian investigators are evaluating the use of an underwater camera to study bottom characteristics and assess sea scallop abundance.

12. Status of the Fisheries

Commercial fishing was carried out by Canada, Poland, USSR, UK, and USA.

Total landings of silver hake for all purposes increased from 155,000 tons in 1963 to 227,000 tons in 1964, due to increases of 12,000 tons in the USA industrial catch and of 60,000 tons in the USSR catch. USSR stern trawlers fishing on Georges Bank from January to September had average monthly catches of 2.9–4.6 tons per hour dragging. The USA fleet fishery conducted mostly in inshore waters took an average of 15.1 tons per day per vessel as compared to 17.4 tons per day per vessel in 1963.

Total landings of herring were 159,000 tons as compared to 154,000 tons in 1963. USSR medium otter trawlers fishing for adult herring on Georges Bank took 131,000 tons, an increase of 34,000 tons from the 1963 catch. Catch per hour trawled increased to over 1.9 tons from 0.8 tons in 1963 due to the recruitment to the fishery of the rich 1960 year-class. The USA fishery with purse seines, traps, weirs, and other fixed fishing gear in the inshore areas decreased drastically to 28,000 tons from 69,000 tons in 1963. The cause of the decrease is difficult to determine.

Total landings of sea scallops were 103,000 tons. Canadian landings were 49,000 tons, about the same as in 1963. USA landings decreased to 54,000 tons from 67,000 tons in 1963. Since 1955 there has been a 50% decrease in effort by the USA fleet which has been paralleled by an increase in effort by Canadian vessels.

Total landings of haddock were 70,000 tons, 10,000 tons more than in 1963. USA landings made up more than 75% of the total landings from the area. With USSR and Canadian landings increasing steadily from 1961 and the likelihood of further increases in effort, the fishery will depend even more on the strength of the year-class just being recruited to the fishery.

Total landings of cod were about 28,000 tons, 2,000 tons lower than in 1963 due to a sharp reduction in USA catch per effort from 3.3 tons per day fishing in 1963 to 2.0 tons per day fishing in 1964.

Total landings of all flounders were 50,000 tons, an increase of 2,000 tons from 1963. USA took 98% of the total catch which was 75% yellowtail flounder. About 15,000 tons of flounders were taken from Georges Bank by USA vessels, an increase from 1963 of 4,000 tons. Catch per effort also increased to 4.2 tons per day fishing.

USA caught most of the redfish (8,000 tons) taken in the area. Total landings are lower than in 1963 by 1,000 tons and catch per day is at a new low of 2.5 tons.

USA landed 56,000 tons of industrial fish, mainly silver and red hake, from the southern part of the subarea.

PART 4

Review of Possible Conservation Actions for the ICNAF Area[1]

BY THE CHAIRMAN OF THE RESEARCH AND STATISTICS COMMITTEE, DR W. TEMPLEMAN[2]

AND THE CHAIRMAN OF THE ASSESSMENT SUBCOMMITTEE, MR J. GULLAND[3]

Terms of Reference

The ICNAF Commissioners in their third meeting at Hamburg on 4 June 1964 requested:

> "that the Chairman of Research and Statistics and of the Assessment Subcommittee review in general terms the various kinds of action which might be taken by the Commission for the purpose of maintaining the stocks of fish in the ICNAF area at a level at which they can provide maximum sustained yields. In so doing, special reference should be made to the provisions contained in Article VIII of the Convention and their probable effects on the stocks and fisheries. Their report should be sent via the Executive Secretary to the Chairman of the Commission by 31 December 1964 and circulated to all member countries not later than 31 January 1965."
>
> (1964 Annual Proceedings, Vol. 14, p. 18)

The action needed is of several kinds: research action to provide the kind of information needed by the Research and Statistics Committee to provide advice to the Commission, and legislation and action to control fishing and catch at the recommended level.

So far as this report is concerned little is said about the research action needed, because this is kept under active consideration by the Research and Statistics Committee, and the urgent need is to consider future legislative and control action. However it should be pointed out that the research information needed is not fixed, but depends on the precision and complexity of the conservation measures. Thus, simple statistics of catch and effort may be sufficient to show that fishing is having a significant effect; additional information on the size composition of the catches and on mesh selectivity may show that a larger mesh would increase catches. Much more data on feeding, growth, etc., may be needed when, for instance, possible interactions of fisheries for different species are being considered.

A. Aims of Conservation

A. 1. Introduction. The aim of ICNAF as given at the beginning of the text of the Convention is "to make possible the maintenance of a maximum sustained catch from (the ICNAF) fisheries."

How this maximum is defined is not specified; the most common interpretation is that the objective is for maximum yield in weight of fish, separately from each stock of fish. It will be suggested later in this report that such an interpretation gives rise to difficulties and contradictions in situations that are at all complex, though it does provide a good objective in the simpler situations, as described in the following section.

Any conservation or management measure consists of restricting present catching operations in some way in order to ensure better catches in the future, either by allowing the fish to grow to a better size, or by maintaining an adequate breeding stock, or both. So far as the effect on the stock is concerned conservation measures can be placed into two groups: those restricting the fishing on all sizes of fish (that is, in technical language reducing the fishing mortality), and those restricting, and possibly even eliminating the fishing on certain groups of fish. The latter may include restriction of fishing at certain times or places (e.g. after spawning) when the fish are in poor condition, so that the weight, and more particularly the value of the individual fish are low, but the small fish are the group most frequently given special protection (e.g. by mesh regulation).

The effects of management measures can therefore be described by two basic relationships,

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[1]Presented as Commissioners Document No. 12 to the Fifteenth Annual Meeting of ICNAF, June 1965.

