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INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Document No. 40

THIRD ANNUAL MEETING

A PROGRAM OF INTERNATIONAL FISHERY RESEARCH FOR THE NORTHWEST ATLANTIC

A Report to the Standing Committee on Research and Statistics

by

the Special Committee on the Commission's Research Program

L. A. Walford, Chairman.

Canada:	A.W.H. Needler, W. Templeman
Denmark:	Paul M. Hansen, Å. Vedel Tåning
France:	Jacques Ancellin, P. Desbrosses
Iceland:	A. Fridriksson, J. Jonsson, U. Stefansson
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Spain:	P.D. Espada, C. Rodriguez
United Kingdom:	C.E. Lucas, R.S. Wimpenny
United States:	H.W. Graham, L.A. Walford
ICNAF Secretariat:	J. Cote, W.R. Martin, Erik M. Poulsen

APPENDIX II

A FISHERY RESEARCH PROGRAM FOR THE NORTHWEST ATLANTIC AREA (I C N A F)

The main purpose of the Commission is to so regulate the fisheries as to avoid over-fishing and obtain the maximum long-term yield. Accordingly this research program is planned for the Commission rather than for all of oceanography.

THE SPECIES TO BE STUDIED

Work should be concentrated in the first instance upon the species of fishes listed below, order of priority differing from subarea to subarea:

cod, haddock, redfish, halibut.

Figures 1 to 4 in the appendix 4 show the predominant importance of cod in Subareas 1-4, of haddock in Subarea 5, and the growing importance of the redfish fishery which, since its origin in Subarea 5 eighteen years ago, has been steadily spreading northward. Halibut catches are very much smaller than those of the other species named above, but they are economically important in the north. Since the primary purpose of the Commission is concerned with management of the fisheries, cod is not of great interest in Subarea 5, nor halibut in the southern parts of the Convention area.

THE QUESTIONS TO BE ANSWERED

The main question with which the research program must be designed to answer are these:

1) What principal fish stocks are there, where, how divided and how now used?

2) How do intensity and method of fishing affect the stocks and the long-term yield?

3) How are the stocks affected by natural factors?

THE WORK TO BE DONE

1. Essential Records on all Fisheries which must be collected by all countries.

The Commission needs to keep current knowledge on the size, intensity and effects of all fisheries throughout the Convention area well enough to recognize the cases that require more concentrated research effort to lay the basis for possible regulation. To carry out a continuous watch for these cases each nation must make certain minimal observations on its fisheries in the Convention area, and must continue to do so indefinitely. The following are minimum essential records:

a) Statistics on catch and effort. The Commission has already agreed to the essentiality of statistics giving in considerable detail the fishing effort and the catches and landings by commercial size categories of the important species by statistical areas and by months. It is necessary to record effort in such a manner that it can be studied comparatively over long periods.

b) Samples of catch for length composition. In order to recognize the effect of fishing it is necessary to record the lengths of the fish in adequate samples of catches, showing fish discarded and fish retained. This is considered essential for all the fisheries for the important species by all the participating countries throughout the Convention area. The total range of fish caught can be sampled only at sea by specially trained observers. The sea sampling of the sizes retained should be supplemented by sampling of landings ashore.

2. Essential Records to be obtained co-operatively, not necessarily by every country.

a) To define the stocks and their movements.

Knowledge of units of stocks and their distribution and movements is necessary before the sizes of the stocks can be assessed and the rates of mortality and recruitment can be determined and the results applied in regulations. This may require fishing and sonic surveys by research

vessels, tagging experiments, studies of meristic and other morphological features, determination of age at first maturity, fecundity, growth characteristics, distribution of parasitized fish, and biochemical attributes. The determination of spawning seasons, location of spawning concentrations, and the dispersal of larvae are important to understanding the identity of the stocks.

b) To assess size of stocks and rates of mortalities and recruitment. This requires systematic sampling of otoliths, scales or other parts for age determinations to yield information on growth, total mortality and recruitment. Distinction between natural and fishing mortalities requires special investigations, for example tagging experiments, study of effects of various fishing intensities, and surveys of egg production.

c) To determine the effects of natural factors on abundance and distributions. The Commission needs to know climatic and hydrographic conditions and their variations in order to relate these changes in the fishery and so distinguish between natural factors influencing the abundance and distribution of the commercial species and the effects of the fishery itself. Ultimately it is hoped to understand the changes in hydrographic conditions well enough to predict them.

3. Contributory information to be obtained as opportunity permits. The above pertains only to information that is essential to achieving the Commission's aims. The coordination of the collection and analysis of such information is a sufficient though ambitious first step for the members to accomplish. Meanwhile, advantage should be taken of any opportunity to collect correlative information pertinent to abundance and distribution. For example, measures of basic productivity will give the rate of production of the organic material on which fish ultimately depend. Variations in productivity may be correlated with variations in recruitment and in yield. From the relative numbers of different species of organisms and from studies of their food, it can be determined what role each species plays as predator, competitor or prey.

HOW THE WORK IS TO BE COORDINATED

The research for the Commission will be carried out by national agencies in centres far removed from one another. If it is to be effective with no duplication of effort, special provision must be made for the pooling of the varied knowledge and experience, for coordination of the work, and for the development of sound agreed conclusions and recommendations. The Commission must face the fact that the great distances involved in its work will make adequate consultation between scientists costly in time and money but that such consultation is, nevertheless, essential and cannot be accomplished by correspondence.

It is proposed that coordination be achieved by the following means:

(1) The establishment of working parties, responsible to the Committee on Research and Statistics, on (a) cod and haddock, (b) redfish and halibut and (c) hydrography. These working parties should examine and standardize techniques for sampling and other activities in their fields, review progress of research for the Commission, recommend changes in programs and develop conclusions. The working parties should consist of active research workers in their special fields, who will exchange cruise announcements and reports and any other material of mutual interest.

(2) The provision of opportunity for working scientists to make visits to the stations and ships of other countries to observe and practice techniques and develop ideas.

(3) The maintenance, through the Executive Secretary, of an up-to-date list of scientists engaged in the various branches of the Commission's work.

(4) The exchange, through the Executive Secretary, each December or as soon thereafter as possible, of programs for the ensuing year.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

APPENDICES

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INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

App. 1

Report of First Meeting of Special Committee on Commission's Research Program

In accordance with action taken at the Second Annual Meeting of the Commission a special meeting of Commission Scientists was held at Charlottenlund Slot, Copenhagen, Denmark on 26 and 27 September 1952 for the purpose of drawing up a research program for the Commission. The following participated in the meeting; with Dr. Walford the elected chairman:

Canada	-Dr. A.W.H. Needler
Denmark	-Dr. Å.V. Tåning, Dr. P. Hansen
France	-P. Desbrosses
Iceland	-Dr. A. Fridriksson, J. Jonsson
Norway	-Dr. G. Rollefsen, B. Rasmussen
Spain	-Dr. O. Rodriguez y Martin
United Kingdom	-Dr. C.E. Lucas, R.S. Wimpenny A.T.A. Dobson
United States	-Dr. L.A. Walford, Dr. H.W. Graham
ICNAF Secretariat	-Dr. W.R. Martin, Dr. E.M. Poulsen Miss E. Ravnkilde

Doctors Needler, Tåning and Walford made preparations for the meeting by soliciting from Commission scientists of each Government a list of topics which should be discussed. The resultant material was consolidated into four papers which were placed before the meeting:

1. A Proposed Fishery Research Program for the Northwest Atlantic Area (ICNAF)
   by Dr. Walford

2. Questions for Discussion on Needs of a Research Program for the Whole Northwest Atlantic Area, and on Possibilities of Cooperative Action
   by Dr. Walford

3. Research Program for ICNAF
   by Dr. Needler

4. General long-term fishery research program for the whole Northwest Atlantic Area (ICNAF)
   by Dr. Tåning

The Committee discussions resulted in the attached "Draft of a Fishery Research Program for the Northwest Atlantic Area (ICNAF)".

DRAFT OF A FISHERY RESEARCH PROGRAM FOR THE NORTHWEST ATLANTIC AREA (I C N A F).

The main purpose of the Commission is to so regulate the fisheries as to avoid over-fishing and obtain the maximum long-term yield. Accodingly the program was drafted for the Commission rather than for all of oceanography.

The main questions which the committee had to consider were these:

1) What principal fish stock are there, where, how divided and how now used?
2) How are these stocks affected by natural factors?
3) How do intensity and method of fishing affect the stocks and the long-term yield?

I. To obtain the maximum long-term yield of fisheries in the Convention area this committee is of the opinion that work should be concentrated in the first instance upon the species of fishes listed below, order of priority differing from sub-area to sub-area:

cod, haddock, redfish, halibut

II. To carry out investigations on the above species, it is recommended that the following program of work be carried out:
Items 1-3 describe essential knowledge about the fish stocks and how they are changing.
Items 4-6 provide essential knowledge about natural factors affecting these stocks.

1. OBTAIN FISHERY STATISTICS IN DETAIL BY AREA AND SEASON.

This would include the making of comparative scales of the catching power of different kinds of gear in order to provide a basis for adjusting to a common unit of effort. This is necessary for estimating relative abundance by catch per unit of effort. To accomplish this, it will be necessary not only to analyse commercial statistics but to make systematic observations on board fishing vessels working on the same grounds.

2. DISTINGUISH AND DESCRIBE THE STOCKS AND THEIR MOVEMENTS.

Knowledge of units of stock and their distribution and movements is necessary before the studies mentioned in 3 below can be carried out, and the results applied in regulations. This may require fishing and sonic surveys by research vessels. Tagging experiments are the most efficient way of dealing with this problem (see also 3 a below). Pertinent information may also be obtained from meristic and other morphological studies (e.g. types of otoliths and of bones), from analyses of growth characteristics, from the distribution of parasitized fish, and from blood studies. The determination of spawning seasons and the location of spawning concentrations of each stock are important.

3. ASSESS SIZE OF STOCKS AND RATES OF MORTALITIES AND RECRUITMENT.

To do this it is necessary to determine the numbers, sizes and ages of fish that are caught from each stock, including the fish that are discarded. Methods of assessing the sizes of stocks should include the following:

a) Tagging.
This technique is a key to measuring rates of mortality, and through them, sizes of stocks. However, no practical method has yet been developed to tag such species as haddock or redfish in their usual habitats. Consequently a great deal of inventive, purposeful study is required to develop tags and tagging techniques for large-scale marking experiments on these species.

b) Studying the effect on the stocks of varying fishing intensity, such as will result from the experimental regulation in sub-area 5.

A possible though not promising method which might be explored is to assess egg production and abundance of larvae.

4. MAKE COMPREHENSIVE SYSTEMATIC HYDROGRAPHIC STUDIES TO FOLLOW CHANGES IN CLIMATE AND IN PATTERN OF CURRENTS.

The results will be used to correlate the hydrographic factors with recruitment and with distribution, movements and growth of adults, and so explain and predict natural changes in stocks.

5. MEASURE BASIC PRODUCTIVITY.

This will give the rate of production at various times and places of the organic material on which fish ultimately depent. Variations in productivity may be correlated with variations in recruitment and yield. A promising method of measuring productivity is by the use of active carbon (C 14).

6. STUDY OF THE BIOLOGICAL ENVIRONMENT.

From the relative numbers of different species of fishes caught in the experimental fishing surveys, and from studies of their food, it can be determined what role each species plays in its ecological system as predator, competitor or prey.

7. MAINTAIN ANNOTATED BIBLIOGRAPHY OF PUBLISHED LITERATURE ON THE SCIENTIFIC WORK IN THE AREA AND AN ANNOTATED LIST OF UNPUBLISHED DATA, RECORDS AND REPORTS.

III. The committee will, before its next meeting take inventory of the ships, laboratories and staff available, including those of non fishery agencies and will in its final report express an estimate on what further resources would be necessary to implement the program outlined in section II.

