Serial #57

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

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ICNAF Meet. Doc. 52/15

FIRST REPORT OF COMMITTEE ON RESEARCH AND STATISTICS

The Committee, having met in four half-day sessions, agreed to recommend to the Commission as follows:

1. That the Executive Secretary be requested to prepare a pamphlet with an illustration and brief description of each species important to the Commission, based on material from the forthcoming monograph by Bigelow and Schroeder properly acknowledged and including also a statement on the common names used in each country, such a publication to be prepared in close co-operation with FAO and ICES. (Minute 5).

2. That, in view of the usefulness of such information, the compilation of readily available statistics according to established commercial size categories be attempted by the Commission's staff. (Minute 6).

3. That the Commission compile and publish its statistics in terms of Metric Tons and round fresh weights (weights of entire fish as they come from the water). (Minute 7).

4. That the Commission's statistician, Mr. Côté, be requested to review the situation regarding conversion factors in close co-operation with FAO and ICES and make a progress report to the Committee a year from now. (Minute 7).

5. That the Executive Secretary be asked to attempt to bring together for all vessels fishing in the Convention area information on the number of vessels of various types and sizes, and the number of days spent by vessels of each category on the fishing grounds, and that he also be requested to review the availability of more refined data on catch per effort for parts of the fishing and report his findings next year, on the understanding, of course, that the actual collection of such statistics must be the work of the various governments themselves. (Minute 8).

6. That the Executive Secretary be requested to inquire of the various governments what information is now available as a basis for development of a standard unit of fishing effort, and to make a progress report in a year's time. (Minute 8).

7. That the Commission request the governments concerned, and its Secretariat, to work towards the compilation of statistics of catches and fishing efforts on a monthly basis. (Minute 9).

8. That, in view of the importance of information on economic and other factors influencing catch, governments be requested to provide a brief commentary on the operation of such factors when submitting their statistics annually to the Commission. (Minute 12).

9. That the Executive Secretary be requested to arrange during the 1953 meeting of the Committee a symposium on long-term changes in hydrographic conditions and corresponding changes in the abundance of fish stocks to guide us in planning hydrographic programs and to throw light on the effects of such natural factors on fisheries. (Minute 15).

10. That the Commission approve the recommendation of Panel 5 for a minimum mesh regulation for the haddock fishery in Sub-area 5, but selecting as the minimum mesh size $4\frac{1}{2}$ inches instead of $3\frac{3}{4}$ inches. (Minute 17).

11. That the research program recommended by Panel 5 as a means of assessing the results of an experimental mesh regulation for the haddock fishery in Sub-area 5 be approved. The experimental nature of the proposed regulation was emphasized. (Minute 17).

The Committee had under review at the time of the first report the following subjects:

1. The definition of statistical areas within Sub-areas (Minute 4).

2. The publication of statistics by the Commission (Minute 11).

3. Program of hydrographic research for the Convention area (Minute 16).

4. The requirements of a general research program for the Commission (Minute 14).

Additional detail and supporting material may be found in the attached summary minutes of the four sessions of the Committee.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

COMMITTEE ON RESEARCH AND STATISTICS

1952

Minutes of First Session, 2:30 p.m., June 30

Attendance:

Canada - Mr. MacKichan, Dr. Needler (Chairman), Dr. Templeman, Dr. Smith, Mr. McCracken, Mr. Fleming.

Denmark - Mr. Dinesen, Dr. Tåning, Dr. Hansen, Mr. Thygesen.

France - Captain Audigou, Mr. Barbier

Iceland - Mr. Eggerz

Norway - Mr. Lund, Dr. Rollefsen, Mr. Rasmussen

Portugal- Comm. Almeida

Spain - Mr. Baraibar, Mr. Espada, Mr. Ojeda, Mr. Trelles

United Kingdom - Dr. Lucas, Mr. Wimpenny

United States - Mr. Knollenberg, Dr. Walford, Dr. Graham, Mr. Clark, Mr. Kelly, Mr. Schuck, Mr. Taylor

FAO - Dr. Finn

ICES - Dr. Tåning

Secretariat - Dr. Martin, Mr. Côté, Miss Parker, Miss Welsh.

1. On behalf of the Canadian representatives, the Chairman expressed a welcome to those attending and invited all to visit the Atlantic Biological Station of the Fisheries Research Board of Canada.