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one relating the yield to the total amount of fishing (or more strictly the fishing mortality caused), and the other relating yield to the size (or age) at which the fish is first exposed to the full fishing mortality) i.e. the size, or age, at first capture). Examples of the curves relating yield and effort have been already given in the 1964 Report of the Assessment Subcommittee (ICNAF Redbook 1964 Part I, Appendix VII, Fig. 3); examples of the relation between yield and size of first capture are given in the 1961 Report of the Assessment Working Group (Supplement to 1961 ICNAF Annual Proceedings, Vol. 11).

The theoretical methods by which these curves are calculated have been fully described elsewhere (Beverton and Holt, 1957)[4]. They depend on knowing the numbers of recruits entering the fishable life-span, their growth pattern and their death rates. Because the number of recruits often varies widely, the calcultations are usually made in terms of an average number of recruits. If fishing has no effect on recruitment, either directly or through changes in the adult stock, then changes in recruitment will not alter the shape of the curves, though they will alter the absolute magnitude of the yield. That is, the strategy giving the maximum yield for the average recruitment will also (at least very closely) give the maximum yield (in terms of weight, though possibly not in economic yield) from any other recruitment.

In most fisheries, therefore, where there are fluctuations in recruitment or other factors, independent of the amount of fishing, it is difficult to predict what the absolute magnitude of the catch would be with any pattern of fishing, or to say that the catch in any particular year following some regulation (e.g. an increase of mesh size) will necessarily be greater than before the regulation. What is possible is to determine that catches following some regulation will be greater than they would have been if the regulation had not been introduced. Thus, it may be difficult to determine as an absolute quantity, a maximum sustainable yield for a stock, but it may be possible to determine that a certain strategy (combination of amount of fishing and size at first capture) will give a greater yield than any other strategy.

If recruitment decreases with decreasing stock, then the shape of the curves will alter, being lower at high levels of effort, or at low sizes of first capture. Thus, they will have more pronounced maxima, and these maxima will occur at lower effort values or higher values of size at first capture. Because of the considerable difficulties in determining the true relation between stock and recruitment, the yield curves are calculated, at least initially, in terms of constant recruitment. If there is a relation between stock and recruitment these constant-recruitment curves will give over-estimates of the desirable level of effort, and under-estimates of the desirable mesh size.

These relationships between yield and effort. and between yield and size of first capture, are interdependent, so that there is a whole range of curves relating catch to fishing effort, depending on the size and age at first capture (and also possibly on variations if any of fishing mortality with age above the age at first captures). Similarly the relation between catch and size at first capture depends on the amount of fishing. The general form of the two sets of curves is shown in Fig. 1 and 2.

A. 2. Catch and size at first capture. Figure 1 shows the relation between catch and size at first capture (expressed as a percentage of the largest size to which a fish can grow), for both a moderate level of fishing (curve **a**), and very heavy fishing (curve **b**) (moderate fishing, but with recruitment reduced at low levels of stock, may also give a curve similar to **b**). Though theroretically the curves can be drawn over the whole range of possible sizes, in practice, because of differences in behaviour and distribution of the smallest fish, they cannot be caught in quantities, and there is a lower limit to the possible effective size at first capture (as shown by the broken part of the lines).

As each of the curves represents changes in catch at a fixed level of fishing, the curves of catch per unit effort against size at first capture will be exactly the same. In particular the maximum of each curve represents both the maximum catch and the maximum catch per unit effort. Therefore, at least so far as the particular individual stock is concerned, that point is by any reasonable criterion the 'best'.

[4]Beverton, R. J. H. and S. J. Holt. "On the Dynamics of Exploited Fish Populations." London: HMSO. 1957.

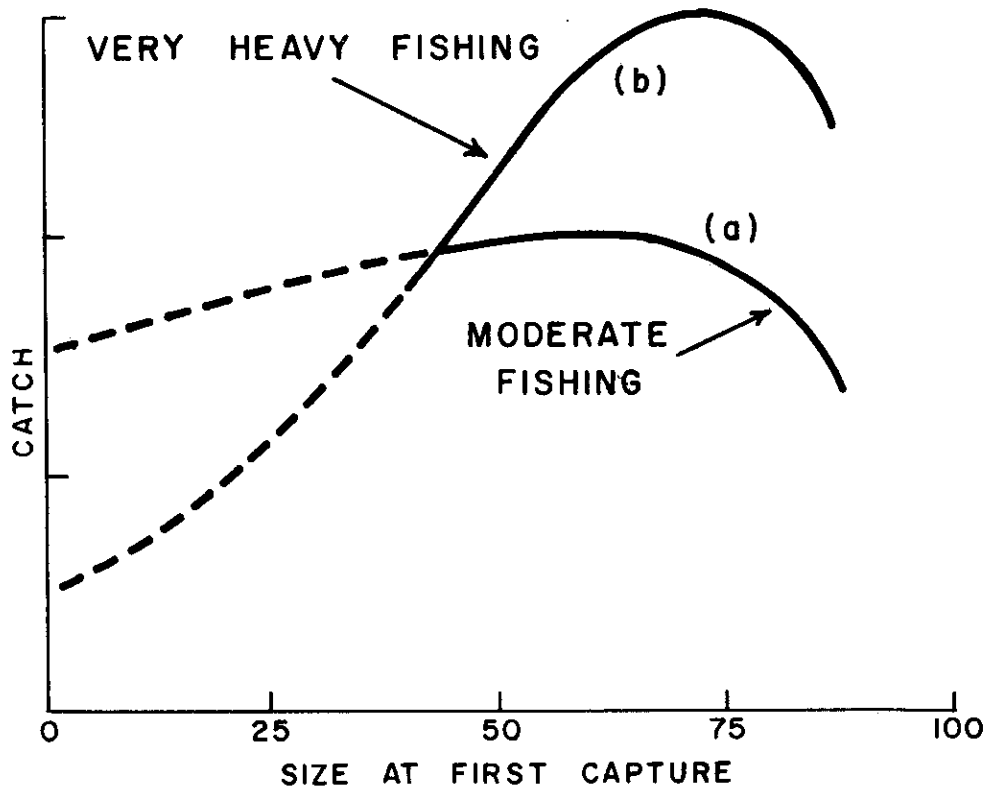

Fig. 1. The relation between total catch and the size of first capture, at two levels of fishing effort.