The Committee will meet again for three days preceding the next Annual Meeting of the Commission. It will then draft, in greater detail, the program which is now definitely in prospect, and the additional work which it considers essential to implementing of the general purposes outlined above.

INVENTORY OF RESEARCH FACILITIES REQUESTED FOR USE OF COMMITTEE ON COMMISSION'S RESEARCH PROGRAM

1. From what sources does your country expect to obtain hydrographic or fishery-biological data in the Convention Area in 1953?

   A. Research ships

      Give number and names, approximate dates operating. Show on blank charts courses or areas which they will work. Use as many charts as necessary.

   B. Commercial vessels

      How many observers will your government engage on fishing? Show on blank charts when and where they will be working.

   C. Shore sampling

      Show on blank charts what areas they will cover.

   D. Non-Fishery agencies

      What meteorological, hydrographic and biological observations will be made by such agencies as Navy, weather ships, Coast Guard. Show on blank charts where.

   E. Mechanical recording instruments, anchored or attached to ships. Show on blank charts where these will be operating.

2. What hydrographic and meteorological data, and what biological data for what species, will be collected from the sources listed under 1A to 1E above? Use charts where helpful.

3. What research facilities not listed above might be available in the near future (for example, research vessels now assigned elsewhere, or now under construction).

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Answers to Dr. L. A. Walford's Questionnaire on Research Possibilities within the Convention Area.

Contents:

I.C.N.A.F.

INVENTORY OF RESEARCH FACILITIES REQUESTED FOR USE OF COMMITTEE ON COMMISSION'S RESEARCH PROGRAM

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3. What research facilities not listed above might be available in the near future (for example, research vessels now assigned elsewhere, or now under construction).

Summary of Information received to answer Dr. L.A. Walford's Questionnaire distributed from Headquarters 29 Dec. 1952

Information received from Canada, Denmark, France, Iceland, Norway, Portugal, Spain, U.K., and U.S.A.

From a few countries working only in a limited part of the Area no special answers were received. In such cases answers have been compiled from separate research programs handed in by these countries.

I. Sources of data from Convention Area 1953.

A. Research ships

1. Canada.

"Investigator II", 124 gross tons. March Nov. Subarea 3 (mainly), 2, and 4.
"Sackville", 1100 displ. tons. 4 seasonal cruises in Subarea 4 (mainly) and 3.
"J.J. Cowie", 49 gross tons, Subarea 4, mainly inshore.
"Mallotus", 29 gross tons, Subarea 4, inshore.
Further 4 long-liners and 1 Danish seining boat engaged for experimental fishing, Subarea 3, inshore.

2. Denmark.

M/S "Dana", 500 gross tons, July-August, Subarea 1.
M/B "Ad. S. Jensen", May-October, Subarea 1, mainly inshore.

3. France.

Frigat "Aventure", May-Sept., Subareas 1 and 3.

4. Iceland. None.

5. Italy. No information.

6. Norway. None.

7. Portugal.

M/S "Gil Eanes", summer half of the year, Subareas 1, 2 and 3.

8. Spain. None.

9. U.K. None.

10. U.S.A.

"Albatross III", Subareas 4 and 5.
"Atlantis", Subareas 3, 4 and 5.
"Caryn", Subareas 3, 4 and 5.

B. Commercial Vessels

1. Canada.

Subarea 3, one trip per month with 2 men.
Subarea 4, one trip per month with 1 man.

2. Denmark.

1 biologist on board one Faroese trawler in Subarea 1 in March.

3. France. Nil.

4. Iceland.

At least investigations from 1 commercial trawler in Subarea 1.

5. Italy. No information.

6. Norway.

One or more biologists will be working on commercial vessels in Subarea 1 from May to end of summer.

7. Portugal.

A scientist will be working on board a fishing vessel in Subarea 1.

8. Spain.

A biologist and a hydrographer will carry out research work from a fishing vessel in Subarea 3 (and 4) from February to April.

9. U.K.

No work, but an observer will be sent on one or two vessels fishing in East-Greenland waters.

10. U.S.A.

2 observers will work throughout the year on board vessel fishing on Georges Bank and Nova Scotian Banks.

C. Shore sampling

1. Canada. a. At St. John's, Bonavista and Burin.
b. At Lockport, Lunenburg, Halifax and Louisburg.

2. Denmark. Samplings (measurements and otoliths of cod at the coast of West-Greenland).

3. France. Nil.

4. Iceland. Nil.

5. Italy. No information.

6. Norway. Nil.

7. Portugal. Nil.

8. Spain. Nil.

9. U.K. Samplings of cod from trawlers near Cape Farvel.

10. U.S.A. Samplings of fish from major ports in Subareas 3, 4 and 5.

D. Non-Fishery agencies

1. Canada.

   a. Hydrographic stations will be worked in Subareas 3 and 4 from six hydrographic Service ships, from one Naval Research ship, and from various Navy ships.

   b. Daily surface temperature measurements at St. John's, Halifax, Entry Island, and St. Andrews throughout the year and in part of the year from Borden and Grand River.

   c. Daily temperature measurements, from surface to bottom from L.S. off Halifax and off Yarmouth.

   d. Meteorological observations from many stations along the E-coast.

2. Denmark.

   a. Surface temperature measurements will be made onboard merchant ships en route to and from W. Greenland ports.

   b. Meteorological observations from several coastal stations along the West Greenland coast.

3. France.

   Researches from Frigat "Aventure" (see under A).

4. Iceland. Nil.

5. Italy. No information.

6. Norway. Nil.

7. Portugal. (Gil Eanes, see under A).

8. Spain. Nil.

9. U.K. Nil.

10. U.S.A.

a. Woods Hole Oceanographic Institution (see under A 10)

b. U.S. Coast Guard for International Ice Patrol, Vessel "Evergreen". Hydrographic observations over the whole Area.

c. U.S. Weather Bureau; Weather ships "Baker", "Easy" and "Dog"; meteorological observations only.

E. Mechanical recording instruments, anchored or attached to ships

U.S.A. a. Bio-acoustic studies in Subarea 5.
b. Hydrographic survey by plane.

It should here be borne in mind that to most research vessels and to other vessels too mentioned already, recording instruments of various kinds are attached.

II. Nature of data (see attached appendices).

III. New Research facilities in near future.

1. Canada. New research vessels are planned.

2. Denmark. The new Biological Station at Godthåb (Subarea 1) will be in use from 1953.

3. France. The research vessel "President Theodore Tissier" might be available for research in the Area next year.

4. Iceland. The amount of observations gathered and of research work made on commercial vessels might be increased.

5. Italy. No information.

6. Norway. No information.

7. Portugal. The possibilities of increased researches from commercial fishing vessels are considered.

8. Spain. The possibilities of increased researches from commercial fishing vessels are considered.

9. U.K. No increased research facilities can be guaranteed.

10. U.S.A. No information.

Inventory of Canadian Research Facilities in the Convention Area (Charts: Canada 1, 2 and 3).

Prepared in reply to questionnaire from Special Committee on Commission's Research Program

(received from A.W.H. Needler)

1. A. Research ships - refer Chart 1.

"Investigator II" - 78 ft.; 124 gross tons. Operated by Fisheries Research Board. Based at St. John's. Works mainly in Subarea 3 (six months) and some in 2 and 4 (about one month each). Operates March to November. Two months hydrographic work and remainder general fisheries exploration.

"Sackville" - 205 ft.; 1100 displacement tons. Operated by Joint Committee on Oceanography. Based at St. Andrews, N.B. Works mainly in Subarea 4 with some cruises to Subarea 3. Operated year-round; four seasonal cruises. Work largely physical oceanography applicable to fisheries; some effort in non-fisheries directions.

"J.J. Cowie" - 56 ft.; 49 gross tons. Operated by Fisheries Research Board. Based at St. Andrews. Used in Subarea 4, mainly in inshore general fisheries exploration.

"Mallotus" - 54 ft.; 29 gross tons. Operated by Fisheries Research Board. Based at St. Andrews. Operated in Subarea 4. In 1953 work will include tagging of groundfish in south-western Nova Scotia.

Long-liners in Subarea 3 - Four 55 ft. long-liners engaged in 1953 in exploratory fishing inshore in Subarea 3. Chartered by Department of Fisheries.

"Matthew II" - 56 ft.; 46 gross tons. Engaged in inshore exploratory fishing (Danish seining).

B. Commercial vessels - refer Chart 2.

In Subarea 3, sea trips (one trip per month with two men) are made by technicians from Newfoundland Fisheries Research Station.

In Subarea 4, sea trips (one trip per month with one man) are made by technicians from Atlantic Biological Station.

C. Shore sampling - refer Chart 3.

Shore sampling has been established by the Newfoundland Research Station at St. John's, Bonavista and Burin.

Shore samplers have been stationed by the Atlantic Biological Station at Lockeport, Lunenburg, Halifax and Louisburg, N.S. These field men sample the inshore fishery at Freeport, Yarmouth, Lockeport, Liverpool, Canso, Louisburg and North Sydney in Nova Scotia. They sample the offshore fishery at Shelburne, Lunenburg, Halifax, Louisburg and Mulgrave in Nova Scotia and at Caraquet, N.B.

D. Non-fishery agencies

The following groups of ships occupy hydrographic stations in Subareas 3 and 4 with emphasis on the latter:

Six Hydrographic Service ships.
One Naval Research Establishment ship.
Various Navy ships.

Daily surface temperatures are now taken at St. John's, Nfld. Surface temperatures have been taken twice daily for many years (30) at St. Andrews, N.B.; Halifax, N.S.; and Entry Island, P.Q. Other shore stations have been established for daily temperatures seasonally at Borden, P.E.I., and Grand River, P.Q.

Daily temperatures, surface to bottom, and wind direction are recorded at Sambro lightship off Halifax and Lurcher lightship off Yarmouth, N.S. (Refer Chart 2).

Meteorological observations are available for many stations along the east coast of Canada; e.g., Saint John, Yarmouth, Halifax, Sable Island, St. John's. (Refer Chart 2).

2. Answered under 1.

3. New Research vessels are planned but none are now under construction or assigned elsewhere.

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Inventory of Danish research facilities in Subarea 1
(Charts: Denmark 1, 2 and 3)

1. A. Research ships

M/S Dana. 1/7-10/8 1953
M/K Adolf Jensen. 1/5-1/10 1953

B. One biologist onboard a Faroese trawler in March in the Southern Davis Strait.

C. Material will be collected at several Greenlandic fisheries stations.

D. Surface temperatures taken from merchant ships.

E. Surface temperature recorder, thermograph and barograph attached to M/S Dana.

2. A. M/S Dana. (Chart I) Work in open sea.
Hydrographical sections. Hauls with 2m stramin bag for catching fish larvae and different macroplankton animals.
Vertical hauls with Hensen net.
Trawling experiments.
Tagging experiments with cod, halibut, seawolf (if possible).
Collections of cod otoliths.

M/K Adolf Jensen. (Chart II) Work in coastal waters and in the fjords.
Hydrographical observations.
Hauls with 1m stramin bag.
Vertical hauls with Hensen net.
Fishing experiments with shrimp trawl.
Tagging experiments with cod, seawolf, salmon and char.
Fishing experiments for herring with seine and drift nets.
Collections of herring scales.
Collections of otoliths of cod, char, halibut, caplin.
Collection of material of shrimps.
Investigations of stomach content of different fishes.

B. Faroese trawler. Investigations upon spawning conditions for cod in Davis Strait.
Collections of otoliths of spawning cod.
Hydrographical observations.

C. (Chart III) Samples of otoliths from Greenlanders' catches during the season at different fisheries stations.

3. (Chart I) Biological station at Godthåb. (1953)
M/B Umarissok. (1953)

Paul M. Hansen.

