

INTERNATIONAL COMMISSION

FOR THE

NORTHWEST ATLANTIC FISHERIES



ANNUAL PROCEEDINGS

Vol. 12

for the year

1961-62

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Halifax, N. S., Canada

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FOREWORD

The Commission's publications have been established in two annual series since 1953; an "Annual Proceedings" and a "Statistical Bulletin." Since 1957 a third annual series the "Sampling Yearbook" has been added. Special publications from the Commission are issued separately.

This Annual Proceedings Vol. 12, appears in a form and with a content somewhat different from that of the preceding volumes. The summaries of researches by countries, which in previous years made up Part 3 of the volume are now published in the 1962 Redbook Part II, and are in this volume substituted by summaries of research by subareas compiled from the individual research reports by countries. Selected papers from the Annual Meeting which in the previous Annual Proceedings were included in Part 4 are published in the 1962 Redbook Part III. The latest list of scientists and laboratories engaged in Commission's work, published every second year, is to be found in Annual Proceedings, Vol. 11.

The Statistical Bulletin deals with the fisheries statistics of the Convention Area, mainly those for the year in question, but also with statistics for former years collected and compiled by the Commission. The Statistical Bulletins Vol. 1-3 dealt with the more important groups of groundfish. The Statistical Bulletins from Vol. 4 (year 1954) also deal with the other fishes and with shellfish, however in a more summarized form.

The "Sampling Yearbook" includes in tabular form length measurements, age determinations and other data relating to the stocks of commercial fish species, and collected by the member countries in ports or on board fishing vessels or research vessels. Its distribution is restricted to directly interested institutions or persons.

The Special Publications include reports of scientific meetings. Up to now Nos. 1-3 have appeared. No. 4 is in preparation. It will include papers prepared for and reports of the ICNAF Symposium on North Atlantic Fish Marking held in Woods Hole, Mass., U.S.A., 24th - 27th May, 1961.

During the last two years a group of scientists, appointed by ICNAF, has worked on Fishery Assessment in Relation to Regulation Problems. The extensive report by this Group has been printed as an appendix, under separate cover, to the Vol. 11 of the Annual Proceedings.

A list of the Commission's publications is found on the two last pages of the cover.

Erik M. Poulsen,
Executive Secretary.

Halifax, 30 November, 1962.

PART 1

Administrative Report for the Year Ending 30 June, 1962

1. Poland Becomes a Member of the Commission

The Government of the Polish People's Republic notified, on November 21st, 1961, the Depositary Government of her adherence to the International Convention for the Northwest Atlantic Fisheries; on that date the Convention entered into force for Poland, and, following this, Poland became as of that date, a member of the International Commission for the Northwest Atlantic Fisheries.

Polish fishing vessels have, in the recent years, been operating in certain parts of the Convention Area, mainly in Subarea 2, where redfish was the main species sought by the Polish trawlers. Poland has submitted data on this fishery for inclusion in the Statistical Bulletin and has further provided data for Commission's List of Fishing Vessels. Observers from Poland have participated in the ICNAF Annual Meetings since 1959.

The Commission has greatly appreciated this Polish participation and is now with satisfaction looking forward to the strengthening of the co-operation after Poland has become a member of the Commission.

2. Officers during the Year

Chairman of Commission -

Mr. G. R. Clark, Canada.

Vice-Chairman of Commission -

Mr. B. Dinesen, Denmark.

Chairman Panel 1: Mr. K. Sunnanaa, Norway.

,, Panel 2: Mr. B. C. Engholm, U.K.

,, Panel 3: Dr. G. K. Izhevsky, U.S.S.R.

,, Panel 4: Dr. G. Cannone, Italy.

,, Panel 5: Mr. H. R. V. Earle, Canada.

The above officers were elected at the 1961 Annual Meeting, and are serving for a period of two years.

Chairman of Standing Committee on Finance and Administration -

Mr. J. H. MacKichan, Canada.

Chairman of Standing Committee on Research and Statistics -

Mr. R. J. H. Beverton, U.K.

These two Chairmen were elected at the 1961 Annual Meeting, and are holding office for a period of one year.

3. Panel Memberships 1961/62.

Country	Panel No.					Total
	1	2	3	4	5	
Canada		+	+	+	+	4
Denmark	+					1
France	+	+	+	+		4
Germany	+	+				2
Iceland	+					1
Italy			+	+		2
Norway	+					1
Portugal	+	+	+	+		4
Spain	+	+	+	+		4
USSR	+	+	+			3
United Kingdom	+	+	+			3
United States			+	+	+	3
TOTAL	9	7	8	6	2	32

4. Changes in the Staff of the Secretariat

On October 15th, Miss Jean Maclellan resigned from her position as secretary, which she had held since August 1, 1959.

The vacant position was filled by Miss Margaret Henderson of Halifax, Canada.

On November 1st, the Commission's Biologist-Statistician, Mr. Frank Thomas, resigned his position in the Secretariat, which he had held since December, 1960.

The vacant position was filled by Mr. B. F. Calvin DeBaie, B.Com., B.Ed., of Dartmouth, Canada.

On December 1st, Miss Joan Edwards resigned her position as stenographer in the statistical department of the Secretariat; Miss Edwards has held this position for four years. The position was provisionally (until the 15th June, 1962) filled by Miss Jean Maclellan.

The vacant position was filled by Miss Gertrude F. Schrader of Halifax from August 1st.

In January, 1962, Dr. Erik M. Poulsen gave the due 12 month notice of resignation as of January, 1963, of his position as Executive Secretary, held since October, 1952.

5. Newsletters

Newsletters were distributed from headquarters in order to provide information relative to the Commission's activities and interests (on 15 October, 1961, 11 January, and 30 April, 1962).

6. Commission's Publications.

The Sampling Yearbook, Vol. 4, dealing with the year 1959, was published and circulated in July, 1961.

The 1961 Redbook was circulated in October, 1961. It includes Proceedings of the Meetings of the Standing Committee on Research and Statistics during the 1961 Annual Meeting, a series of scientific papers prepared for that meeting, and summaries of researches in 1960 by subareas prepared by the Chairmen of the Groups of Advisers.

The Statistical Bulletin, Vol. 9 for the year 1959 was distributed in February, 1962.

The Annual Proceedings, Vol. 11, dealing with the administrative year 1960/61, was circulated in April, 1962.

The Assessment Report, prepared by the Group of scientists during the last two years, and presented to the Commission at the 1961 Annual Meeting, has now been edited, and is with the printers. The printing is expected to be completed in the summer of 1962.

The editing of the papers from the ICNAF marking Symposium held in May, 1961, has been completed, and the report was sent to the printer in May, 1962.

7. Co-operation with other International Organizations.

This co-operation has been continued in a form similar to that of the previous years. A joint meeting of the FAO/ICES/ICNAF Continuing Working Party was held during the 1961 Annual Meeting in June, 1961. Joint discussions by members of this Party took place in connection with the Annual Meeting in Moscow in May-June, 1962.

8. Co-operation with Non-member Countries.

Belgium, which periodically undertakes exploratory fishing in parts of the Convention Area, is reporting data from this fishery to the Commission.

The fishery by trawlers from Rostock (Soviet Zone in Germany) in the Convention Area, especially in Subarea 2, is developing, and data from this fishery are reported to the Commission and included in the "Statistical Bulletin" and the "List of Fishing Vessels". A research vessel from Rostock has been carrying out investigations in the Convention Area in late winter and early spring in 1962; results of the investigations were reported to the Commission.

9. Research Programs.

Research programs for 1962 were forwarded from member countries in December, 1961 to April, 1962, and have been distributed by the Secretariat.

10. Research Reports.

Reports of researches in 1961 were submitted to the Secretariat and distributed for the 1962 Annual Meeting.

11. Sampling.

The volume of data from samples of fish taken by exploratory, research and commercial vessels in 1960, which have been forwarded by member countries to the Secretariat, has far exceeded that of previous years. So much so, that it has been necessary to publish Volume 5 of the Sampling Yearbook in two parts. Part 1,

dealing with Cod-Haddock-Flounder, was distributed in the latter part of April. Part II dealing with Redfish, will be distributed in August.

12. Collection of Statistics.

The Commission's collecting of statistics and the compilation of the data have been continued in accordance with the requirements as extended by the Commission in its 1961 Annual Meeting. It is expected that Vol. 10 of the Statistical Bulletin will be published well within the November deadline of earlier years.

13. Otolith Exchange Programmes.

In accordance with the Commission's decision at the 1961 Annual Meeting, Cod and Redfish Otolith Exchange Programmes, with reference to spawning zones, were initiated early this year with the result that 14 cod samples and 8 redfish samples are now in circulation between interested countries. More samples are expected and will be distributed in due time.

Samples from the Halibut Otolith Exchange Programme which was initiated following the decision made at the 1959 Annual Meeting were fully circulated amongst the interested member countries and are now reported in a document prepared for the 1962 Annual Meeting. A co-operation with the International Pacific Halibut Commission has been initiated.

14. Fisheries Regulations.

The proposals for trawl regulations in Sub-areas 1, 2, 3 and 4 (introduction in 1 and 2 and amendments to existing regulations for 3 and 4) adopted by the Commission in the 1961 (June) Annual Meeting, were submitted by the Secretariat to the Depositary Government, and circulated by the Depositary Government to Member Governments for consideration and ratification. All countries have not yet completed their considerations; the date for the entering into force of these regulations can, therefore, not yet be stated.

15. Resolution on Harp and Hood Seals.

The resolution intending to bring harp and hood seals under the provisions of the Convention, which was adopted by the Commission in the 1961 Annual Meeting, has by the Depositary Government been brought to the notice of the Member Governments. The Resolution is still under consideration by the Member Governments.

16. Inspection of Fisheries

The collection of detailed data on the results of inspections by member countries of trawl fisheries in regulated subareas is being continued, and data for the year 1961 were submitted for consideration by the Commission in the Annual Meeting in June, 1962.

17. Meetings.

No actual ICNAF meetings have been convened since the 1961 Annual Meeting.

A number of ICNAF scientists present at the ICES Meeting in Autumn, 1961, made use of that opportunity to carry out joint discussions of various ICNAF problems, mainly concerned with the planning of the Environmental Survey (fish eggs, larvae, plankton and hydrography) in the northern part of the Convention Area scheduled for spring, 1963, and with preparations for the Environmental Symposium to be held in connection with the 1963 Annual Meeting.

A mid-year meeting of scallop experts from Canada and USA was held in Woods Hole in February, 1962. A report from this meeting is circulated as a document for the 1962 Annual Meeting.

The Commission's Twelfth Annual Meeting was convened in Moscow, USSR, 4-8 June, 1962. It was preceded by a meeting of the Assessment Group, 24-26 May, and by meetings of the Standing Committee on Research and Statistics and of Groups of Advisers to Panels, 28 May to 2nd June. The Chairman's Report of the Annual Meeting is printed as part 2 of this volume.

18. Other Matters.

The Commission has been represented by observers at meetings of other International Organizations as follows:

International North Pacific Fisheries Commission, Oct. 1961 - Mr. G. R. Clark, Canada.

International Council for the Exploration of the Sea, Oct. 1961 - Dr. E. Bertelsen, Denmark.

International Fisheries Convention of 1946, May, 1962 - Mr. Klaus Sunnanaa, Norway.

Requests for data for the "List of Fishing Vessels" for the year 1962, has been circulated. This list is prepared for every third year. The collection of data for the 1962 year is expected to be completed early in 1963, and the "List" can then be ready for distribution in spring, 1963.