The comparison of the two curves in Fig. 1 (for moderate and heavy fishing) shows that the following occur with an increased amount of fishing:

(i) The maximum catch occurs at a larger size at first capture;
(ii) The absolute quantity of the catch at the maximum is greater;
(iii) The relative difference between the catch with a large mesh and that with any smaller mesh (i.e. the benefit from a larger mesh) is greater.

These facts have already been pointed out in the 1961 Report of the Assessment Working Group (Supplement to the 1961 ICNAF Annual Proceedings, Vol. 11, Section 11); they are particularly relevant to that report, as it was made at the beginning of a period of expansion of fishing, and the calculation of the expected benefist of larger meshes presented in that report probably underestimates the need for, and benefit from, larger mesh sizes under present conditions.

A. 3. Catch and fishing effort. Figure 2 shows the relation between catch and fishing effort and Fig. 3 the relation between catch per unit effort and effort, in both cases for curve (**a**), small size at first capture (small mesh size) and curve (**b**), large size at first capture (large mesh size). This fishing effort is defined in the biological sense; it is, or should be, proportional to the fishing mortality caused, and includes all the relevant corrections to the basic effort statistics for changes in fishing power, searching tactics, etc. It will differ from the basic statistics of fishing effort, e.g. hours fishing, if there are any changes in the efficiency of the fleet.

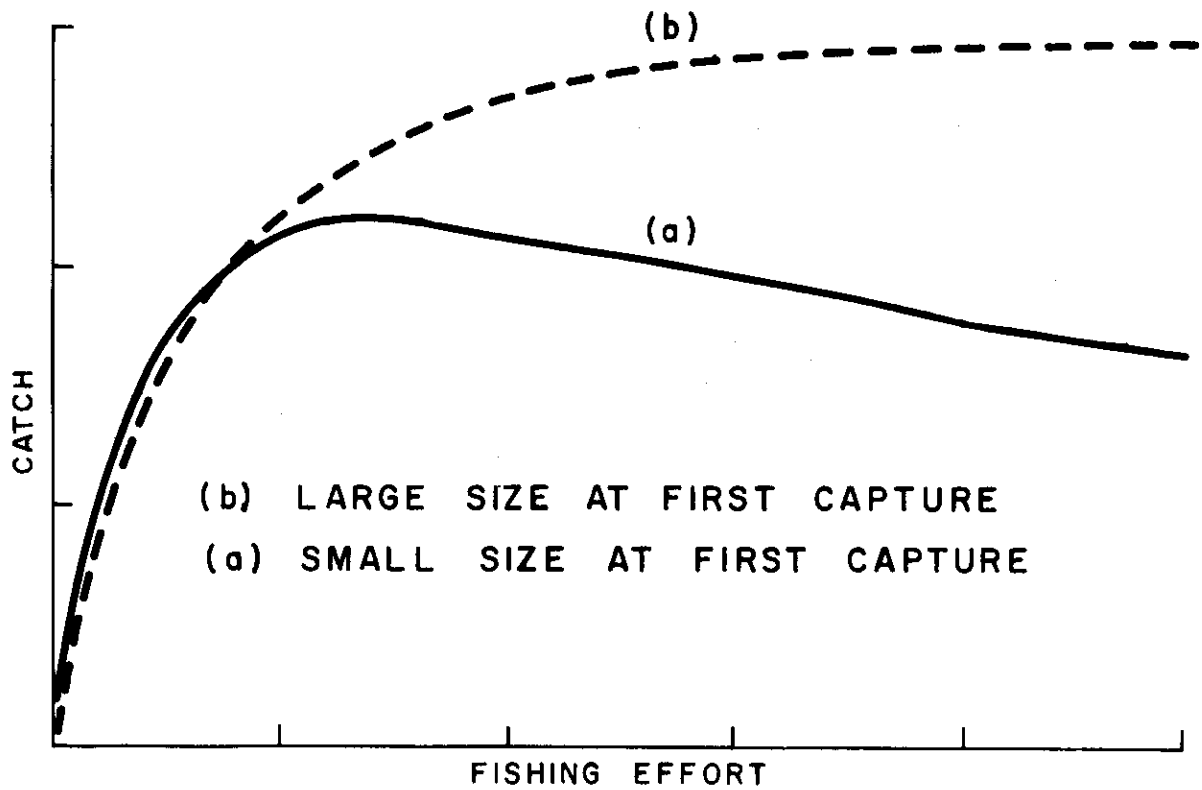

Fig. 2. The relation between total catch and the fishing effort at two sizes at first capture (mesh sizes).