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Inventory of French Research Activity in the Convention Area in 1953 (translated from the French)

(Chart: Other Countries)

In answer to the questionnaire on research facilities enclosed in your letter of 29 December 1952 I beg to tell you that the following activities within the Convention Area are expected from France during 1953:

1. A. Research vessels. The oceanographic research vessel "President Theodore Tissier" will not be used in the Area during 1953 owing to repair works and a general overhauling of the vessel.

D. The frigate "Aventure" of the Marine Nationale Française will operate from May to September in the area of the Grand Banks of Newfoundland and off the Westcoast of Greenland between 40° and 65° N. Lat.

2. Hydrographic observations. Temperature and salinity will be determined from the surface and down to a depth of 500 m. in Subarea 1 (West of Greenland) and in Subarea 3 (the Grand Banks of Newfoundland). A special hydrographic section will be made from St. Jean de Terre Neuve to Cape Farvel (Greenland) (Subareas 1, 2 and 3).

Desbrosses.

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Inventory of Icelandic Research Facilities in the Convention Area in 1953. (Chart: Other Countries).

1. A. No research vessels.

B. At least one commercial trawler will be in charge of collecting material.

C. No shore sampling.

D. None.

E. It is hoped that one or more trawlers can be fitted with thermographs.

2. Temperature-measurements. Biological investigations will be limited to cod and comprise: 1) Long-scale length-measurements 2) Sampling of otoliths for age-determinations and 3) Observations of stages of maturity.

3. None.

31.1.1953
Arni Fridriksson.

7

Norway: Program of work in Panel 1, 1953 (Chart: Other Countries)

As in preceeding year one or more biologists will be at work on commercial vessels fishing on the banks in the Davis Strait. The work will mainly comprise collecting of cod otoliths, at the same time noting the catches in the different regions of the banks. This for assessing the age composition and the quantitative distribution. Also marking experiments will be carried out.

If conditions permit temperature sections will be across Frederikshaabs Bank, Fyllas Bank, Little Hellefisk Bank and Great Hellefisk Bank. Bottom temperature observations will be taken on most fishing stations for the study of the influence of temperature changes on fish distribution, density and general fish biology. As in previous years notes will be taken on ice conditions.

It is hoped that the biologists will be able to work aboard a trawler in the early part of the season (May-June), and later in the summer collect material from a long-liner.

Gunnar Rollefsen.

Birger Rasmussen.

8

Portugal

Compiled at headquarters (Chart: Other Countries).

A letter has been received from Commander Tavares de Almeida (13 December 1952) stating that it is not yet possible for Portugal to submit a special Research Program for Subarea 1. However, means are expected to be available permitting a continuation and improvement of the work initiated in 1949 onboard M/S "Gil Eanes" to such an extent that cooperation with other countries working in that area can be effected.

Another letter from Commander Tavares de Almeida (6 February 1953) states that a Portuguese scientist will be sent to the Greenland waters in 1953 partly to work (for training purposes) together with Danish scientists on land, on board Danish Research vessels, and on board a Portuguese fishing vessel, and partly to carry out research work on board the "Gil Eanes". Finally he will investigate the possibilities for carrying out researches from vessels of the Portuguese fishing fleet.

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Spain, Scientific Investigations to be included in the Program of the Committee on Research of the I.C.N.A.F. (Translated from the Spanish) (Chart: Other Countries).

1. The biologist of the Direccion General de Pesca Maritima Don Olegario Rodriguez Martin has received your letter of 29 December last, including information on the last Committee meeting in Copenhagen, and including also a request concerning research projects of Spain in the Convention Area.

2. We do not actually have an appropriate research vessel, but we have decided to send immediately biologists of the Direccion General and a chemist of the Spanish Institute of Oceanography aboard a cod fishing vessel which is the property of PYSBE, which vessel has been reconditioned provisionally for such an expedition.

3. The ship will sail from the port of Pasajes the 10th of February, and the scientists will return to Spain in the middle of April with information to present to the May Meeting in New Haven.

4. This trip has for main objective to give orientation so as to be able to determine a concrete program of research for Spain in the area in which Spanish vessels are fishing. Information will be given particularly to the biometrical study of cod, haddock and pollock.

5. On the Chart: "Other Countries" are indicated the zones where the investigations will take place aboard the ship already mentioned.

El Director General,
Subsecretariat of the Merchant Marine,
Direccion General de Pesca Maritima.

10a

The answers to the questionnaire on research facilities attached to your letter of 29-12-52 as far as England and Wales is concerned, are as follows: (Chart: Other Countries)

1 A, B, D and E	No effort in Commission's Area
1 C	Shore sampling from trawled cod fishery in Panel 1 Area (near Cape Farewell)
2	Biological information collected under 1.C would include, in addition to monthly statistics showing the catch and effort of the various species for trawl and line caught fish from the subareas of the various Panel regions involved, age length determination samples for the cod of the Cape Farewell trawl fishery. To make the determinations necessary from these samples otoliths and fin rays will be employed. It is not expected that any hydrographic or meteorological data will be collected.
3.	No research facilities other than those listed above are expected to be available in the near future.

In accordance with the request in your letter, I have indicated the area from which we expect to obtain material for shore sampling (1.C of the questionnaire) on a chart which I now return.

10b

Scottish Home Department, Marine Laboratory

In answer to the questionnaire on research facilities enclosed with your letter of the 29th December, 1952, the answers, as far as this laboratory is concerned, appear at the moment to be as follows:- (Chart: Other Countries)

1 (A) I regret that, as far as we can foresee, it will not be possible for one of our research vessels to operate in the Commission's area during 1953. Unfortunately, it may even prove impossible for a vessel to be operating in East Greenland waters.

(B) No effort in the area, although we shall, if possible, send an observer on one or two cruises of commercial vessels in East Greenland waters.

(C) Probably no shore sampling, unless Aberdeen line vessels should be operating in the Commission's area, but there will be shore sampling of Aberdeen halibut catches taken in waters off East Greenland, and these may be relevant.

(D) No effort by non-fishery agencies as far as I am aware.

(E) No work with mechanical recording instruments.

2. Again no effort within the area but statistics will be collected concerning halibut in adjacent waters.

3. No increased research facilities in the area can be guaranteed for the near future.

I am sorry that so many of my answers must be negative but I am afraid that this is all we are in a position to undertake at the moment.

11

United States Research in the Convention Area Planned for 1953

(Charts: United States 1 and 2)

Agencies in the United States proposing to carry out investigations in hydrography and fishery biology in the Convention area in 1953 are the Woods Hole Oceanographic Institution, the U.S. Coast Guard, the U.S. Fish and Wildlife Service, the U.S. Weather Bureau and the U.S. Navy.

The plans of the first four agencies are listed below. The plans of the U.S. Navy are not available.

Woods Hole Oceanographic Institution (Chart 1)

1. Icthyological Survey of continental slope in zone between 100 and 1000 fathom contours, extending from south of Long Island to the Grand Banks of Newfoundland. Surveys were made in this zone last year and it is intended to continue this work, if funds become available. (Chart 1)

2. Hydrographic survey in pattern including parts of Georges Bank and the waters southeast of the Bank. This pattern was occupied once and set up for systematic resurvey. Further surveys depend upon securing vessel time. (Chart 1)

3. Bio-acoustic studies. These have been conducted from time to time and will be continued. The area involved just barely includes a corner of the Convention Area. (Chart 1)

4. Hydrographic surveys by boat and plane of the Gulf Stream area. (Chart 1)

5. Thermographs. Recently developed long recording thermographs will probably be set out in Subarea 5 during the year.

Vessels used by the Institution: Atlantis and Caryn and chartered vessels.

U.S. Coast Guard for International Ice Patrol

1. Network of stations in Area A. Occupied each year during April, May, June and July.

2. "Bonavista Triangle" in Subarea 3 (B). A triangle of three hydrographic sections. Occupied two or more times annually between April and July. (Chart 1)

3. Hydrographic Section between Labrador and Cape Farewell, Greenland ("L"). Occupied once each July. (Chart 1)

4. Occasional hydrographic sections across the major currents of the northern part of the Labrador Sea and the southern part of Baffin Bay. (Chart 1)

Observations include temperature and salinity, and sometimes Phosphorus.

Vessel: "Evergreen" operated by U.S. Coast Guard on behalf of International Ice Patrol.

U.S. Fish and Wildlife Service

1. Research Vessel. "Albatross III" will survey Georges Bank, Gulf of Maine and western Nova Scotian Banks. Will conduct biological and hydrographic studies. (Chart 2)

2. Commercial Vessels. Two observers will work throughout the year on vessel working on Georges Bank and Nova Scotian Banks. (Chart 2)

3. Shore Sampling. Practically all boats fishing in the Convention Area will be interviewed. Samples will be obtained from major ports. (Chart 2) U.S. boats land fish from as far away as the Grand Banks.

U.S. Weather Bureau (Chart 1)

1. Weather ships "Baker" and "Easy". Air temperature, barometric pressure, wind velocity, and other standard meteorological observations.

Kinds of Data.

Biological Data. Only the Fish and Wildlife Service will be collecting samples of fish; eggs, larvae, and adults. The Woods Hole Oceanographic Institution will be making some productivity studies and possibly collecting general plankton studies.

Haddock: samples for studies of growth, independence of stocks, year class strength and population problems; plankton samples for study of distribution and abundance of eggs and larvae; other collections for food habits studies.

Redfish: samples for studies of growth, age determination, fecundity, spawning habits, racial problems, migrations, and parasite incidence; plankton samples for study of distribution and abundance of eggs and larvae.

Whiting: samples of fish for studies of growth, food habits, and spawning habits.

Herring: samples for abundance studies and studies of herring disease.

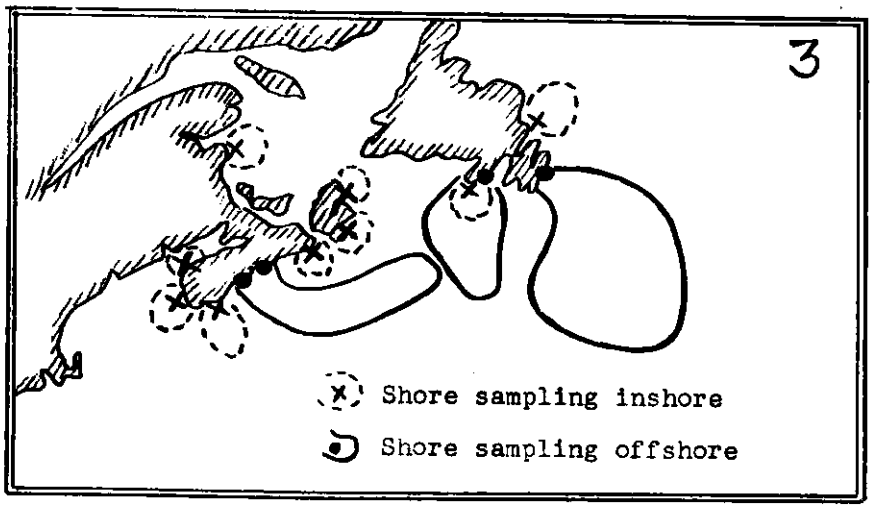
Hydrographic Data. The Fish and Wildlife Service will collect temperature and possibly salinity data in Subarea 5. Details of the station plan have not yet been worked out. Currents will be studied by means of drift bottles.