19. Financial Statements for the Fiscal Year ending 30 June, 1962.

The accounts of the Commission for the year ending 30 June show an appropriation of \$ Can. 61,000.00 and a total expenditure of \$59,961.31.

The audit of the Commission's finances for the fiscal year ending 30 June, 1962, was made

by the Auditor General's Office of the Government of Canada in July, 1962.

The report from the Auditor General's Office, 22 Oct., 1962, says:

"In compliance with the requirements of Financial Regulations 11.2, I certify that, in my opinion:

- (a) the financial statements are in accord with the books and records of the Commission;
- (b) the financial transactions reflected in the statements have been in accordance with the rules and regulations, the budgetary provisions, and other applicable directions; and
- (c) the monies on deposit have been verified by certificate received direct from the Commission's depository.

Ready access was given to all books of account and records necessary for the performance of the audit. The co-operation of the Executive Secretary and his staff is acknowledged with appreciation".

The following three financial exhibits are attached to the Auditor's report:

Exhibit I

Statement of Budget Appropriations, Obligations Incurred, and Unobligated Balances of Appropriations for the year ended 30 June, 1962 (Expressed in Canadian Dollars)

Purposes of Appropriations	Appropriated by Commission	Authorized Transfers	Amended Appropriations	Obligations Incurred	Unobligated Balances of Appropriations
Personal Services -					
Salaries	\$27,600.00	\$-119.14	\$27,480.86	\$27,207.48	\$ 273.38
Superannuation	2,600.00	—	2,600.00	2,243.49	356.51
Additional help	1,200.00	119.14	1,319.14	1,319.14	—
Travelling	2,000.00	—	2,000.00	1,968.46	31.54
Transportation of things	400.00	135.88	264.12	223.03	41.00
Communication Services	1,100.00	135.88	1,235.88	1,235.88	—
Rent and Utility Services	2,400.00	—	2,400.00	2,400.00	—
Other Contractual Services, including Printing	16,200.00	—	16,200.00	16,061.11	138.89
Supplies and Materials	1,800.00	117.59	1,917.59	1,917.59	—
Equipment	500.00	-117.59	382.41	192.58	189.83
Annual Meeting	5,200.00	—	5,200.00	5,192.55	7.45
	<u>61,000.00</u>		<u>61,000.00</u>	<u>59,961.31</u>	<u>1,038.69</u>

EXHIBIT II

Statement of Income and Expenditure for the year ended 30 June, 1960
(Expressed in Canadian Dollars)

Income:			
Members' contributions assessed -			
Canada		\$ 6,526 .45	
Denmark		2,026 .61	
France		6,526 .45	
Germany		3,526 .56	
Iceland		2,026 .60	
Italy		3,526 .56	
Norway		2,026 .61	
Poland		526 .66	
Portugal		6,526 .45	
Spain		6,526 .45	
Union of Soviet Socialist Republics		5,026 .51	
United Kingdom		5,026 .51	
United States		5,026 .51	
		<hr/>	\$ 54,844 .93
Miscellaneous income -			
Sales of publications		1,743 .65	
Bank interest		734 .47	
Refund of previous year's expenditure		27 .00	
		<hr/>	2,505 .12
			<hr/>
			57,350 .05
Expenditure:			
Obligations incurred (Exhibit I)			59,961 .31
Obligations incurred in excess of income, carried to Surplus Account			2,611 .26

EXHIBIT III

Statement of Assets and Liabilities as at 30 June 1962
(Expressed in Canadian Dollars)

Assets		Liabilities	
GENERAL FUND			
Cash on deposit	\$ 16,396 .35	Unliquidated obligations	\$ 10,096 .95
Accounts receivable		Advances on future contributions	5,677 .98
Assessments	\$ 3,036 .52	Surplus Account:	
Other	276 .17	Surplus as at 1 July 1961	\$ 6,545 .37
	3,312 .69	Less: Obligations incurred in excess of income (Exhibit II)	2,611 .26
	<hr/>	Surplus as at 30 June 1962	3,934 .11
	19,709 .04		<hr/>
	<hr/>		19,709 .04
WORKING CAPITAL FUND			
Cash on deposit	\$ 10,769 .23	Principal of Fund	\$ 10,000 .00
	<hr/>	Credits due to Member States as a result of new Member's contribution for 1961-62	769 .23
	10,769 .23		<hr/>
	<hr/>		10,769 .23

PART 2

Report of the Twelfth Annual Meeting

4th - 8th June, 1962

BY THE CHAIRMAN, MR. G. R. CLARK

1. Time and Place of Meeting.

The Twelfth Annual Meeting of the Commission was convened in Moscow on 4th June, 1962, and continued through to the 8th June. It was preceded, 24th to 26th May by a Meeting of the Assessment Group, and 28th May to 2nd June by Meetings of the Standing Committee on Research and Statistics and of Groups of Advisers to Panels.

2. Participants (Appendix I)

Commissioners with advisers and experts from all thirteen member countries were present. Observers were present from the Food and Agriculture Organization of the United Nations, International Council for the Exploration of the Sea, International Fisheries Convention of 1946, and International North Pacific Fisheries Commission.

3. Opening of the Meeting (Agenda Item 1)

The opening session was convened in the Trade Union Building, Moscow, where all subsequent meetings were held, as well as were the preceding meetings of the Standing Committee on Research and Statistics. The preceding meetings of the Assessment Group were held at the Moscow University. Present at the opening session were: Representatives of the Embassies of ICNAF countries in Moscow, Representatives of USSR Fisheries Organizations, and the commissioners, advisers and experts from the member countries.

The Commission's Chairman, Mr. G. R. Clark, Canada, opened the meeting and welcomed guests, observers and delegates. He addressed a special welcome to the members of the delegation of Poland, which had joined the Commission since the last Annual Meeting. Mr. Ishkov,

Minister of Fisheries of the USSR extended an address of welcome to the Commission. Mr. B. Dinesen, Denmark, Vice-Chairman of the Commission, thanked Mr. Ishkov for his address of welcome. The Chairman concluded the opening session by reviewing the work accomplished during the year. He mentioned his concern about the great increase in fishing effort applied in the Convention Area in recent years and raised the question whether ICNAF is not proceeding too slowly with adequate conservation measures and management procedures. The Chairman suggested that the Commission at its current annual meeting should give preliminary consideration to this problem.

Shortly after the adjournment of the opening session the first plenary meeting was opened by the Chairman. It was followed on the 8th June by the 2nd and final plenary. During these meetings the following business was concluded.

4. The Agenda (Item 2, Appendix II)

The agenda, circulated 60 days in advance of the meeting was adopted.

5. Publicity for the Meeting (Item 3)

The USSR Government had made a press officer available for the Annual Meeting. A committee consisting of the Commission's Chairman and the Chairmen of the two Standing Committees was appointed to work with the press officer.

6. Review of Panel Memberships (Item 4)

The new member country Poland requested memberships on Panels 1, 2 and 3, and USSR already a member of Panels 1, 2 and 3, requested memberships on Panels 4 and 5. The acceptance of these memberships was recommended by the

respective panels and by the Standing Committee on Finance and Administration and agreed to by the Commission. Thus, Panel memberships for 1962/63 are 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

7. Report on Staff Matters and Auditor's Report (Items 5, 6 and 21)

The Auditor's Report for 1960/61 was received and accepted, and the Commission approved the provisional administrative Report for 1961/62 with financial statements (up to 2nd May, 1962. Meeting Document No. 51).

8. Budget (Items 7, 8 and 18)

The Commission approved the recommendation of the Standing Committee on Finance and Administration to appropriate \$67,540 for the year 1962/63 for the following purposes:

Section 1.	Personal Services . . .	
	(a) Salaries	\$31,340.00
	(b) Superannuation	2,700.00
	(c) Additional Help	1,200.00
„ 2.	Travel	3,000.00
„ 3.	Transportation of Things	2,600.00
„ 4.	Communication Services	1,400.00
„ 5.	Rent and Utility Services	2,400.00
„ 6.	Other Contractual Services, including printing	17,200.00

„ 7.	Supplies and Materials	2,200.00
„ 8.	Equipment	600.00
„ 9.	Annual Meeting	2,400.00
„ 10.	Honorarium to retiring Executive Secretary	500.00
Total		\$67,540.00

The Commission noted that the Committee proposed an advance budget estimate for 1963/64 as follows:

Section 1.	Personal Services	
	(a) Salaries	\$31,340.00
	(b) Superannuation	2,700.00
	(c) Additional Help	1,200.00
„ 2.	Travel	3,500.00
„ 3.	Transportation of Things	1,000.00
„ 4.	Communication Services	1,600.00
„ 5.	Rent and Utility Services	2,400.00
„ 6.	Other Contractual Services, including printing	17,500.00
„ 7.	Supplies and Materials	2,500.00
„ 8.	Equipment	600.00
„ 9.	Annual Meeting	3,200.00
Total		\$67,540.00

9. The Commission adopted the following Recommendations of the Standing Committee on Finance and Administration (Items 5, 18, 19 and 21)

- (a) That the date of billing be August 1, 1962.
- (b) That the 1963 Annual Meeting be held in Halifax, Canada, in the week beginning Monday, June 3.
- (c) That the 1964 Annual Meeting be convened in Halifax, Canada, subject to consideration at the 1963 Annual Meeting being given to any invitations which might be received to meet elsewhere.

- (d) That the Chairman of the Commission and the Chairman of the Standing Committee on Finance and Administration be authorized to select and appoint a replacement for the Executive Secretary and that the appointment be ratified by the Commission at its 1963 Annual Meeting.

The Commission noted that Mr. J. Howard MacKichan had been re-elected Chairman of the Committee for the ensuing year, and approved the two reports (Proc. No. 9 and No. 12) in their entirety.

10. Invitations to Annual Meetings of other International Organizations
(Item 17)

Upon recommendation by the two Standing Committees the Commission accepted with thanks the invitation by ICES to send observers to its 1962 Statutory Meeting.

11. Inspections in Connection with ICNAF Trawl Regulations (Item 9)

A report on annual returns of inspections carried out by member countries from the appointed *ad hoc* Committee was considered and adopted.

It was noted that the *ad hoc* Committee as requested by the Plenary had considered the problems connected with the possible use of double codends and with the use of chafing gear, and the following two recommendations by the *ad hoc* Committee were adopted:

- (a) That the Commission instruct the Executive Secretary to communicate with the member governments to insure that the proposals for trawl regulations adopted by the Commission at its 1961 Annual Meeting are understood to prohibit the use of double codends.
- (b) That the advisability of amending the trawl regulations to permit the use of flap-type chafers be considered by each member country in advance of the 1963 Annual Meeting, so that a fully-informed decision can then be taken.

12. Meeting of Commissioners
(Items 10 and 20)

In a meeting of Commissioners the possibility of introducing a joint enforcement system was considered. A Working Group with Mr. Engholm (UK) as Chairman, and Mr. Dinesen (Denmark), Mr. Möcklinghoff (Germany), Mr. Aas (Norway), Mr. Izhevsky (USSR), and Mr. Fulham (USA) was appointed. The report of the Working Group was considered by the Commission and the following resolution was adopted unanimously:

"The Commission requests all member governments to give further consideration to the introduction of a joint enforcement system, and in particular to the possibility of introducing into Article XII of the Convention for the North-West Atlantic Fisheries a provision similar to paragraph 3 of Article XIII of the Convention for the North-East Atlantic Fisheries 1959, a suitable draft of which should be circulated by the Chairman to Commissioners as soon as possible. The Commission further requests member governments to complete their consideration of these matters before the 1963 meeting with a view to the Commission reaching a decision at that meeting on what further action should be taken."

