

INTERNATIONAL COMMISSION

**FOR THE
NORTHWEST ATLANTIC FISHERIES**



ANNUAL PROCEEDINGS

Vol. 14

for the year

1963-64

Issued from the Headquarters of the Commission

Dartmouth, N. S., Canada

1964

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 1963-64.

This is the fourteenth annual report of proceedings of the Commission and is an authoritative record of its activities and achievements during the period 1 July 1963 to 30 June 1964. The report contains an account of the activities of the Commission's Secretariat, an account of the Fourteenth Annual Meeting and summaries of research carried out in each of the five Convention subareas.

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 1964**1. The Commission's Officers**

At the Annual Meeting, June, 1963, the following officers were elected to serve

a. for a period of two years:

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)

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)

b. for a period of one year:

Chairman of Standing Committee on Research and Statistics—

Mr R. J. H. Beverton (UK)

Chairman of Standing Committee on Finance and Administration—

Dr J. H. MacKichan (Canada)

2. Panel Memberships for 1963/64

| 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 Headquarters

Effective 1 August 1963, the headquarters of the Commission was moved from the campus of Dalhousie University in Halifax, Nova Scotia, to the Bedford Institute of Oceanography in Dartmouth, Nova Scotia. The move, which allowed the University to reclaim much needed additional classroom space, was made possible through the kind invitation of the Department of Mines and Technical Surveys of the Canadian Government to the Commission to occupy office space in its fine new Bedford Institute of Oceanography.

In accordance with the unanimous decision of the Commission, a letter was sent to the President and Board of Governors of Dalhousie University expressing the appreciation of the Commission for accommodation for the Commission's headquarters since September 1953.

Accommodation in the Bedford Institute of Oceanography consists of a total of 1680 square feet of lighted and heated office space and approximately 220 square feet of dry storage for the Commission's publications.

Special thanks are due Dr W. N. English, Director of the Institute, and his staff for their warm welcome and generous assistance.

4. The Commission's Secretariat

Permanent members of the Secretariat were:

Executive Secretary—L. R. Day

Statistician—B. F. C. DeBaie

Editorial Assistant—W. H. Champion (from 15 November 1963)

Secretary—Miss Jean Maclellan

Clerk-Typist—Miss Gertrude Schrader

Clerk—Mrs Barbara MacKenzie

During the period covered by the report, the Executive Secretary discussed publication procedures with the Editor of the Fisheries Research Board of Canada in Ottawa, 3 December 1963; discussed common problems with Mr K. Atkinson, Executive Secretary of North-East Atlantic Fisheries Commission (formerly the Permanent Commission) in London, 23 January 1964; attended the ICNAF Environmental Symposium in Rome, 27 January-1 February 1964; discussed arrangements for the Fourteenth Annual Meeting with Mr G. Möcklinghoff of the Ministry of Food, Agriculture and Forests of the Federal Republic of Germany and Dr v. Brandt, Director of the Federal Institution of Fisheries Research in Hamburg, 4 February 1964; and discussed common problems with Dr A. Fridriksson, Secretary General of ICES, and Dr E. Bertelsen (Director) and Dr E. Poulsen of the Danish Institute for Marine and Fisheries Research, Charlottenlund, Denmark, 6-7 February 1964.

5. The Commission's Publications

Since January 1963 the Commission has issued almost 1500 pages of printed material in its seven publications.

The *Redbook* 1963 was issued in three parts as in 1962. Part I contains the Proceedings of the 1963 meetings of the Standing Committee on Research and Statistics. Part II contains the national reports on research in 1962, and Part III contains selected papers from the 1963 meetings. Part I was distributed in October 1963, Part II and III (one book) were distributed in December 1963.

The *Annual Proceedings* Vol. 13 for the year 1962-63 contains the Administrative Report for the year ending 30 June 1963 by the Executive Secretary, Report of the Thirteenth Annual Meeting 1963 by the Chairman of the Commission, Summaries of research carried out in each subarea of ICNAF in 1962, and a list of scientists and laboratories engaged in the Commission's work. The Annual Proceedings was distributed in December 1963 and copies are available (\$ Canadian 1.50) from the headquarters of the Commission.

The *Statistical Bulletin* Vol. 11 for 1961 was distributed in December 1963. Copies are avail-

able (\$ Canadian 3.00) from the headquarters of the Commission. The *Statistical Bulletin* Vol. 12 for 1962 was sent to the printers in March 1964, five months earlier than previous numbers.

The *List of Vessels* fishing in the Convention Area in 1962 was distributed in January 1964. Copies are available (\$ Canadian 2.00) from the Commission's headquarters.

The *Sampling Yearbook* Vol. 6 for 1961 was distributed in April 1963 and *Sampling Yearbook* Vol. 7 for 1962 was distributed in April 1964.

The ICNAF *Special Publication* No. 4 containing 64 scientific articles presented at the Commission-sponsored North Atlantic Fish Marking Symposium held at Woods Hole, Mass., May 1961, under the Chairmanship of Mr R. J. H. Beverton, was distributed in February 1964. This publication presents information on methods and effectiveness of marking, tagging, and tag recovery and on the analysis of results of marking and tagging experiments. It is of great value both to the experienced researcher and to those who are beginning research. Copies are available (\$ Canadian 4.00) from the Commission's headquarters.

The ICNAF *Special Publication* No. 5 (Vol. 2 of the Proceedings of the Joint ICNAF/ICES/FAO Special Scientific Meeting on Fishing Effort, the Effect of Fishing on Resources and the Selectivity of Fishing Gear, held in Lisbon, 1957) containing 24 scientific articles on the selectivity of fishing gear was distributed in February 1964. Copies are available (\$ Canadian 5.00) from the Commission's headquarters.

The *Research Bulletin* of ICNAF will make its initial appearance in 1964. As the title implies, this new serial publication will contain papers on the results of scientific research of importance to the work of the Commission. Papers for the first issue are now in press.

6. Newsletter

Two newsletters were distributed, No. 44 covering the period January 1963 to March

1964, and No. 45 covering the period April-June 1964. Future issues will be prepared and distributed quarterly.

7. Co-operation with Other International Organizations

During the year the Secretariat was in close contact with the Fisheries Division of the Food and Agriculture Organization of the United Nations (FAO), the International Council for the Exploration of the Sea (ICES), and the North-East Atlantic Fisheries Commission (NEAFC), formerly the Permanent Commission.

The Commission was represented at the Annual Meeting of ICES in October 1963 in Madrid by Mr R. J. H. Beverton (UK), at the Annual Meeting of the International North Pacific Fisheries Commission (INPFC) in November 1963 by Mr D. L. McKernan (USA), at the Annual Meeting of NEAFC in May 1964 at The Hague by Mr G. Möcklinghoff (Federal Republic of Germany), at the Executive Meeting of the Scientific Committee on Oceanic Research (SCOR) of the International Council of Scientific Unions (ICSU) on 8 and 9 June 1964 at Paris and at the meeting of the Intergovernmental Oceanographic Commission (IOC) from 10 to 19 June 1964 in Paris by Mr A. J. Lee (UK).

Regular exchange of publications, reports and meeting proceedings was maintained with FAO, ICES and NEAFC.

The Commission was pleased to accept an invitation to use the conference facilities of FAO in Rome for its Environmental Symposium, 27 January-1 February 1964.

8. Co-operation with Non-Member Countries

Japanese fishing activities in the Convention Area increased within the past year. The Government of Japan continues to supply catch statistics in the form required by the Commission and accepted an invitation to send an observer to the Commission's Fourteenth Annual Meeting in Hamburg, Federal Republic of Germany,

Belgium continues to report catch statistics as a result of fishing operations in the Convention Area.

9. Programmes and Reports of Research

Programmes of research for 1964 for each member country were exchanged through the Secretariat.

National reports of research to be carried out in 1963 in the Convention Area were being prepared as meeting documents for the 1964 Annual Meeting. Reports by Canada, Denmark, France, Germany, Iceland, Norway, USSR and UK on their participation in the ICNAF Environmental Surveys (NORWESTLANT 1-3) in the northern part of the Convention Area (Sub-areas 1, 2 and Divisions 3K and 3L) during April-June 1963, were being received and prepared for consideration at the 1964 Annual Meeting.

10. Statistics

Concerted effort by the Statistician has shortened the time required to publish the complete statistics of the fisheries in the Convention area (Statistical Bulletin of ICNAF) from two years to eighteen months.

In an attempt to provide the Commission's scientists with earlier and more complete statistics, preliminary statistical data on the groundfish and herring landings by countries and divisions in 1962 were made available prior to the 1963 Annual Meeting. With the assistance of FAO and the use of the new FAO/ICNAF statistical reporting form, STANA 1W, by member countries (except Canada and USA in 1963), 1963 landings for major species by country, sub-area and division were made available at the 1964 Annual Meeting.

Considerable time and effort was spent on graphic presentation of landings by species, country and year from 1952-62 inclusive (vide 1964 Meeting Document No. 7). In addition, consideration was given to a standard graphic presentation of landing and effort statistics to allow ready appraisal of trends by both Commissioners and scientists.

11. Otolith Exchange Programs

Exchange of cod, redfish and halibut otoliths has continued through the Secretariat. Results of readings of halibut and redfish otoliths by interested countries are reported in 1964 Meeting Document No. 8 and 9 respectively.

12. Changes in the Convention

The declaration of understanding that the words "fish", "fishes", "fishery", "fisheries" and "fishing", as they appear in the text of the Convention, include and apply to molluscs as well as finny fish, entered into force for all Contracting Governments 5 June 1963.

Proposed changes in the Convention to allow proposals for national and international measures of control, adopted by the Commission 7 June 1963, were forwarded to Depositary Government 10 July 1963, who circulated a draft protocol to member governments 25 September 1963.

A proposal for a change in the Convention regarding procedures for bringing into effect proposals adopted by the Commission was approved by the Commission 6 June 1964 and was forwarded from the Secretariat to Depositary Government 30 June 1964 for circulation to member governments.

13. International regulation of trawl fisheries

Amendments to regulations regarding savings gear in Subareas 1, 2, 3, 4, and 5, adopted by the Commission 7 June 1963, were forwarded to Depositary Government 10 July 1963 and are still under consideration by member countries.

Amendments to trawl regulations in Subareas 1, 2, 3, 4 and 5, allowing the Commission to establish minimum mesh sizes for trawl nets made of materials other than manila based on a standard for trawl nets made of manila and measured with an ICNAF gauge were adopted by the Commission 6 June 1964 and forwarded to Depositary Government 30 June 1964 for circulation to member governments.

14. Inspection of Regulated Fisheries.

In accordance with the decision of the Commission, the results of inspections by member countries of trawl gear in regulated fisheries and subareas for 1963 were submitted for consideration by the Commission at the 1964 Annual Meeting on a new form "Annual Returns of Infringements".

15. Meetings

The Co-ordinating Committee for the ICNAF Environmental Surveys (NORWEST-LANT 1-3) met in Madrid 7 October 1963, (during the ICES Meeting) under the Chairmanship of Mr A. J. Lee to discuss the working-up of the material collected.

The ICNAF Environmental Symposium, another major feature of the environmental program of the Commission was held, by courtesy of the Director General of FAO in Rome from 27 January to 1 February, 1964, under the Chairmanship of Dr C. E. Lucas. The Symposium considered aspects of the influence of the environment on the principal fish stocks of the North Atlantic. Pre-meeting circulation of 90 scientific contributions allowed the participants to devote a maximum of time to sessional discussion. About 70 scientists from 12 countries attended. Considerable progress has been made in preparing the contributions for publication in the Commission's Special Publication Series.

16. Financial Statements for the Fiscal Year ending 30 June 1964

The accounts of the Commission for the year ending 30 June show an appropriation of \$ Canadian 71,540 and at total expenditure of \$74,209 leaving a deficit balance of appropriations of \$2,669.

The audit of the Commission's finances was made by the Auditor General's Office of the Government of Canada in July 1964.