In these curves there is a difference between the changes in the total catch (Fig. 2) and the changes in catch per unit effort (the return to the individual fisherman or fishing vessel, Fig. 3). The catch per unit effort starts to decline when fishing begins and continues to decline with increase in fishing effort. The total catch, however, increases at first with increasing fishing; with a small size at first capture (e.g. a small mesh size) it may soon reach a maximum, but at larger sizes the maximum occurs at an increasingly higher level of fishing or may even not occur at all; for example, for most herring stocks, which are usually not fished until the herring are relatively large, there is no maximum in the yield-effort curve, unless recruitment is affected. Thus, the maximum of curve (**b**) in Fig. 2 occurs outside the range of values in the diagram. Clearly any position to the right of the maximum is undesirable, as, compared with the maximum, there is a loss on both total catch and catch per unit effort. However, a point a little to the left of the maximum, which gives a total catch very little less than the maximum, but with a reduced effort and increased catch per unit effort, may be more attractive to the fishermen than the point giving the maximum yield in weight.

Besides considering the simple effects of changes in effort for constant size at first capture, or changes in size at first capture for constant effort, the effects of simultaneous changes in both should also be considered. A full presentation of all possible such changes would require a three-dimensional diagram, but in fact there is one combination that is particularly important. This is the relation between catch and effort when the size at first capture at any given level of effort is adjusted to give the maximum catch for that effort. This curve, often called the eumetric fishing curve, is important because, as shown above, the use of the optimum size at first capture maximises both catch and catch per unit effort, and, therefore, whatever effort level is desirable, the optimum size for that effort level should be used if at all practicable. The form of the eumetric curve, as a plot of catch against effort, is likely to be similar to that for a fairly large size at first capture or possibly flatter, with the maximum occurring at a very high level

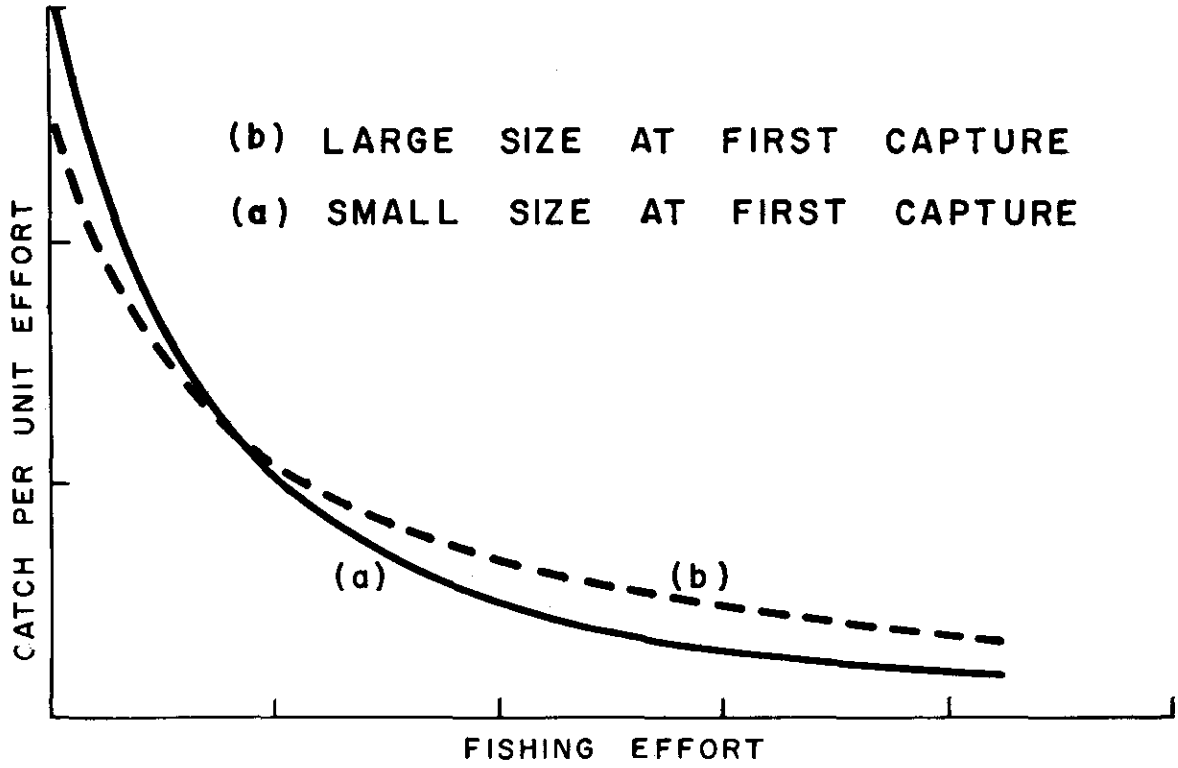

Fig. 3. The relation between catch per unit effort and the fishing effort at two sizes at first capture (mesh sizes).

of effort, or even, theoretically, at infinite effort. The curve may, however, have a clear maximum at a moderate level of effort if recruitment is decreased by decreasing the stock.

If a stock can be considered in isolation, and if there is a maximum in the yield-effort curve at a moderate level of effort — either because there is such a maximum in the eumetric curve, or because the size of first capture is relatively small and cannot be altered — then such a maximum provides a precisely definable objective of management.

Even when considering a single stock the concept of the absolute maximum yield in weight becomes less useful if the maximum can be obtained only with a large, or theoretically infinite, amount of fishing. Then, a level of effort much less than that giving the maximum yield will give a yield only a little less than the maximum; expressed in another way the increase in yield resulting from a given increase in effort becomes small and even negligible as the maximum is approached. This is in fact always true, wherever the maximum occurs, but the disproportionate effort involved in obtaining the last few per cent of the absolute maximum yield, and the contrast between economics and the concept of maximum yield, is most obvious when the yield-effort curve is flat. Thus, if the curve has a sharp maximum, it may be economically more attractive to fish at, say, 98% of the effort giving the maximum yield, and get, say, 99.5% of the maximum which in practice is the same as fishing at the maximum — but if the curve is flat, then an economically desirable position might be to fish at 50% of the maximum effort, and take 90% of the maximum yield.