The meeting further considered a preliminary report by the Chairman of the Standing Committee on Research and Statistics dealing with the results of the sessions of that Committee. (See Section 15).

Finally, the meeting considered the concluding remarks in the Chairman's speech at the opening session (see Section 3) concerning increased activity by ICNAF to insure an adequate conservation of the fisheries in the Convention Area. At the final Plenary session the Commission unanimously adopted the following resolution:

"That an *ad hoc* Committee consisting of one member from each member country be appointed to consider the problem at the time of the 1963 Annual Meeting."

13. **A Report on the Status of Proposals by the Commission** adopted in the 1961 and earlier Annual Meetings was given and considered (Item 11).

14. **Reports by ICNAF Observers on Meetings of other International Organizations** were tabled or given (Item 16).

15. **Report on the Standing Committee on Research and Statistics** (Items 12, 13, 14, 15, 17 and 20).

This Committee, with Mr. R. J. H. Beverton in the Chair, and its sub-committees met in the period 24th May - 8th June. The proceedings from these meetings with recommendations are reprinted in the Redbook for the 1962 Annual Meeting, and are here summarized as follows:

a. **Organization Work:**

To provide continuity of work and leadership it was resolved to keep in being during the ensuing year and for the 1963 Annual Meeting the following main sub-committees: Assessment and Sampling, Statistics, Environmental Studies, and Gear and Selectivity.

b. **Assessments:**

The Committee considered the four specific questions listed under items 12 and 13 of the Plenary Agenda and reported:

Item 12 a: Preliminary estimates of immediate loss for redfish in Divisions 3 NOP have been made. The problem is being further studied as a matter of urgency.

Item 12 b: No information is yet available on which new assessments can be made for the effect of mesh size in Subarea 4 on species other than cod, haddock and flounders.

Item 12 c: Provisional assessments for silver hake in Subarea 5 show that increase from the present 2 3/4" to 4" mesh size would result in substantial immediate losses, but probably also in long-term gains.

Item 13: There are indications that increase in the age of shucking in the scallop fishery in Subarea 5 may result in appreciable long-term gains. Further researches were planned.

Generally it was found that no changes of substance in the 1961 assessments could be given at the present stage. Studies on the assessment of transitional effects, on effect of changes in fishing effort and of other outstanding problems were planned.

c. **Mesh gauges** (Item 14):

The Committee agreed to adopt as standard for research purposes the ICES Mesh Gauge. More experience is needed before advice can be given to the Commission on its suitability for purposes other than research.

d. **Chafing Gear:**

It was noted that both the ICNAF chafer and the "flap-type" chafer, if properly fitted, are reasonably effective in permitting escape-ment of small fish (see also Section 11 b).

e. **Environmental Studies** (Item 15):

It was agreed that the Environmental Symposium scheduled to be held in connection with the 1963 Annual Meeting should be postponed until 1964, probably to the dates January 27 - February 1. It was also agreed that the Commission, through the Executive Secretary, should suggest to the Food and Agriculture Organization of the United Nations that the Organization's facilities at its headquarters in Rome might be made available to hold the Symposium. It was noted that the plans for the Environmental Survey in Subarea 1 and adjacent waters in 1963 were well advanced, and that 7 countries would participate.

Following a response by the Intergovernmental Oceanographic Commission under UNESCO to the ICNAF Resolution on Oceanography of 1961 it was resolved that IOC through a letter from the Executive Secretary be informed of the plans for the Environmental Survey and that IOC be requested to keep ICNAF informed of proposals for oceanographic research, particularly those with fisheries objectives in the ICNAF area.

The Committee noted with pleasure that FAO is taking steps to convene a meeting in consultation with national and intergovernmental bodies in accordance with the ICNAF Resolution of 1961 (Ann. Proc. Vol. 11, p. 18).

f. Publications:

The Committee considered a number of problems related to ICNAF publications and made proposals for their solution. It was urged that a new series "The Research Bulletin of ICNAF" be established. This was agreed to by the Commission and the funds for it were provided and are included in the 1962/63 budget.

g. Tagging:

It was noted that the report of and contributions to the 1961 Marking Symposium had been edited and now were being printed. It was agreed that in order to improve the efficiency of tagging experiments summaries of releases of tagged fish be circulated to member countries through the Secretariat.

h. Ageing Techniques:

Detailed plans for the Ageing Techniques Workshop to be held in Bergen in November 1962 were drawn up, and the Committee urged all countries concerned to send to the Workshop scientists actually engaged in age-determination work.

i. Statistics:

A number of recommendations were made partly to insure a more complete reporting of efforts and discards, an earlier publication of the "Statistical Bulletin" and a certain re-arrangement of some of its tables, partly to effect some condensation of the "Sampling Yearbook", which over the years has been steadily growing in volume.

Mr. R. J. H. Beverton was re-elected Chairman for the ensuing year.

The report was adopted by the Commission.

16. Reports of Meetings of Panels
(Items 4, 12, 13 and 22).

In the meetings of the five panels the status of the fisheries, the researches carried out and plans for future work were discussed based on the reports by the groups of advisers.

Panel 1. The panel recommended that Poland's request for membership be accepted. The 1960 recommendation that research ships should use fine mesh net covers to investigate whether there were nursery areas for redfish outside the coastal areas in the Davis Straits was endorsed. It was agreed that no changes were necessary in mesh regulations, but that statistical data should continue to be collected for future assessments. The plans for the 1963 Environmental Survey were considered and it was agreed to urge countries which had so far not offered any help, to do all they could to provide additional research vessels.

Panel 2. The panel recommended that Poland's request for membership be accepted. The panel agreed (I) that countries be asked to provide research documents and landing statistics earlier so that the Chairman of Scientific Advisers could have this information in time to prepare his summary; (II) that in view of greatly increased effort for cod in this subarea all countries be urged to provide the additional biological and selectivity data on cod needed by the Scientific Advisers and by the Assessment Group; (III) that on the basis of the Report of the Scientific Advisers there was no need to make changes in the mesh regulations agreed on last year for Subarea 2. In connection with the 1963 Environmental Survey all member countries and especially those which are not now taking part in the survey were requested to do all they could to provide the ships and the scientific staff necessary for an adequate coverage of the survey area.

Panel 3. The Panel recommended that Poland's request for membership be approved. It was agreed, based on the Report by Scientific Advisers (I) that there should be no amendments in present mesh regulations for Subarea 3, and that no mesh regulations for

redfish in Divisions 3 NOP should be proposed at this time; (II) that in view of the rapid increase in the size of the trawl fishery for cod in the northern part of the subarea the fishery and cod population in this region should be watched very closely.

Panel 4. The panel **recommended** that the USSR request for membership be accepted. It was agreed that no proposals for changes in mesh size regulations should be made until there had been opportunity to test the effectiveness of the mesh regulations adopted in 1961. The panel considered the problem of topside chafers and decided to take no action on it in view of the fact that the *ad hoc* Committee on Inspections had been asked to deal with it.

Panel 5. The panel **recommended** that the USSR request for membership be accepted. Based on a report by the subcommittee on sea scallops the panel agreed that further studies should be conducted on the selectivity and design of scallop gear. The panel agreed that there were insufficient data at present for **recommendations** of minimum mesh sizes for species other than cod and haddock, and **recommended** that the scientists give further study to the development of minimum mesh sizes for species other than cod and haddock in Subarea 5. After consideration of the whiting and industrial fisheries the Panel **recommended** that every effort be made to determine the effect of the application of some minimum mesh size for species other than cod and haddock, which might minimize the incidental catch of small cod and haddock by the whiting and industrial fisheries. The Panel finally **recommended** that investigations on herring in Subarea 5 be conducted with the same co-operation under the Commission as the investigations on other species. It was agreed that the Scientific

Advisers to the Panel should meet in Boothbay Harbour, Me., USA, for three days immediately before the meeting of the Committee on Research and Statistics in May, 1963, to review research and plan future programs of research on herring and environmental studies in Subarea 5 and adjacent waters.

17. Acknowledgements and Adjournment (Items 23 and 24).

The Chairman expressed the Commission's gratitude to the Standing Committee on Research and Statistics for the valuable advice given on the condition of the stocks of fish and the status of the fishery.

On behalf of the Commission he thanked the Government of the USSR for the facilities for the Annual Meeting provided in the Moscow Trade Union Building and the Moscow University; for the efficient additional staff which had been placed at the Commission's disposal, and for the great hospitality extended to the meeting participants.

He thanked the observers from FAO for their valuable help during the Annual Meeting and expressed the Commission's gratitude to its own staff for a job well done.

Finally he thanked the retiring Executive Secretary, Dr. Poulsen, for the major contribution he had rendered to the status and work of ICNAF during his 10 years of service, and concluded by thanking Commissioners and other delegates for helpful co-operation and excellent work during the Annual Meeting.

In his response, the Executive Secretary thanked the Commission for the fruitful and interesting years he had spent with the Commission and concluded by wishing the Commission and his friends within the Commission good luck.

Mr. Villegas Urzais, Spain, expressed his and the other delegates sincere thanks to the Chairman for the excellent way in which he had conducted this Annual Meeting and thanked the retiring Executive Secretary for the valuable service he had rendered the Spanish delegations and scientists during his term of office.

As there was no other business, the Twelfth Annual Meeting was adjourned.

APPENDIX I

LIST OF PARTICIPANTS

CANADA:

Commissioners:

- Mr. G. R. Clark, Deputy Minister, Department of Fisheries, Ottawa, Ontario.
- Mr. H. R. V. Earle, President, Earle Sons & Co. Ltd., St. John's, Nfld.
- Mr. J. H. MacKichan, General Manager, United Maritime Fishermen Ltd., Halifax, N. S.

Advisers:

- Dr. L. M. Dickie, Fisheries Research Board of Canada, St. Andrews, N. B.
- Mr. J. B. Estey, Eagle Fisheries Ltd., Loggieville, N. B.
- Dr. V. M. Hodder, Fisheries Research Board of Canada, St. John's, Nfld.
- Mr. S. G. Lake, H. D. Clyde Lake and Sons Ltd., St. John's, Nfld.
- Mr. J. H. LeBreton, Robin, Jones and Whitman, Paspebiac, Quebec.
- Dr. A. Marcotte, Marine Biological Station, Grande-Riviere, P. Q.
- Dr. W. R. Martin, Fisheries Research Board of Canada, St. Andrews, N. B.
- Mr. J. E. Paloheimo, Fisheries Research Board of Canada, St. Andrews, N. B.
- Mr. H. D. Pyke, Lunenburg Sea Products Limited, Lunenburg, N. S.
- Mr. W. R. Ritecy, Ritecy Brothers Fisheries, Ltd., Riverport, N. S.
- Dr. Wm. M. Sprules, Special Assistant to the Deputy Minister, Department of Fisheries, Ottawa, Ontario.
- Dr. W. Templeman, Fisheries Research Board of Canada, St. John's, Nfld.
- Mr. C. Webster, Embassy of Canada, Moscow, USSR.

DENMARK:

Commissioners:

- Mr. B. Dinesen, Departementschef, Ministry of Fisheries, Copenhagen K.
- Mr. K. Djurhuus, Chairman Local Government, Thorshavn, Faroe Islands.
- Dr. P. M. Hansen, Chief, Greenland Fishery Research, Charlottenlund Slot, Charlottenlund, Denmark.