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

EXHIBIT I

**Statement of Budget Appropriations, Obligations Incurred
and the Balance of Appropriations
for the year ended 30 June 1964
(Expressed in Canadian Dollars)**

| Purposes of Appropriation | Appropriated by Commission | Obligations Incurred | Surplus or Deficit (-) Balances of Appropriations |
|---|-------------------------------|-------------------------|--|
| Personal Services— | | | |
| Salaries | \$35,980 | \$35,607 | \$ 373 |
| Superannuation | 2,800 | 1,036 | 1,764 |
| Additional help | 1,200 | 1,154 | 46 |
| Medical plan | 200 | 181 | 19 |
| Travel | 6,000 | 7,384 | -1,384 |
| Transportation of things | 1,200 | 1,339 | - 139 |
| Communication services | 1,600 | 3,524 | -1,924 |
| Rent and utility services | 2,400 | 2,400 | — |
| Other contractual services, including printing | 10,800 | 11,584 | - 784 |
| Supplies and materials | 2,500 | 2,181 | 319 |
| Equipment | 1,600 | 2,326 | - 726 |
| Annual meeting | 5,260 | 5,493 | - 233 |
| | <u>71,540</u> | <u>74,209</u> | <u>-2,669</u> |

EXHIBIT II

**Statement of Income and Expenditure for the year ended 30 June 1964
(with comparable figures for the year ended 30 June 1963)
(Expressed in Canadian Dollars)**

| Income: | 1964 | 1963 |
|--|-----------------|-----------------|
| Members' contributions assessed— | | |
| Canada | \$ 7,145 | \$ 6,674 |
| Denmark | 2,181 | 2,015 |
| France | 7,145 | 6,674 |
| Germany, Federal Republic | 3,836 | 3,568 |
| Iceland | 2,181 | 2,015 |
| Italy | 3,836 | 3,568 |
| Norway | 2,181 | 2,015 |
| Poland | 5,490 | 5,234 |
| Portugal | 7,145 | 6,674 |
| Spain | 7,145 | 6,674 |
| Union of Soviet Socialist Republic | 8,797 | 8,260 |
| United Kingdom | 5,490 | 5,121 |
| United States of America | 5,490 | 5,121 |
| | <u>\$68,062</u> | <u>\$63,613</u> |
| Miscellaneous income — | | |
| Sales of publications | 4,116 | 1,389 |
| Bank interest and exchange | 782 | 925 |
| Refund of previous year's expenditure | 145 | — |
| | <u>5,043</u> | <u>2,314</u> |
| Expenditure: | | |
| Obligations incurred (Exhibit I) | 73,105 | 65,927 |
| Excess of obligations incurred over income carried to surplus account | 74,209 | 67,152 |
| | <u>1,104</u> | <u>1,225</u> |

EXHIBIT III
Statement of Assets and Liabilities as at 30 June 1964
 (with comparable figures as at 30 June 1963)
 (Expressed in Canadian Dollars)

| | Assets | | Liabilities | |
|-----------------------------|---------------|---------------|--------------------|-----------------|
| | 1964 | 1963 | 1964 | 1963 |
| GENERAL FUND | | | | |
| Cash on deposit | \$ 6,055 | \$18,872 | \$ 3,853 | \$ 7,457 |
| Accounts receivable | 350 | 443 | 178 | 8,380 |
| | | | 3,934 | |
| | | | 769 | |
| | | | <u>4,703</u> | |
| | | | 1,225 | <u>3,478</u> |
| | <u>6,405</u> | <u>19,315</u> | <u>2,374</u> | <u>19,315</u> |
| | \$10,000 | \$10,000 | \$10,000 | \$10,000 |
| WORKING CAPITAL FUND | | | | |
| Cash on deposit | | | | |
| | | | 3,478 | |
| | | | <u>1,104</u> | |
| | | | <u>3,478</u> | |
| | | | 1,104 | <u>3,478</u> |
| | <u>6,405</u> | <u>19,315</u> | <u>2,374</u> | <u>19,315</u> |
| | \$10,000 | \$10,000 | \$10,000 | \$10,000 |
| | | | Principal of Fund | |
| | | | | <u>3,478</u> |
| | | | | <u>19,315</u> |
| | | | | <u>\$10,000</u> |

PART 2

Report of Fourteenth Annual Meeting

of the

International Commission for the Northwest Atlantic Fisheries**Hamburg, Federal Republic of Germany, 1-6 June 1964**

BY THE CHAIRMAN, MR K. SUNNANAA

1. Introduction

Under the terms of a Convention signed in 1949, the International Commission for the Northwest Atlantic Fisheries (ICNAF) is responsible for promoting and co-ordinating scientific studies on the stocks of the species of fish which support international fisheries in the Northwest Atlantic. Based on these researches, the Commission recommends measures to keep these stocks at a level permitting the maximum sustained catch.

The Commission has five panels, each one reviewing the status of and recommending proposals for the fisheries in a geographic subarea of the Convention Area. Panel 1 administers the fisheries in the subarea off West Greenland (Subarea 1), Panel 2 the subarea off Labrador (Subarea 2), Panel 3 the south and east of Newfoundland and on the Grand Banks (Subarea 3), Panel 4 the Gulf of St. Lawrence and Nova Scotia Banks (Subarea 4) and Panel 5 the Gulf of Maine and Georges Bank (Subarea 5).

2. Time and Place of Meeting

The Fourteenth Annual Meeting of the International Commission for the Northwest Atlantic Fisheries was held, at the invitation of the Ministry of Food, Agriculture and Forestry of the Federal Republic of Germany, at the Federal Institute for Fisheries Research, Hamburg-Altona, from 1 to 6 June 1964 under the chairmanship of Mr Klaus Sunnanaa of Norway.

Plenary sessions were preceded by various scientific meetings starting 21 May 1964. The *ad hoc* Working Group on Herring and Other Pelagic Fishes met from 21 to 23 May 1964

under the chairmanship of Mr B. E. Skud of USA. The Subcommittee on Fishery Assessment in relation to Regulation Problems also met from 21 to 23 May 1964 under the chairmanship of Dr L. M. Dickie of Canada. The Standing Committee on Research and Statistics and its various subcommittees met from 25 to 29 May 1964 under the general chairmanship of Mr R. J. H. Beverton of the United Kingdom. Groups of Scientific Advisers to each of the five Panels met on 30 May 1964.

Throughout the week of 1 June 1964 the Commission met in plenary session and assigned various agenda items and other matters to 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)

Commissioners from the 13 member countries were present with their advisers and experts. Observers were present, at the invitation of the Commission, from the Food and Agriculture Organization of the United Nations (FAO), the International Council for the Exploration of the Sea (ICES), and the North-East Atlantic Fisheries Commission (NEAFC). Special mention must be made of the participation for the first time of 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 1964-

65 are presented on the inside of the front cover of this Report.

4. Opening of Meeting (Agenda Item I)

The opening session was convened in the Main Hall of the Federal Institute for Fisheries Research, Hamburg-Altona on 1 June 1964. The Chairman of the Commission, Mr Klaus Sunnanaa presided over the session. He welcomed the guests, observers and delegates to the Fourteenth Annual Meeting of the Commission and introduced Ministerialdirigent Dr Gerhard Meseck of the Federal Ministry of Food, Agriculture and Forestry, who welcomed the delegates to the Federal Republic of Germany on behalf of the Federal Minister of Food, Agriculture and Forestry. He spoke of the appreciation of his government for the co-operative and constructive efforts of the Commission to maintain the stocks of fish in the Northwest Atlantic. He pointed out the similarity of the fisheries problems over the whole of the North Atlantic and the possibility of developing a broader co-ordination of effort in their solution. He wished the meeting every success and hoped that its delegates would find time to enjoy the cosmopolitan city of Hamburg.

After adjournment of the opening session, the first Plenary Session was convened by Chairman Sunnanaa. Second, third and final Plenary Sessions were convened on 3 June, 5 June and 6 June respectively. During these meetings the following business of the Commission was concluded.

5. The Agenda (Item 2, Appendix II)

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

6. Publicity for the Meeting (Item 3)

The Commission agreed that the Chairman of the Commission and the Chairmen of the Standing Committees on Research and Statistics and Finance and Administration and Mr G Möcklinghoff of the Federal Republic of Ger-

many should constitute a committee to control policy regarding publicity.

7. Review of Panel Memberships (Item 4)

The Commission reviewed panel memberships as required under Article IV(2) of the Convention. No applications for new memberships were received during the year 1963-64. All Contracting Governments were represented on panels on the basis of their current substantial exploitation of ICNAF species of fishes in the subareas concerned. Panel memberships for the year 1964-65 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 1963 (1963 Annual Proceedings, Vol. 13, Part 1, Item 19);
- (ii) Administrative and Financial Report for the fiscal year ending 30 June 1964 (complete to 4 May 1964) (1964 Meeting Document No. 70);
- (iii) Budget estimate for the fiscal year ending 30 June 1965 (Appendix I

to the Agenda for the 1964 Meeting of the Standing Committee on Finance and Administration);

- (iv) Budget forecast for the fiscal year ending 30 June 1966 (Appendix II to the Agenda for the 1964 Meeting of the Standing Committee on Finance and Administration).

(b) Report of the Standing Committee on Finance and Administration

At the first Plenary Session, the Commission assigned all financial and administrative items on its agenda (Items 5, 6, 7, 8, 9, 22, 23 and 24) to the Committee for consideration. These items and Item 15 referred to the Committee from the first meeting of Commissioners were dealt with and reported upon by the Committee in meetings held on 2, 4 and 5 June 1964. Reports of the Committee were presented to the Commission at its final plenary session. **Recommendations** adopted by the Commission are summarized below:

- (i) that the accounts of the Commission showing expenditures totaling \$ Can. 67,152 against appropriations of \$ Can. 67,540 and the report of the Commission auditor, the Auditor General of Canada, for the fiscal year ending 30 June 1963 be adopted;
- (ii) that the provisional Administrative Report prepared by the Executive Secretary for the fiscal year ending 30 June 1964 with financial statement to 4 May 1964 (1964 Meeting Document No. 70) be adopted;
- (iii) that the office accommodation for the Secretariat which is guaranteed to 1 August 1966 in the Bedford Institute of Oceanography be reviewed at the Fifteenth Annual Meeting;
- (iv) that draft agenda and budget estimates and forecasts be circu-

lated to member countries in January of each year;

- (v) that each contracting Government be billed by the Commission, for payments due under the 1964-65 administrative budget of the Commission in accordance with Article XI of the Convention, on 1 August 1964;
- (vi) that the Fifteenth Annual Meeting of the Commission be held in Halifax, Nova Scotia, Canada, from 7 to 12 June 1965;
- (vii) that the salary structure and classification effective for employees of the Fisheries Research Board of Canada be used as a guide for the Commission to establish salaries for the staff of the Commission's Secretariat and that position classifications be established based on comparative written job descriptions. Suggested classifications might be made by an appropriate board of the Civil Service of Canada.
- (viii) that, in return for considerations during the ICNAF Environmental Symposium held at FAO, Rome, in January - February 1964, 200 copies of each of the North Atlantic Fish Marking Report (ICNAF Special Publication No. 4) and the Report on Selectivity of Fishing Gear (ICNAF Special Publication No. 5) be sent to the Fisheries Division of FAO with the compliments of the Commission.
- (ix) that the following United States proposal for changes to paragraphs 7 and 8 of Article VIII of the Convention which would establish less time-consuming procedures for bringing into effect regulatory measures adopted by the Commission, be circulated, through Depositary Government,

for consideration by Contracting Governments before the Fifteenth Annual Meeting:

“7. (a) Each proposal made by the Commission under paragraphs 1 or 5 of this Article shall become effective for all Contracting Governments six months after the date on the notification from the Depositary Government transmitting the proposal to the Contracting Governments, except as otherwise provided herein.

“ (b) If any Contracting Government participating in the Panel or Panels for the subarea or subareas to which a proposal applies, or any Contracting Government in the case of a proposal made under paragraph 5 above, presents to the Depositary Government objection to any proposal within six months of the date on the notification of the proposal by the Depositary Government, the proposal shall not become effective for any Government for an additional sixty days. Thereupon any other Contracting Government participating in the Panel or Panels concerned, or any other Contracting Government in the case of a proposal made under paragraph 5 above, may similarly object prior to the expiration of the additional sixty-day period, or within thirty days after receiving notice of an objection by another Contracting Government made within such additional sixty days whichever date shall be the later. The proposal shall become effective for all Contracting Governments except those Governments which have presented objections, at the end of the extended period or periods for objecting. If, however, objections have been presented by a major-

ity of Contracting Governments participating in the Panel or panels concerned, or by a majority of all Contracting Governments in the case of a proposal made under paragraph 5, the proposal shall not become effective unless any or all of the Contracting Governments nevertheless agree as among themselves to give effect to it on an agreed date.

“ (c) Any Contracting Government which has objected to a proposal may at any time withdraw that objection and the proposal shall become effective with respect to such government, immediately if the proposal is already in effect, or at such time as it becomes effective under the terms of this Article.

“8. The Depositary Government shall notify each Contracting Government immediately upon receipt of each objection and of each withdrawal of objection, and of the entry into force of any proposal.”