2. - Report of Executive Secretary on Fisheries Statistics -

The Executive Secretary (Dr. W. R. Martin) read his report (Document VIII) on the adequacy of the statistics now available and on the problems involved in improving them, which was prepared on the recommendation of this Committee at its first meeting in April, 1951. The report was accepted as a basis for discussion, its specific recommendations being covered in the items to follow. The Committee expressed its appreciation of Dr. Martin's work in this field during the preceding year.

3. - Review of Statistics now available -

Reference was made by the Chairman and by the Executive Secretary to Documents VI, VII and IX, Document VI being a report by the Executive Secretary to FAO on the statistical requirements of the Commission, and not including any compilation of available statistics. Document VII summarizes the figures available from each country on catches of groundfish in the Convention area with some supplementary information. In Document IX Mr. Côté had, in his first month as statistician for the Commission, prepared a digest of statistics of cod landings in the Convention area to date.

In discussion it was pointed out that, commencing with the present year, complete statistics of landings by Sub-areas would be available. The Committee expressed its appreciation of the excellent progress made in this direction in the short period of one year.

Members of the Committee were asked to bring inaccuracies or omissions to the attention of the Secretariat by discussion with Mr. Côté. Dr. Hansen stated that the statistics for west Greenland, on the lower half of page 4 of Document IX, had been based from 1928 onward on an inaccurate conversion factor and that the figures should be multiplied by 1.2, with corresponding corrections in the other tables.

4. - Unit Areas for Fisheries Statistics -

As recommended by the Executive Secretary on page 9 of Document VIII, the Committee considered the desirability of sub-dividing the Sub-areas into smaller units for statistical purposes. It was generally agreed that statistics should, if possible, be made available on the catches and fishing efforts in such smaller unit areas, although it was realized that reporting of statistics in such detail by areas would not be possible for all parts of the fishery. A review of the present situation brought out that the United States is now collecting statistics of catch and effort for the sub-divisions of Sub-areas 5 and 4 indicated in Document IX, but makes as yet no breakdown

of its catches in Sub-area 3; that Canadian statistics can be related to such sub-divisions of Sub-area 4 since 1946 and that a similar breakdown can be extended in the near future to all Canadian catches; that Danish catches in Sub-area 1 can be broken down for small coastal districts and the offshore catches for three unit areas; that Norwegian catches in Sub-area 1 are now reported for nineteen districts; that Portugal, Spain and France, because of the long fishing trips by their vessels, will experience some difficulty in obtaining statistics for small unit areas but will do their best in that direction; and that the United Kingdom expects to be able to report its catches in the Convention area in the detail desired.

In discussion it was emphasized that detail of this sort is valuable only if accurate and reliable, and that accuracy should not be made to suffer from any attempt to obtain such detail for a greater part of the fishery than practicable. It was agreed that an attempt should now be made to describe sub-divisions of the various Sub-areas to serve as a framework for the reporting of statistics by all countries in order to make them comparable, it being understood that any such subdivision for statistical purposes could only be regarded as tentative and should be subject to careful review and adjustment during the coming year. The following sub-committee was appointed for this purpose and requested to report back to the Committee later during the present meetings:

Mr. Wimpenny	United Kingdom (Chairman)
Dr. Graham	United States
Mr. Espada	Spain
Comm. Almeida	Portugal
Mr. Rasmussen	Norway
Mr. Eggerz	Iceland
Capt. Audigou	France
Dr. Hansen	Denmark
Mr. Fleming	Canada
Mr. McCracken	Canada (Secretary)
Dr. Finn	FAO
Dr. Tåning	ICES

5. - <u>Nomenclature of Principal Commercial Species</u> -

In discussing the Executive Secretary's recommendation (page 9, Document VIII) regarding nomenclature, the importance of identifying the commercial species listed in the statistics was recognized. It was agreed that the Commission could not well influence the fishing industry in the various countries concerned to change the common names now in use, but that the present practices should be clearly understood and stated in order to avoid misunderstanding and confusion in compiling the statistics. The listing of scientific and common names following page 4 of Document VIII was accepted for the

time being with the understanding that it would be reviewed by the representatives of the countries concerned and errors or omissions reported to the Secretariat. In this connection Mr. Eggerz pointed out that the Icelandic name for Gadus callarias would more properly be spelt Thorskur instead of Porskur. Dr. Hansen suggested that Greenlandic common names be included. Dr. Finn outlined the work now in progress by FAO in listing the common names used in various countries for commercial species and it was agreed that the Commission should co-operate closely with both FAO and ICES in developing this information. The Commission, however, needs to list all the scientific names used, indicating in its listing which common names are used in the official statistics of each country.