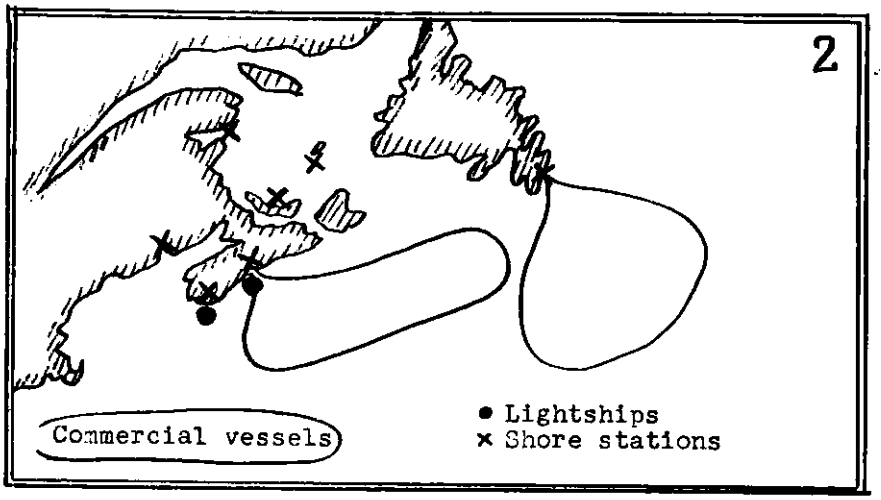
In the International Ice Patrol surveys temperatures and salinities are recorded and sometimes phosphorus content of the water.

The Woods Hole Oceanographic Institution will measure temperature and salinity in the areas indicated.

- THE END -

CANADA


3
Shore sampling inshore
Shore sampling offshore


2
Commercial vessels
Lightships
Shore stations

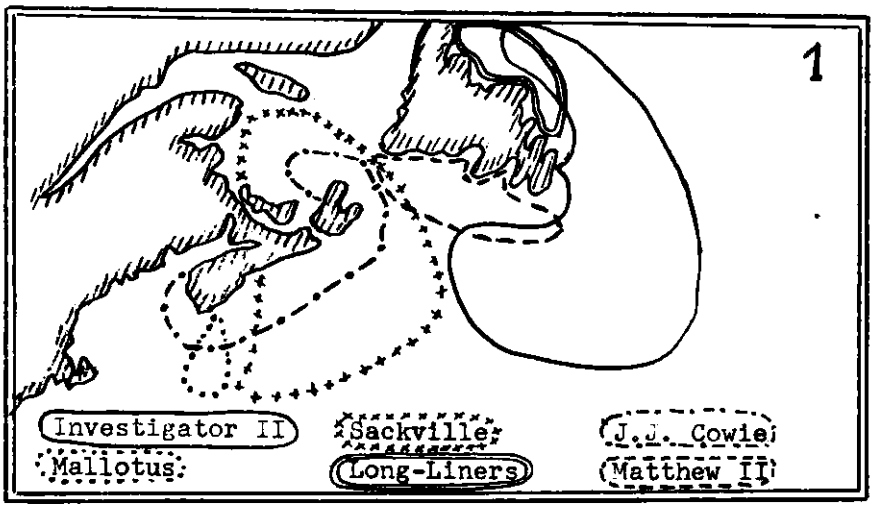
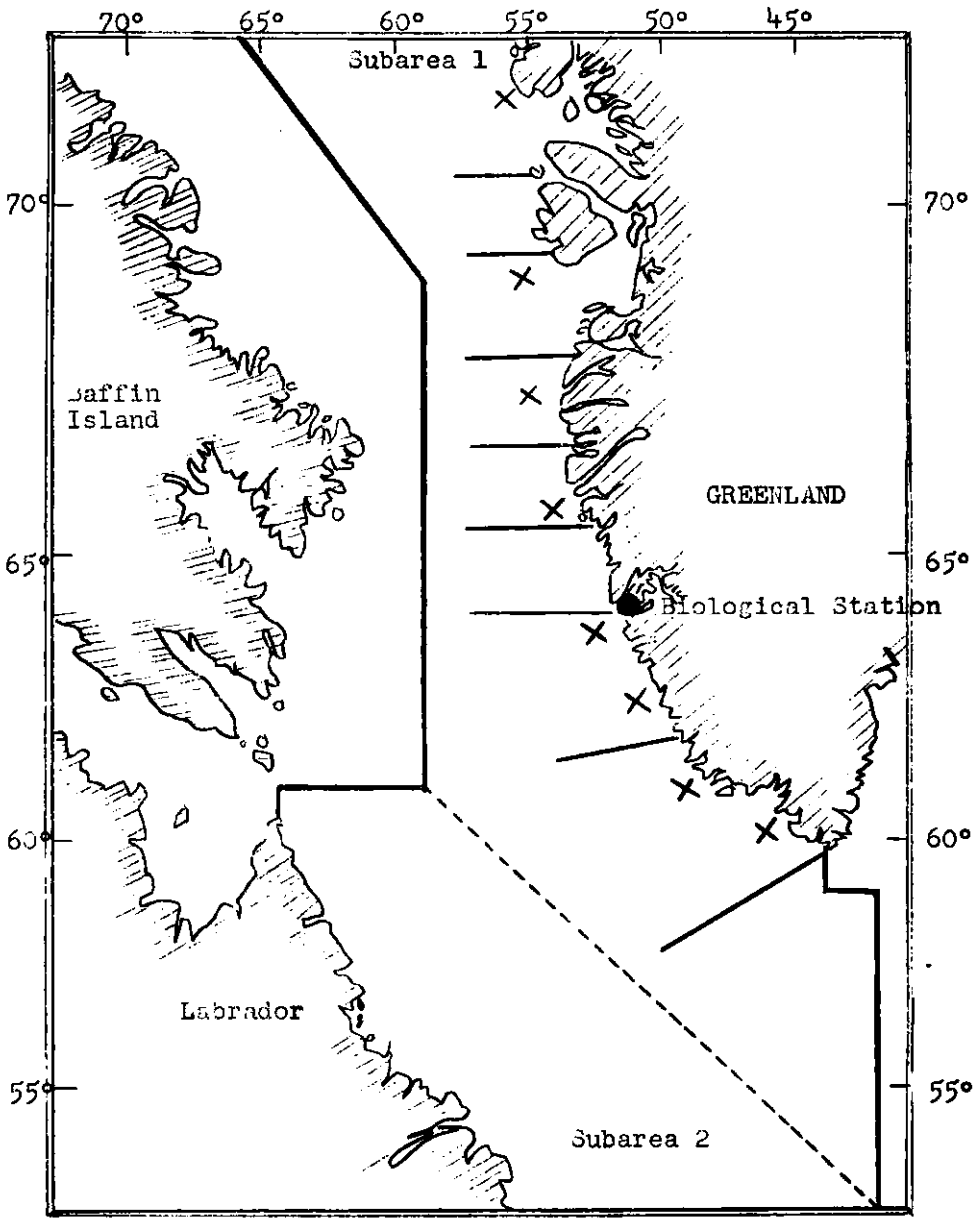

1
Investigator II
Mallotus
Sackville
Long-Liners
J.J. Cowie
Matthew II

Chart I.

Denmark, Research Program 1953, Subarea 1

M/S "Dana" 1 July - 10 August



Hydrographical sections with plankton samplings

× Taggings and otolith samplings of cod

Chart II.