Advisers:

- Dr. Frede Hermann, Danmarks Fiskeri-og Havundersøgelser, Charlottenlund Slot, Charlottenlund, Denmark.
- Mr. Sv. Aa. Horsted, Grønlands Fiskeriundersøgelser, Charlottenlund, Denmark.
- Mr. Lodberg Jensen, West Jutland Fishermen's Organization, Esbjerg.

FRANCE:

Commissioners:

- Mr. C. Ravel, Sous-Directeur des Pêches Maritimes, Secretariat d'Etat à la Marine Marchande, Paris.

Adviser:

- M. Dezeustre, Directeur des Pêcheries de Bordeaux-Bassens, Bordeaux.

GERMANY:

Commissioners:

- Dr. G. Kreffft, Federal Research Institute for Fisheries, Hamburg.
- Mr. G. Möcklinghoff, Ministry of Agriculture, Bonn.
- Mr. M. H. Rehder, Association of German Deep Sea Fisheries, Bremen.

Adviser:

- Dr. Kotthaus, Biologische Anstalt Helgoland, Hamburg.

ICELAND:

Commissioners:

- Dr. Jón Jónsson, Director, Fisheries Research Institute, Reykjavik.
- Dr. J. Magnússon, Fisheries Research Institute, Reykjavik.

ITALY:

Commissioners:

- Dr. Bonizi, Councillor, Direz.Gen. della Pesca Marittima, Rome.
- Dr. G. Gambardella, Director, Section of Ministero della Marina Mercantile.
- Dr. Francesco Matta, Laboratorio Centrale di Idrobiologia, Rome.

NORWAY:

Commissioners:

- Mr. Trygve Aas, Deputy Director of Fisheries, Bergen.
Mr. E. Bratberg, Institute of Marine Research, Bergen.

POLAND:

Commissioners:

- Dr. F. Chrzan, Sea Fisheries Institute, Gdynia.
Mr. Z. Fruczek, Manager, Department of Fisheries, Warsaw.

Adviser:

- Dr. S. Laszczynski, Sea Fisheries Institute, Gdynia.

PORTUGAL:

Commissioner:

- Captain T. de Almeida, Captain, Portuguese Navy, Lisbon.

Adviser:

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

SPAIN:

Commissioners:

- Dr. Rodriguez Martin, Direccion General de Pesca Maritima, Madrid.
Don Luis de Villegas Urzaiz, Councillor of Embassy, Foreign Ministry, Madrid.

Advisers:

- Don Pedro Diaz de Espada y Mercader, "PYSBE", San Sebastian.
Don Alejandro Hernandez Zunzunegui, Presidente del Grupo Portuario de Altura, Vigo.

UNION OF SOVIET SOCIALIST REPUBLICS:

Commissioners:

- A. A. Ishkov, Minister of the USSR.
Dr. G. K. Izhevsky, Research Institute of Marine Fisheries and Oceanography, Moscow.
Prof. Ju. Ju. Marty, Vice-Director, Research Institute of Marine Fisheries and Oceanography, Moscow.

Advisers:

- N. P. Biryukov, Vice-Director, BALTNIRO.
Dr. Mrs. T. F. Dementieva, Chief, Ichthyology Laboratory, VNIRO.
Dr. S. G. Fedorov, Chief, Division of International Fisheries, VNIRO.
Dr. S. S. Fedorov, VNIRO.
Mr. V. M. Kamentsev, Deputy Chairman, Murmansk Economic Council.
Mr. G. G. Kask, Deputy Chief, Fisheries Department, Esthonian SSR Economic Council.
Mr. V. M. Mayevsky, Vice-Director, PINRO.
Mr. V. N. Naumov, Fisheries Department, Latvian SSR Economic Council.
Mr. A. A. Oliv, Main Fisheries Department, Economic Council of RSFSR.
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- Dr. M. M. Androv, PINRO.
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- Mr. R. J. H. Beverton, Deputy Director of Research, Fisheries Laboratory, Lowestoft, Suffolk.

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Mr. Popper, Fisheries Division, FAO, Rome.
Dr. Mario Ruivo, Chief, Program Research
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INTERNATIONAL COUNCIL FOR THE
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Observer:

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tory, Aberdeen, Scotland.

INTERNATIONAL FISHERIES
CONVENTION, 1946:

Observer:

Mr. B. Dinesen, Chief of Department,
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INTERNATIONAL NORTH PACIFIC
FISHERIES COMMISSION:

Observer:

Mr. G. R. Clark, Deputy Minister, Depart-
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Mr. B. F. Calvin DeBaie, Biologist-Statist-
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Miss Margaret Henderson, Secretary,
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ADDITIONAL SECRETARIAT:

Miss Tamara Agapova.

Mr. I. B. Bukhanevich.

Capt. V. A. Kushnarev.

Mrs. A. E. Kuskova.

Mrs. S. V. Malysheva.

Mr. V. M. Muntyan.

Mr. I. M. Rogov.

RUSSIAN INTERPRETERS:

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Mrs. F. P. Milshtein.

Miss Margaret Moossiniantz.

Mr. G. A. Semin.

GUIDES:

Mrs. N. A. Makerova.

Miss Karine Moossiniantz.

Miss Tina Umanskaya.

INQUIRY OFFICE:

Mrs. T. M. Aranovich.

Mrs. G. S. Simanina.

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 (vide Meeting Document No. 1), including a request by Poland for memberships in Panel 1, 2 and 3.
5. Report on staff matters, with presentation of the Administrative Report 1961/62 and up to date financial statements for 1961/62.
6. Presentation of Auditor's Report for the financial year 1960/61 (Annual Proceedings, Vol. 11, pp 8-9).
7. Consideration of budget estimate for 1962/63 (See appendix 1 to Agenda for the Committee on Finance and Administration).
8. Consideration of advance budget estimate for 1963/64 (See Appendix 2 to Agenda for the meetings of the Committee on Finance and Administration).
9. Consideration of "Annual Returns" showing inspections carried out in connection with ICNAF trawl regulations. Further, the appointment of an *ad hoc* committee to consider the collected information (vide Chairman's Report, Item 10, 1958 Annual Meeting - Annual Proceedings, Vol. 8, p. 12).
10. Consideration of a report by the *ad hoc* Committee to study the question of the establishment of an international inspection system for ICNAF trawl regulations.
11. Report on the status of proposals by the Commission adopted in the 1961 Annual Meeting.
 - a. Proposals for trawl regulations in Sub-areas 1, 2, 3 and 4.
 - b. Proposal for inclusion of harp and hood seals in the provisions of the Convention and of the establishment of a panel for dealing with conservation measures for these seals.
12. a. Consideration of minimum mesh size regulation in Subarea 3 (southwest section, i.e., 3NOP) for redfish. (vide Chairman's Report 1961 Annual Meeting, Item 15 e).
 - b. Consideration of minimum mesh size regulation in Subarea 4 for species other than cod, haddock and flounders, particularly redfish (vide Chairman's Report 1961 Annual Meeting, Item 15 d).
 - c. Possible extension of mesh size regulations in Subarea 5 for species other than cod and haddock (vide Chairman's Report 1961 Annual Meeting, Item 15 e).
13. Possible minimum ring size regulation for scallop fishing in Subarea 5 (vide Chairman's Report 1961 Annual Meeting, Item 15 e).
14. Consideration of the adoption for the Convention Area of a standard research gauge for mesh measurement.
15. Report by the Convener (Dr. C. E. Lucas) on preparations for the Environmental Symposium to be held in conjunction with the 1963 Annual Meeting.
16. Reports by ICNAF observers on meetings of other organizations held during the preceding year.
17. Invitations to the Commission to be represented by observers at meetings of other international organizations.
18. Date and place of Annual Meeting, 1963.
19. a. Resignation of the Executive Secretary effective January 31st, 1963.
 - b. Selection of new Executive Secretary and other necessary arrangements.
20. a. Report of the Standing Committee on Research and Statistics.
 - b. Report of the Assessment Group.
21. Report of the Standing Committee on Finance and Administration.
22. Reports on meetings of Panels 1-5.
23. Other business.
24. Adjournment.

PART 3

Summaries of Research, 1961, by Subareas

The following summaries by subareas comprise in the main the summaries by Subareas prepared for the 1962 Annual Meeting by the Chairmen of the Groups of Advisers, viz.

- Subarea 1 – by Paul M. Hansen
- Subarea 2 – by W. Templeman
- Subarea 3 – by W. Templeman
- Subarea 4 – by A. Marcotte
- Subarea 5 – by Herbert W. Graham

A few items have been added to them alongside with the editing in the Secretariat mainly describing the actual research work carried out, or considering research data not available when the summaries were originally prepared. Finally the order of the separate sections have been rearranged to make the forms of the five summaries to conform.

Executive Secretary

Subarea 1

Reports on researches in 1961 are submitted by the following member countries: Denmark, Germany, Iceland, Norway, USSR and UK and by the High Sea Fishery Institute in Rostock (eastern Germany).

1. Work Carried out.

a. Denmark: R/V "Dana," "Adolf Jensen" et al. Hydrographic sections across Fylla Bank (April, June and July) and Lille Hellefiske Bank; Store Hellefiske Bank and off Egedesminde (July); the standard hydrographic station at the entrance to Godthaab Fjord (through the year); and hydrographic observations in connection with biological research. Surveys of cod eggs and larvae in the Davis Strait and the Labrador Sea. In-shore and off shore investigations on the abundance, length and age of young cod and cod of commercial sizes. Tagging of cod. Trawling experiments for small redfish in Godthaab Fjord (through the year). Sampling of cod from Faroese trawlers (May-June).

b. Germany: R/V "Anton Dohrn" and commercial trawlers. Experimental trawling in Subarea 1 and off E-Greenland for cod and redfish (age, length, maturity and food). Tagging of cod in E-Greenland waters. Mesh selection experiments on redfish.

c. Iceland: Commercial trawler. Sampling of cod (age and length) in Divisions 1 DEF, April, Sept., Dec. Sampling of redfish in 1D.

d. Norway: Two cruises by R/V "Johan Hjort" in 1B-1F in April-May and off E-Greenland in Aug.-Sept. Hydrographic section across and westward of Noname Bank, Dana Bank, Banan Bank, off Sukkertoppen (April-May) and off E-Greenland, Prins Christians Sound, Cape Tordenskjold, Cape Dan (Aug.-Sept.) Experimental trawl- and line fishery for cod and halibut (age and length) in Subarea 1 and off E-Greenland. Cod tagging in E-Greenland waters.

e. USSR: R/V "Topseda" and scouting vessels off W-Greenland (April-May and Aug.-Sept.). Age- and length investigations of trawl-caught cod and redfish.

f. United Kingdom: Market sampling of cod.

g. The High Sea Fishery Institute, Rostock: R/V "Eisenach", April and August. Six hydrographic sections across the banks and southward and westwards between Cape Farvel and Lille Hellefiske Bank (August). Experimental trawling for cod and redfish (age and length). Surveys for fish eggs and larvae. Tagging of cod.

2. Hydrography.

Hydrographic researches were carried out in March to May and in July to October.

As early as March, one month earlier than in 1960, the water was warming up, and the temperatures in the whole area were even higher

than in the preceding year which was considered as the warmest year in the last decade.