The desirability of preparing a small publication suitable for wide distribution to officials and members of the industry, in which the principal species would be described and the nomenclature in the various countries listed, was discussed at some length, Dr. Walford pointing out the availability of illustrations and other material in the forthcoming publication by the United States Fish and Wildlife Service of a monograph by Bigelow and Schroeder.

It was moved by Mr. Knollenberg, seconded by Dr. Lucas and agreed that the Executive Secretary be requested to prepare such a publication with an illustration and brief description of each species important to the Commission, based on material from the monograph by Bigelow and Schroeder properly acknowledged and including also a statement on the common names used in each country, such a publication to be prepared in close co-operation with FAO and ICES.

6. - Statistics by Size Categories of Fishes -

Referring to the Executive Secretary's recommendation on page 9 of Document VIII, it was explained that no suggestion was implied that countries should be requested to collect special statistics on the landings of fish in various size categories, but rather that data of this sort now readily available should be compiled. It was pointed out in discussion that commercial size categories are subject to change and that care should be exercised in their use, but that they can be valuable where more precise data are lacking.

It was moved by Dr. Lucas, seconded by Mr. Knollenberg and agreed that the Committee, recognizing the usefulness of such information, recommend that the compilation of readily available statistics according to established commercial size categories be attempted by the Commission's staff.

7. - Units of Measure and Definition of Condition -

Following the Executive Secretary's recommendation on page 5 of Document VIII, it was agreed that the Commission should compile and publish its statistics in terms of Metric Tons and round fresh weights (weights of entire fish as they come from the water).

In discussion the vital importance of accurate conversion factors for the calculation of round fresh weights from basic statistics on landings in other forms was stressed. Dr. Finn reviewed the effort planned by FAO to develop such factors in the immediate future and assured the Committee that the detailed information obtained would be available to the Commission.

It was moved by Mr. Knollenberg, seconded by Dr. Lucas and agreed that the Commission's statistician, Mr. Côté, be requested to review the situation regarding conversion factors in close co-operation with FAO and ICES and make a progress report to the Committee a year from now.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

COMMITTEE ON RESEARCH AND STATISTICS

1952

Minutes of Second Session, 9:30 a.m., July 1

8. - Improvement of Data on Fishing Effort -

Reference was made to Recommendations 6 to 9 in the Executive Secretary's report on fisheries statistics in the Convention Area (Document VIII) which relate to improvement of data on fishing effort. The Committee at its meeting in April, 1951 included in the minimum requirements for the purposes of the Commission "data on fishing effort expended per annum, (such as, for example, number of days absent from port by fishing vessels, number of vessel-days spent in actual fishing, etc.)". Good progress had been made during the year in the development of statistics on catches but the Executive Secretary reported that the data on fishing effort available to the Commission remained much less complete and he requested the guidance of the Committee in planning the improvement of information of this kind.

In discussion it was pointed out that figures for the total fishing effort in any part of the fishery under study were essential to an understanding of how the fishery is affecting the stock. On the other hand, reliable and detailed information on catch per effort for a good sample of the fishery is valuable as an index of relative abundance without obtaining such information for the whole fishery. The Committee therefore considered what effort data should be sought for the entire fishery to satisfy the former purpose, in addition to the more detailed information already available on parts of the fishery valuable for the latter purpose.

Discussion brought out the varying difficulties of obtaining offshore data. Inshore fisheries involving the operation of very numerous small fishing units landing at scattered points are particularly difficult, whereas fishing effort by large vessels is more easily recorded. A review indicated that all countries are able to collect valuable data on fishing effort by their vessels, Portugal, for example, recording the number of days spent on the banks by its fishing vessels, and even the number of days fishing and hours of dragging by otter trawlers and the number of hours dories are out for line fishing vessels.

It was moved by Dr. Lucas, seconded by Dr. Walford and agreed that the Committee recommend that the Executive

Secretary attempt to bring together for all vessels fishing in the Convention area the information on the number of vessels of various types and sizes, and the number of days spent by vessels of each category on the fishing grounds, and that he also be requested to review the availability of more refined data on catch per effort for parts of the fishing and report his findings next year. It is, of course, understood that the actual collection of such statistics must be the work of the various governments themselves.

During discussion the importance of developing the means of standardizing units of effort was emphasized. In order to obtain a figure for the total fishing effort to which any stock of fish is subjected, it is necessary to determine the relative efficiency of the various types of vessels in use so as to express figures on their fishing efforts in terms of a standard unit of fishing effort. It was agreed that such information involved inquiries more properly classified as research than as routine collection of statistics.