Denmark, Research Program 1953, Subarea 1

M/C "Ad. S. Jensen" May - October

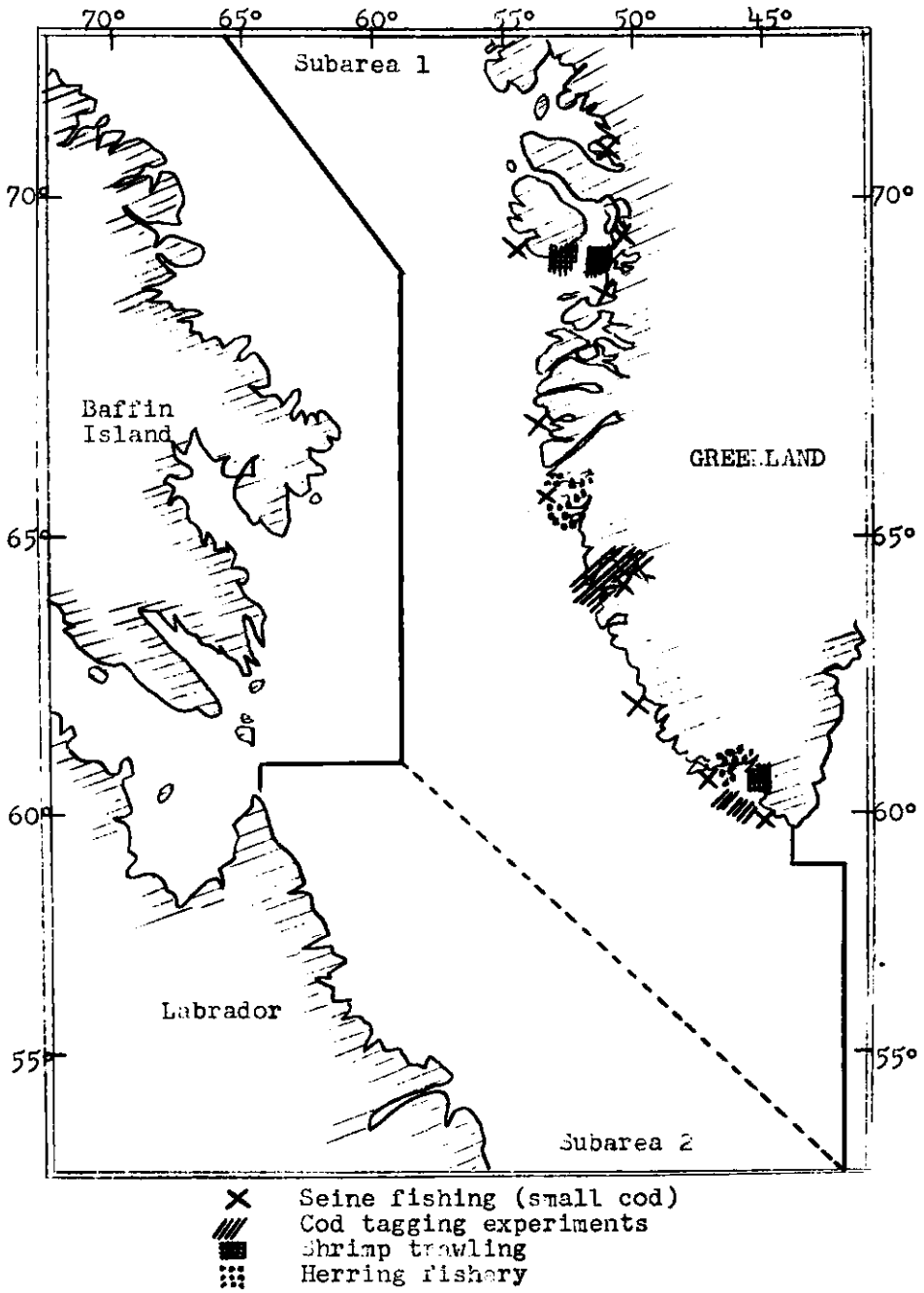
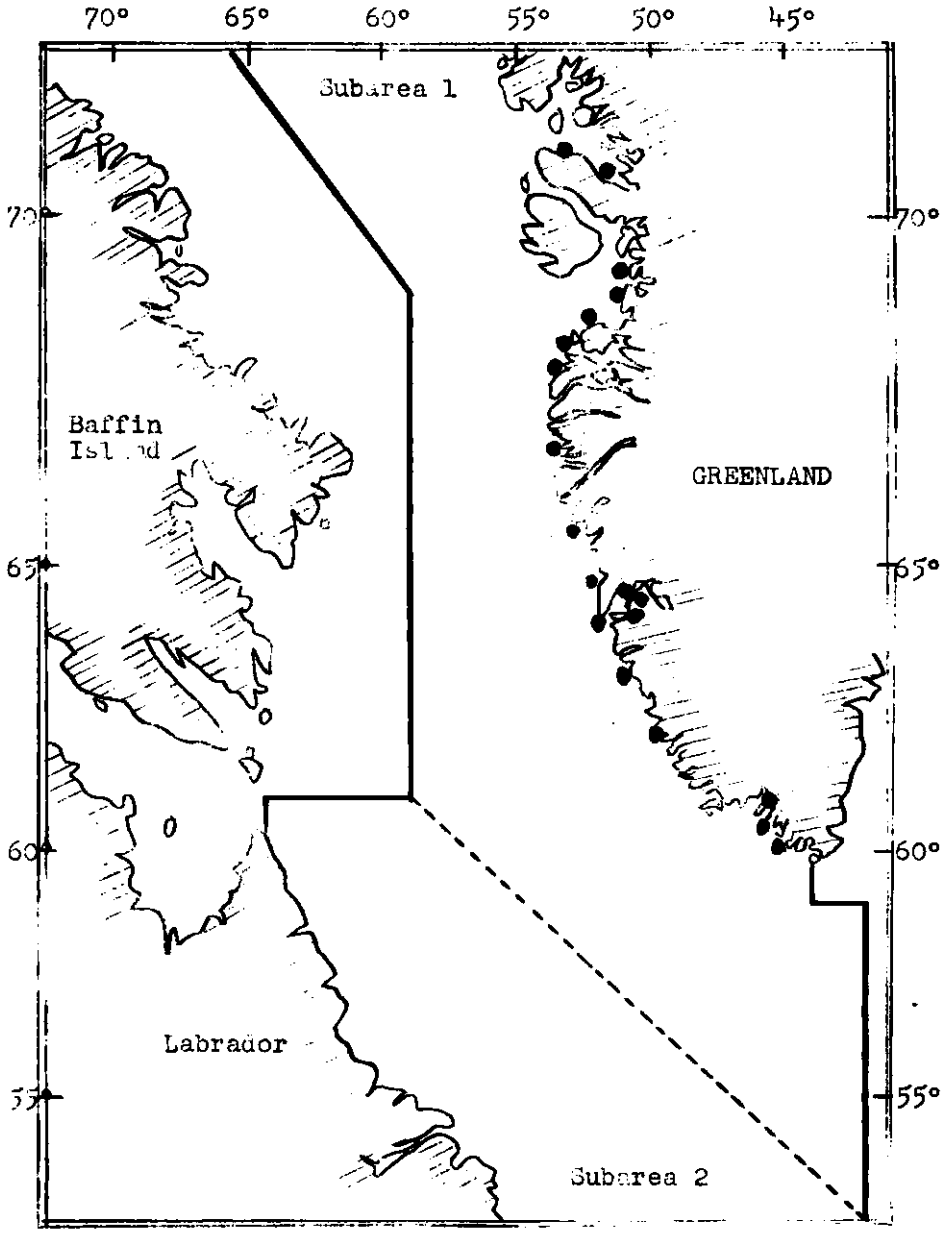
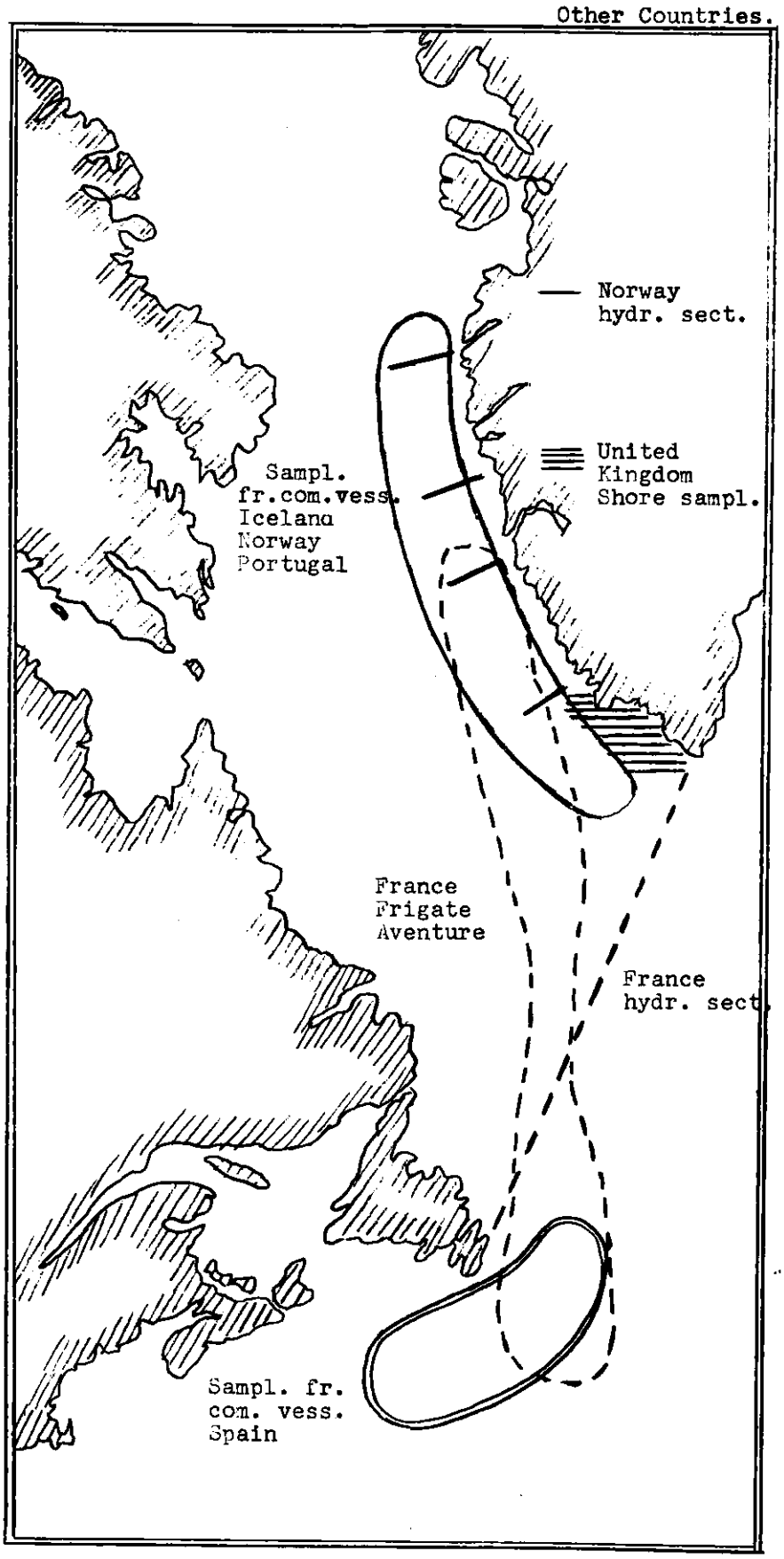


Chart III.

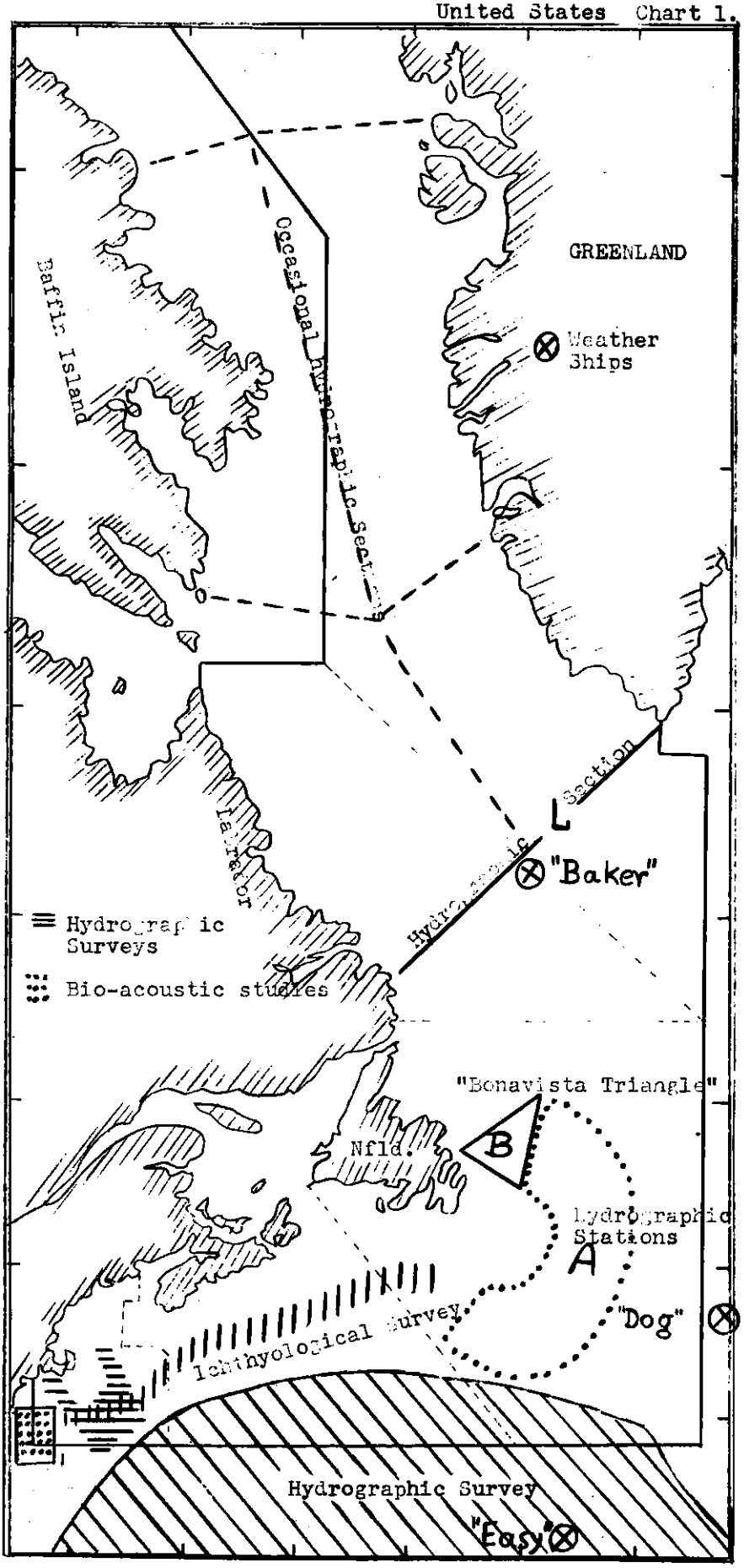
Denmark, Research Program 1953, Subarea 1

Samples of cod otoliths collected by fisheries officers
at different fisheries stations
from catches made by Greenlanders.