(x) that the Commission appropriate a sum of \$ Can. 74,000 from Contracting Governments to meet Ordinary Expenditures for the fiscal year ending 30 June 1965, the appropriations to be used for the following purposes:

| | |
|---------------------------|----------|
| 1. Personal Services | |
| (a) Salaries | \$41,300 |
| (b) Superannuation | 1,200 |
| (c) Additional help | 1,200 |
| (d) Medical plan | 300 |
| 2. Travel | 3,500 |
| 3. Transportation | 500 |
| 4. Communications | 2,000 |
| 5. Publication | 11,300 |

| | |
|------------------------------------|----------|
| 6. Other Contractual Services..... | 5,200 |
| 7. Materials and Supplies | 3,000 |
| 8. Equipment | 1,500 |
| 9. Annual Meeting | 3,000 |
| | <hr/> |
| TOTAL | \$74,000 |

(xi) that a sum of \$ Can. 7,500 be advanced from the Working Capital Fund to finance a Special Environmental Project (part of cost of publishing the contributions to the Environmental Symposium as ICNAF Special Publication No. 6) during the fiscal year ending 30 June 1965 and that the amount of the advance be reimbursed to the Working Capital Fund over a period of three years beginning in the fiscal year ending 30 June 1967.

(xii) that the Contracting Governments note for consideration at the Fifteenth Annual Meeting, the following advance budget estimate of \$ Can. 80,000 for Ordinary Expenditures and \$ Can. 11,000 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 as ICNAF Special Publication No. 7) for the fiscal year ending 30 June 1966:

| | |
|-------------------------|----------|
| 1. Personal Services | |
| (a) Salaries | \$41,300 |
| (b) Superannuation .. | 1,200 |
| (c) Additional help .. | 1,200 |
| (d) Medical plan | 300 |
| 2. Travel | 4,000 |
| 3. Transportation | 500 |
| 4. Communications | 2,500 |
| 5. Publication | 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 |
| | <hr/> |

Total Ordinary Expenditures \$80,000

Total Special Project (Environmental) \$11,000

(xiii) that the Commission note the retirement of Dr J. Howard MacKichan after 13 years of devoted and valuable service as Chairman of the Committee and the election of Mr R. W. Green of the United States as Chairman of the Committee for the year ending 30 June 1965.

9. Report of the AD HOC Committee on Trawl Regulations (Items 10, 11, 12 and 13)

The Commission, at its first Plenary Session, assigned agenda items 10, 11 and 12 to the committee under the chairmanship of Mr H. Gardner of the United Kingdom. Commissioners at their first meeting also assigned plenary item 13 to the Committee. **Recommendations** of the Committee adopted by the Commission are summarized below:

- (i) that the Annual Returns of Infringements to ICNAF Trawl Regulations for 1963 by member countries be accepted;
- (ii) that the form "Annual Returns of Infringements relating to mesh size, mesh obstruction and excess landings" be accepted with suggested improvements (1964 Meeting Proceedings No. 15, para. 4);
- (iii) that each member country supply to the Commission Secretariat a statement of its procedures for

enforcement of the Commission's trawl regulations and particularly of the instructions given to its enforcement officers and a general statement of its views as to the form that should ultimately be taken by a system of international inspection or joint enforcement when powers are available in the Convention; national statements to be collated and circulated to member countries not less than four months before the Fifteenth Annual Meeting of the Commission;

- (iv) that, in order to gain experience in each others' enforcement procedures and problems, invitations be given in the next 12 months to enforcement officers of member countries to accompany the inspection officers of other countries on their work.

The Committee received the report of its Working Group on Chafing Gear and Mesh Measuring Problems and recommended

- (v) that member countries be encouraged to adopt synthetic materials in the construction of nets that are sufficiently strong not to require additional topside cod-end protection, or methods of hoisting the net on board that obviate this need;
- (vi) that member countries using topside chafing gear which differs from that approved by the Commission, submit results of selectivity experiments for study by the Standing Committee on Research and Statistics;
- (vii) that paragraph 1 of the Trawl Regulations for groundfish in Subareas 1, 2 and 3 adopted by the Commission at its Eleventh Annual Meeting (1961 Annual Proceedings Vol. 11, pages 15-16) be amended to read as follows:

"1. The Contracting Governments take appropriate action to prohibit (except as provided in paragraphs 2 and 3) the taking of groundfish in Subareas 1, 2 and 3 by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 114 millimetres 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 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."

- (viii) that paragraph 1 of the Trawl Regulations for cod, haddock and flounder in Subarea 4 adopted by the Commission at its Eleventh Annual Meeting (1961 Annual Proceedings Vol. 11, page 17) be amended to read as follows:

"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, *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 millimetres or 4½ in. 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."

- (ix) that paragraph 1 of the Trawl Regulations for cod and haddock in Subarea 5 adopted by the Commission at its Fifth Annual Meeting (1955 Annual Proceedings Vol. 5, pages 11-12) be amended to read as follows:

"1. That the Contracting Governments take appropriate action to prohibit (except as provided in paragraph II) the taking of cod, *Gadus morhua* L., and haddock, *Melanogrammus aeglefinus* (L.), in Subarea 5, by persons under their jurisdiction with trawl nets having in any part of the net meshes of dimensions less than 4½ in. or 114 millimetres 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."

- (x) that, when the regulations proposed in paragraphs (vii), (viii) and (ix) enter into effect, the Commission adopt mesh-size equivalents for material other than manila, and for the different methods of measurement indicated below:

| Type of Net | ICNAF gauge | ICES and simple gauge |
|--|--------------------|-----------------------|
| Seine Net | 100 mm (4 in.) | 95 mm (3¾ in.) |
| Such part of any trawl net as is made of cotton, hemp, polyamide fibres or polyester fibres. | 105 mm (4⅛ in.) | 100 mm (4 in.) |
| Such part of any trawl net as is made of manila or any other material not mentioned above. | 114 mm (4½ in.) | 110 mm (4⅜ in.) |

- (xi) that the Commission study a Canadian proposal to introduce a clause in the trawl regulations providing an **annual** exemption for incidental catches of regulated species in Subarea 4 and Division 3NOP, similar to a clause in effect for Subarea 5 (1956 Annual Proceedings Vol. 6, page 16) and to consider

amendments to all existing and proposed trip and annual exemption clauses to apply to incidental catches of **all** regulated species rather than to catches of **each** regulated species; the Canadian proposal to be circulated more than 60 days in advance of the Fifteenth Annual Meeting of the Commission.

10. Report of the Meeting of Commissioners
(Items 13, 14, 15, 18)

The Commissioners met on 1, 2 and 3 June 1964 under the chairmanship of Mr K. Sunnaa of Norway to consider items 13, 14, 15 and 18 assigned at the first Plenary Session. The Commissioners, in turn, referred Item 13 to the *ad hoc* Committee on Trawl Regulations (see Section 9 above) and item 15 to the Standing Committee on Finance and Administration (see Section 8 above). Reports of the Commissioners' meetings were adopted by the Commission at its final Plenary Session. **Recommendations** adopted are summarized below:

- (i) that the Assessment Subcommittee of the Standing Committee on Research and Statistics be commended for the progress made in its report to the Commission (Redbook 1964, Part I, Appendix VII), and be urged to continue its analysis and interpretation of trends in the fisheries and its researches into the effects of fishing on the stocks, along the lines proposed and to report further progress at the 15th Annual Meeting of the Commission;
- (ii) that the Chairman of the Standing Committee on Research and Statistics and the Chairman of the Assessment Subcommittee review the various kinds of action which might be taken by the Commission for the purpose of maintaining the stocks of fish in the Convention 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 member countries not later than 31 January 1965.

11. Report of the Standing Committee on Research and Statistics (Items 17, 18 and 23)

The Committee, under the chairmanship of Mr R. J. H. Beverton of the United Kingdom, and its Subcommittees and working groups met during the week 25-29 May 1964. These meetings were preceded by separate and joint meetings of the *ad hoc* Working Group on Herring and Other Pelagic Fish and of the Subcommittee on Fishery Assessment in relation to Regulation Problems from 21 to 23 May 1964.

Of vital significance to the Commission and member countries was the scientific advice provided by the Assessment Subcommittee, at the request of the Commission (Agenda Item 18), on the problem of the adequacy of present ICNAF conservation measures in the face of recent increased fishing activity and its probable consequences. The advice resulted in recommendations from the meeting of Commissioners (See Section 10 above) which were adopted by the Commission.

No less significant are the real achievements reported by the Environmental Subcommittee with completion of two pioneering projects. The Environmental Survey (NORWEST-LANT 1-3) from April to July 1963 co-ordinated the efforts of eight countries using eleven research vessels in a study of spawning and survival of cod and redfish young in relation to the environmental conditions at the northern limit of the geographical range of the species. The Environmental Symposium from 27 January to 1 February 1964 provided ideas for environmental studies to distinguish between the effects of the environment and the effects of fishing on changes in the fish stocks.

Of particular interest is the almost two-fold increase in total landings from Georges Bank (Div. 5Z) due to the heavy exploitation by the

USSR fleet of silver hake and herring, species hitherto of only minor importance in the landings.

Members of the Committee heard the distinguished German scientists, Dr G. Hempel, on intrinsic differences in the survival of herring larvae, and, Dr H. Mohr, on fish behaviour in relation to fishing gear, at a short informal scientific session during the week.

The report of the Committee with appendices contains the results of the work of the Committee and its subcommittees and working groups and is contained in the ICNAF Redbook for 1964. 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** that:

- (i) for mesh assessments, no major revision of assessments is offered beyond those given for redfish in Division 3NO (1964 Redbook, p. 37) and for redfish and other species in Subareas 4 and 5 (1961 Mesh Assessment Report); mesh size increases for American plaice in 4T up to about 6 inches would give long-term gains in yield; mesh size greater than 4 inches for silver hake in Subarea 5 would cause immediate and probably long-term losses in yield; increase in ring size of mesh in the scallop fishery, although it would give long-term gain in yields is not practicable and alternative methods of regulation are being considered; the effects on the 1961 mesh assessments of recent increased fishing activity and a greater concentration on smaller fish are estimated;
- (ii) for assessment of effects of fishing, studies of recent trends in catches and fishing activity, long-term assessments of the relation-

ship between catch and fishing intensity and the productivity of ICNAF fisheries show that the continuity with which many of the major stocks of cod and haddock are now being fished is near that at which they can provide their greatest sustained catches and that mesh-size regulations while helping to keep up the total catches cannot offset the expected decrease in the ratio of catch landed to fishing effort expended, if fishing activity continues to increase;

- (iii) future work will include analyses and interpretations of trends in the ICNAF fisheries; improvements to assessments of the effects of mesh increase in the light of recent changes in the fishery and since fishing in the ICNAF area is intensifying and is spreading to a variety of species, knowledge of the general productivity of marine communities is becoming more important and, it is therefore **recommended**:

that ICNAF express formally to FAO its interest in the promotion of studies on the fish and fish-food phases of production chains in marine communities and offer to co-operate in co-sponsoring a symposium if required.

(b) **Environmental Studies**

The Committee **noted** that the Environmental Symposium was successfully completed at FAO in Rome, 27 January-1 February 1964 under the chairmanship of Dr C. E. Lucas and plans were completed for publication of the contributions. Topics ranged from matters of direct relevance to practical fishing operations to long-range climatic changes in the North Atlantic and their effect on the abundance of the fish stocks. The symposium provided ideas on how best to direct research, both national and international, to obtain a better understanding of the long-range productivity of fish resources in relation to the environment.

The Committee recognized the success of the symposium and **recommended** the following item from the Environmental Subcommittee's report:

that the Commission's appreciation be officially conveyed to the Director General of FAO, Dr Sen, for the Organization's generous and invaluable hospitality on this occasion, and especially for the help rendered by the staff of Biology Branch of the Fisheries Division.

The Committee further **noted** that the Environmental Survey (NORWESTLANT 1-3) April-July 1963 was successfully completed with Mr A. J. Lee responsible for the planning and co-ordination. Reports from all participating countries were received. Preliminary analyses show a marked lack of cod larvae at both South and West Greenland despite an earlier abundance of eggs. A meeting of those responsible for preparing the final report on NORWESTLANT was approved for Copenhagen on 25-26 September 1964 at national expense.

(c) Gear and Selectivity

The report of the Gear and Selectivity Subcommittee was approved by the Committee which **noted** that the selectivity of polyamide and polyester fibres, e.g. nylon, terylene, is 5% to 16% higher than manila, while that of polyethylene, e.g. courlene, is roughly the same as manila; that the ICNAF mesh gauge, used at a pressure of 12 lb., gives readings 4% to 7% higher than that of the ICES gauge at a pressure of 4 kg for both manila and synthetic fibres and about 5% higher than that of the parallel-sided enforcement type gauge; that further information is requested on the selectivity of codends fitted with a new topside chafer used by large Soviet and Polish trawlers; that information on mesh size and types of gear used is to be provided by all member countries on a new form devised for this purpose.

(d) Sampling

The Committee **noted** that, because of their basic importance in fish population research, age-length keys will be published in the ICNAF

Sampling Yearbook and approved a **recommendation** that ICNAF should inform ICES of its great interest in a meeting to consider ways and means of achieving the maximum degree of uniformity in the collection and presentation of fish sampling data and to discuss the scientific basis of sampling techniques and their application to fisheries research, should one be organized by ICES.