It was moved by Dr. Lucas, seconded by Mr. Knollenberg and agreed that the Committee recommend that the Executive Secretary be requested to inquire of the various governments what information is now available as a basis for development of a standard unit of fishing effort, and to make a progress report in a year's time.

9. - <u>Statistics of Catches and of Fishing Effort by Months</u> -

Reference was made to Recommendation 10 by the Executive Secretary in Document VIII, to the effect that annual statistics should be broken down by seasons or months if statistics are obtained in greater geographical detail than by Subareas. In discussion it was generally agreed that monthly statistics are more valuable than annual statistics, not only to reveal, in association with such geographical detail, the movements of fish stocks, but also to afford information on variations in the fishery in association with such factors as weather, and to improve the accuracy of the statistics generally.

A review revealed that all countries are obtaining basic data which would permit the compilation of catch and effort figures by months, although a good deal of difficulty is involved in such compilation and time would be needed to organize it effectively.

It was moved by Mr. Knollenberg, seconded by Mr. MacKichan and agreed that the Committee recommend that the Commission request the governments concerned and its Secretariat to work towards the compilation of statistics of catches and fishing efforts on a monthly basis.

10. - Fish Discarded at Sea -

In its first meeting in April, 1951, the Committee, having in mind especially the regulation of the haddock fishing in Sub-area 5, listed as information essential to the purposes of the Commission "estimates of the quantities caught but not landed for each of the principal species". In discussion the Committee agreed to reaffirm the importance of such information, which not only has a bearing on possible regulation of fishing for species now in demand but also may provide long-term information on species not now used but which may eventually be fished commercially. It was agreed, however, that although reports by fishing captains have some significance and valuable, reliable information on this subject can be obtained only by observations at sea by trained technicians and is, consequently, expensive both in money and in trained personnel. The Committee felt, therefore, that while the importance of the information must still be stressed, it should be collected as required for special purposes (as is planned in the case of the haddock fishery) rather than attempting to collect such information as routine statistics for the entire fishery.

11. - Publication of Statistics by Commission -

In discussion it was generally agreed that publication of digests of statistics by the Commission was desirable as a means of obtaining the distribution necessary to their full use and of recording them permanently for future use. The Executive Secretary suggested that statistics might be published as appendices to the printed annual report of the Commission and it was further suggested that separates of such appendices might be available for special distribution. It was agreed to recommend publication of statistics subject, of course, to such financial limitations as are necessary. The Executive Secretary was asked to discuss the form of such a publication further during the course of the meetings, especially with those experienced in such matters, and to report verbally to the Committee at a later session.

In answer to the suggestion that publication of such statistics by the Committee might result in duplication of statistical publications by FAO, Dr. Finn stated his belief that the Commission would require and publish statistics in considerably greater detail, especially as regards places where catches are made than would FAO.

12. - Information on Economic and Other Factors Influencing Fishery

The Executive Secretary pointed out that catches are often greatly influenced by economic and other factors not recorded in fisheries statistics and that current as well as future interpretation of the statistics depends on the availability of information on such factors. A number of examples were cited by

members of the Committee and it was agreed that the operation of such factors may easily be overlooked, leading to faulty interpretation of fisheries statistics from the biological point of view.

It was moved by Dr. Lucas, seconded by Mr. Knollenberg and agreed that the Committee express its recognition of the importance of information on economic and other factors influencing catch and recommend to the Commission that governments be requested to provide a brief commentary on the operation of such factors when submitting their statistics annually to the Commission.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

COMMITTEE ON RESEARCH AND STATISTICS

1952

Minutes of Third Session, 2:40 p.m., July 1

13. - Reviews of Research Programs and Results -

The summaries of research programs and results submitted by each country in accordance with a recommendation of the first meeting of the Committee in April, 1951, and distributed as Document V, were discussed briefly but no general conclusions were reached regarding desirable form, the summaries submitted this year being somewhat more than the current summaries to be expected in that they included information on past as well as current work. Detailed comment included a statement by Dr. Lucas that the "Scotia" would probably be working in east Greenland waters rather than those of west Greenland in 1952, and a statement by Mr. Eggerz that, while Iceland had carried out no investigations in the Convention area in recent years, some research in Sub-area 1 was anticipated.