Other Countries.
Norway
hydr. sect.
United
Kingdom
Shore sampl.
Sampl.
fr.com.vess.
Iceland
Norway
Portugal
France
Frigate
Aventure
France
hydr. sect.
Sampl. fr.
com. vess.
Spain

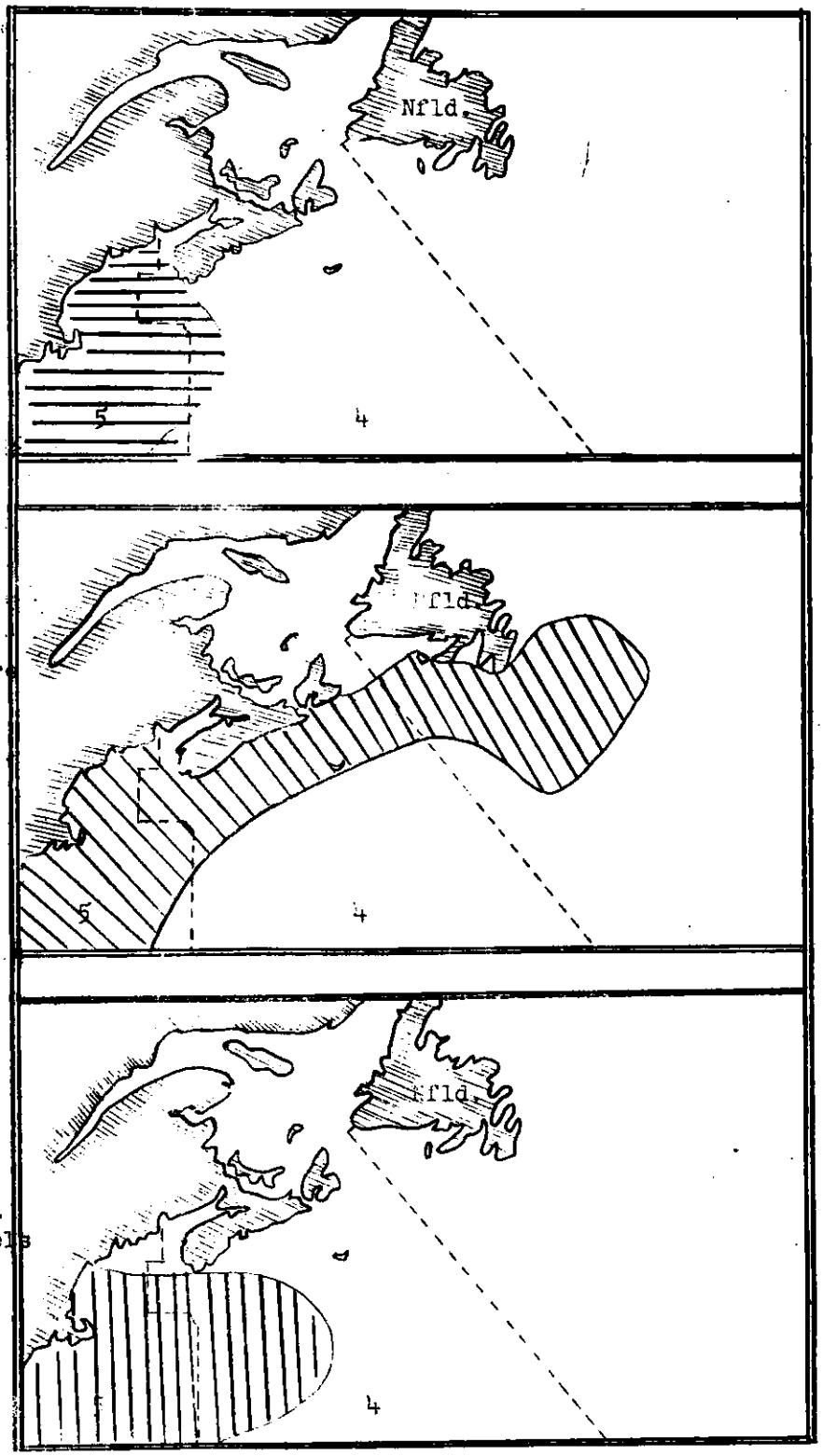
United States Chart 1.



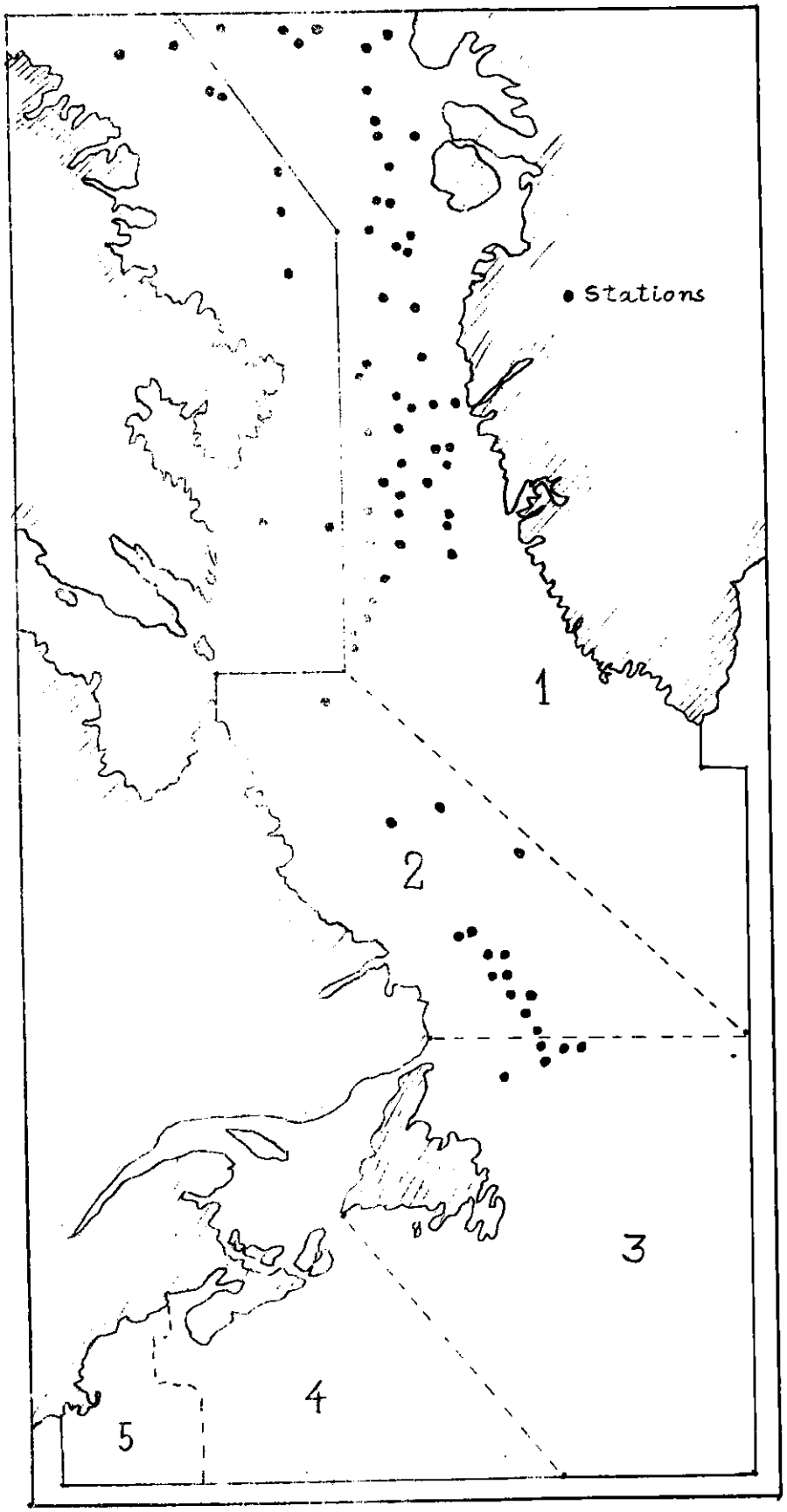
C 4

United States Chart 2

U.S. Fish and Wildlife Service



OCEANOGRAPHIC [illegible] BY THE U.S.N. HYDROGRAPHIC OFFICE



INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

App. 4.

Meeting of Canadian and United States Biologists to Assist the Special Committee on the Commission's Research Program

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Commission Headquarters, St. Andrews, N.B., Canada
January 28 to 30, 1953

Present: Messrs. A.W.H. Needler, W. Templeman, W.R. Martin, H.B. Hachey, G.F.M. Smith, of Canada; L.A. Walford (Chairman), H.W. Graham, C.C. Taylor, J. Clark, G. Kelly, of United States; E.M. Poulsen, J. Cote, of the International Commission for the Northwest Atlantic Fisheries.

1. The purpose of the meeting was to assist the Chairman of the Special Committee on the Commission's Research Program and the Commission Secretariat in the preparation of material which would facilitate progress of the final meeting of the Special Committee preceding the Annual Meeting of the Commission.

The work of the group consisted of reviewing the program drafted in outline at Copenhagen, September 26-27, 1952, and of developing more detailed proposals on some aspects of the program as a basis for discussion by the Special Committee at its next meeting.

Relative Importance of Species

2. Dr. Poulsen presented a series of graphs, which are appended (Appendices 1-4), showing the catches in the Convention area by species, country and Subarea. These figures emphasize the predominant importance of cod in Subareas 1-4, of haddock in Subarea 5, and the growing importance of the redfish fishery which, since its origin in Subarea 5 eighteen years ago, has been steadily spreading northward. Halibut catches are very much smaller than those of the other species named above, but they are economically important in the north. Since the primary purpose of the Commission is concerned with management of the fisheries, cod is not of great interest in Subarea 5, nor halibut in the southern parts of the Convention area.

Essential Records on all Stocks

3. The Commission needs to keep current knowledge on the size, intensity and effects of all fisheries throughout the Convention area well enough to recognize the cases that require more concentrated research effort to lay the basis for possible regulation. To carry out a continuous watch for these cases a certain minimum effort must now be applied by each nation to all of its fisheries in the Convention area, and this effort must be continued indefinitely. The following are proposed as minimum essential records:

4. The Commission has already agreed to the essentiality of statistics giving in considerable detail the fishing effort and the catches of the important species by statistical areas and by months. The group emphasizes that it is necessary to record effort in such a manner that it can be studied comparatively over long periods.

5. In order to recognize the effect of fishing on mortality rates, it is necessary to record the lengths of the fish in adequate samples of catches, showing fish discarded and fish retained. This is considered essential for all the fisheries for the important species by all the participating countries throughout the Convention area.

6. The total range of fish caught can be sampled only at sea by specially trained observers. The sea sampling of the sizes retained should be supplemented by sampling of landings ashore.

7. The sea sampling will give opportunity to collect other material pertinent to the biology of the fishes, such as growth, age composition, characteristics of races, spawning seasons, spawning places, parasitism, etc.

Review of Present Knowledge and of Recommended Program

8. The group reviewed the present status of knowledge about the biology of the several species, and considered what important gaps need to be filled.

Haddock

9. Identification of stocks: Vertebral counts, tagging experiments, growth characteristics and age composition have shown a consistent picture of divisions of the haddock stocks in the Convention area and, apart from some further analysis of material already available, no special additional effort is recommended.

10. Rates of mortality, growth and recruitment: Age determination by scales and otoliths is well established for haddock. Growth rates have been determined for all important haddock stocks. Total mortality has been well estimated in Subarea 5, and is emerging from determination of age composition in other stocks. It has nowhere been possible to distinguish between natural and fishing mortality of haddock. Efforts in this direction should be encouraged. In Subarea 5 recruitment has been estimated from catch per effort of the smallest available ages, and attempts to estimate abundance of still smaller haddock are to be made shortly by research vessels.

11. An experimental minimum mesh regulation is about to come into force in Subarea 5 as a result of the Commission's action. This has been based on long, intensive study of the fishery, which has provided much better information there than elsewhere in the Convention area. The group emphasized the importance of continuing investigations which will provide a measure of the effects of this regulation for at least ten years, and probably twenty.

12. In Subareas 3 and 4 the mixed fishery makes separate regulation of haddock fishing difficult. This fact, coupled with lack of evidence of overfishing, makes the need for more intensive quantitative studies on the haddock stocks less urgent, but the possibility of a beneficial mesh regulation, which would not affect the cod fishery, should be assessed.

Redfish

13. Identification of stocks: Although it now seems probable that the American redfish belongs to one species, Sebastes marinus, scientists should be watchful for evidence to the contrary.

14. Evidence from differences in vertebral counts and parasitization with Sphyrion lumpi indicates many local stocks, even within such a relatively small area as Subarea 5. However, more evidence is needed on which to base definition of stocks. The group therefore recommends that, where possible, more special sampling should be done by research vessels to obtain a more representative picture than is afforded by catches of the fishing fleets.

15. Migrations: Such evidence as there is suggests that the redfish does not migrate extensively. However, this needs to be supported by other evidence. Although tagging appears rather unpromising for redfish, efforts should be made to develop methods of tagging as opportunity permits in the schedules of research ships. Observations on the incidence of the parasite Sphyrion lumpi are useful in the study of migration and of the division of the stocks, but present knowledge of the life history of this parasite is inadequate, and thorough investigation is recommended.

16. Size and distribution of redfish stocks: The present redfish fishery depends on catching fish on the bottom during daytime. However, the species appears to be pelagic for at least part of the time and the real distribution of the stock may be very imperfectly known. This points to the need for extensive biological exploration both on the bottom at depths not now sampled by the fishery and at mid-water depths.