Another difficulty involved in aiming at the absolute maximum yield from a single stock is that the stock abundance and catch per unit effort will be less, and possibly appreciably less, at the effort level giving the maximum yield than at the lower effort levels giving the best economic returns. This difference is greatest when the maximum occurs at a high effort level. In the preceding examples, the stock levels at the alternative levels of effort are respectively about 2% and 80% above the stock levels at the maximum.

A. 4. More than one stock. The consideration of maximum yield in weight from each single stock as the only objective of management becomes much more difficult when two or more stocks have to be considered together. For instance, particularly in the southern part of the Commission's area, trawling with small meshes for unregulated species is developing; inevitably these trawls catch quantities of small fish of the regulated ICNAF species. Clearly the maximum yield of haddock can be taken only if the small-mesh trawling is stopped, but the maximum yield of the smaller unregulated species can be taken only if small-mesh trawling is intense. This clash of interests requires consideration of the combined yield from all stocks and implies the use of a common measure. If the prices are very different, value is likely to be a more meaningful measure than weight. The existing 10% exemption rules for redfish and other small mesh trawling presently in effect indicate that the Commission has already taken into account total yield and recognized that the maximum yield of regulated species, considered individually, is not a reasonable objective.

When more than one stock, not necessarily of different species, is considered, the additional effort used in obtaining the last few per cent of the maximum yield from one of the stocks is more than just an economic waste. If there is any alternative stock which is not heavily fished, i.e., one for which an increase in effort will give a commensurate increase in yield, then it is desirable, in terms of both economic return, and total yield in weight, that the 'wasted' effort should be diverted to the alternative stock.

The same thing occurs when the effort is being reduced so as to reach the level giving the optimum yield. If this reduction is made without altering the efficiency of the fishing operation, there will be a saving in the cost of fishing, which may appear as reduced costs or increased profits. A surplus effort (in the form of men, ships and money) may be diverted to under-exploited stocks, thus increasing the total yield. Alternatively, if the efficiency is reduced, then the costs of fishing will remain much the same, and the benefit will only be in the increased yield from the protected stock — there will be no benefit in the form of reduced costs or in the form of increased yield from the alternative stocks.

The possible economic benefits of efficient management may be illustrated by using a typical yield-effort curve with a clear maximum at a moderate effort level (that is, a situation where the principle of maximum yield presents fewest problems). For a first approximation, the cost of fishing, assuming the efficiency of operations is unchanged, is proportional to the fishing effort, and the value of the output, assuming prices are unaffected, is proportional to the yield in weight. In Fig. 4, if an over-fished situation A is taken to be one in which costs equal value, then the line OA represents the line of equal costs and value. If fishing effort is reduced, without changing efficiency, to the level of effort giving the maximum yield (C_2) then the value of the yield will exceed the cost of catching it by an amount A_2C_2, of which about two-thirds (A_2B_2) represents reduction in cost, and one-third (B_2C_2) increased value. A greater excess of value (A_1C_1) over costs would be achieved, at a still lower level of effort, when most of the gain (A_1B_1) is due to reduction of costs, but also some (B_1C_1) to increased value. The important point is that even when the objective is simply to reach the maximum yield, the possible benefits that may be obtained are likely to be as much or more in the form of reduced costs, as in that of increased yield. Because so much of the benefit may be in economic terms, and because some of the problems arising in conservation, whatever the objective, are likely to be economic ones, it seems desirable that the Commission should be enabled to seek economic advice, just as at present it has available statistical, biological and oceanographic advice.

B. Methods of Conservation

B. 1. Introduction. In Article VIII(1) of the International Convention for the Northwest Atlantic Fisheries, five conservation measures are listed. These are:

(a) establishing open and closed seasons;

(b) closing to fishing such portions of a subarea as the Panel concerned finds to be a spawning area or to be populated by small or immature fish;

(c) establishing size limits for any species;

(d) prescribing the fishing gear and appliances the use of which is prohibited;

(e) prescribing an over-all catch limit for any species of fish.