The Arctic and the Atlantic components of the West Greenland current were well developed, the temperature of the Arctic water was higher than usual and the cold water layer on Lille and Store Hellefiske Banks was less thick than in 1959-60. The cold water boundary had a more northward position in 1961 than in 1959 and 60. As usual Arctic water was found on the top of the southern banks, and mixed water, mostly Atlantic, on the slopes. In April 0.5°C was measured over the top of Fylla Bank and 3.1°C and 3.9°C in June and July. In August the bottom temperature was $2^{\circ}\text{--}3^{\circ}\text{C}$ over the southern banks. In September the surface temperature was about 5°C ; in the region from Cape Farewell to Ivigtut even $7\text{--}8^{\circ}\text{C}$. In the main the surface temperatures were comparatively high, probably due to stirring by the wind, late arrival of the drift-ice, and heavy inflow of warmer Atlantic water.

3. Eggs and Larvae.

As in 1960 very few cod eggs and larvae occurred in coastal waters and in the Godthaab Fjord (1D). In April the largest numbers of eggs were found west of Banan and Fiskenaes Banks and lower numbers west of Fylla Bank. Over the top of Fylla Bank and east of the bank only few eggs were taken. In July and August the catches of larvae over the banks were very poor. This may possibly be ascribed to the unusually large size of the larvae; in July 66% were over 20 mm and larvae of this size easily escape the stramin net. In August the average length was 39 mm. The large size of the larvae may be caused partly by the early spawning in 1961 and partly by a favourable nutrition owing to the high temperatures. The westerly concentrations of cod larvae, similar to those in previous years, indicate a drift of larvae with the westward branch of the West Greenland current from spawning grounds in the Davis Strait towards the Labrador waters.

4. Cod.

a. Age-groups I, II and III. Only small numbers of young were caught in coastal waters. The material is too scarce to permit prediction

of rich or poor year-classes in the stock of young cod.

b. Commercial Stock. The 1953 year-class (average length about 80 cm,) predominated in the stock of old cod. The year-class 1947, which was important some years ago, has decreased very much, but due to the large size of its individuals (average lengths between 85 and 90 cm) the year-class still played a role in some catches.

The predominating younger year-classes were the 1956 and 1957 year-classes. The former predominated heavily in the southern Divisions 1E and 1F and partly in 1D, the latter in the northern Divisions 1A, 1B, 1C and partly in 1D. The 1957 year-class may well for the present be regarded as the richest year-class in W-Greenland waters. The boundary between these two year-classes appeared to be in 1D. The difference in their distribution must be explained by the fact that the 1956 year-class originates from East Greenlandic and possibly Icelandic, and the 1957 year-class from West Greenland spawning grounds. The distribution and richness of the 1956 and 1957 year-classes were predicted in the Danish research report for 1959 (ICNAF Ann. Proc. Vol. 10). In the report for 1958 (Ibid. Vol. 9) the year-class 1957 was characterized as extremely rich. A similar distribution was observed for earlier rich year-classes; 1924 and 1945 with a southern; 1926 and 1947 with a northern distribution.

The prospects for the fishery in the nearest following years must be as follow. The 1947 year-class will nearly lose its importance and the 1953 year-class will show a further decrease, although it will be dominant in the long line catches. The trawl fishery will mainly depend on the two rich year-classes 1956 (in the south) and 1957 (in the north). This means that 6 and 5 years old cod with average lengths about 66-70 cm and 60 cm will form a large amount of the catches in 1962.

c. Observations on Spawning Cod. The spawning occurred earlier than in previous years. According to the German report spawning was observed west of Banan Bank medio March in depths of 350-550 m.

The height of the spawning was reached end of March to beginning of April, when only 10% of the trawl-caught cod were immature. Of the mature cod 34% were ready to spawn, 48% were spawning, 4% nearly spent and 14% spent. The 1953 year-class predominated with 48%. Off Fiskenaes Bank April 3 spawning cod were found in 230-300 m's depth, with similar percentages of the different spawning stages as off Dana Bank April 1.

The temperatures in the water layers where spawning cod were found were: 4.2°C at 320 m off Dana Bank, April 1, and 3.5°C at 280 m off Fiskenaes Bank, April 3.

Almost all the cod had completed spawning in April and their occurrence in shallow water must probably be ascribed to feeding migrations. The condition of the cod was good. Immature cod were found on some of the banks in spite of relatively low temperatures.

The observation of spawning cod far west of the offshore banks is of great importance for the study of the recruitment of the West Greenland cod stock. The spawning of cod takes place in the warm Atlantic water and the spawning places must be sought farther westwards and deeper than hitherto the case. The drift of cod larvae towards the west observed in recent years, may at least in certain years be considerable. It is possible that the variation in the occurrence of warm Atlantic water and the strength of the westward branch of the Greenland current may influence the strength of the year-classes in the West Greenland cod stock.

The Norwegian report states spawning to be almost completed in the bank area by mid-May. The USSR report notes spawning as completed by end of April, only few spawners being observed in May.

d. Tagging. A total number of 6352 cod were tagged in Subarea 1 B-F, and 776 off East Greenland. Recaptures from tagging experiments carried out in previous years have shown migrations between W. and E. Greenland and Iceland. The German report concludes from these tagging results and from studies of age and size of cod that the rich winter fishery in

1F depends upon cod on spawning migration towards E. Greenland.

5. Redfish.

In Godthaab Fjord samples of small redfish were taken through the year, except in June, with shrimp trawl for studies on growth and year-class strength.

Tagging experiments with big redfish in the Godthaab Fjord in 1960, yielded 11 recaptures in 1961, 4 at the tagging locality, 6 in the fjord about 20-30 miles from the tagging locality, and one on Fiskenaes Bank. One redfish tagged in 1956 was recaptured at the entrance of Godthaab Fjord. Three recaptures (males 44-48 cm) show longer migrations into 1D, 1F and to SE-Greenland). The experiments show that the stock of redfish in the fjord is not a local one. The recaptures indicate that mature redfish migrate out of the fjord, southward, round Cape Farewell and then continue to the South-West Icelandic breeding grounds. The very rare occurrence of redfish larvae in Greenland fjords (only on one single occasion two females extruding larvae have been caught in the Godthaab Fjord) and in the Davis Strait indicates that no spawning or only an occasional spawning takes place at or off West Greenland. The larvae which occur in the southernmost part of the Davis Strait are undoubtedly brought there by the current from West Iceland. This is in full agreement with what is found by the USSR investigations. Female redfish with larvae have not been recorded from the Davis Strait. The opinion that the Greenland stock of redfish must be recruited from eastern breeding grounds was published in a paper by Adolf Jensen (1922) on the basis of observations made on the "Tjalfe," expedition in 1908-09.

The average size of redfish caught by Icelandic trawlers in 1D was 45.5 cm.

USSR data reveal an increase in length of redfish from 1C to 1E (38.7 to 42.6 cm); the average age in 1C was 16 years. Females with developing embryos were not recorded, this is in agreement with observations from previous years.

6. Tagging of Halibut was undertaken by Norway.

7. Status of the Fishery.

a. **Cod.** The early warming of the water, the high temperatures in the sea and the sparse occurrence of ice were favourable to the fisheries.

Since 1958 Germany has carried out fishery during all seasons and Greenland is now its most important trawling area. The fishery yielded 60,000 tons or three times the 1960 landings. The good result was caused mainly by stronger fishery in 1B, 1E and particularly 1F.

Iceland carried out trawl fishery mainly in July and August. In spite of only 61 trips against 105 in 1960 the cod catch increased from 4,700 tons in 1960 to 10,600 tons in 1961 owing to a stronger fishing effort for this species.

USSR reports that the cod concentrations in April were unstable due to insufficient amounts of food. In May the fishing improved on Fylla, Banan, Lille and Store Hellefiske Banks. Cod were scarce in September and the 1st half of October and occurred mainly in mid water layers, but when the sandeel appeared on Fylla

Bank in mid October the cod concentrations became more stable.

The Faroese report gives information on discards. Only cod over 45 cm were used. 118 tons or 19% of the total catch were discarded. Considering that the discarded cod are small-sized (35-47 cm) and of low weight, the numbers discarded must be extremely high. If the discards by all other trawlers in Subarea 1 are of the same dimensions, the stock of cod must suffer severely. The discarding deserves closer investigations in the coming years.

UK conventional trawlers and factory trawlers operated in the subarea throughout the year, with larger landings in the 2nd half of the year; the average size of the cod caught were between 50 and 70 cm.

b. **Redfish.** In April good USSR catches of redfish were reported from 1C, D and E. Up to 7 tons per hour's fishing in 1D. In August the best catch in 1D was 3 tons per hour, taken on the slope of Dana Bank. 16-18 years old fish were dominant in the catches.

Subarea 2

Reports on researches in 1961 are submitted by the following member countries, Canada, Germany, Iceland, Portugal, Spain, USSR and USA, and by the High Sea Fishery Institute in Rostock (eastern Germany).

1. Work Carried out.

a. **Canada:** Various research vessels. A hydrographic section across Hamilton Inlet Bank and seawards, 31 July-1 Aug. Oceanic cruise in Aug.-Sept. Sampling of commercial catches.

b. **Germany:** Scouting trawler. Sampling of Commercial landings of cod and redfish from Division 2J.

c. **Iceland:** Commercial trawler. Sampling of redfish, length measurements.

d. **Portugal:** Sampling of catches of cod aboard commercial trawlers in 2J, length measurements and weight data.

e. **Spain:** Sampling of catches of cod aboard commercial trawlers in 2J, length measurements and age-determinations. Collection of data on discards (quantities and sizes of fish discarded).

f. **USSR:** R/V "*Topseda*" and scouting trawlers. Hydrographic section from the coast of Labrador and seawards (June-July). Age- and length observations on cod and redfish in 2J. Tagging of cod in 2J. Observations on occurrence of fish eggs and larvae.

g. **United Kingdom:** Factory vessels. Sampling of cod. Continuous plankton recorder surveys.

h. **USA:** Hydrographic section Labrador-Cape Farewell, July.

i. **High Sea Fishery Inst. Rostock:** R/V "*Eisenach*" and commercial trawlers. Cod in 2J, length measurements.

2. Hydrography.

The International Ice Patrol US Coast Guard occupied the Labrador - Cape Farewell section from July 3-11. The section off southern Labrador showed positive anomalies both in volume and temperature.

Canada took the southern Labrador section off Seal Island at the usual time, July 31-Aug. 1. In spite of the unusually cold winter and the greater amount of ice, the temperatures of the cold intermediate layer and of the deep water between Hamilton Inlet Bank and the coast were higher than usual.

The USSR vessel *Topseda* made two hydrographic surveys in the Labrador area, in May-June and August-September. In July the mean temperatures of the whole Labrador Current in Subarea 2 approached the normal value. The core of the Labrador Current was cooler than usual.

3. Plankton.

Distribution of plankton from Continuous Plankton Record surveys to the southern part of 2J are reported by UK. USSR has studied the plankton in the southern part of the Subarea.

4. Fish Eggs and Larvae.

The USSR data show that spawning of cod and American plaice occurs off southern Labrador, in Division 2J. The maximum spawning of cod is in April-May; American plaice spawns in April-June.

5. Cod.

In Canadian investigations in 1960 the 1953 and 1955 year-classes were most abundant in 2J and the 1957 year-class in 2H. There were no great variations in year-class strength.

Portugal sampled the cod in 2J in May, September and November. Lengths were mainly between 43 and 73 cm. Fish from night and day samples had approximately the same length.