14. - Research Program Generally -

The problem of planning research programs generally to carry out the main purpose of the Commission, stated in the preamble to the Convention as "maintenance of a maximum sustained catch" was discussed at length in an attempt to develop a background for the planning of programs to answer more specific questions regarding individual areas and stocks. While it was, of course, impossible to treat this subject exhaustively in a single session, certain points emerged and an attempted summary is given below.

Subjects of special importance to the Commission's work were mentioned as follows:

(1) Definitions of units of stocks was agreed to be a prerequisite to study of the effects of the fishery on them leading to the best fishery practices and regulations. As a means of defining units of the stock, differences in morphological characters such as vertebral counts, differences in growth rates, in parasitization, in age composition of stocks (reflecting local differences in variations in recruitment), were discussed. Immunization experiments were also mentioned as being tested on the Pacific coast as a means of recognizing different populations, although not yet attempted in the Convention area. The importance of tagging to study fish migrations was emphasized. It was also pointed out that stocks could not be defined

once for all, but that the distinction between divisions of the stocks must be watched continually in order to recognize changes in interrelationships.

(2) Estimation of abundance and of changes in abundance was recognized as of basic importance. The use of catch per effort as a criterion of relative abundance was discussed and the limitations of our knowledge of the relationship between catch per effort and absolute abundance were mentioned. Two means of estimating absolute abundance received attention: (a) study of the relationship of catches, determined from adequate fishery statistics, to the proportion caught, or fishing rate estimated by tagging, a method subject to error caused by unknown mortalities resulting from the tagging itself, and (b) estimation of the numbers of spawning adults from estimations of numbers of eggs in spawning areas through sampling with egg nets, and determination of fecundity by examination of mature females, a method which, though effective where spawning occurs in known restricted areas (e.g. plaice in the southern North Sea) is difficult or impossible where identification of newly-spawned eggs is not possible, where spawning occurs over extensive or ill-defined areas, or where water movements remove eggs from spawning areas rapidly. Because of unknown mortality rates immediately following spawning, only newly-spawned eggs can be used effectively in this method.

(3) Determination of growth rates in both length and weight, usually a relatively easy matter, is necessary for the calculation of the ages or sizes at which fish should be caught to give maximum yields. Variations in growth rate from year to year may be great enough to require repetition of such determinations.

(4) Sampling of stocks for age composition is important as a means of discovering total mortality and it is desirable to separate the mortality due to fishing or fishing rate (as determined, for example, by tagging) from the mortality caused by natural factors. Such knowledge of mortalities is, like knowledge of growth rate, essential to calculation of the ages or sizes at which fish should be caught -- a matter susceptible to regulation.

(5) The relationship of the total yield from year-classes to recruitment was mentioned as a criterion of the effects of changes in fishing arising from unregulated changes in method or effort or from regulation. If one level or method of fishing gives a higher yield from the same relative level of recruitment than does another level or method of fishing, the former is preferable to the latter and may be brought about by regulation. Variations in recruitment may be estimated from catch per effort as year-classes enter the commercial fishery, or by special fishing by research vessels for young fish. The yield from individual year-classes may be obtained from adequate statistics on catches and from the age composition of the commercial catch determined by sampling.

(6) Environmental factors such as temperature, and their correlation with short or long-term changes in abundance, are important as a means of separating the influence of such natural factors from the influence of fishing, which is subject to regulation.

The importance of tagging as a means of obtaining information on movements of fish (to distinguish units of the stock), on growth rate and on the fishing rate was emphasized. Tagging has hitherto been less satisfactory for the last-mentioned purpose than for the others because of the difficulty of obtaining reliable quantitative results. Attempts to improve tagging methods were reviewed, including experiments in Norway on the relative efficacy of various marks, and experiments in the United Kingdom to determine the rate at which tags are lost - by placing more than one tag on the same fish, the importance of using tags which are easily seen, of good publicity, of information and questions printed on the tags themselves, and of adequate rewards, were all brought out. Although there is much room for the improvement of tagging methods, and although efforts to improve them are important, there is reason for optimism regarding the value of tagging even for estimating the rate of fishing in some fisheries. It is particularly difficult to obtain reliable quantitative results from the tagging of haddock, a bottom fish which does not well survive being brought to the surface and, consequently, is subject to high losses caused by the tagging process and difficult to assess.

15. - Symposium on Long-Term Changes in Hydrography and Abundance of Fish -

It was agreed to request the Executive Secretary to arrange during the 1953 meeting of the Committee a symposium on long-term changes in hydrographic conditions and corresponding changes in the abundance of fish stocks to guide us in planning hydrographic programs and to throw light on the effects of such natural factors on fisheries.

