INTERNATIONAL COMMISSION

FOR THE

NORTHWEST ATLANTIC FISHERIES

REDBOOK 1969 PART I

STANDING COMMITTEE ON RESEARCH AND STATISTICS

PROCEEDINGS

1969

ANNUAL MEETING

Issued from the Headquarters of the Commission
Dartmouth, N. S., Canada

SEPTEMBER 1969

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Note

REDBOOK 1969 appears in 3 books. The first book contains Part I, Proceedings of the Standing Committee on Research and Statistics. The second book contains Part II, Reports on Researches in the ICNAF Area in 1968. The third book contains Part III, Selected Papers from the 1969 Annual Meeting.

prepared by Valerie L. Caton

Issued from the Headquarters of the Commission

Dartmouth, N.S., Canada

1969

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PART I. REPORT OF STANDING COMMITTEE ON RESEARCH AND STATISTICS

PART I. REPORT OF STANDING COMMITTEE ON RESEARCH AND STATISTICS

Chairman: Sv. Aa. Horsted; Rapporteurs: D. Garrod and W. Templeman

The Standing Committee on Research and Statistics (R&S) met in Jablonna near Warsaw, Poland, from Monday, 26 May to Friday, 30 May 1969 in the week preceding the 19th Annual Meeting of the Commission. The Subcommittee on Assessments and the Steering and Publications Subcommittee held meetings in Jablonna near Warsaw 24 and 25 May respectively. The Subcommittee on Assessments also had a mid-term meeting in London, England, 22-25 January 1969 (Res. Doc.69/46). The Joint ICES/ICNAF Working Group on Selectivity Analysis met in Moscow, USSR, 26-29 March 1969 and the Joint ICES/ICNAF Working Party on North Atlantic Salmon met in Charlottenlund, Denmark 21-22 May 1969 (Res. Doc.69/33). The major items considered at these meetings are summarized below:

1. ASSESSMENTS (APP.I)

(a) Review of Latest Statistics of Nominal Catches

The series on nominal catch in each Subarea has been updated to include provisional* landings for 1968 (App.I, Tables 1-2).

In previous years, estimates of activity and catch per day were included. However, in recent years changes in the pattern of fishing and in the efficiency of vessels have meant that the number of days fished do not always provide a satisfactory measure of fishing intensity. Equally, catch per day may be an unsatisfactory measure of stock abundance. These data have therefore been omitted from this year's tables.

In addition to landings from the Convention Area given in the Tables, catches of some of the main ICNAF species were made in Statistical Subarea 6. These included herring (28,000 tons), silver hake (15,000 tons) and sea scallops (24,000 tons). The herring catch in this subarea was six times larger than in 1967.

Subarea 1

Total landings of cod in 1968 (353,000 tons) decreased about 16% from 1967 to about the same level as in the period 1964-66.

Trawler catch per day increased considerably from 1966 to 1967. This can, however, not be taken as an indication of increased stock size because the main trawler fleets tend to concentrate their effort more and

* Non-member countries have not submitted data on landings (nominal catch) for 1968. Total nominal catch of all species by non-member countries was over 141,000 metric tons in 1967.

more in the season giving the highest catch per day. This concentration of effort in the best season does not mean that a decrease in activity will be followed by a decrease in fishing mortality rate.

Redfish landings (approximately 9,000 tons) are now back on the same level as in the early 1950's.

Subarea 2

Cod landings in 1967 (298,000 tons) were about 12% lower than in 1966 but in 1968 increased again sharply to 406,000 tons, the highest so far recorded in Subarea 2.

Subarea 3

Total groundfish landings in Subarea 3 in 1967 exceeded 1,000,000 tons and were only slightly below this level in 1968 (982,000 tons, provisional figure). This is a doubling since 1962. Cod landings exceeded 700,000 tons in 1967 and 1968 (less than 300,000 tons in 1962). In Div. 3N and 3O, in particular, the cod catch in 1967 was three times the 1962-66 average. It decreased by 30% in these Divisions in 1968, but remained high in Division 3L and increased by more than 50% in Division 3K. Herring landings increased from 50,000 tons in 1966 to over 150,000 tons in 1968.

Subarea 4

Groundfish landings increased 21% from the 1967 level to 509,000 tons (provisional figure) in 1968. Cod landings were somewhat above the 1957-68 average while redfish and flatfish were much above the long-term average. Haddock landings declined slightly to 46,000 tons. Herring landings in 1968 increased 33% to a new record of 348,000 tons. A new herring fishery appears to have occurred in Division 4V.