Spain reported lengths and data on age and growth and reproductive biology for cod in 2J from May-November. The most frequent lengths caught were from 48 to 65 cm. The most numerous ages were 4-8 but there was no

considerable dominance of any year-class. The growth rate was lower in 2J than in the neighbouring 3K and essentially the same as in 1960.

Most of the cod obtained by USSR scouting trawlers were of the 1953, 1954 and 1955 year-classes in 2J and of the 1951, 1952 and 1953 year-classes in 2H. The size-and age distributions of the Labrador cod have not changed much during 1957-1961. Growth rates for cod in 2H, 2J and the adjacent 3K are similar and lower than for the southern Grand Bank. Most Labrador cod spawn in April. Cod tagged in the Labrador area were returned from near the tagging area, at least up to 3-7 months later. Cod disappeared from the deep water of the Hamilton Inlet Bank area in early June, presumably becoming pelagic and migrating coastward. Studies of the distribution of cod eggs and larvae indicated cod spawning grounds in 2J. The greatest numbers of young cod were found on and west of Hamilton Inlet Bank and south of Hawke Channel.

In the fishery by trawlers from eastern Germany in 2J the peak of the cod length frequencies was at 60-70 cm in January and in May and June at 50-60 cm. In May the 1952 and 1953 year-classes were most numerous.

6. Redfish

In 2H males dominated the USSR redfish catch in May (79%) but in July the sex ratio became 1:1 as the larger females became available. In 2J the numbers of males and females were similar throughout the year; the dominant age for males was 13-14 years with some as old as 23 years, and for females 15-19 years with a few 18-year-old specimens. The feeding habits were studied. The distribution of young redfish was investigated; no concentrations of young below about 12 cm were encountered.

The redfish length-frequency curves for catches by east German trawlers showed two peaks, at 31 and 41 cm for females and at 29 and 35 cm for males. Females predominated in the catch but this may have been due partially to greater mesh selection escapement of the smaller males.

7. Stock Divisions.

Summaries of information on cod stock divisions and on halibut distribution have been prepared by Canada, and the USSR reports information on stock divisions in cod and redfish.

8. Status of the Fisheries.

Cod landings of 263 thousand metric tons represent a considerable increase over the 188 thousand tons landed in 1960 and the 60 thousand tons in 1959. The 1961 cod landings from this area constitute by far the greatest landings from the area since 1936. During the period 1936-59 the landings have only exceeded 100 thousand metric tons on one occasion (1953) when 111 thousand tons were landed.

Redfish landings of 25 thousand metric tons declined greatly from the 1960 landings of 83 thousand tons which were the greatest annual landings from the subarea since the beginning of the fishery in 1958 when 71 thousand tons were landed.

Apparently the effort by trawlers for cod in the southern part of this subarea has been

considerably increased over the past two years with the development of a great new deep water winter and spring fishery for this species. At the same time there has been a corresponding decrease in the effort for redfish.

German trawlers obtained good cod catches

on the southern Labrador Shelf from Hamilton Inlet Bank southwards (2J) in Jan.-March, and fair catches (70%), the remainder being redfish, in April at 360-400 m. The main Icelandic fishery for redfish in the Subarea took place - as in previous years - in the vicinity of Sundall Bank in 2J. The main Spanish fishery for cod in the Subarea was on Hamilton Inlet Bank, and the best catches were made in May. USSR trawlers fished mainly on the southeast slopes of this Bank at 285-360 m (3-3.8°C) and in the first part of the year. UK factory trawlers operated in the southern part of the Subarea, 2J.

Trawlers from eastern Germany caught in 2J in January three times as much redfish as cod and in May twice as much. In June the catch was almost entirely cod, but from July onward large amounts of redfish were caught.

Subarea 3

Reports on researches in 1961 are submitted by the following member countries: Canada, France, Germany, Iceland, Italy, Poland, Portugal, Spain, USSR, UK, and USA; further by the High Sea Fishery Institute in Rostock eastern Germany.

1. Work Carried out.

a. Canada: "A. T. Cameron" and other research vessels. Five hydrographic sections across the shelf and Labrador current from off Bonavista to S-Grand Bank (July-Aug.); the St. John's-Flemish Cap section also in March; additional observations in Aug.-Sept. Research cruises covering the bank-and slope areas NE. and S. of Newfoundland including Flemish Cap (March-August). Survey of inshore distribution of young cod (Sept.-Oct.). Sampling of cod from traps (July-Aug.) and from line fishery (through the year). The main species considered

in the survey cruises are cod, haddock, redfish, and American plaice. Tagging of American plaice. Market samplings of commercial fish.

b. France: R/V "Thalassa". Cruise in the region of S. Grand Bank and St. Pierre Bank (July-Sept.) with hydrographic sections and collection of data on cod, haddock, silver hake, and redfish. Collection of sample data from a commercial trawler (Febr.-April).

c. Germany: Scouting and commercial trawlers. Collection of hydrographic data and experimental trawlings on Flemish Cap, SW. slopes of Grand Bank, St. Pierre Bank and Burgeo Bank (March-April). Market sampling of cod and redfish.

d. Iceland: Commercial trawlers. Sampling of redfish in 3K.

e. Italy: Commercial trawler. Sampling of cod and haddock in 3P and 3O (Feb.) (1962).

f. **Poland:** Factory trawler "Kastor". Sampling of commercial catches from 3L with length measurements of cod, American plaice, Greenland halibut, and redfish.

g. **Portugal:** Commercial trawlers. Sampling of cod catches including age-determinations and length measurements in 3L, 3K, 3M and 3P (Febr.-Nov.).

h. **Spain:** Commercial trawlers. Sampling of catches of cod including age determinations, length measurements and discards in 3K, 3L, 3M, 3N, and 3P (March-Nov.).

i. **USSR:** R/V "Topseda" and scouting trawlers. Hydrographic surveys off Newfoundland (May-June, Aug.-Sept.). Observations on plankton. Collection of data on age, length, maturity, food and races of the major commercial fishes. Taggings of cod and haddock.

j. **United Kingdom:** Factory vessels. Sampling of cod. Continuous plankton recorder surveys.

k. **USA:** 4 hydrographic surveys by the US Coast Guard in the Grand Bank region and Bonavista Triangle sections (April until July). Sampling of landings of commercial fish species.

1. **High Sea Fishery Inst. Rostock:** Scouting trawler cruises on S. Grand Bank (March-April) and in 3KLOPN in Sept. Oct. Sampling of cod and redfish, including age-determinations and length measurements.

2. Hydrography.

The five Canadian sections across the continental shelf and the Labrador Current from off Bonavista to the southern Grand Bank, July 22 and Aug. 21, and the Canadian sections St. John's - Flemish Cap in March showed that bottom temperatures in March were slightly higher on the western slope of Flemish Cap and similar to summer temperatures on the eastern slope. The very cold water of -1.7 to -1.8°C in the Avalon Channel in March was replaced by warmer -1.2 to -1.3°C water by July which is unusual.

The French sections along the SE and SW slopes of the Grand Banks (end of August) revealed intermediary (25-150 m) layers of cold

water (-1° to 1°C) overlaid by summerheated surface water (14 to 17°C) and resting on tongues of warmer Atlantic water ($4-6^{\circ}\text{C}$).

USSR observations indicated a continued, slow increase in temperatures from the cold 1959 year, and in June-July the temperature in the standard sections of Subarea 3 were above normal.

Also the USA surveys showed temperatures above normal for late spring and summer, and less extension of the Labrador current in the east Grand Bank area.

3. Plankton.

Three reports (Bainbridge and Jones, Glover, and Henderson, Oceanographic Laboratory, Edinburgh) deal with the abundance and distribution of plankton considering separately the most abundant species as determined from surveys using the Continuous Plankton Recorder.

The USSR carried out plankton investigations in 1960 and 1961 particularly on Euphausiids and *Calanus* and on the distribution of fish eggs and larvae, and provided new evidence of the great differences in composition and quantities of plankton (both phyto- and zooplankton) in the colder Labrador current and the warmer offshore Atlantic waters.

4. Eggs and Larvae.

USSR collection of egg and larvae of commercial fishes contributed to the delimiting of spawning grounds and spawning seasons. Cod spawning grounds were located along the NE and SW slopes of the Grand Bank, in the area SW of Flemish Cap, and in shallower waters of 3N. Spawning occurred from March to August with maximum in April-May. Redfish were found spawning on the N and NE slopes of the Grand Bank and in the area SE of Flemish Cap. The maximum spawning was in April-May. Spawning of American plaice appears to occur in the southern part of the Grand Bank in April-June.

5. Cod.

Canada's inshore fishery was less successful than usual with cod less available to shallow water traps. Fish caught near shore in traps

are mainly 4 to 6 years old and for a successful trap fishery a constant succession of good year-classes is necessary. The 1955 year-class has been relatively numerous. The Canadian deep-water longline fishery off Bonavista on a stock also fished by European otter trawlers and longliners continued its steady decline from over 100 pounds per line (50 hooks) from 1952-54 and 85 pounds in 1957 to 35 pounds in 1961. The annual autumn survey of the inshore shallow water areas for young cod of the 0+, 1+ and 2+ groups was continued. All these age-groups were caught in smaller numbers in 1961 than in 1960 and it is possible that both 1960 and 1961 are poor year-classes. On the other hand the value of this beach-seining method of assessing the success of new year-classes has not yet been established for the subarea.

In otter-trawl sets (*A. T. Cameron*, March 20-29) from a northern and a southern line of stations on Flemish Cap, the best cod catch (0.9 metric tons of cod and 0.8 metric tons of redfish in a 1/2 hour set) was south of Flemish Cap at 216 (200-237) fathoms (3.8°C). Most of the mature spawning cod were south of Flemish Cap rather than to the north. On Flemish Cap almost all the cod were spent having spawned in March and some probably in February. The cod concentrations on Flemish Cap in the shallower water, 95-130 fathoms, almost entirely on small redfish. A large cod concentration was found on the northern slope of the Grand Bank at 100-120 fathoms (1.2 to 2.0°C bottom temperature) feeding on young capelin. These cod were expected to spawn mainly in May and June.

Portuguese sampling of cod in 3K, 3L, 3Ps and 3Pn showed that with the exception of the 1955 year-class in 3L and 3Ps year-classes were not strongly dominant. Few spawning females (0.6 -3.4%) were observed between April and June. Studies were carried out on sex ratio, stage of maturity and age at first maturity.

The Spanish samplings revealed that growth rate for 3Ps cod was considerably greater than for 3L and 3K and the growth rate for 3L was slightly greater than that for 3K. Apart from 3K where there were significant numbers of older fish, almost all the fish were below 9 years

of age. The fish were largest in 3Ps in April and in 3L in August. Almost all (90%) of the Spanish fishing in the subarea was on the Belle Isle ground 3K, and on Hamilton Inlet Bank, 2J. The best fishing in these areas occurred in May.

USSR investigations showed concentrations of cod in 3K in April. Most of the mature cod had already spawned. In 3K, the 1952, 1953 and 1955 year-classes were most abundant but there was little dominance of individual year-classes. The dominant year-classes in 3L were those of 1952, 1955 and 1957, in 3O, 1954 and 1955 and in 3P, 1955 and 1956. Older cod were more abundant in the northern than in the southern divisions. Cod spawn on Flemish Cap (3M) in February-March, on the northeastern slope of the Grand Bank (3L) in May-June and on the southern part of the Grand Bank (3N, 3O) mainly in June.