16. - Program of Hydrographic Research -

The following sub-committee was asked to review the subject of hydrographic research in the Convention area and to report to the Committee at a later session on a co-ordinated program:

Dr. Lucas	United Kingdom
Dr. Walford	United States
Mr. Ojeda	Spain
Comm. Almeida	Portugal
Dr. Rollefsen	Norway
Mr. Eggerz	Iceland
Capt. Audigou	France
Dr. Tåning	Denmark
Dr. Hachey	Canada (Secretary)
Dr. Templeman	Canada (Chairman)

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

COMMITTEE ON RESEARCH AND STATISTICS

1952

Minutes of Fourth Session, 9:30 a.m., July 2

17. - Experimental Mesh Regulation for Haddock Fishery - in Sub-area 5

The Committee considered the recommendation of Panel 5 at its February, 1952, meeting of an experimental mesh regulation for haddock fishing in Sub-area 5 as set forth in its report (Document IV). Dr. Graham reviewed for the Committee the basis for this recommendation as set forth in the report and supplementary report of scientific advisers to Panel 5 (Appendices 4 and 5 of Document IV). He also reported the results of recent experiments by the United States Fish and Wildlife Service on the selectivity of meshes, which showed that the 50% selection point of a 3¾-inch mesh on haddock is about 32 cm. and that of a 4 1/8-inch mesh about 37½ cm. These results disagree with the earlier results on the basis of which a 3¾-inch minimum mesh size was recommended in order to place the 50% selection size of haddock at 40 cm., but agree closely with the formula developed by English investigators on the basis of experiments on the selective action of smaller meshes. On the basis of these new results a somewhat larger mesh than 4 1/2 inches would be necessary in order to release 50% of the 40 cm. haddock. Thus, in order to fulfil the aim of the regulation recommended by Panel 5, an increase in the recommended minimum mesh size from 3¾ to about 4½ inches appeared to be desirable. In discussion the following points received attention:

(a) It was pointed out that the increase in mesh size might be expected to increase the efficiency of the trawls by increasing the flow through the net, but this effect, though recognizable in other experiments, was considered to be slight.

(b) It was considered that the increased abundance of haddock which might result from the institution of a larger mesh size might lead to increased fishing effort, but it was believed that such an increase in effort would not result in a decreased yield as it would be discouraged by diminishing returns before such an effect resulted.

(c) The possibility of adverse effects on the haddock stock resulting from reduction in the catch of predators was discussed but although this effect might be important in other areas, it was believed that the regulation would have little effect of this sort in Sub-area 5. The principal potential

predator mentioned in that area (Merluccius) is not taken in large quantities by the vessels which would be affected by the regulation.

(d) As further support for the apparent straight-line relationship between mesh size and sizes of haddock at the 50% selection point it was stated that the relation of girth of haddock to length is a direct one in the George's Bank area

(e) In further support of the selection of a larger mesh size than 3¾ inches, it was pointed out that in the experiments a 4 1/8-inch mesh caught as many marketable haddock as did smaller meshes and still caught some haddock too small to be marketed.

(f) It was noted that the 4½-inch mesh now recommended (about 114 mm.) is close to the mesh recommended by ICES for the Arctic cod fishery (110 mm.).

It was moved by Mr. Knollenberg, seconded by Mr. MacKichan and agreed that the Committee advise the Commission to approve the recommendation of Panel 5 for a minimum mesh regulation for the haddock fishery in Sub-area 5, but selecting as the minimum mesh size 4½ inches instead of 3¾ inches.

The research program recommended by Panel 5 to follow the results of the proposed regulation was reviewed. Dr. Graham indicated that work was in progress and would be continued on the first four items of this program which were considered by the scientific advisers to be essential. It was pointed out in discussion that after the institution of the minimum mesh size it might be possible to catch, by special fishing with a small mesh, enough young haddock to obtain an estimate of natural mortality. The desirability of watching for possible changes in growth rate was mentioned, requiring additional analysis of data rather than additional observations. It was also pointed out that some estimate of natural mortality of haddock at the ages at which they now enter the fishery might be deduced from a comparison of age composition of the stock after the regulation comes into force with that before.

It was moved by Mr. Knollenberg, seconded by Mr. MacKichan and agreed that the Committee express to the Commission its approval of the research program recommended by Panel 5 as a means of assessing the results of this experiment.