Subarea 5

Total groundfish landings did not change much from 1967 to 1968. Haddock landings decreased from 57,000 to 44,000 tons. Silver hake landings decreased for the third consecutive year (80,000 tons in 1968) and red hake landings decreased by half to 20,000 tons. Mackerels and alewives showed substantial increases (doubling or more) with landings in 1968 of 47,000 and 22,000 tons respectively. Herring landings increased by nearly 50% to 339,000 tons.

General Remarks

Total landings of groundfish from the Convention Area in 1968 (approximately 2,700,000 tons) increased slightly from the 1967 level. There was

an 18% decrease in Subarea 1, a 29% increase in Subarea 2 and a 21% increase in Subarea 4 whereas Subareas 3 and 5 remained on the 1967 level. The expansion of the herring fishery in Subareas 3, 4 and 5 has continued with a total increase of about 43% from 1967 to the 1968 level of about 842,000 tons.

(b) Further Assessments of the State of the Exploited Stocks in the ICNAF Area in relation to Questions posed by Standing Committee on Regulatory Measures. (STACREM)

The questions posed to R&S in 1967 by STACREM in relation to the need for regulatory measures controlling fishing mortality have been given further consideration at a mid-term meeting of the Subcommittee on Assessments (Res.Doc.69/46) and at the present meeting. The conclusions, particularly with regard to Subarea 1 cod and Subarea 5 haddock are given in detail in Appendix I together with the latest considerations of other stocks in the Convention Area.

(1) Subarea 1 Cod

In its 1968 report R&S indicated that an increase in fishing beyond the present level would not result in any long-term increase in average annual yield, and that a reduction of fishing mortality rate of up to 25% would not result in any significant reduction in yield per recruit and would increase the catch per unit effort. Based on figures before the 1968 statistics were available and assuming the 1968 level of fishing mortality to be F = 0.8, estimates of catches for 1968 and 1969 were made at the mid-term meeting of the Assessment Subcommittee. This assessment was based on a constant parameter model assuming inter alia that fishing mortality rate in any year is constant for all exploited age-groups. New data presented at the present meeting have provided estimates of the variation of fishing mortality with age caused by the recruitment of a year-class taking place over a span of years. Also changes in the pattern of fishing itself could lead to changes in fishing mortality between age-groups. The present fishing mortality rate is probably close to that giving the maximum sustainable yield-per-recruit. It remains true, however, that a reduction of the present fishing mortality rate by up to 25% would not result in any significant loss of total catch-per-recruit and would increase the catch-per-unit-effort.

The level of fishing mortality rate in 1968 could have been as much as F = 0.8. Based on this assumption and considering that year-classes since 1963 that are now recruiting are weak so that the catch rate is likely to decrease in the immediate future, whatever course of action is adopted, catch quotas for 1968 were assessed with the latest statistical information being for the year 1967.

Catch quotas for 1968 to give a specified level of fishing mortality rate would have been:

To achieve (maintain	F = 0.80	- 349,000 tons
To achieve (10% reduction)	F = 0.72	- 314,000 tons
To achieve (25% reduction)	F = 0.60	- 285,000 tons

Using the same basic data as for 1968, estimates of catches to achieve specified levels of F in 1969 are:

To achieve F = 0.80	- 293,000 tons
To achieve F = 0.60	- 238,000 tons

If fishing mortality in 1968 had been reduced by 25% the level of catch to achieve F = 0.60 in 1969 would have been 286,000 tons showing that most of the initial loss caused by the reduction in fishing mortality would have been made up by the end of the second year.

It is emphasized that the above estimates are only examples of the catch quotas to achieve a cutback in fishing mortality rate of 25%. They do not apply if regulations are introduced in 1970 or subsequently. Predictions of recruitment in the beginning of the 1970's are that with continued high fishing a further decrease in stock abundance will occur. This would necessitate setting lower quotas than those indicated above.

It is stressed that regulation of fishing mortality at this time would prevent the adverse effects on long-term yield that could follow a substantial increase of fishing effort in the Subarea should a strong year-class be recruited in future. Such regulation would also mitigate any effect that the reduction of spawning stock due to fishing might have upon subsequent recruitment.