(e) Statistics

The Committee **noted** that the 1963 innovations in the collection and reporting of ICNAF statistics, including the use of STANA common reporting forms, is working satisfactorily; that a simplified form for reporting discards and industrial fish catches was devised; that proposals made by ICNAF to ICES and FAO in 1963 regarding the future of the joint ICES/ICNAF/FAO Continuing Working Party (CWP) (Annual Proc. 13, Section 12 (d)) were accepted; that ICNAF and ICES will exchange reports of their Statistical Subcommittees; that, for the first time, complete catch statistics were available at the 1964 meeting for the immediately preceding year (1963) due to the service of the ICNAF Secretariat, the help of Mr D. Gertenbach of FAO and the co-operation of member countries.

(f) Ageing Techniques and Tagging

The Committee approved the report of the *ad hoc* Group on Tagging and the Subcommittee on Ageing Techniques and **noted** that first result of the exchange of cod otolith photographs to improve the standard and comparability of age-reading was encouraging; that exchange of ideas on methods of tag reporting and publicity in member countries was useful.

(g) Herring and Other Pelagic Fish

The Committee **noted** that the report of the newly-formed Subcommittee contains a valuable summary of the information on the progress of the herring fisheries and plans for co-ordinated research. The report includes also an account of recent developments in fisheries for other pelagic fish, including tuna, swordfish, sharks and mackerel in the ICNAF area.

(h) Publications

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

- (i) that a sum of \$5,000 be allotted in the year 1965/66 in addition to the \$7,500 allotted in 1964/65 to meet the total cost of publishing the proceedings of and contributions to the 1964 Environmental Symposium in the ICNAF Special Publication Series;
- (ii) that the sum of \$6,000 be allocated in the year 1965/66 to cover the cost of printing the NORWESTLANT Report in the ICNAF Special Publication Series;
- (iii) that the Executive Secretary in conjunction with the Chairman of the Standing Committee on Research and Statistics and its Environmental Subcommittee discuss with the American Geographical Society their suggestion that charts of the results of NORWESTLANT be published in the Serial Atlas of the Marine Environment and to make arrangements accordingly provided no expense to the Commission is incurred;
- (iv) that National Research Reports carry the name(s) of those responsible for the research and for compiling the report.
- (v) that the Commission endeavour, at the earliest opportunity, to adopt again the arrangements which were used prior to 1962 for publication of National Research Reports in the Annual Proceedings and Summaries of Research by subareas in the Redbook.

(i) Other Matters

The Committee, having considered relevant parts of the Report of the FAO Working

Party for National Utilization of Tuna Resources in the Atlantic Ocean, **recommended:**

- (i) that the Commission send FAO a copy of the Report of the Subcommittee on Herring and Other Pelagic Fishes for 1964, which details the present status of ICNAF's interest in tuna statistics and research and inform FAO that ICNAF would be willing to cooperate with any future Atlantic Tuna Organization in working out arrangements for handling tuna statistics and research in the ICNAF area;
- (ii) that, if the Commission receive an invitation to send an observer to a plenipotentiary conference for setting up an Atlantic Tuna Organization, the Executive Secretary and Chairman of the Standing Committee on Research and Statistics be empowered to appoint such an observer.

The Committee recognizing the common scientific basis of the work of both the ICES Liaison Committee and the ICNAF Research and Statistics Committee **recommended:**

- (iii) that the Commission request the North - East Atlantic Fisheries Commission (NEAFC) to transmit each year the approved Report of the ICES Liaison Committee to ICNAF for use by its Standing Committee on Research and Statistics at its Annual Meeting which follows that of NEAFC.

(j) Organization and Functions of Research and Statistics

The Committee, concerned at the limited opportunity to give proper attention to the scientific basis of its work and to its reporting to the Commission during the one week immediately preceding the Annual Meeting of the Commission, **recommended:**

- (i) that approval be granted for one or other of its subcommittees or,

when possible, smaller nominated working groups to meet in mid-year, when appropriate contiguously with the Annual Meeting of ICES or quite separately, as required and

- (ii) that particular requests, from the **Environmental Subcommittee** for a two day meeting prior to ICES for those concerned with preparation of the final NORWESTLANT report, from the **Sampling Subcommittee** for a special meeting with ICES scientists to deal with the scientific problems of sampling and the collection and reporting of sampling data and from the **Assessment Subcommittee** for mid-year meetings, not necessarily annually, to deal more effectively with the scientific basis of its work, be approved.

The Committee further **recommended**:

- (iii) that the Assessment Subcommittee meet 28 and 29 May 1965 and the Herring and Other Pelagic Fishes Subcommittee on 29 May 1965;
- (iv) that Mr A. J. Lee of the United Kingdom act as Commission observer at the forthcoming meetings of the Scientific Committee on Oceanic Research (SCOR) and Intergovernmental Oceanographic Commission (IOC) and Mr S. Olsen of Norway at the forthcoming meeting of ICES.

(k) The Committee elected Dr W. Templeman of Canada as Chairman for the ensuing year.

12. Reports of Meetings of Panels (Items 4, 17 and 25)

The Commission reviewed and approved the reports of Panels 1-5. Each panel considered the status of the fisheries, the research carried out and plans for future work 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, **noted** that cod landings decreased from 450 thousand to 380 thousand metric tons and redfish from 60 to 43 thousand metric tons, that Greenland waters, like in 1962, were colder than in recent years and that increased salmon catches in Greenland waters gave interesting returns from salmon tagged on both sides of the Atlantic and **recommended**

- (i) that results of cod tagging in the Greenland area in post-war years be submitted, by member countries to the Secretariat, for assessment at the Fifteenth Annual Meeting by a small working group, of the magnitude of interchange of cod stocks between Subarea 1 and East Greenland and Iceland;

- (ii) that environmental investigations, speedy reporting and pooling of biological data be encouraged in order to facilitate forecasts of possible long-term changes in the marine climate in Greenland waters and their subsequent impact on the fisheries;

- (iii) that member countries assist Dr Hansen of Denmark in assembling all the available information about relevant salmon taggings and returns for reporting at the Fifteenth Annual Meeting of the Commission.

(b) **Panel 2.** The panel, under the chairmanship of Mr H. Gardner of the United Kingdom, reviewed the status of the fisheries in Subarea 2 and **noted** that cod make up over 95% of the landings and that a decline in landings from 255 thousand tons in 1962 to 216 thousand tons in 1963 was due to a lessened activity of the USSR fleet in the area. The panel **noted** that greater amounts of ice in 1963 created unfavourable fishing conditions. Further data on the selection of nets of the

large stern trawlers during the spring cod fishery were needed. There were no changes recommended in conservation measures. However, the panel **noted** the Assessment Subcommittee report that most major stocks of cod and redfish are now exploited and unless new resources are found the catch per unit effort might be expected to decline rather sharply if the effort continues to rise.

- (c) **Panel 3.** The panel under the chairmanship of Mr V. M. Kamentsev of USSR, reviewed the status of the fisheries and research work and **noted** that due to increased landings of cod, redfish and flounders, total landings of major species were up to 590 thousand tons from 535 thousand tons. The panel took **note** of the likelihood that most fisheries for cod, haddock, redfish and flounder are in the neighbourhood of their maximum sustained yield and that as much information as possible should be obtained about the relative production of the different fish species for changes caused by their possible interactions. The panel referred a proposal to introduce to Divisions 3NOP an annual exemption for incidental catches of regulated species, similar to that in effect for Subarea 5, to the *ad hoc* Committee on Trawl Regulations (see Section 9 (xi)).
- (d) **Panel 4.** The panel, under the chairmanship of Captain Tavares de Almeida of Portugal, reviewed the status of the fisheries and **noted** that groundfish catches increased by 130 thousand tons to over 540 thousand tons due mainly to the development of the silver hake fishery by USSR and that swordfish and tuna landings both increased almost fourfold from about 1500 tons and 115 tons respectively. Both USA and USSR agreed to make every effort to obtain information on quantities and sizes of regulated species caught (including discards) in fisheries for non-regulated species in Subarea 4. Canada gave notice that proposals for changing the 10% exemption clause for regulated species taken incidentally to the fishery for non-regulated species would be presented

for study at the Fifteenth Annual Meeting. The panel **noted** from the Assessment Committee report that major fisheries for cod, haddock, redfish and flounder stocks may have reached or passed their maximum sustained yield.

- (e) **Panel 5.** The panel, under the chairmanship of Mr W. C. MacKenzie of Canada, **noted** increases in catches of all species, particularly silver hake, except herring to give record total landings of about 480 thousand tons. Proposed studies of mortality rates and an exchange of otoliths of silver hake were encouraged. No conservation measures were recommended for species fished in the subarea. Sampling the size, composition of by-catches of regulated species taken by the herring, whiting, industrial and other unregulated species fisheries was agreed to by USSR and USA. The panel **noted** that Canada and USA planned further joint studies of sea scallops and an informal mid-year meeting to discuss research pertinent to possible regulation of the fishery. A study of the redfish parasite (*Sphyrion*) in the Gulf of Maine was advocated.
- (f) **Joint Meeting of Panels.** At a joint meeting of all panels held on 5 June 1964, under the chairmanship of Mr H. Gardner, Panels 1, 2, 3, 4 and 5 each agreed to recommend to the final Plenary Session for acceptance the changes to mesh regulations proposed by the *ad hoc* Committee on Trawl Regulations which would allow the Commission to prescribe (i) the appropriate mesh size for trawl nets made of other materials, or for seine nets; (ii) not more than two alternative methods of measuring mesh sizes other than by the ICNAF gauge; and the mesh sizes equivalent for such methods of measurement.

13. Conservation of Seals (Item 16)

The Executive Secretary informed the Commission in plenary session that all member countries had not yet deposited letters of ratification or adherence with Depositary Government. Therefore, 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 19)

The Commission at its second Plenary Session agreed to adopt the proposals of 17 January 1964 of the European Fisheries Conference Resolution in Fisheries Policing to invite the Governments of all countries participating in the North-East Atlantic fisheries and Canada and USA to send representatives to a technical conference to consider a draft Convention, on the lines of the 1882 Convention for regulating the policing of the North Sea fisheries, and embodying a modern code for the conduct of fishing practices in the whole of the North Atlantic.

15. Reports from Other International Meetings (Items 20 and 21)

(i) The Commission in Plenary Session agreed that the Chairman and Executive Secretary should be empowered to appoint observers when necessary.

(ii) The Commission received reports from FAO and Commission observers to Advisory Committee on Marine Resources Research (ACMRR), North-East Atlantic Fisheries Commission (NEAFC), International Council for the Exploration of the Sea (ICES), International North Pacific Fisheries Commission (INPFC) and the Intergovernmental Oceanographic Commission (IOC). The Commission noted that Mr A. J. Lee of the United Kingdom would act as observer at June 1964 meeting of the Scientific Committee on Oceanic Research (SCOR) and the Intergovernmental Oceanographic Commission (IOC), and Mr S. Olsen at the October 1964 meeting of ICES.

16. Acknowledgements and Adjournment (Items 26 and 27)

The observer from FAO, Mr Roy I. Jackson, Chief of the Fisheries Division, thanked the Commission for the invitation to attend the meetings, referred to the effective co-operation between FAO and ICNAF and reviewed programs and plans of the Division. The observer from Japan, Mr Y. Uchimura, First Secretary, Japanese Embassy, London, expressed the gratitude of his colleagues and his government for the opportunity to attend the meetings and reviewed the Japanese fishery and plans for its future in the Northwest Atlantic.

Mr F. Briggs of the USA moved that the best thanks of the Commission be extended to the Government of the Federal Republic of Germany, to Dr G. Meseck and his colleagues of the Federal Ministry of Food, Agriculture and Forestry, to Dr A. von Brandt of the Federal Institute for Fisheries Research, Hamburg, and to the officials of the City of Hamburg for their generosity, hospitality and excellent meeting facilities and arrangements. Special thanks was extended to Captain T. Frerichs of the fine new Research Vessel *Walther Herwig* for the cruise on the Elbe. Mr G. Möcklinghoff of the Federal Republic of Germany expressed the pleasure of his Government and its workers for the opportunity to be host to the Fourteenth Annual Meeting of the Commission and to contribute to the furtherance of its objectives.

The Chairman thanked all meeting participants, in particular Mr R. J. H. Beverton, for three years of leadership and progress as Chairman of the Commission's Standing Committee on Research and Statistics, and Dr J. H. MacKichan for 13 years of dedicated and valuable service as Chairman of the Commission's Standing Committee on Finance and Administration.