In Dec.-March the greatest quantities of young cod were observed on the northern slopes of the Grand Bank. Other cruises showed a great abundance of young cod also on Flemish Cap and the southern part of the Grand Bank and St. Pierre Bank.

Cod spawning areas are probably located on the NE slope of the Grand Bank, on SW Flemish Cap, in the shallow waters of 3N and on the SW Grand Bank slope (3O).

Cod tagged in 3P and 3O showed no long migrations. Racial investigations indicate four cod populations with different characteristics - 1, from southern Labrador to northern Grand Bank; 2, Flemish Cap; 3, NE and SE Grand Bank; 4, SW Grand Bank.

6. Haddock.

Haddock concentrations in summer on the Southeast Shoal of the Grand Bank were probably not as great as in 1960. From a research cruise of the *A. T. Cameron* on the southern Grand Bank the most abundant haddock were of the 1955 year-class, 65% by number of the catch, with a modal length of 36-37 cm. The 1956 year-class was about one-quarter as abundant as that of 1955. Since 1956 there has been no successful year-class, that of 1958 showing the

only significant survival and this is not expected to be large enough to provide a very significant addition to the commercial fishery. The trend in the haddock fishery over the next 4 or 5 years is expected to be strongly downward.

The USSR researches showed a single size group of haddock on the Grand Bank (3N and 3O) with peak sizes of 36-43 cm. In 3P in February the length frequency was trimodal with peaks at 32-37, 42-47 and 52-53 cm. There has been very little haddock fishing in 3P in recent years and the larger fish have not been fished out as on the Grand Bank. A smaller group, presumably the 1958 year-class, is showing up relatively more strongly than on the Grand Bank but this is probably because the older year-classes present were not as successful as those on the Grand Bank. In December 1961 to March 1962 young haddock were found to be most abundant on the SW slopes of the Grand Bank and on St. Pierre Bank. Observations on the feeding of haddock were made; they showed that on the southeast shoal of the Grand Bank capelin formed the main food in July.

7. Redfish.

Polish trawling on the NE slope of the Grand Bank (3L) in August-September was in 230-400 m (generally in 270-300 m) and *mentella* made up 98.7% of the catch. The percentage of females and the average length of the redfish increased with increasing depth.

Catches by the *A. T. Cameron* on the eastern slope of the Grand Bank in September were almost entirely *mentella*. The best catches were between 150 and 175 fathoms to the south and 175 and 200 fathoms toward the north. On Flemish Cap in late March, *mentella* were most plentiful (3 tons per hour) at 290 fathoms and fairly plentiful, (2 tons per hour) at 350 fathoms. There was an unusual abundance of large *mentella* males at 350 fathoms. *Marinus* were scarce and both *marinus* and *mentella* were 50 fathoms or more deeper than in summer. The *mentella* females with best developed larvae (many ready for extrusion) were found in the deep water, 250-290 fathoms. In shallow water, 200-150 fathoms, larval development was at least several weeks behind that at 250-290 fathoms.

On the northern slope of the Grand Bank the best redfish catches (*mentella*) were 4.6 tons per hour at 240 fathoms with catches half this size at 200 and 175 fathoms. Both here and at Flemish Cap *mentella* sizes increased with depth. On the northern slope of the Grand Bank also the *mentella* females with the most highly developed larvae lay deep, at 275 fathoms, whereas at 240, 200 and 175 fathoms the degree of larval development was progressively less. On the northern slope of the Grand Bank redfish spawning had progressed further than at Flemish Cap with 12% of the females at 275 fathoms already spent on March 29 and an additional 45% with larvae ready for extrusion.

At Flemish Cap small redfish from the age of 1+ and upward were plentiful and were especially numerous in cod stomachs while on the northern slope of the Grand Bank young redfish below 24 cm were almost entirely absent.

A study of redfish food in Hermitage Bay on the south coast of Newfoundland showed the food to be mainly euphausiids with the larger redfish having a preference for larger food organisms and for small fish when these are plentiful.

Experimental trawling by France resulted in several good catches of redfish in July-September on the Grand Bank slopes. On the western slopes of St. Pierre Bank the moderate catches consisted of redfish, silver hake, cod and haddock.

The USSR found redfish most concentrated during the months close to and including the spawning time of the females, March-June, and no dense concentrations were observed from July to December. Maximum spawning apparently occurs in April-May. The predominant ages of redfish in 3K and 3L were 14-15 years for males and 20-22 years for females and in 3M, where redfish were smaller than usual, 11-12 years for males and 12-13 years for females. In December-March young redfish were found most abundant on the SW slopes of the Grand Bank.

Racial investigations indicate three *Sebastes mentella* stocks: one in 2J, 3K and 3L; another on Flemish Cap (3M); and the third in 3P

(and presumably 30), and in Nova Scotia and New England areas. 3N is an intermediate area whose redfish have a relationship to the southern stock.

Special USSR studies on *Sebastes mentella* in Subarea 3 (and 2) have shown that these redfish are pelagic feeders mainly feeding on plankton but with fish gradually replacing plankton at the larger sizes. Feeding of mature individuals decreases greatly at spawning time in April, May, June, the delayed spawning of the males causing their increase in feeding to be later than that of females. Redfish feed most actively at night and euphausiids and bathypelagic fish are their main food, and the reduction in redfish catches at night is related to the pelagic feeding at this time. There is a positive correlation between the amount of feeding fish and the size of the catch.

Data from two exploratory cruises from the High Sea Fishery Institute in Rostock in September-October showed concentrations of small redfish on the SW slope of the Grand Bank and of somewhat larger redfish on the southern part of the eastern edge of this bank. In the latter area redfish were larger with increasing depth.

8. American Plaice.

Tagging of American plaice has been carried out by the Biological Station, St. John's on the Grand Bank. With the intensive fishing and the reduction of size of plaice the proportion of fish with jellied fillets is declining. Plaice on the northern Grand Bank grow more slowly than those on the southern parts of the bank. Effort for plaice has been rapidly increasing and the catch per unit of effort is declining except on the northern half of the Grand Bank.

9. Stock Divisions

Summaries of information on cod and haddock stock divisions and on halibut distribution have been made respectively by Templeman, Grosslein and Kohler. The cod stocks of the area include the southern part of the Labrador-Newfoundland stock, the Grand Bank, Flemish Cap, northern and southern St. Pierre Bank, Avalon-Burin and Burgeo Bank stocks. In the winter and early spring the eastward

extension of the West Newfoundland cod stock migrates into 3Pn and the northwestern part of 3Ps. The main haddock stocks are those of the St. Pierre Bank and the southern Grand Bank, with the southern Grand Bank usually providing almost all the catch.

The USSR has carried out work and has come to some conclusions regarding stock divisions in cod and redfish. More details of this work are given in the cod and redfish summaries.

10. Status of the Fisheries.

The data given here for 1961 are not yet entirely complete.

The cod landings were 460 thousand metric tons, an increase of 7,000 tons over 1960. There was a decrease in the inshore landings but an increase in the offshore landings particularly from the spring deep-water fishery in 3K which has developed rapidly in the past 3 years. The 1961 landings were the second largest obtained in the cod fishery for this subarea, the largest being 475 thousand metric tons in 1954. The fishing effort by trawlers for cod has presumably increased in 1960 and especially in 1961 with the diversion of a considerable part of the USSR effort from redfish to this species.

Haddock landings decreased slightly to 78 thousand metric tons from the probable landings of 84 thousand tons in 1960 (assuming the USSR landings from 3N and 3O in 1960 to be 90% of their cod and haddock landings from these two divisions). In the previous history of the haddock fishery only the landings of 1956 and 1960 (84 thousand tons) and those of 1955 (104 thousand tons) were significantly in excess of those of 1961. However in view of the lack of successful year-classes of haddock in this subarea in recent years as discussed in the various Canadian and USSR research documents it is expected that there will be a gradual decline of the haddock fishery in the next few years.

Redfish landings were 89 thousand metric tons, a decrease from the 99 thousand tons of the previous year and a great decrease from the 246 thousand tons landed in 1959. There has also been a considerable decline in the effort for redfish.

The Icelandic redfish fishery in the northern part of 3K which started in 1958 has decreased rapidly from 48,400 and 55,700 tons in 1958 and 1959 to 6,500 tons in 1960 and 4,200 tons in 1961.

A review of the trend in the United States redfish fishery on the Grand Bank shows that

the catch per day decreased rapidly in the first 5 years of the fishing, 1951-55, and has since stabilized at about half the catch per day from the virgin fishery.

Subarea 4

Reports on researches in 1961 are submitted by the following member countries: Canada, France, Germany, Italy, Portugal, Spain, USSR and USA.

1. Work Carried out.

a. Canada: Several research vessels. Hydrographic sections off Halifax and across Cabot Strait, quarterly, and in Chaleur Bay, June-Aug. Regular observations of temperature from coast stations. Studies of water circulation on the Scotian Shelf, in the Gulf of Maine/Bay of Fundy area, and the Gulf of St. Lawrence. Zooplankton production in 4T. Groundfish surveys at intervals through the year; main species considered are cod, haddock, redfish, pollock and American plaice. Special studies of 4T cod (recruitment, growth and mortality). Tagging of cod. Collection of data on discards. Market sampling of commercially important species.

b. France: R/V "Thalassa". Cruise in the Banquereau area in August. Hydrographic section; experimental trawling; collection of data on mainly cod, redfish and great silver smelt.

c. Germany: Scouting commercial trawlers, March-May. Hydrographic observations in 4RVW. Experimental trawling in 4RVW with collection of data mainly on cod and redfish.

d. Italy: Commercial trawler, Jan.-Apr. 1962. Experimental trawling with sampling of data on length and age of cod, and length of haddock redfish and pollock. Observations of discards.

e. Portugal: Commercial trawlers. Sampling of cod with investigations of age, length and maturity.

f. Spain: Sampling of catches by commercial trawlers in 4V and 4T. Age and growth studies of cod. Collection of data on discards.

g. USSR: Scouting operations on Scotian Shelf with sampling of herring and redfish. Hydrographic, plankton and small fish studies.

h. USA: Sampling of commercially caught fish.

2. Hydrography.

The Canadian sections revealed a general decrease in temperature from the 1960 values and French observations in the Banquereau region showed great quantities of cold water above the bank in August. Inshore bottom temperatures were the lowest since 1950. German data from March-April showed below 0° temperatures down to 100-150 m in the Gulf of St. Lawrence and on the Scotian Shelf; at 200 m temperatures of 2-4°C were observed.

3. Plankton.

Canadian observations in Chaleur Bay (4T) indicated a relatively poor plankton production in 1961 compared to that of 1960. Continuous plankton record surveys were initiated by United Kingdom. Plankton surveys by USSR revealed dense concentrations of diatoms at the outer edge of the Scotian Shelf.

4. Cod.

A summary of information on the division of cod stocks was prepared by Templeman (Redbook 1962). New Canadian tagging results conformed with earlier evidence that cod of the 4T and 4Vn area are distinct from those of 4R, 4S, 4Vs and 4W.

This western Gulf of St. Lawrence cod stock is fished by Canadian fishermen from spring to autumn and by European otter trawlers during winter and early spring. Age and length samples of catches from this stock were reported by Canada, Portugal and Spain. Discrepancies in ageing techniques are suggested by (a) Spanish reporting of a dominant 1957 year-class and relatively fast growth, (b) Canadian reporting of a dominant 1956 year-class and intermediate growth, (c) Portuguese reporting of a dominant 1955 year-class and relatively slow growth.