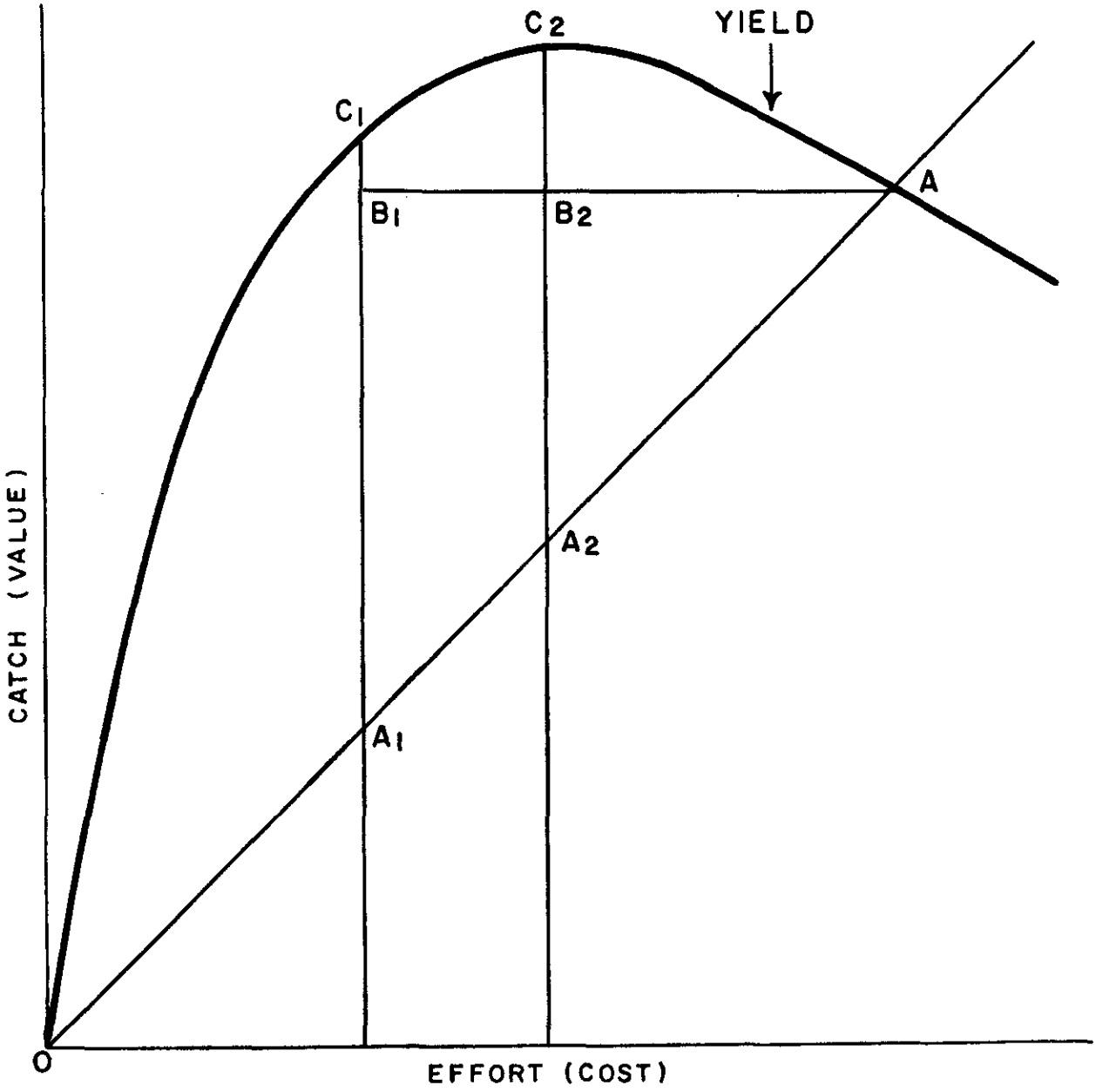

Fig. 4. The effect on yield and on the difference between value of the catch, and cost of fishing, of changes in the total fishing effort.

So far as the effects on the stock and future catches are concerned these measures can be classed according to whether they affect the sizes of fish caught, or the total fishing effort. The usefulness of regulations, particularly those affecting fishing effort, will be reduced if they seriously affect the efficiency of fishing (cost of unit fishing effort).

B. 2. Protection of spawning fish. For most fish stocks there is no very good evidence about the precise relation between the adult stock and the number of recruits produced. For some, e.g. the North Sea plaice, it is known that as the stock decreases (e.g. due to increased fishing), there is an improvement in the survival of eggs or young stages that almost exactly

balances the reduction in the total number of eggs laid, and the number of recruits changes little if at all. A similar constancy of recruitment is believed to hold for many other stocks, though for some there is evidence that recruitment is reduced if the adult stock decreases.

For those stocks where the number of young recruits is independent of the number of adults (over the range of adult stocks likely in practice) there is no need for specific protection of spawning fish. For most ICNAF stocks it is not yet known to what degree, if any, the production of recruits is affected by reduction of the number of eggs produced by the spawning populations, so that the maintenance of a sufficient spawning stock may be necessary.

If a sufficient spawning stock has to be maintained, this can only be done by adequate protection of the fish during their whole life. In many ICNAF stocks fishing on the immature part of the stock is increasing, and therefore the spawning stock could be sufficiently reduced to affect the number of recruits produced even though there was no fishing on the spawning stock. In such fisheries protection of the spawning fish is not a sufficient measure. Also prespawning and spawning fish are usually in large concentrations, and readily available to the fisherman, so that fishing at this time is likely to be most efficient (unless at this time the fish are in poor condition).

B. 3. Protection of small fish. This may be, to a greater or lesser degree, achieved by measures (b) closure of certain areas, (c) size limits, and (d) prohibiting certain types of gear — in particular mesh regulation of trawls.

Closure of areas primarily inhabited by small or immature fish is only feasible in the limited number of stocks for which reasonably well defined nursery grounds exist. For such stocks, especially when productive alternative grounds containing larger fish are available, such closures provide a method of protection of small fish which causes little disruption of fishing practice, and is a valuable method of conservation. Unfortunately, there are few easily defined nursery areas for the major ICNAF stocks.

The question of size limits for fish has been discussed by the Working Group on Fisheries Assessment (Supplement to the 1961 ICNAF Annual Proceedings, Vol. 11, p. 76). Where mesh regulations are in force, unless the size limit was placed near the lower part of the selection range, there would be so much wastage that the long-term gain would be reduced. If the limit were high in the selection range loss in discarded fish might well outweigh the gain to be expected from the legal mesh. If mesh regulations did not exist and a size limit were imposed it would not be possible to predict how the fishermen would adapt their mesh to the size limit and what the wastage would be.

There are now so many factory vessels and part-processing vessels with meal plants, and salting vessels engaging in the fisheries that size limits are impractical for the international fisheries in the ICNAF area.