There being no other business, the Chairman declared the Fourteenth Annual Meeting of the Commission adjourned at 11:30 a.m., 6 June 1964.

APPENDIX 1

LIST OF PARTICIPANTS

CANADA

Commissioners:

- Mr Wm. MacKenzie, Dept of Fisheries, Ottawa, Ontario.
- Dr J. H. MacKichan, 1131 South Park St., Halifax, Nova Scotia.
- Mr P. P. Russell, Bonavista Cold Storage, St. John's, Newfoundland.

Advisers:

- Dr L. M. Dickie, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
- Mr J. B. Estey, Eagle Fisheries Ltd., Loggieville, New Brunswick.
- Mr R. E. S. Homans, Dept. of Fisheries, Halifax, Nova Scotia.
- Dr Yves Jean, Dept of Industry & Commerce, Quebec, P.Q.
- Mr J. LeBreton, Robin, Jones & Whitman, Paspebiac, P.Q.
- Dr F. D. McCracken, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
- Dr W. R. Martin, Fisheries Research Board of Canada, Ottawa, Ontario.
- Dr J. C. Medcof, Fisheries Research Board of Canada, St. Andrews, New Brunswick.
- Mr E. J. Sandeman, Fisheries Research Board of Canada, St. John's, Newfoundland.
- Dr W. Templeman, Fisheries Research Board of Canada, St. John's, Newfoundland.

DENMARK

Commissioners:

- Mr K. Djurhuus, Local Government, Torshavn, Faroe Islands.
- Dr P. M. Hansen, Grønlands Fiskeriundersøgelser, Charlottenlund Slot, Charlottenlund.
- Mrs G. Skibsted, Fiskeriministeriet, Copenhagen.

Advisers:

- Mr Sv. Aa. Horsted, Grønlands Fiskeriundersøgelser, Copenhagen.
- Mr J. S. Joensen, Fiskivinnustovan, Foroya Landstyri, Torshavn, Faroe Islands.
- Mr E. Smidt, Grønlands Fiskeriundersøgelser, Charlottenlund Slot, Charlottenlund.

FRANCE

Commissioners:

- M. J. Rougé, Marine Marchande, Paris.
- M. R. H. Letaconnous, Institut des Pêches Maritimes, Paris.
- M. R. Legarde, Marine Marchande, Paris.

Advisers:

- M. Ch. Allain, Institut Scientifique et Technique des Pêches Maritimes, Paris.
- M. A. Dezeustre, Pecheries de Bordeaux-Bassens, Bordeaux.
- Mme G. Rossignol, Marine Marchande, Paris.

GERMANY

Commissioners:

- Dr G. Meseck, Bundesforschungsanstalt für Ernährung, Landwirtschaft und Forsten, Bonn.
- Mr G. Möcklinghoff, Bundesministerium für Ernährung, Landwirtschaft und Forsten, Bonn.

Advisers:

- Dr H. Bohl, Bundesforschungsanstalt für Fischerei, Hamburg.
- Dr A. von Brandt, Bundesforschungsanstalt für Fischerei, Hamburg.
- Dr J. Genschow, Association of German Trawler Owners, Bremerhaven.
- Dr M. Gillbricht, Biologische Anstalt Helgoland, Hamburg-Altona 1.
- Dr G. Hempel, Institut für Hydrobiologie und Fischereiwissenschaft der Universität Hamburg, Hamburg-Altona 1.

Dr A. Kotthaus, Biologische Anstalt Helgoland, Hamburg-Altona 1.

Dr G. Krefft, Bundesforschungsanstalt für Fischerei, Hamburg-Altona 1.

Dr J. Krug, Bundesforschungsanstalt für Fischerei, Hamburg-Altona 1.

Dr J. Messtorff, Bundesforschungsanstalt für Fischerei, Bremerhaven.

Dr A. Meyer, Bundesforschungsanstalt für Fischerei, Hamburg-Altona 1.

Dr P. F. Meyer-Waarden, Direktor des Institut für Küstenund Binnenfischerei, Hamburg-Altona 1.

Dr H. Mohr, Bundesforschungsanstalt für Fischerei, Hamburg-Altona 1.

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APPENDIX II

AGENDA

1. Opening by the Chairman.
2. Adoption of Agenda.
3. Policy with regard to publicity for the Annual Meeting.
4. Review of panel memberships.
5. Report on staff matters, with presentation of the Administrative Report for 1963/64 and preliminary financial statements for 1963/64.
6. Presentation of Auditor's Report for the fiscal year ending 30 June, 1963 (vide Annual Proceedings, Vol. 13, p. 9-10).
7. Budget estimate for the fiscal year ending 30 June, 1965.
8. Budget forecast for the fiscal year ending 30 June, 1966.
9. Office accommodation for Commission headquarters.
10. Infringements to ICNAF trawl regulations.
 - (a) Annual returns of infringements.
 - (b) Annual returns form.
11. Top-side codend protection.
12. Uniform mesh measuring arrangements and minimum mesh requirements for trawl fisheries in the North Atlantic area.
13. Joint enforcement system for ICNAF trawl regulations.
14. Status of recommendations adopted by the Commission
 - (a) Proposals for changes in the Convention.
 - (b) Proposals for regulation of fisheries.
15. Consideration of procedures for bringing into effect proposals adopted by the Commission.
16. Conservation measures for harp and hood seal populations of the Northwest Atlantic area.
17. Conservation requirements
 - (a) Minimum mesh size regulation in Subarea 3, Divisions NOP for redfish.
 - (b) Minimum mesh size regulations in Subarea 4 for species other than cod, haddock and flounders, particularly redfish.
 - (c) Measures for scallop fishery in Subarea 5.
 - (d) Possible extension of mesh size regulations in Subarea 5 for species other than cod and haddock.
18. Adequacy of present measures for conservation of fisheries in the Convention area.
19. Fishing and navigational practices in the Convention area.
20. Reports by Commission observers on meetings of other organizations.
21. Invitations to the Commission to be represented by observers at meetings of other international organizations.
22. Date and place of 1965 Annual Meeting of Commission.
23. Report of the Standing Committee on Research and Statistics (special Environmental Survey and Symposium Reports).
24. Report of the Committee on Finance and Administration.
25. Reports of the Meetings of Panels 1-5.
26. Other business.
27. Adjournment.

PART 3

Summaries of Research and Status of Fisheries by Subareas, 1963

The following summaries are prepared from the research reports and other pertinent documents submitted to the 1964 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 — W. Templeman (Canada)
 for Subarea 4 — R. H. Letaconnoux (France)
 for Subarea 5 — J. C. Medcof (Canada)

Subarea 1

Reports on researches in 1963 were submitted by the following member countries: Denmark, Germany, Iceland, Norway, Portugal, Spain, UK and USSR.

1. Work carried out

a. Denmark: R/Vs *Dana* and *Adolf Jensen*. Oceanographic observations in Davis Strait (NORWESTLANT 2 and 3) and at fixed in-shore stations year round. Cod eggs and larvae collected in Godthaab and Amerlik Fjords, mid-January to end July. Distribution and length and age of young and commercial-sized cod. Cod tagging. Redfish growth studies and tagging in Godthaab Fjord.

b. Germany: R/Vs *Anton Dohrn* and *Walter Herwig* and commercial trawlers. Oceanographic observations off East Greenland (NORWESTLANT 2). Hydrographic observations and length and age composition of cod and redfish in West Greenland. Cod tagging in Divisions 1D and E.

c. Iceland: R/V *Aegir* and commercial trawlers. Oceanographic observations off East Greenland (NORWESTLANT 2). Sampling cod and redfish off East and West Greenland for length and age.

d. Norway: R/Vs *G. O. Sars* and *Johan Hjort*. Oceanographic observations off West Greenland (NORWESTLANT 1). Length and age of cod and bottom long-line experiments

from Holsteinsborg to Nunarsuit off West Greenland. Hydrographic sections (5) off East Greenland and length and age of cod.

e. Portugal: Commercial trawlers. Sampling cod in July in Division 1F for length, age, sex and maturity.

f. Spain: Commercial trawlers. Exploratory trawl fishing between Lille and Store Hellefiske Banks.

g. USSR: R/Vs *Topseda*, *Academician Knipovich* and commercial trawlers. Oceanographic observations off SW Greenland (NORWESTLANT 1 and 3) and West Greenland. Sampling cod and redfish in Divisions 1B, C and D. Distribution of young cod and redfish.

h. UK: R/Vs *Ernest Holt* and *Explorer*. Oceanographic observations off East Greenland (NORWESTLANT 1 and 3). Sampling at landing ports and aboard Fairtry factory vessels. Continuous plankton recordings.

2. Hydrography and plankton

Water temperatures were, as in 1962, colder than in recent years. Production of plankton was very poor due, perhaps, to the adverse influence of an unusually warm winter and extremely cold and stormy spring. In addition, zooplankton development, particularly *Calanus*, was later than usual. Results of the hydrographic and plankton observations made by Canada, Denmark, Norway and USSR during the ICNAF

Environmental Survey (NORWESTLANT 1-3) in April-July are being prepared for publication in ICNAF Special Publication No. 7.

3. Eggs and larvae

In inshore waters and in the fjord the occurrence of cod eggs was rather poor.

In April large numbers of cod eggs were found in the Davis Strait and in the southern part of the Denmark Strait. The northern boundary for the distribution of cod eggs was about 65°N in the Davis Strait. The temperature on the surface where eggs were found was between 1° and 3°C.

Cod larvae were found in much smaller amount than in previous years in which research work has been carried out. The poor occurrence of cod larvae can possibly be explained by the late occurrence of their most important food, the *Calanus* larvae. There is reason to believe that under such conditions the greatest number of cod larvae have died by starvation.

Redfish larvae occurred in smaller numbers than in 1961. They were generally found in deeper water layers than usual and were distributed farther to the west.

4. Cod

a. Age-groups 1, 2 and 3

Catches of small cod with fine-meshed gear in inshore waters showed that the two year-classes 1961 and 1960 must be considered as good year-classes, especially 1960, while 1962 seemed to be a rather poor year-class.

b. Commercial stock

As in 1962 the two rich year-classes 1957 and 1956 predominated in the catches. The former in the northern Divisions (B-D) and the latter in the southern (E and F). The 1957 year-class had a more southern distribution than in previous years. The 1958 year-class was rather common especially in Division 1E. The old year-classes 1953, 1950 and 1947 were without any importance.

c. Tagging

Tagging experiments have been carried out by Denmark and Germany. Germany has tagged 93 cod in Divisions 1D and 1E. Denmark has tagged 4,616 cod including 1,840 small cod (age groups II and III) distributed in all divisions.

Germany reports 135 recoveries from 2,081 taggings in previous years in Southwest and Southeast Greenland, 26 were recovered off Iceland, 6 off East Greenland.

5. Redfish

USSR have studied the distribution of small redfish (4-6 cm) in the Davis Strait by examining the stomach content of cod. In that way it was found that great numbers of young redfish must be common in November in Divisions from 1F to 1C (western slope of Banan Bank.) In December young redfish were found in cod stomachs on Store Hellefiske Bank. This shows that there are nursery grounds for redfish in the Davis Strait as in some of the West Greenland fjords. In Godthaab Fjord growth studies on small redfish have been continued. A total of 743 redfish were tagged in the Godthaab Fjord.

6. Atlantic Salmon

Recaptures of tagged salmon have shown that salmon from both sides of the Atlantic move to West Greenland on feeding migrations where they occur along the coast in inshore as well as in offshore waters.

Until now 26 tagged salmon have been recorded. The places where they had been tagged were as follows: Maine (USA) 1, New Brunswick and Newfoundland 10, England 8, Scotland 5 and Sweden 2.

Most of them were tagged as smolts (length 17-20 cm). The recaptures were made in most cases 1 or 1½ yr after tagging.

7. Other fishes

The small fjord cod (*Gadus ogac*) occur in inshore waters in West Greenland in increas-

ing numbers year by year. This fish, which was very common before the warm period set in about 1920, nearly disappeared during this period. At the same time the cod grew more and more numerous.

The Arctic fish, the Greenland halibut, which also decreased in number during the warm period is also more common in recent years and is again, like in the years before 1920, an important fish to the Greenlanders' fishery. The landing of Greenland halibut was 1,590 tons in 1963 which is double the amount of the landing in 1955.

The increasing occurrence in West Greenland waters of *Gadus ogac* and Greenland halibut makes it possible that Greenland is entering a cold period. At the present time, however, it is impossible to predict if this period will be of a short or a long duration.

German trawlers caught haddock on Walloe Bank off Southeast Greenland in 1963. The year-class 1959 predominated in the catches. The growth rate was very much like the growth rate of the Iceland haddock but the composition of year-classes tended to show that the haddock originated from East Greenland where spawning haddock were found in April 1963 on Fylkir Bank.