The mean lengths of cod taken from this 4T-4Vn stock by Canada, Germany, Italy, Portugal and Spain were in the vicinity of 50 cm. This reduced size of cod appears to have resulted from more intensive otter trawling. The quantities of cod discarded at sea from this stock have been reduced from about 7 to about 1 million fish, as a result of the adoption of large-mesh nets and the greater market acceptability of small fish.

Diurnal differences in the distribution of cod and food of cod are being studied by Canada in Chaleur Bay (4T).

5. Haddock.

Canada reported good catches of haddock at 45 to 60 fathoms on Western and Emerald Banks (4W) during the winter and early spring of 1961. A survey cruise by the "A. T. Cameron" showed that suitable temperatures of 3° to 5°C covered a smaller area at that time. Commercial catches were based on the 1954 to 1957 year-classes. The 1956 year-class was dominant and the modal length was 46 to 50 cm. Research-vessel surveys showed that 1958 and possibly 1959 year-classes are poor and that landings may be expected to be reduced in 1963 and 1964.

6. Pollock.

Otter-trawl landings of pollock have become increasingly important to the Canadian mainland groundfish fishery. Canadian research since 1960 has shown that pollock found at the mouth of the Bay of Fundy (4X) during summer months are segregated by sizes with the largest fish on the northern side of the Bay.

Tagging results show that these pollock migrate south in the autumn as far as Cape Cod in Sub-area 5 and return north again in the spring.

7. Redfish.

Survey trawl hauls made by France at depths of 80 to 195 fathoms in the Banquereau region (4V) yielded good catches of redfish at temperatures of 3° to 7°C. USSR sampled redfish (*Sebastes mentella*) during scouting operations.

8. Halibut.

Pooled information from Canada, Denmark, Norway, UK, USA and USSR on the distribution of halibut was summarized by Kohler, Canada.

9. American Plaice.

Surveys made by Canada in the western Gulf of St. Lawrence (4T) indicated a shoal-water distribution in spring and summer, and an autumn migration to deep water (4°C) along the western slope of the Laurentian Channel where the plaice concentrate in winter.

10. Great Silver Smelt (*Argentina silus*).

Large catches of great silver smelt were made by the French research vessel "Thalassa" south and southeast of Sable Island at temperatures of 7° to 8°C.

11. Herring.

Canada studied herring inshore and on Browns Bank. USSR reported a separate stock of herring on Banquereau from late autumn to early spring, consisting of large fish, many age groups and fast growth.

12. Discards.

Improved records of fish discarded at sea were noted in reports received from Canada, France, Portugal and USA. A considerable decrease in numbers and weights of cod was reported (see under item 4 - cod).

13. Codends.

Canada reported on changes in the codends of commercial otter trawls during the period 1954 to 1961. Trawlers have converted from manila to synthetic twine and from small meshes to those of regulation size. Topside chafing gear is generally used by trawlers over 75 gross

tons, and in about half the nets this chafing gear is still too narrow. A special committee, chaired by Skerry USA, recommended alternatives of flap-type chafers or polypropylene ends to meet this problem.

14. Status of Fisheries.

Canada, France, Norway, Portugal, Spain, USSR and USA participated in the 1961 fishery. Groundfish landings from Subarea 4 of about

376 thousand tons were similar to those of 1960. Canada took about 60% of the groundfish landings. Cod landings have levelled off at about 215 thousand tons, with Spain taking more and Canada less during 1960 and 1961 than in the late 1950's. Catches in 1961 of other groundfish were similar to those of 1960. The trend toward reduced inshore and increased offshore Canadian effort continued. A significant catch of porbeagle by Norway was noted.

Subarea 5

Reports on researches are submitted by Canada, United Kingdom, USSR and USA.

1. Work Carried out.

a. **Canada:** Various research vessels. Hydrographic observations in the Gulf of Maine-Bay of Fundy area. Researches on pollock, herring and sea scallop.

b. **United Kingdom:** Hardy Plankton recorder surveys UK-Boston.

c. **USSR:** Various research vessels. Oceanographic surveys especially in the Georges Bank Area. Herring population studies in the Georges Bank area.

d. **USA:** Various research vessels. Hydrographic surveys and releases of drift bottles. Monthly temperature surveys at Gloucester and Eastport. Studies of sediments and benthic invertebrates in Gulf of Maine. Sampling of landings of major commercial species. Collection of data on length and age of haddock, cod and silver hake. Distribution and abundance of pre-recruit haddock. Taxonomic studies of pre-extrusion redfish larvae. Growth studies in yellowtail. Tagging and studies of the spawning of the fluke. Experiments on mesh selection, especially for silver hake. Continuation of the studies of the effects on the yield of increasing the mesh size of trawl codends. Tagging of redfish. Studies on sea scallops. Effects of various combinations of ring size and linkage on size composition of catches, data on abundance of the fishable stock and on the strength of pre-recruit year-classes.

2. Hydrography.

The circulation and bottom currents was studied in the Gulf of Maine, Bay of Fundy area by means of drift bottles, sea bed drifters and other mechanical devices by Canada and USA. The various phases of the circulation studies have been undertaken to gain a better knowledge of the tidal streams and non-tidal drift and their effects on the environment.

The USSR conducted three oceanographic surveys. Northeastern winds increase the flow of the slope water along the continental slope and may lead to a complete destruction of the anticyclonic eddy on Georges Bank. Southwestern winds increase the penetration of Atlantic water masses of high salinity into the bank area.

The USA continued its operation of 13 lightship stations located from Maine to Georgia where daily observations of temperature and salinity are made and these observations have been supplemented by observations from several shore stations and Texas Towers 2 and 3. Many lightships also released drift bottles. The analyses of these data have not been completed.

The USA conducted six cruises in Subarea 5 during the year on which temperature observations were made from surface to bottom. Analysis of these data is underway.

3. Plankton:

The oceanographic Laboratory at Edinburgh extended its Hardy Recorder program to include a run to Boston, Mass. Redfish

larvae were found in July and August in the Gulf of Maine. Total copepods were most abundant there in July and August and least abundant in December. Certain species of copepods showed a marked seasonal variation in abundance.

4. Benthic Studies.

Studies of bottom sediments, microscopic benthic invertebrates, and food habits of groundfish in Subarea 5 by the USA were continued.

Silt clay, sand, and gravel bottoms are distributed throughout the Gulf in a complex way and are not necessarily related to depth of water or distance from land as might be expected. New studies of haddock feeding indicate that they may be somewhat selective in their feeding habits preferring crustaceans and to some extent echinoderms over molluscs, annelids and miscellaneous group of bottom organisms.

5. Haddock.

Landings of haddock from Georges Bank in 1961 are for the major part due to the strong 1958 year-class occurring as a 3-year-old fish; but the 1959 year-class was not small, being twice as large as the 1956 and 1957 year-classes although only one-half as large as the 1958 year-class.

The fall haddock survey indicated the 1961 year-class to be one of the poorest observed on survey cruises. Special studies were made of relation of young-of-the-year haddock to depth and temperature. This age group consistently occurred in depths between 50 and 100 fathoms and at temperatures below 45°F. The data suggest that improvements in precision of year-class strength may be made by appropriate stratification of grounds for survey purposes.

6. Pollock.

Returns from Canadian tagging of large pollock (60-85 cm) show a southern migration in autumn to the winter spawning area of the southern Gulf of Maine.

The summer distribution of pollock at the mouth of the Bay of Fundy was surveyed at sea and by sampling commercial landings. Most pollock caught by otter trawl were above sizes released by 4 1/2 inch manila meshes.

7. Silver Hake.

Studies of commercial samples and research surveys show a marked seasonal and secular change in availability on different grounds.

8. Redfish.

Studies of the Eastport stock were continued by the USA. Petersen disc tags curtail growth for 2 1/2 years after which time growth gradually increases until 4 1/2 years after tagging when it returns to normal. Recent studies with plastic dart spaghetti tags through the dorsum indicate that tagging in this manner has little effect on growth rate.

9. Yellowtail Flounder.

Relative abundance of this species on the two fishing grounds: Southern New England and Georges Bank has increased in recent years. Strong year-classes in 1955, 1956, and 1958 have been responsible for these increases. The 1959 year-class appears to be of about average size but the 1962 catch is expected to consist primarily of the 1958 year-class and will remain high. Research has concentrated on the study of growth and on age composition.

10. Fluke.

Research conducted by the USA consisted of (1) spawning studies, (2) abundance and distribution of 0-age group, (3) stock identification, and (4) preliminary age and growth studies.

Information so far collected suggests that spawning takes place in the fall during migration from the summer inshore grounds to the winter offshore grounds. Chesapeake Bay appears to be an important nursery ground. About 1800 fluke have been tagged to identify exploited groups. Scales appear to be useful for age determination.

11. Herring.

Canada, USSR, and USA carried out researches on herring in Subarea 5 during 1961. The USSR concluded that the Georges Bank population is an isolated stock and does not perform long migrations. Canada and USA conducted researches on various stocks in the Gulf of Maine, on Georges Bank and in areas to the southwest, studying morphology, blood

groups, age compositions, growth rates, and relation of larval drift to hydrography. These studies are aimed at differentiating the various stocks in the general area of Subarea 5, adjacent areas of Subarea 4 and extra-convention areas to the south.

12. Sea Scallops.

The high abundance of sea scallops characteristic of the last two years continued during 1961.

Both Canada and the USA conducted research on the question of possible ring size regulation.

Study of growth rates and mortality rates have resulted in estimation of yield per recruit in relation to age selectivity of the fishery. The calculations indicate that delaying age of shucking by one year of life would increase the yield per recruit in the order of 10 to 20 per cent. The analysis of selection data thus far has not allowed us to predict a precise relationship between age of capture and ring size. It appears, however, that to increase the age of shucking by one year would require a ring size of considerably more than 4 inches.

Canada conducted research on the culture of sea scallop larvae and were successful in rearing them for 42 days but they did not settle in this time. The USA carried out tank experiments on the effect of tags on movement of adults. Both tagged and untagged showed little movement in cold water and both showed some movement toward the light in water of higher temperature.

13. Status of Fisheries.

The total landings show an increase from 443,000 tons in 1960 to 491,000 tons in 1961, first and foremost due to the moving in of a USSR fishing fleet in 1961, fishing almost exclusively for herring. The USSR landings of herring amounted to 67,550 tons, all other species only to 970 tons.

Total landings of cod from the Subarea were in 1961 about 25% higher than in 1960; USA reached a 10 year high level of almost 18,000 tons; the small Canadian landings were nearly doubled (to 241 tons). Canadian haddock landings decreased sharply from 460 to 190 tons, whereas USA landings increased from 45,000 to 52,000 tons; the USA landings from Georges Bank were the highest since 1957. The USA silver hake fishery declined in 1961 due to lowered availability and abundance. Landings of redfish, flounders and other groundfish remained on the same level as in 1960; however, the US catch of yellowtail was the highest since 1948.

Total herring landings increased considerably from about 70,000 tons to 94,000 tons, this solely due to the new USSR fishing of herring which amounted to almost 68,000 tons. USA herring landings decreased strongly from about 69,000 tons to only 27,000 tons.

USA sea scallop landings reached a record of 92,000 tons, and the Canadian landings increased with about 30% to 38,000 tons.

It can be noted -- as a new venture in the fishery -- that Norwegian liners caught a few hundred tons of porbeagle in 1961.