The various aspects of mesh regulation have been well described in the Report of the Assessment Group (Supplement to the 1961 ICNAF Annual Proceedings, Vol. 11). Little need be added to this except to reiterate that the result of increasing fishing effort is to make the need for, and effect of, mesh regulation that much greater. However, by itself mesh regulation cannot do much to mitigate the effects of increasing effort.

B. 4. Control of fishing effort. Fishing effort may be controlled by measures (a) closed seasons, (d) limitation of types of gear, or (e) catch limit. Limitation of the type of gear is, however, effective in limiting effort to the extent that it reduces the efficiency of the gear, and hence increases the cost of exerting a standard unit of effort. Such a measure, therefore, can produce only that part of the benefit possible from restricting effort which comes from increased catch from the regulated stock, but not that part due to the reduced cost of taking that catch, or to the greater catch from some alternative stock.

Catch quotas and closed seasons are to some extent the same, particularly if the quotas are not allocated. In that case presumably fishing will be unrestricted until the quota is reached, and then fishing ceases, i.e., there is a closed season, the length of season being dependent on the amount of fishing. This method has been used for both the Pacific halibut and Antarctic whales. For the Pacific halibut the regulation was successful in reducing the effort to the desired level, but for the Antarctic whales the initial quota was set a little too high, and the subsequent inability of the International Whaling Commission to reduce the quota to the level suggested

by the later scientific findings has led to reduction in landings and a prospective collapse of the industry.

For both fisheries, as the regulation became effective in restricting the total effort, the competition between ships to maximize their individual shares of the total quota became intense and the season became shorter and shorter, thus dissipating much of the benefits in inefficient operations (particularly in the whaling industry where there was no alternative employment for the ships concerned). For the whales this problem was solved by allocating the total quota among countries, though this was done outside the Commission.

The events in these two fisheries point to two difficulties that are likely to arise whenever catch quotas are used. The first is that the objective of regulation is to achieve a particular level of the fishing mortality, i.e. fishing effort, but the effort exerted to catch a given quota depends on the stock abundance. There must therefore be a quick and simple procedure for adjusting catch quotas, corresponding to observed or predicted changes in stock, e.g. year-classes of unusual strength entering the fishery or depletion of the stocks by too high a quota in the previous season. Similar adjustments would have to be made to the length of open season to correct any over-optimistic estimates of the desired length of season, though not to allow for changes in year-class strength.

Secondly, as regulation becomes successful and stocks increase, more vessels are likely to enter the fishery and, to keep the effort at the proper level, the season becomes shorter — from 268 days to 24 days on one ground of the Pacific halibut. Thus, unless entry of vessels to the fishery is controlled, quota regulation tends to be wasteful of the capital invested in the fishery. Such waste may be reduced if there is an allocation of separate catch quotas to sections of the fishery within which competition may be less.

For closed seasons there are particular difficulties in a complex area such as ICNAF. Each major stock must have its separate season, and if these are consecutive then the mobile part of the total effort (i.e. freezer trawlers, salting vessels) could concentrate in turn on each stock, thus maintaining the high level of effort. If the seasons are simultaneous then during the closed season the most mobile vessels may be able to continue fishing elsewhere, for instance outside the ICNAF area, while other vessels, e.g. the inshore fleets, may have no alternative employment.

A similar inequity may occur with quotas. For many stocks there are different seasonal fisheries, e.g. an offshore winter-spring fishery, and an inshore summer fishery. If a single quota is set for the year, one or other of these seasonal fisheries will have a big advantage, depending on the date from which the quota year is calculated, e.g. if it is 1 January, the winter-spring fishery might be virtually unrestricted. Again these difficulties may be reduced by dividing the total quota among sections of the fishery or among countries. Then difficulties of an allocation between countries with a long and stable fishery in the ICNAF area and those whose fisheries in the area are developing are obvious.

The origin of these and most other problems of conservation is that when the stocks are in their optimum condition, the value of the catch is greater, and possibly very much greater, than the total cost of catching it. In an unregulated fishery this potential surplus is dissipated by "overfishing" — the effort (and hence cost) increasing unrestrictedly and the catch increasing very slowly or even decreasing. In a regulated fishery it is likely that the surplus will be dissipated by making, directly or indirectly, the fishing effort more and more inefficient. This is almost certain to happen unless there is a deliberate decision as to how the surplus should be obtained — as cheaper fish, better conditions for fishermen, or even as a direct contribution to the national treasury. For instance it has been suggested that the whale stocks should be owned and managed by a UN agency, not only because such a body could ensure rational management of the whale stocks but also because it would be a body which could well use the potential $100 million per year net income which could ultimately be taken from the Antarctic whale stock (the possible gross annual catch has been estimated to be worth $200 million).

In the ICNAF area different countries are likely to wish to use the potential surplus in different ways; this would be possible with the total quota divided nationally.

C. Application of Conservation

Recent events in the International Whaling Commission are very relevant to the general problems of putting conservation measures into operation. Some years ago the scientists pointed out that stocks of whales in the Antarctic were becoming depleted. No effective action was taken because it was felt that the scientists (who were not in complete agreement, at least in detail) could be mistaken. More recently, the decline in stocks became only too clear, and it was shown that only very drastic limitation in catches could halt the decline and allow the stocks to build up. Again there was no effective action because, it was claimed, the economic state of the industry was already too precarious. It now seems probable that the next few years will see still further reduction in Antarctic whaling.

The first lesson of general interest is that action may have to be taken before absolute certainty in understanding the state of the stocks is reached, otherwise events may have gone too far — though fortunately, because of their different reproductive powers, the collapse of fish stocks is likely to be much slower and less catastrophic than the collapse of the whale stocks.