8. Status of fisheries

Commercial fishing was carried out by Denmark, France, Germany, Iceland, Norway, Poland, Portugal, Spain, UK and USSR.

Total cod landings decreased from 451,000 metric tons in 1962 to 374,000 tons in 1963.

Landings by Denmark decreased from 177,000 tons in 1962 to 101,000 tons in 1963 due, mainly, to the failure of the Greenlanders' pound net fishery in inshore waters (36,000 tons in 1962 to 23,000 tons in 1963). Low water temperatures, an unusually warm winter and an extremely cold and stormy spring may have been unfavourable for a successful fishery. Landings by Germany and UK increased to 118,000 tons and 27,000 tons respectively due to increased fishing activity. Iceland landed 4,000 tons from good concentrations of cod in 1D and E compared with just over 1,000 tons in 1962 and 11,000 tons in 1961. Landings by Spain decreased from over 3,000 tons to 500 tons. USSR trawlers fishing commercially for the first time in the subarea took over 5,000 tons. Landings by Portugal decreased 30% to 63,000 tons, by Norway 45% to 19,000 tons. Best cod catches in the subarea were made from February to May in Divisions 1D, E, and F.

Total redfish landings decreased by 17,000 tons to 43,000 tons. German catches decreased 23% to 39,000 tons apparently owing to a lack of fish. The remaining 4,000 tons were taken by Denmark, Iceland, Poland, USSR and UK.

Increases in abundance of *Gadus ogac* and Greenland halibut, species abundant during the cold period before 1920, and a new fishery for Atlantic salmon (200 tons in 1963) suggests that Greenland waters are entering a period of cold years. However, the increasing abundance of haddock off South Greenland (31 tons in 1962 to 120 tons in 1963) and good growth rate and the first capture of plaice off Greenland provide evidence to the contrary.

Subarea 2

Report on researches in 1963 were submitted by the following member countries: Canada, Poland, Portugal and USSR.

1. Work carried out

a. Canada: Research work was carried out by laboratories in St. John's, St. Andrews, Dartmouth, Montreal and Quebec as well as on board the eight research vessels. Sampling of cod redfish and American plaice for age and length

composition and distribution studies. Study of hydrographic conditions. Researches on the selectivity of cod trawling fishery on Hamilton Inlet Bank. Oceanographic observations for NORWESTLANT 2.

b. Poland: Study of length and age composition, maturity, and feeding of cod; catches at different times of day. Distribution of redfish by depth. Samples taken from the large-size fishing trawlers' catches.

c. Portugal: Study of cod sampled aboard commercial fishing vessels; age and length determination, sex composition of the day and night catches; sexual maturity and, in particular, age at maturity; girth, length and weight measurements.

d. USSR: Research and fish-scouting vessels as well as laboratories of the Polar Research Institute of Marine Fisheries and Oceanography (PINRO, Murmansk) conducted hydrographic investigations. Study of spawning cod and redfish, distribution and age composition of young cod as well as of commercial size cod and redfish. Oceanographic observations for NORWESTLANT 1 and 3.

2. Hydrography

The Canadian hydrographic sections on 5-6 August 1963 off Seal Islands showed that temperatures at all depths in the colder part of the Labrador current from Hamilton Inlet Bank to shore were quite similar to those of 1962. In the warmer part of the Labrador Current in the deeper water seaward of Hamilton Inlet Bank temperatures were slightly higher than usual.

Hydrological investigations by USSR showed that the flow of cold polar waters to the area off Labrador and Newfoundland increased considerably in 1963 in comparison with 1962.

During the spring of 1963 the average temperature of the 0-200 m water layer at standard stations was about 1° to 2°C lower than in 1962. In 1963 off Labrador and Newfoundland the amount of ice was greater than in 1962, and this created unfavourable conditions for fishing.

3. Plankton

The United Kingdom continued a most interesting plankton recorder survey program.

4. Cod

In the period April to early May, the Canadian R/V *A. T. Cameron* worked on the eastern slope and south-eastern slopes of Hamilton Inlet Bank. On 9-12 April on the south-eastern slope of this bank the greatest cod concentrations were found at 275 m and 2.6°C and on the

northern part of the eastern slope the largest catch was at 250 m and 1.8°C.

Sets in shallower water (175-190m) and at lower temperatures (-0.1 to 1.6°C) on the eastern edge of the bank produced only a few small cod. Sets in deeper water in the western part of Hawke Channel at low temperatures (0.6 to 1.8°C) also produced few cod.

On 2-3 May 1963, very large catches of post-spawning cod were obtained on the south-eastern slope of the bank just south of the ice at 225-280 m (2.8 to 3.0°C).

In September moderately large cod concentrations were found in 290 m on the south-west edge of Hamilton Inlet Bank, and again in October at 135-175 m.

On all survey lines cod sizes and the percentages of mature cod, and in the areas of concentration the percentage of females among the mature cod, usually increased with depth and increasing temperatures.

Cod were tagged in the inshore shallow-water area in August at Domino (770), Cape Harrison (1,150), Hopedale (380) and Main (770). Coastal tagging in 1962 has shown that the spawning concentrations on the eastern and south-eastern slopes of Hamilton Inlet Bank in winter and spring receive contributions from inshore cod not only from Labrador but also from along the east coast of Newfoundland from St. Anthony to at least the Baccalieu area on the northern fringe of the Grand Bank.

In a contribution "Trends in the Cod Fishery off the East Coast of Newfoundland and Labrador" by V. M. Hodder (Doc. 76) it is indicated that the greatest increase in landings has taken place in Division 2J in 1960 and 1961 (265,000 tons in 1961 as compared with 60,000 in 1959). In that division there was a reduction of average size of cod in catches from 57.5 cm in 1956-1958 to 56.3 cm in 1960-1961 and of average age from 9.4 to 8.5 yr accordingly. It is also shown that the average catch per hour of trawling has declined from about 1.6 tons per hour in 1954-56 to 1.2 tons per hour in 1961.

The results of Polish investigations showed that in 1963 winter time landings in Division 2J (Sundall Bank) were high and equalled on

the average 5.4 tons per hour. Night catches were especially great and reached 9.2 tons per hour. The cod of 1957 year-class (6 yr old), 1956 year-class (7 yr old), and 1958 year-class (5 yr old) in given order dominated the catches taken on Sundall Bank. Size of cod varied from 42 to 62 cm.

Portuguese researches indicated that in May and September the average size of cod varied from 51.9 to 56.4 cm. The 1956 year-class dominated the catches taken in May, and in those taken in September the 1957 year-class predominated. Some useful data was also obtained on the relations between length, weight and girth.

At the middle of March the USSR research vessels found concentrations of cod in Subarea 2 at a depth of 280-350 m and near-bottom temperature of 2.0-3.5°C. Spawning took place from the middle of March and lasted until the end of April. Tagging results showed that spent cod are migrating southwards and it seems that main spawning grounds of Labrador cod are situated off Northern Labrador. In 1963 sampling of young cod was continued for age and length distribution.

In the USSR Subarea 2 catches, 6-10 year old cod (45-56cm) predominated.

During those short periods when ice conditions enabled fishing operations to proceed, catch per hour trawling was for February 5.6 tons, March 3.3 tons, April 3.7 tons and May 3.7 tons. This reflects the good condition of the cod stock.

5. Redfish

Canadian work on redfish was carried out by the *A. T. Cameron* which fished on the northern seaward slope of Hawke Channel from 230 to 730 m on 9-11 April and 13-14 September. The April catches of *mentella* (per half-hour tow) at 365, 460, 550, 640 and 730 m were 15, 1,020, 860, 580 and 35 kg at bottom temperatures 2.6, 3.4, 3.4, 3.3 and 3.4°C and average weights of 1.0, 0.8, 0.5, 0.8 and 1.1 kg respectively. Catches of *marinus* were 480 kg at 460 m and 15 kg at 550 m with average weights of 2.8 and 4.9 kg.

As a contrast in the same area on 13-14 September significant catches of *mentella* were made from 310 to 620 m with the largest catches, 500 and 980 kg (average weights of 0.5 and 0.7 kg), being made at 310 and 540 m at 3.6 and 3.9°C. Also at this time the only *marinus* catch over 14 kg was one of 840 kg with an average weight 1.5 kg at 230 m and 2.4°C and only one *marinus* was caught below 310 m.

The *marinus* concentrated at the 460 m level in April were 87% females (83% pregnant females). The males were probably shallower, possibly near 410 m. Thus *marinus* were about 180-230 m deeper and *mentella* at least 90-140 m deeper in April than in September. All but insignificant catches of all redfish in this area were obtained in a 180 m range between 460-640 m in April whereas they ranged from 230 to 620 m in September. Thus the redfish in winter-spring and presumably winter are concentrated more than in summer-autumn and this concentration is likely to be most advantageous to fishing in an area with populations both of *marinus* and *mentella* which overlap in the winter-spring distribution but tend to become separated in summer-autumn.

In June 1963 the Soviet research vessels did not succeed in locating commercial concentrations of redfish in Division 2H. In April-May in Division 2J extrusion of larvae was observed. Males dominated in catches taken in this Subarea at a depth of 500-600 m in May-June. In July a concentration consisting of 90% spawning females was observed at a depth of 210-540 m.

6. Other fishes

a) American plaice

A. T. Cameron made sets in April on the south-eastern slope of Hamilton Inlet Bank of which the only two significant catches of American plaice (per half-hour set) were 180 kg at 320 m and 2.6°C and 140 kg at 640 and 3.3°C. The April catch at the greatest depth was considerably deeper than the cod concentrations while in summer and early autumn plaice and cod on this bank are likely to be found at approximately the same depths with the plaice slightly shallower than the cod.

b) Witch flounder

At 550 and 640 m at the mouth of Hawke Channel, a concentration of large witch flounder (1,180 and 680 kg per half-hour tow) was found. These fish averaged about 1.4 kg. The mature females had small opaque eggs and would not spawn for about 2 months.

7. Status of the fisheries

Commercial fishing was carried out by the following countries in 1963: Canada, France, Germany, Poland, Portugal, Spain, USSR, UK and Japan.

The preliminary figures for landings show that the total landings for all countries in Subarea 2 were equal to 223,000 tons. This represents a decrease of 43,000 tons from 1962 when the total catch amounted to 266,000 tons.

Over 95% of the landings were cod and the landings of the species declined from 255,000 tons in 1962 to 216,000 tons in 1963. Almost all the decrease in landings (60,000 tons in 1962 to 21,000 tons in 1963) can be attributed to a lessened activity of the USSR fleet. Landings of most of the other countries with large landings have remained relatively constant.

Subarea 3

Reports on researches in 1963 were submitted by Canada, Germany, Iceland, Poland, Portugal, USSR, UK and USA.

1. Work carried out

a. Canada: R/Vs *A. T. Cameron*, *Baffin*, *Sackville* and other research vessels. Inshore surveys for small cod. Offshore surveys for cod, haddock and redfish. Sampling commercial offshore catches. Cod tagging. Hydrographic sections (5) across Labrador Current and continental shelf in July and August. Oceanographic observations for NORWESTLANT 2.

b. Germany: Market sampling of cod and redfish.

c. Iceland: Sampling cod for length and age in April and May.

d. Poland: Sampling cod, redfish and flatfish from factory trawler *Dalmor*. Cod catches in relation to trawl depths. Day and night catches of redfish.

e. Portugal: Sampling cod for length, age, weight, sex and maturity from commercial trawlers.

f. USSR: Surveys for young and mature haddock in relation to seasons and water temperatures. Biological data collections on cod, haddock and redfish.

g. UK: Continuous plankton recorder surveys.

h. USA: Hydrographic observations by International Ice Patrol (US Coast Guard).

2. Hydrography and plankton

The usual five monitoring sections across the Labrador Current and continental shelf from Bonavista to the southern Grand Bank were taken by Canada (Doc. 36) between 27 July and 22 August. Temperatures in these sections were on the whole not greatly different from those in 1962 being slightly higher in some depths and locations and slightly lower in others. A much greater volume of low temperature water was, however, noted in 1963 in the Avalon Channel and northern Grand Bank section along the 47°N line.

The International Ice Patrol operated by the US Coast Guard carried out its usual work, operating four network surveys on the Grand Bank area (Doc. 18). Less than the normal amount of sea ice and ice-bergs occurred along the east coast of Newfoundland. Labrador Current volume along the eastern slope of the Grand Bank was slightly below normal for the entire season and was on the average warmer and saltier than usual but with lower minimum temperatures.