17. Effect of fishing on the stocks: It appears that the catch and catch per effort of redfish in Subarea 5 have about become stabilized after the usual initial decline in the latter. In the other Subareas the fishery has not yet reached that stage. In the northern part of Subarea 4, and in 3, the fishery is still in its early growing stages. In the Gulf of Maine and off Nova Scotia the catch and catch per unit of effort have declined to such an extent (see accompanying table) that intensification of research to assess the need for restriction is indicated. This requires giving particular attention to study of growth and mortalities, for both of which age determination is essential.

18. Age determination: The interpretation of scales and otoliths of western Atlantic redfish is so uncertain that it is very important that the method of age determination be developed and rigorously tested. This will necessitate periodic systematic fishing for the earliest age groups.

Cod

19. Identification of stocks: There are already accumulated extensive data by which to distinguish stocks of cod throughout the Convention area. These include vertebral counts, the results of tagging experiments, growth characteristics, age composition and parasitization. The group recommends that the collection of these data be continued, and that the analysis of them be hastened, on the basis of which filling in of gaps can be planned.

20. Effect of fishing on the stocks: The available data do not indicate that exploitation has reached a dangerous level anywhere in the Convention area, but some reduction in the abundance of the oldest age groups appears to have occurred recently in the southern part of Subarea 4. It is in Subarea 3, and to some extent 2, that the problem of recognizing the effect of fishing on the stocks of cod is greatest and in these areas the problem cannot be attacked without the greatly improved information on quantities and sizes of fish taken and the effort expended by all countries as recommended in paragraphs 3 to 5. In the absence of these data there is no criterion of the effect of fishing on the off-shore stocks.

21. The group recognized the promise of tagging cod as a technique of estimating mortality rates (as contrasted to the difficulty with haddock and redfish) and an effort to develop techniques is desirable.

Hydrography

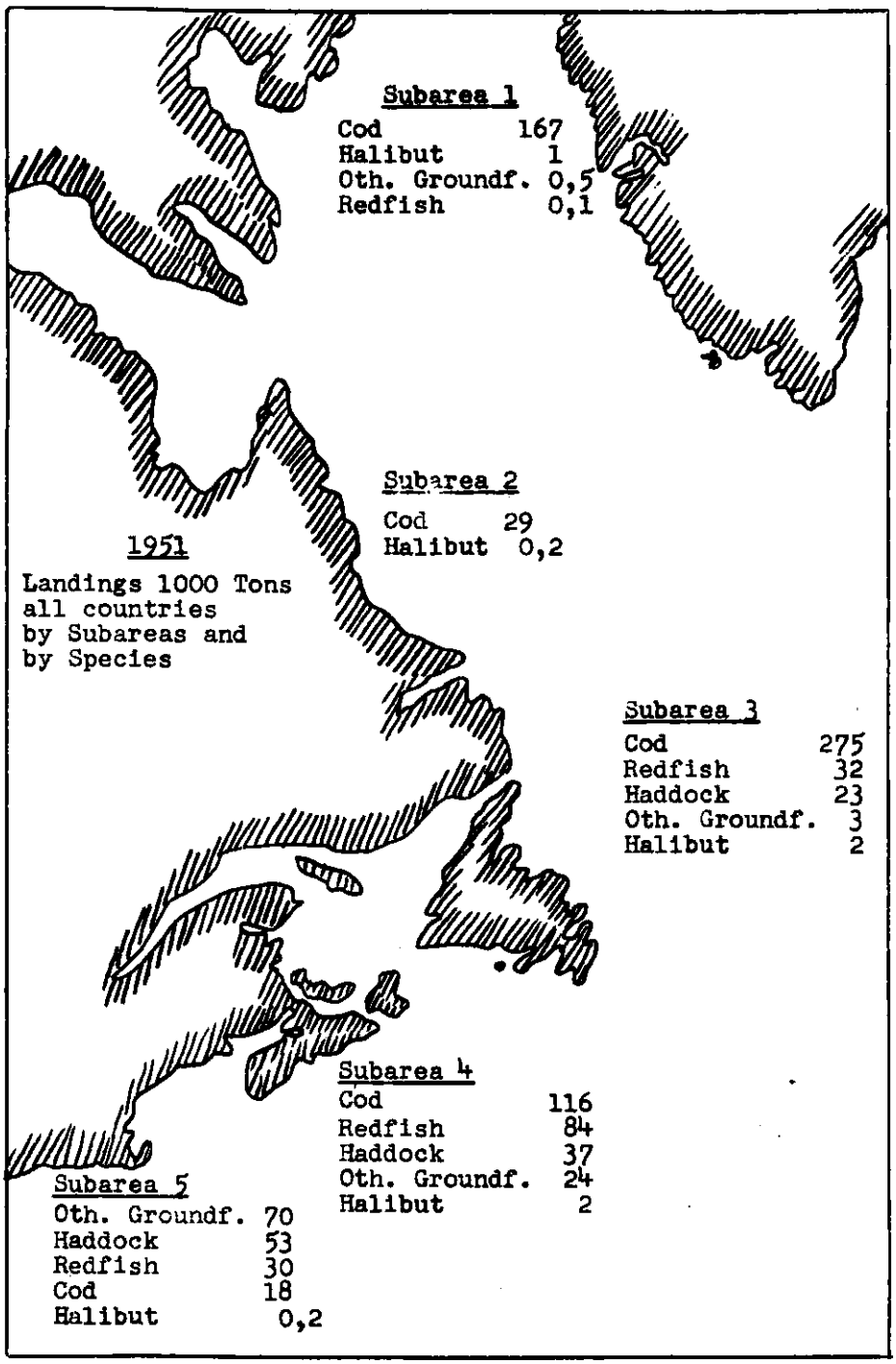
22. The importance of meteorology to an understanding of hydrography was recognized, and the group recommends that a serious review be made of the types of meteorological data in existence and of their availability for the Commission's work.

23. The basic importance of hydrography in influencing production, abundance and availability of the important commercial species was recognized. It was believed, however, that before formulating specific recommendations for a program to study the very complex hydrography in Subareas 3, 4 and 5, a special meeting of hydrographers should be called, and it is suggested that this might be done by Dr. Walford as Chairman of the Special Committee on the Commission's Research Program before the next Annual Meeting.

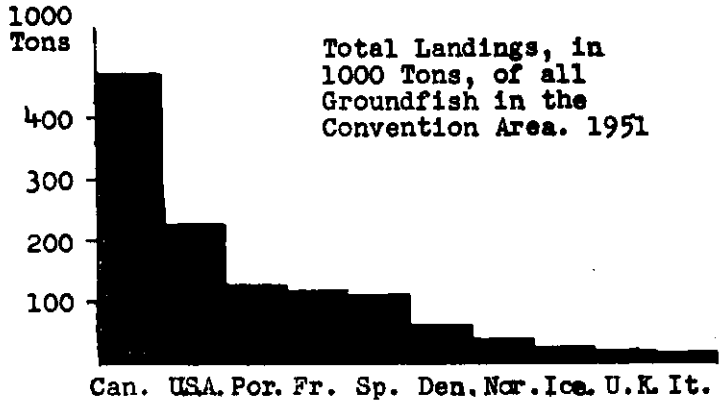
24. It is suggested that the formulation of proposals for the study of the biological effects of hydrography and of other natural factors be postponed until after the proposed meeting of hydrographers.

LIST OF APPENDICES

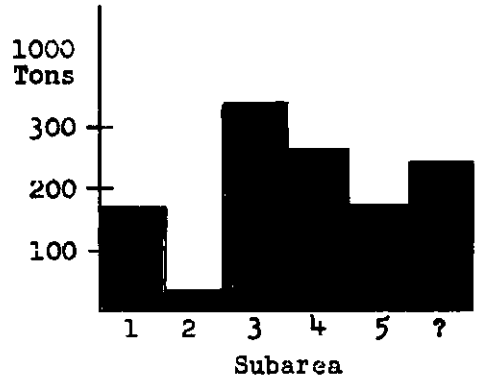
Appendix 1.


Subarea 1
Cod 167
Halibut 1
Oth. Groundf. 0,5
Redfish 0,1
Subarea 2
Cod 29
Halibut 0,2
1951
Landings 1000 Tons
all countries
by Subareas and
by Species
Subarea 3
Cod 275
Redfish 32
Haddock 23
Oth. Groundf. 3
Halibut 2
Subarea 4
Cod 116
Redfish 84
Haddock 37
Oth. Groundf. 24
Halibut 2
Subarea 5
Oth. Groundf. 70
Haddock 53
Redfish 30
Cod 18
Halibut 0,2

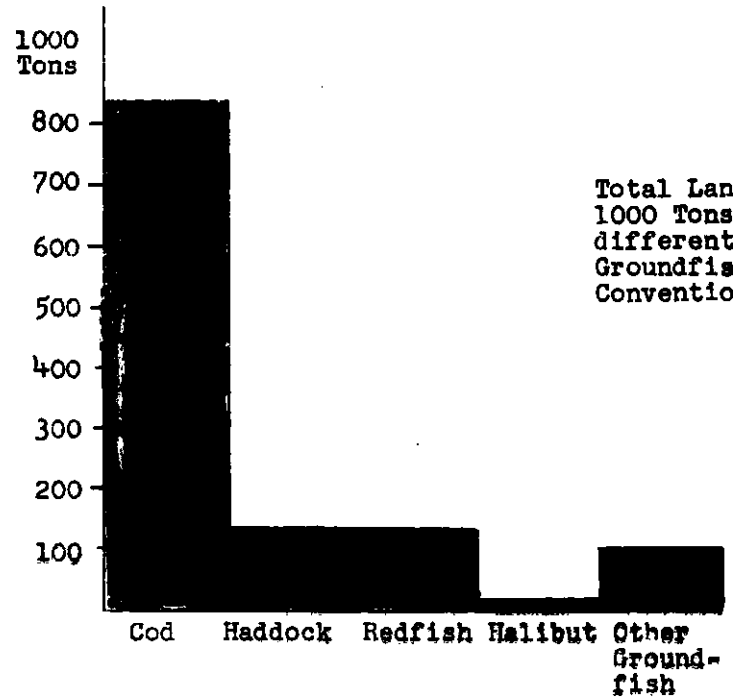
Appendix 2.