Second, and more important, is that there is rarely any such thing as painless conservation, and nearly always some immediate sacrifice has to be made to achieve the long term gain. If this immediate loss is small, e.g. for some mesh changes, there may be no particular problem. More often the immediate loss may be appreciable, and unacceptable to the sections of the fishing industry concerned with the immediate future (ensuring this year's profit, or fulfilling this year's plan). If these sections have undue influence in national delegations to Commissions, little progress may be possible — on the east side of the Atlantic an increase of mesh size in at least one area has proved impossible, despite the clear case for such an increase, for this sort of reason. To achieve good conservation, Commissions, and more particularly national delegations, must be prepared to over-ride short-term sectional interests, either with firm enforcement of unpopular measures, or by suitable interim compensation to make the measures attractive. Otherwise, it will be difficult or impossible to ensure a productive and profitable fishery.

Another problem is that the losses and gains will not be equal for all sections of the fishery — an obvious example is that a hook and line fishery will suffer no immediate loss, but only a gain, from an increase in trawl mesh. If the differences are small then the inequalities may be acceptable, but otherwise a decision may have to be made as to some form of compensation.

To summarize, in most ICNAF stocks the amount of fishing is at present expanding. Inevitably this expansion must reduce the stocks and reduce the catch per unit effort. For many if not most of the stocks of major importance the amount of fishing has now reached a level such that further increase in fishing will bring little or no increase in catch, and may even reduce the catch. Some increase in catch may be obtained by protecting the small fish and allowing them to grow (e.g. by using a large mesh size) but if this is followed by further expansion of fishing, then the present situation of increased fishing giving reduced stock, and little or no increase in catch, will be repeated.

There must therefore be some direct control of the amount of fishing. All methods of doing this raise difficulties, but that presenting least difficulties is by means of catch quotas. There must be separate quotas for each stock of fish, e.g. for cod at West Greenland, and preferably be allocated separately to each section of the industry.

PART 5

Lists of Scientists and Laboratories Engaged in the Commission's Work

Canada

W. Templeman	Director, Groundfish biology and distribution	Fisheries Research Board of Canada, Biological Station, St. John's, Nfld.
A. M. Fleming	Groundfish statistics, cod	,, ,, ,, ,,
A. W. May	Cod	,, ,, ,, ,,
A. T. Pinhorn	Cod	,, ,, ,, ,,
E. J. Sandeman	Redfish	,, ,, ,, ,,
T. K. Pitt	Pleuronectids	,, ,, ,, ,,
R. Wells	Haddock	,, ,, ,, ,,
V. M. Hodder	Pelagic fishes	,, ,, ,, ,,
H. J. Squires	Invertebrates	,, ,, ,, ,,
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L. M. Dickie	Population dynamics	,, ,, ,, ,,
A. C. Kohler	Cod, statistics	,, ,, ,, ,,
P. M. Powles	Pleuronectids	,, ,, ,, ,,
A. V. Tyler	Species association	,, ,, ,, ,,
S. N. Tibbo	Pelagic fish	,, ,, ,, ,,
R. D. Humphreys	Herring	,, ,, ,, ,,
J. S. Beckett	Tuna and swordfish	,, ,, ,, ,,
F. W. H. Beamish	Behaviour	,, ,, ,, ,,
N. F. Bourne	Sea scallops	,, ,, ,, ,,
L. M. Lauzier	Hydrography	,, ,, ,, ,,
J. E. Paloheimo	Mathematical statistics	,, ,, ,, ,,
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R. F. Platford	Chemical oceanography	,, ,, ,, ,,
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A. S. Bursa	Phytoplankton	,, ,, ,, ,,
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J. Bergeron	Biology	,, ,, ,, ,,
G. Lacroix	Zooplankton	,, ,, ,, ,,
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Denmark

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France

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Federal Republic of Germany

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G. Jóakimsson	Codfish	,, ,, ,, ,,
E. Jónsson	Herring, Age determination	,, ,, ,, ,,
G. Jónsson	Radiobiology	,, ,, ,, ,,
J. Magnússon	Redfish	,, ,, ,, ,,
Mrs J. Magnsúson	Fish larvae	,, ,, ,, ,,
Sv. Aa. Malmberg	Physical oceanography	,, ,, ,, ,,
I. Őskarsson	Cod, Age determination Marine molluscs	,, ,, ,, ,,
A. Sigùrósson	Flatfish	,, ,, ,, ,,
Mrs U. Skuladóttir	Marine invertebrates	,, ,, ,, ,,
U. Stefánsson	Hydrography, Chemistry of sea water	,, ,, ,, ,,
Mrs Th. Thoróardóttir	Phytoplankton	,, ,, ,, ,,
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Italy

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E. Bratberg	Cod, halibut, redfish	,, ,, ,, ,,
O. Aasen	Dogfish, porbeagle, sharks	,, ,, ,, ,,
J. Hamre	Tuna	,, ,, ,, ,,

Poland

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J. Netzel	Fishery biology (redfish)	,, ,, ,, ,,
E. Stanek	Fishery biology (cod)	,, ,, ,, ,,
W. Strzyżewski	Fishing gear selectivity	,, ,, ,, ,,
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J. Corlett	Plankton	,, ,, ,, ,,
R. W. Blacker	Otolith reading	,, ,, ,, ,,
D. J. Garrod	Population dynamics	,, ,, ,, ,,
P. G. W. Jones	Chemical Oceanography	,, ,, ,, ,,
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A. P. Stickney	Herring behaviour	,, ,, ,, ,,
J. R. Uzmann	Parasitology	,, ,, ,, ,,
J. E. Watson	Herring biology	,, ,, ,, ,,