3. Cod

Canada carried out the usual sampling of commercial inshore and offshore catches for

length, sex, maturity, age and growth studies. There is a progressive decline in average size at age proceeding from south to north. The numbers of O-group cod caught in the Canadian beach seining from 19 September to 31 October on the east coast of Newfoundland suggest only moderate survival of the 1963 year-class to the settlement stage. Length frequencies in research cruises to the northeast Newfoundland Shelf indicate the presence of significant numbers of 3- to 5-year-old cod. Over 13,400 cod were tagged in 17 inshore and 5 offshore localities. In Canadian researches on the southern Grand Bank (3N and 3O) the polymodal frequency curves and the progression of dominant year-classes provided evidence of the validity of otolith ages. The most successful year-classes of cod in 3N and 3O in recent years occurred in 1946, 1949, 1953, 1955, 1958 and 1959. The first four of these years and possibly 1958 to a lesser degree, were also years with successful year-classes of haddock in this area. Canadian workers have come to the conclusion that stratified sampling using lesser numbers of otoliths at peak sizes than in random samples, can be used with profit to study age and growth of cod in the Newfoundland inshore fishery.

Poland investigated size, age and growth, sex, sexual maturity, feeding and yield of cod in 3K at the seaward edge of the northeast Newfoundland Shelf (2-26 February), on the northeast slope of the Grand Bank in 3L (20 January-5 March) and the southeastern slope of Flemish Cap in 3M (6-19 March). Yields were slightly higher during the day. On Flemish Cap cod were numerous even at 500 m whereas on the other grounds they were not present in quantity deeper than 350-400 m. The most important sizes and age groups in 3K were mainly 42-62 cm (5, 6 and 7 yr; 77%); in 3L mainly 30-50 cm (4 and 5 yr; 67%) and in 3M mainly 48-65 cm (5, 6, 7, 8 and 9 yr; 61% 5 and 6 yr). Flemish Cap had the highest growth rate, except possibly for the largest fish. Judging from the maturity stages of females, cod spawning had not begun in 3K in February or in 3L in January-early March (although in the latter area most of the females examined were of immature size) and 6% were spent at Flemish Cap in 6-19 March.

Portugal has studied length, sex, age and

growth and maturity of cod in 3KL. Almost all the fish caught were between the ages 4-10.

The USSR carried out length, sex, age and growth studies of cod in 3KMN.

4. Redfish

Canadian exploratory fishing with the *A. T. Cameron* on Funk Island Bank at the seaward edge of the northeast Newfoundland Shelf in the general vicinity of 51°24'N to 51°28'N showed in half-hour tows with a No. 41 trawl on 8-9 May, 750 kg of *marinus* at 230 m and 4,300 kg of *mentella* at 275 m and on 28-30 May, 2,050 and 2,270 kg of *mentella* at 550 and 640 m. The latter two sets consisted of large *mentella* averaging 1.0 and 1.3 kg with the females immature even at the largest sizes. It is indicated that from the Funk Island area to the northern Grand Bank approximately two-thirds of the *mentella* spawning (larval extrusion) occurs between mid-April and the end of May and most of the remainder in early June with a small amount in early April. Spawning is delayed slightly in the more coastal areas (off the Grey Islands and St. Anthony) where temperatures are lower. Spawning in *marinus* on the slopes of Funk Island Bank was almost over by the end of May.

The Polish factory trawler *Dalmor* fished for redfish on the northeast Newfoundland Shelf in 3K in July-August and in October-early November. *Sebastes mentella* dominated the catches from 200 to 780 m but *Sebastes marinus* were sometimes numerous (up to 40% of the catches) from 200 to 400 m. For *mentella*, females predominated at all depths from 200 to 600 but declined gradually from 76% at 200-400 m to 52% at 500-600 m. Average sizes of *mentella* at different depths ranged from 37.5 to 39.4 cm for males and 39.6 cm at 200-400 m with a gradual decline to 39.3 cm at 500-600 m for females. Average sizes of *marinus* were larger, 43.8 cm for males and 47 cm for females.

The USSR researches on *Sebastes mentella* of Flemish Cap (3M) lead to the conclusion that in analyzing size and age composition for these redfish the location of the slope area and the depth and season should be considered.

5. Other fishes

Polish exploratory fishing at the seaward edge of the northeast Newfoundland Shelf in 3K found Greenland halibut in greatest quantities at 500-600 m, and quantities of macrurids, 375-750 kg per hour, between 400-600 m.

6. Status of the fisheries

Commercial fishing was carried out by Canada, Denmark, France, Germany, Iceland, Norway, Poland, Portugal, Spain, USSR, UK, USA and Japan.

Total cod landings of 464,000 tons were 75,000 tons higher than in 1962 and were the third highest recorded, next to the 471,000 tons of 1960 and the highest landings of 472,000 tons in 1954. The greatest landings were from 3L (156,000 tons) and from 3K (123,000 tons). Canada reported increasing use of nylon gillnets for cod fishing in Newfoundland coastal waters with about 13,000 91-m nylon gillnets in use in 1963, having mesh sizes of 15-19 cm. The cod caught by these gillnets are large with about 90% ranging from 60 to 100 cm and mainly of ages 7-14. At Trepassey in southeastern Newfoundland, where the nylon gillnet fishery has been successful, the catch of cod per gillnet has declined from 350 kg in 1961 to 300 kg in 1962 and 230 kg in 1963. A Canadian review of statistics of cod landings for 1954-61 shows that cod landings by trawlers for 3K have increased substantially since 1958. During the same period the landings from the inshore fishery in 3K have declined. Starting in 1959 a very productive spring fishery developed in 3K and this has resulted in an upward trend in landings per unit effort when the data are considered on an annual basis. However, when considered on a semi-annual basis, the trend in landings per unit effort has been slightly downward for the summer and autumn fishery by trawlers as the fishing effort has greatly increased. More pronounced decreases in landings per unit effort are indicated for the inshore fishery in 3K. Length and age composition data shows a tendency toward smaller and younger cod in the trawler catches and particularly in the landings of the Newfoundland inshore fishery. The greatly decreased abundance of older fish in the inshore fishery and

the trend toward smaller fish in the trawl offshore fishery are attributed to the greatly increased effort by trawlers in recent years, particularly since 1958. Spain reported that large cod were more abundant in the catches in 3L and 3N. Cod from 3K were also larger, on the average, than in 1962. The USSR reported that the bulk of the catches of cod in 3M was composed of a rich 1957 year-class.

In catch/effort assessment for 1956-58 by the United Kingdom, using available published and unpublished data and subsequent extension of this study by the Assessment Subcommittee to 1962-63, it was concluded that cod of 3KL and 3P were fished during this period at an intensity equal to or below but not appreciably above that giving the maximum yield. In 3NO it is likely that the rate of fishing of cod during the period 1956-58 spanned that giving the maximum yield and was probably beyond it.

Total haddock landings of 14,000 tons were 21,000 tons lower than in 1962 and lower than in any year since 1946 when the fishery was in the earliest stage of its development. In contrast landings were highest in 1954 (104,000 tons) and as recently as 1961 were 80,000 tons (but in 1959 it was as low as 35,000 tons). The greatest landings were from Division 3O (10,000 tons). Canadian otter trawling surveys by the *A. T. Cameron* and the *Investigator II* over the haddock areas of the southern half of the Grand Bank in May and July and on St. Pierre Bank in June showed only small quantities of haddock. The largest catch per half-hour towing on the Grand Bank was 680 kg and on St. Pierre Bank 80 kg. Bottom temperatures were generally suitable for haddock. From the length and age frequencies of samples taken during the May survey of the Grand Bank, haddock of the 1955 and 1956 year-classes, which were dominant in the catches during the surveys of 1959-61, were outnumbered in 1963 by 1- and 2-year-old fish of the 1961 and 1962 year-classes. However, when it is considered that the research vessel catch per unit effort was considerably lower than those of previous years both in number and weight, the apparent abundance of these 1- and 2-year-old fish may be only in relation to the presently reduced year-classes of earlier years. For example, the average number of haddock per half-hour tow was

70 in 1963 and 80 in 1962, while in 1960 it was 590. Distribution of young and adult haddock was the main subject of USSR investigations in Subarea 3. No large quantities of haddock of commercial size were found. Haddock of commercial size mainly belonged to the 1955, 1956 and 1958 year-classes and smaller haddock to the 1961 and 1962 year-classes. The new year-classes, 1961 and 1962, were considered to be of average abundance. In catch/effort assessment for 1956-58 by the United Kingdom, using available published and unpublished data, it was concluded that haddock of 3NO were fished during this period at an intensity equal to or below, but not appreciably above that giving the maximum yield.

Redfish landings of 69,000 tons were 7,000 tons higher than in 1962 but well below the highest landings of 246,000 tons in 1959. The highest landings were from 3K (18,000 tons), 3N (13,000 tons) and 3Ps (10,000 tons). Icelandic landings of redfish from Subarea 3 (3K) were about double those of 1962 but this effect was produced by a similar increase in fishing effort. The USSR redfish landings for 3L increased eight times while those for 3K decreased three-fold because of unfavourable ice conditions. Soviet catches of *mentella* redfish per

trawling hour by BMRT type trawlers on Flemish Cap (3M) have declined gradually from 2.5 and 2.3 tons in 1957 and 1958 to 1.5 and 0.9 tons in 1960 and 1961. United States landings of redfish in 1963 dropped nearly 15% but this was probably due to decreased effort, since the catch per day has held steady over the past few years at about 15-16 metric tons. Reports of redfish statistics of the subarea by depth zones have been provided by France (St. Pierre and Miquelon), Poland and the United States. The assessments presented at the 1963 meeting for 3NO (Redbook 1963, Part I, p. 37) still represent the best available estimates. They show an immediate loss for any mesh above 3 inches (considerable above 4-4½ inches).

Halibut landings of 1,300 tons were lower than the 1,800 tons landed in 1962, and even more below the highest recent landings of 2,800 tons in 1960. Highest landings were from 3O (500 tons) from 3Ps (200 tons) and from 3L and 3N (100 tons in each case).

Flounder landings of 34,000 tons were 7,000 tons higher than in 1962 and 4,000 tons higher than in 1961. The greatest landings were from 3L (18,000 tons), 3N (8,000 tons) and 3O (4,000 tons).

Subarea 4

Reports on researches in 1963 were submitted by the following member countries: Canada, Federal Republic of Germany, Portugal, UK, USSR and USA.

1. Work carried out

a. Canada: R/V *A. T. Cameron* and other research vessels. Monitoring hydrographic features over Halifax section and at coastal stations. Studies of long-term trends in hydrographic features and of non-tidal drift. Surveys of benthic communities in relation to topography, geology and geochemistry of bottom in the Southern Gulf of St. Lawrence (4T). Identity of cod stocks. Laboratory and field studies of cod growth and migrations. Cod and plaice tagging. Distribution pattern of haddock. Distribution and abundance of redfish. Halibut tagging. Age and growth of halibut and plaice.

Studies of witch, wolffish, herring and sea scallops.

b. Germany: Trawler sampling for length and age of haddock.

c. Portugal: Sampling commercial fishery for length, age, sex, maturity in 4R in August.

d. UK: Market sampling. Continuous plankton recorder survey.

e. USSR: Sampling trawl fishery for silver hake, cod, haddock, redfish and argentine.

f. USA: Sampling commercial haddock fishery. Serology of haddock.

2. Hydrography

Hydrographic observations were continued by Canada from the Gulf of St. Lawrence south-

ward to the Bay of Fundy. Long-term observations show year-to-year variations and the downward trend in temperatures continued in 1963. Different proportions of Atlantic and Labrador waters result in warming and cooling periods of the waters of the shelf.

Seven hydrographic surveys were carried out by USSR in the area from St. Pierre to Browns Banks which provided information on water conditions at all seasons of the year and on their influence on the distribution of silver hake mainly in the Sable Island area.

3. Plankton

Continuous plankton recordings were made by UK in 1963, mainly from British merchant ships.

Plankton studies by USSR in the Browns Bank area at different seasons in 1963 have shown that phytoplankton was generally more abundant in May-June 1963 than in 1962. In 1963, Peridineans replaced Diatoms as the dominant group. The biomass of seston in summer was larger in 1963 than in 1962.

4. Cod

Canada tagged 2,700 cod in September in Division 4S in order to identify Gulf of St. Lawrence stocks and further define migration patterns. Studies of vertical migrations of cod showed that light, feeding and spawning are, in that order of importance, the factors responsible. Other field studies showed that nocturnal upward movements of cod are greater (as much as 30 m) in deep water than in shallow water. Laboratory feeding studies showed that feeding and growth are highest at 12°C and lowest at 5°C.

5. Haddock

Preliminary serological studies by USA have shown differences between haddock from Cape Cod (Subarea 5), Browns Bank and Emerald Bank (Subarea 4). Further research is necessary in order to establish the genetic significance of these differences.

Haddock distribution in relation to depth and temperature in Division 4X was studied by Canada in March. Good catches of large and small fish were made on Little Lahave and Browns Banks in 60-180 m and at temperatures of 3° to 5°C.