Total Landings, in 1000 Tons, of all Groundfish in the Convention Area. 1951



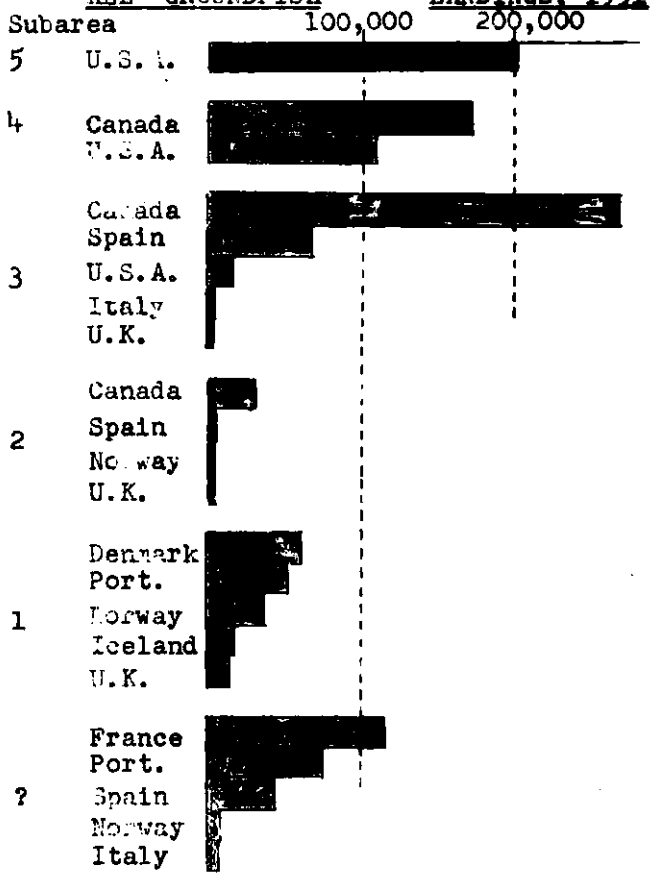
Total Landings, in 1000 Tons, of all Groundfish in Subareas. 1951



Total Landings, in 1000 Tons, of the different Species of Groundfish in the Convention Area. 1951

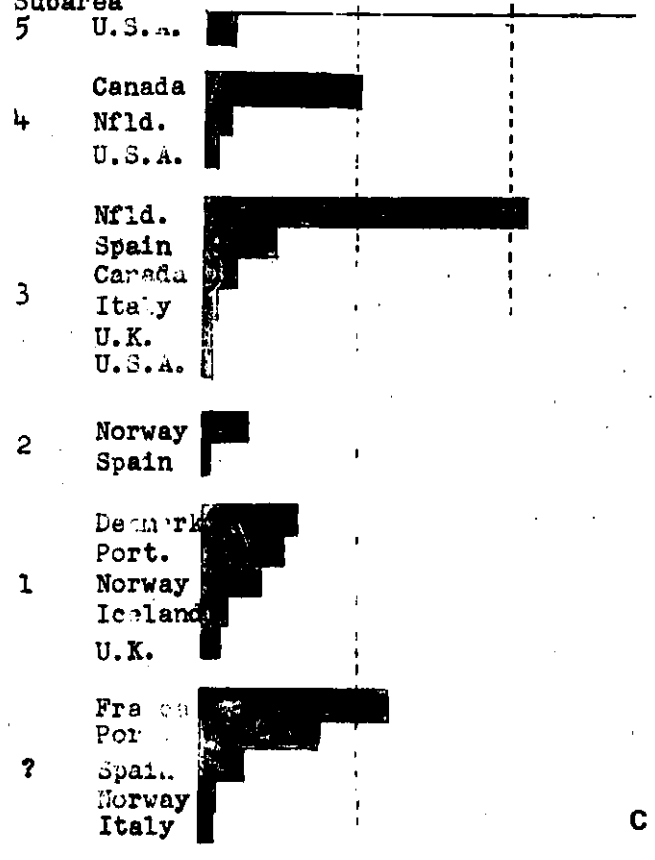
Appendix 3.

ALL GROUNDFISH LANDINGS, 1951



Subarea		Subarea Total 1000 Tons	% of total landings Conv. Area
5	U.S.A.	200	16
4	Canada U.S.A.	278	22
3	Canada Spain U.S.A. Italy U.K.	353	27
2	Canada Spain Norway U.K.	29	2
1	Denmark Port. Norway Iceland U.K.	170	14
?	France Port. Spain Norway Italy	242	19

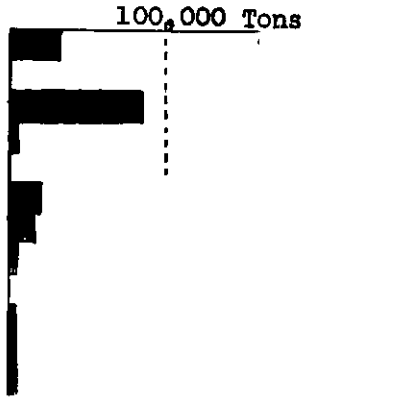
COD



Subarea		Subarea Total 1000 Tons	% of total landings Conv. Area
5	U.S.A.	18	2
4	Canada Nfld. U.S.A.	116	14
3	Nfld. Spain Canada Italy U.K. U.S.A.	277	33
2	Norway Spain	29	4
1	Denmark Port. Norway Iceland U.K.	169	20
?	France Port. Spain Norway Italy	220	27

Appendix 4.

REDFISH **LANDINGS, 1951**

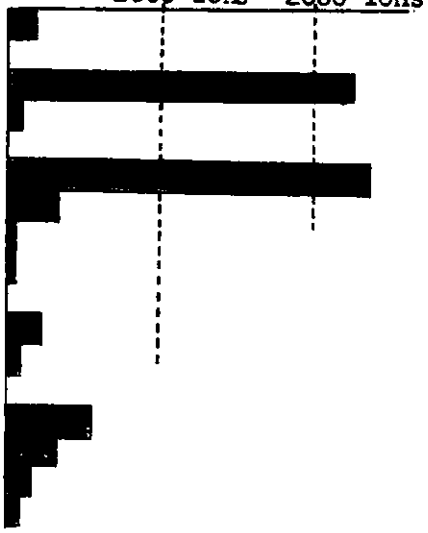


Subarea		Subarea Total 1000 Tons	% of total Redfish landings
5	U.S.A.	30	21
4	U.S.A. Canada	84	57
3	Nfld. U.S.A. Canada	32	22
1	Denmark Iceland U.K.	+	+

HADDOCK

Subarea		Subarea Total 1000 Tons	% of Total Haddock landings
5	U.S.A.	53	38
4	Canada U.S.A.	42	31
3	Spain Nfld. Canada U.S.A.	23	17
1	Iceland	+	+
?	Spain	19	14

HALIBUT



Subarea		Subarea Total Tons	% of Total Halibut landings
5	U.S.A.	154	3
4	Canada U.S.A.	2,289	37
3	Canada Nfld. U.K. U.S.A.	2,599	41
2	Norway U.K.	218	3
1	U.K. Norway Denmark Iceland	1,005	16

REDFISH LANDINGS FROM SUBAREAS 4 AND 5
FOR THE PERIOD 1935-1951,
and CATCH-PER-DAY'S-FISHING FOR 1942-1951

	SUBAREA 5			SUBAREA 4		
Year	Landings	Catch per* Day's fishing	Average Vessel Size	Landings	Catch per* Day's Fishing	Average Vessel Size
1935	16,642	----	----	515	----	----
1936	51,065	----	----	15,862	----	----
1937	32,679	----	----	25,677	----	----
1938	45,504	----	----	19,502	----	----
1939	56,010	----	----	21,603	----	----
1940	59,003	----	----	26,139	----	----
1941	131,829	----	----	23,008	----	----
1942	123,223	15.17	78.3	4,867	17.01	93.2
1943	106,591	14.76	76.7	8,146	30.29	107.5
1944	111,199	11.90	77.2	9,016	24.41	100.5
1945	83,583	9.98	77.7	48,251	19.64	108.9
1946	93,528	10.30	72.5	84,621	27.48	114.6
1947	88,538	10.73	82.6	58,048	20.58	130.2
1948	96,190	11.88	90.2	141,905	28.47	138.6
1949	67,778	7.36	81.7	169,207	21.92	136.3
1950	75,637	8.98	92.3	131,533	18.63	137.6
1951	68,213	8.95	80.5	160,196	21.91	133.7

* Catch per day's fishing is the observed value, not adjusted to a standard vessel size.

66-2-6-53

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

App. 5

Report on a meeting of United States and Canadian scientists to assess North American oceanographic programs in the area of interest to the International Commission for the Northwest Atlantic Fisheries.

Woods Hole, Mass.
February 25-26, 1953.

Present, from Canada: Messrs. A.W.H. Needler, H.B. Hachey, of the Fisheries Research Board.

Present, from United States: Messrs. L.A. Walford (Chairman), H.W. Graham and John Colton of the Fish and Wildlife Service; Admiral E. Smith, Columbus Iselin, Dean Bumpus, of the Woods Hole Oceanographic Institution.

Commander Floyd Soule of the International Ice Patrol; Robert Abel, of the United States Hydrographic Office; William Kielhorn, of the Office of Naval Research.

Value of Hydrographic Research to the Commission.

The Commission needs to know the hydrographic conditions and their variations in order to relate these to changes in the fishery and so distinguish between natural factors influencing the abundance and distribution of the commercial species and the effects of the fishery itself. Ultimately it is hoped to so understand the causes of changes in hydrographic conditions as to predict them.

The Problem of Studying the Oceanography on the Continental Shelf.

The difficulties of determining the circulation in the shallow waters by the use of present methods and instruments indicates that every encouragement should be given the development of new methods and instruments.

For scientifically useful purposes the oceanographic observations in the Convention area must be systematic and continued over a long period.

Meteorological data such as wind force and direction and rainfall, are of great importance to understanding oceanography. Such observations as are now made are not sufficient for the purposes of the Commission.

Research agencies should be encouraged to include in their programs geological as well as biological studies of the bottom.

Knowledge of the offshore circulation of the whole Atlantic Basin will contribute to understanding causes of environmental conditions in the Convention area.

Review of Present Programs.

The Woods Hole Oceanographic Institution is studying fluctuations in the circulation of the entire North Atlantic Ocean. Their studies in the Straits of Florida may be of great

importance to understanding changes which occur later in the circulation patterns of the Convention area. The Institution is collecting and interpreting all past records of drift bottle experiments in the North Atlantic.

The International Ice Patrol makes repeated annual dynamic topographic surveys from April to July in Subarea 3, to trace the movements of icebergs; and carries on cruises in the Labrador Sea, Davis Strait, and Baffin Bay, as opportunity permits, for long range studies leading to predicting the circulation in that area. Its calculations on the volume transport of the West Greenland current and the Labrador current are of particular significance in the study of water conditions in the Convention area. The Ice Patrol publishes its observations and interpretations thereof currently.

Ocean Station vessels. One of these, "B", is in the Labrador Sea at a point where continuous observations would be of greatest significance in supplementing the work done by research vessels. Two other stations, "E" and "D", just outside the Convention area are in position to provide similarly valuable data. Agreement was unanimous that oceanographic, as well as meteorological data should be collected by the vessels at these stations, especially "B".

United States Navy Hydrographic Office has made many sections through Subareas 1, 2 and 3, mostly during summer, and probably will continue to do so in the future. Many of the results of Hydrographic Office investigations are classified and may not be available for the purposes of the Commission.

The Canadian Joint Committee on Oceanography operates a vessel solely for research in physical oceanography by means of which sections are taken quarterly covering Subarea 4 and parts of Subarea 3.

The Fisheries Research Board of Canada, through its Newfoundland Fisheries Research Station makes a number of sections annually in Subareas 3 and 2.

The data collected by Canadian agencies also include continuous daily or more frequent observations at a number of points in Subareas 3 and 4.

The U.S. Fish and Wildlife Service, in collaboration with the Woods Hole Oceanographic Institution, is planning to start long-term hydrographic studies in Area 5. Attention is being given to the possibilities of placing recording instruments on buoys strategically located, and even on commercial fishing gear. These will be supplemented by observations from the Albatross III.

RECOMMENDATIONS

It was recommended that a small, select, standing committee of oceanographers be appointed to review, plan and coordinate hydrographic programs in the Convention area. The Executive Secretary should arrange the time of its annual meetings so as to minimize interference with the schedules of the participants. It appears that November may be most satisfactory.

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Appendix 6

List of Scientists Engaged in Research on Cod, Haddock, Redfish and Halibut in the Convention Area.

	Cod	Haddock	Redfish	Halibut
Canada	W. Templeman A.H. Fleming H. Macpherson	W. Templeman B.G. Johnson	W. Templeman R. Fisher	
	W.R. Martin F.D. McCracken	W.R. Martin F.D. McCracken	W.R. Martin F.D. McCracken	W.R. Martin F.D. McCracken
Denmark	Paul Hansen		R. Vedel Tåning	Paul Hansen
France	J. Ancellin			
Iceland	Jon Jonsson			
Italy				
Norway	B. Rasmussen		B. Rasmussen	
Portugal	J.M. Figueiredo			
Spain	O. Rodrigues	O. Rodrigues		
U.K.	M. Graham G. Trout	R. Jones		A.D. Mc Intyre
U.S.A.		Clyde Taylor John Clark	George Kelly Robert Wolf	