6. Silver hake

Seasonal distribution of silver hake of various sizes and degrees of sexual maturity in relation to depth and bottom temperatures in the Sable Island area was studied by USSR. During the period November-February silver hake was found mainly at depths of 100-150 m and at bottom temperatures from 5.5° to 7.8°C. The sizes ranged from 25 to 29 cm. From February to June, they were concentrated at 140-250 m and at temperatures of 7° to 10°C. Sizes ranged from 29 to 35 cm (mature and pre-spawning fish). Spawning was found to occur in August-September in shallow water (up to 50 m) and at temperatures ranging from 9° to 12°C.

7. Redfish

Research vessel surveys in the Gulf of St. Lawrence showed that redfish which were detected as 8-16 cm fish (mostly 3 yr old) in 1959 had reached a mode of 26 cm for males and 28 cm for females in 1963. This new size-group is abundant (up to 3 tons per half-hour tow).

8. Halibut

Returns from Canadian halibut taggings in Divisions 4V and 4W indicate extensive movement to the eastward. Gulf of St. Lawrence halibut resemble those of the Grand Bank (Subarea 3) in that they are larger and older than those from southwest Nova Scotia (Division 4X).

9. Flounders

The study by Canada of American plaice in the Magdalen Shallows (4T) was completed in 1963. Tagging has shown that two groups are present in the southwestern Gulf of St. Lawrence: a northern group in 4T and a southern group in 4T and 4V. American plaice are found at depths of 200-500 m in winter and at 40-100 m in summer.

A study of witch in the Cape Breton area (4T and 4V) was started in 1963. Witch move from depths of 800 m in winter to 100-200 m in summer. Adults have a restricted diet of worms, amphipods and crustaceans.

10. Wolffish and cusk

Studies of these species were undertaken by Canada in 1963 in order to assess the possibilities for expanded exploitation.

11. Herring

Larval studies were carried out by Canada. No clear relationships have appeared between larval abundance and subsequent recruitment to the commercial fishery in Division 4T. In 4X, these studies are designed to discover the source or supply of "sardine" herring to the Bay of Fundy.

12. Swordfish

Studies of swordfish by Canada indicate that the stock fished in October on the Nova Scotia Banks is not the same as the one fished on Georges Bank in November. These observations tend to discredit an earlier view that there is a migration of swordfish northeastward in the spring and early summer and a retreat to the south and west in the autumn. But more observations are necessary.

13. Scallops

Laboratory studies of spawning adults and rearing of larvae on cultured algae were continued by Canada. Larvae were reared up to 125 days to a size of 293 microns in length. They are believed to settle at a length of 300 microns.

14. Status of the fishery

Groundfish landings have increased 133,000 tons (34%) to 531,000 tons in 1963 due main-

ly to the USSR silver hake fishery (123,000 tons in 1963 from 8,800 tons in 1962), the bulk of which took place in Division 4W (109,000 tons) off Sable Island. Due to decreased landings by Canada and France, which apparently expended less effort than in 1963, cod landings have decreased by about 3% to 212,000 tons. Recruitment and size composition of cod stocks in Subarea 4 have not altered conspicuously from last year. Discards remain at a low level.

Haddock landings on the other hand have increased by 16% to 51,000 tons due to greater catches by Canada, Germany and Spain. In 1963, the larger proportion of the Canadian catch came from 4X, in 1962 from 4W. The year-classes of 4W haddock seem to be below average strength (except that for 1959). Those in 4X seem strong and prospects for 1964 fishing in this division are good.

Redfish landings increased 13% to about 59,000 tons, a 13% increase over 1962, mainly by Canada and USSR. The assessments made in 1961 remain the best estimates for redfish. They show immediate and probably long-term losses for any mesh greater than 102 mm.

Flounder landings increased 20% to about 30,000 tons, mainly by Canada. Discards of small fish reported in American plaice fishery in 4T (more than 50% by number) are very large and an increase of mesh up to 152 mm would release small non-market size fish. This would certainly give long-term gains, possibly substantial, for this particular species.

Herring catches decreased 5% to about 109,000 tons due mainly to smaller landings by USSR.

Recent introduction of long-line fishing for swordfish and purse-seine fishing for tuna resulted in increased landings for the former species, from 1,600 tons in 1962 to 5,600 tons in 1963, and for the latter species from 116 tons in 1962 to 452 tons in 1963.

Subarea 5

Reports on researches in 1963 were submitted by the following member countries: Canada, USSR and USA.

1. Work carried out

a. **Canada:** Various research vessels. Studies

of circulation in Bay of Fundy and Gulf of Maine. Sampling haddock and herring. Scallop gear and selectivity. Studies of swordfish and tuna.

b. **USSR:** Various research-scouting trawlers. Hydrographic and plankton surveys of

Georges Bank area. Studies of distribution, abundance and population dynamics of silver hake and herring. Tagging silver hake and herring.

c. **USA.** R/Vs *Albatross IV* and *Delaware*. Environmental surveys in coastal waters of Gulf of Maine. Benthic studies in Gulf of Maine. Analyses of commercial landings statistics. Groundfish ecology and population dynamics. Studies of herring larvae and adults. Estimates of pre-recruit haddock and abundance indices. Studies of abundance of sea scallops.

2. Hydrography

Analyses of temperature, salinity, transparency, density and non-tidal drift data collected by USA along the coast of the Gulf of Maine in connection with herring larval studies suggested (1) that tidal movement is responsible for the movement of larval herring into some estuaries and embayments along the coast (2) that there is an east and west difference in the physical oceanic characteristics along the Gulf of Maine coast and (3) that appreciable annual differences in temperature and salinity along the coast depend on river discharge and runoff.

Regular USSR hydrographic surveys of the Georges Bank area showed seasonal temperature peculiarities. In winter, the area was characterized by homogeneous temperatures from top to bottom. Cold Labrador waters (4° to 5°C) were observed on the slopes of the Bank. Spring warming began in April on the slopes of the Bank and by May temperature gradients had risen from 4.5° to 7.5°C over 5-10 miles distance. In summer, near bottom temperatures on the Bank were 9° to 14°C and on the northern slopes were 5° to 6°C. In August the influence of Labrador waters was not great on the southeast part of the Bank. On the northern slopes, temperature gradients remained relatively high, 5° to 10°C per 10 miles. In autumn, the shallow part of the Bank (up to 100 m) had 5° to 15°C temperatures by September. Maximum temperatures did not exceed 10° to 11°C. Cooling began in October. Waters of Labrador origin were located in the same area as in summer.

3. Plankton

Results of surveys in late April-early May, early June and early August show that the com-

position of phytoplankton predominantly perid-
inaceous in 1963 and diatomaceous in 1962. Phytoplankton was more abundant in May-June 1963 than in the corresponding period of 1962. Seston biomass was somewhat greater in 1963 than in 1962. Spawning of *Calanus finmarchicus* and *Euphausiacea* sp. began 10-15 days earlier in 1963 than in 1962.

4. Benthos

USA benthic studies show that the biomass in the Gulf of Maine is, on the average, about half that on Georges Bank. South of Nantucket Island, where the biomass is generally comparable to that on Georges Bank, there appear to be five macrobenthic faunal communities.

5. Silver hake

Results of sampling commercial catches by USSR showed that the fish were 3 and 4 yr old (30.2 cm average length), that most were spawning for the first time and that mortality was high after spawning. In spring and early summer, the fish concentrated at 85-200 m along the slope of Georges Bank in 10° to 12°C temperatures. In mid-July spawning was completed and the fish dispersed. Tags were placed on 220 fish. Food consists of small crustaceans. In August active feeding takes place about midnight and noon. During pre-spawning and spawning, concentrations were on bottom during the day and off the bottom at night. As a result catches were smaller at night.

USA studies of port landings and catches aboard vessels fishing in more inshore areas for silver hake to be used as food fish show that most fish were 3 and 4 yr old (25-40 cm in length) and that the index of abundance was about the same as for 1962.

6. Herring

Research on herring was continued by the USA on the inshore immature fish (Maine sardine) and by USSR and Canada on the Georges Bank stock of mature fish. The USSR reported that, from February to August, the Bank fishery depended on the 1957 and 1958 year-classes

(25-29 cm fish length). From August to November, the catch depended on the 1960 year-class (20-24 cm fish length). This is the first time that young herring have been fished in abundance on Georges Bank and suggests that the fishery may be having considerable effect on the stocks. USA research on small herring in inshore waters showed that the fishery continued to be dominated by 2-year-old fish.

Canadian sampling of bottom trawl catches on Georges Bank in August showed that the fish varied from 18 to almost 40 cm in length (mean length of 26.2 cm).

7. Sea scallops

USA and Canada continued research on changes in the Georges Bank fishery. Estimates of relative abundance and the drop in landings per day fished indicate a downward trend in the level of abundance. No unusually abundant year-classes such as the dominant year-class recruited to the fishery in 1959 and indications are that commercial scallops will be less abundant in 1964. Canadian studies of gear efficiency and early life history of the scallop were continued.

8. Haddock

USA reported that abundance on Georges Bank will remain relatively low during 1964 because of the weak 1960-1962 year-classes. However, the 1963 year-class showed an unusual abundance of young-of-the-year haddock which will appear in the fishery early in 1965 as scrod. USA assisted by Canada continued to collect data regarding the stocks of the Gulf of Maine. USA developed new methods for estimating abundance of pre-recruit haddock which seem more useful for prediction and tend to confirm the view that factors determining year-class strength operate chiefly in the first few months of life. Evidence of the correspondence in brood success in the New England and Nova Scotian stocks gives support to the hypothesis that pre-recruit dispersion or environmental factors common to the entire area may be involved.

9. Redfish

Studies by USA indicate that strong year-classes may increase the abundance of fishable

stocks. Studies on the isolated Eastport, Maine, stock corroborated earlier finding that different types of tags have quite different effects on growth rate. Records of the incidence of the redfish parasite, *Sphyrion lumpi*, collected since 1942 show that the parasite is important in the natural mortality of redfish and that the infestation of Gulf of Maine redfish has doubled in the past 20 yr.

10. Yellowtail and winter flounder

USA studies of the relation of abundance to fishing effort over the past 20 yr for the three New England stocks of Yellowtail flounder showed that fluctuations seemed to result from natural causes rather than fishing activity. About 10,000 winter flounder were tagged by USA research agencies in waters off Massachusetts and on Georges Bank during March-May.

11. Large pelagic fish

Research by Norway and Canada on sharks and by USA and Canada on tuna and swordfish on identification and abundance of stocks, their migrations and life histories has been stimulated by increased landings. Tuna were tagged by USA and Canada.

12. Status of the fisheries

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

Total landings of silver hake for food almost doubled in 1963 to about 147,000 tons due, principally, to increased fishing by USSR on Georges Bank. USSR took 107,000 tons and USA 39,000 tons. Large USSR stern trawlers took 4.4 tons per hour of dragging in the spring. In the summer the catch dropped to 1.0 tons per hour and included considerable hake. The catch rose to 1.5-2.0 tons per hour in November and December. USA fishing more inshore waters with smaller vessels took 17.4 tons per day as compared to 18.5 tons in 1962.

Landings of large herring from Georges Bank by USSR amounted to 97,000 tons, only 64% of the 1962 catch. Catch per unit effort

for the large stern trawlers was about the same as in 1962 but for the smaller drift-net vessels it decreased substantially. USA landed 70,000 tons of herring, mostly 2-year-old fish, from in-shore waters using weirs, stop-seines and purse-seines. This was a slight increase from the 1962 catch. It satisfied all demands and fishing stopped early in the season.

Total landings of sea scallops were 128,000 tons, 1,000 tons less than in 1962. USA landings declined from 82,000 tons to 67,000 tons while Canadian landings rose from 47,000 tons to 61,000 tons.

Total landings of haddock were almost 60,000 tons, almost 1,000 tons more than in 1962. USA landings decreased to 49,000 tons while Canada doubled her landings to 8,000 tons. USSR landings were doubled to 2,400 tons all of which were taken as by-catches in her silver hake and herring fisheries. This haddock catch is less than 1% of her combined hake and herring landings.

Total cod landings were about 30,000 tons compared with 26,000 tons in 1962. USA took 16,000 tons. USSR catch (18% of the total) was taken as by-catches in her silver hake and herring fisheries and was 1.5% of her combined silver hake and herring catches. Japan made small catches from the Georges Bank area.

Total landings of all flounders reached an all time high of 48,000 tons (38,000 tons in 1962). Approximately three-quarters of these landings were yellowtail flounder.

USA landed 54,000 tons of industrial fish, nearly double that taken in 1962. Principal species were red and silver hake.

USA took almost 90% of the 9,000 tons of redfish landed. Although indices showed a higher level of abundance than in 1962, landings were 4,000 tons lower. Strong year-classes will enter the fishery beginning in 1965.