(2) Subarea 5 Haddock

During the years 1935-60 the fishery on this stock generated an average fishing mortality rate of F = 0.5. R&S considers that under these circumstances the yield-per-recruit is close to the maximum, and with average recruitment this level of fishing mortality will result in an annual yield of about 50,000 tons.

In 1965 the outstanding good 1963 year-class recruited to the fishery. The improved stock attracted extra effort to the fishery resulting in extremely high catches of 155,000 tons in 1965 and 127,000 tons in 1966. However, the catch declined to 57,000 tons in 1967 and 44,000 tons in 1968. The increased effort reduced markedly the abundance of the older year-classes so that by 1967 the major part of the spawning stock consisted of the remainder of the 1963 year-class. The five year-classes since 1963 are all poor or extremely

poor with the consequence that the stock is now extremely small and with no prospect of immediate recovery. It is not known why the 1964-68 year-classes are poor. However, R&S noted the landings for poor year-classes to be associated with small rather than with moderate spawning stocks and is therefore of the opinion that there is now a considerably reduced probability of producing good year-classes. This probability will be increased again if the stock is allowed to recover to nearer its 1935-60 average level.

If the fishing mortality in 1969 and 1970 were F = 0.5 (as in 1935-60) the 1969 catch would be about 16,000 tons and the 1970 catch about 13,000 tons. Even this level of catch will, however,decrease the stock further from its 1969 level. To allow the stock to recover (and with it the probability of producing good year-classes) would require no, or very little, fishing for a period of not less than 4-5 years, and until a moderate to strong year-class has recruited and grown to maturity. The application of closed season and/or closed area regulations as alternatives to catch limitation were considered. It was indicated that closure during March and April when catch rates are highest on adult fish would alone reduce landings by about 20%, and in conjunction with a catch quota would tend to spread the catch more evenly through the remaining part of the year. It is noted that unless trawling for all other species on Georges Bank were banned, some incidental by-catch of haddock would be inevitable. Of the 44,000 tons caught in 1968, 6000 tons were by-catches in fisheries for other species.

(3) Division 4X Haddock

The haddock stock of Div. 4X now forms the only remaining sizeable haddock resource in the Convention Area. A diversion of haddock effort from Subarea 5 and Div. 4VW into Div. 4X is therefore likely to take place since the catch rates in 1969 in this division are likely to remain at the present level due to the strong 1963 year-class. The 4X haddock stock is now considered to be fully exploited, and due to poor year-classes since 1963, the prospects for the immediate future (1970-74) are poor unless reasonable numbers of the 1963 year-class are allowed to survive. If no action is taken it is therefore likely that in 1970-71 the fishery on that stock will be faced with a problem similar to that now faced by the Georges Bank haddock fishery. In spite of the lack of data for any very precise assessment, R&S believes that if action is not taken to avoid catches greater than the previous long-term average annual landings of 20-25,000 tons over at least the next five years, a rapid and serious decline in stock abundance will occur.

(4) Subareas 2 and 3 Cod

Div. 2G to 3L. Cod catches have risen more than 30% since 1967 when assessments indicated that fishing level was already producing at least 80% of the maximum sustainable yield. R&S considers it unlikely that the 1968 catch level (close to 900,000 tons) can be maintained.

Div. 3N and 3O. Cod catches have decreased in 1968 from the unusually high level in 1967 and catch rates in 1969-70 are likely to be much reduced from the 1967-68 level. The very marked, but temporary improvement in 1967 (tripling of the 1962-66 average) was largely related to the strong 1964 year-class, but the increased effort it attracted when recruiting to the fishery has reduced its potential yield. If effort is maintained at the recent high level, larger year to year variations in catches will occur.

(5) General State of Groundfish Stocks in the Convention Area

R&S considers it unlikely that the record catches of cod in the Convention Area in 1968 (about 1,850,000 tons) can be sustained. The high 1967-68 catches are due partly to good year-classes and partly to the removal of an accumulated stock of older age-groups. Prospects for recruitment in the near future are poor compared to the size of year-classes that sustained the fishery in 1967-68. The effect of weak year-classes on the catches of the next few years will be made worse in some areas by the heavy fishing on the preceding good year-classes. This heavy fishing has

(i) reduced, to some extent, the total yield from the good year-classes during their life-span in the fishery,

(ii) concentrated the yield of a year-class into fewer years and thereby

(iii) caused higher year to year variability in catches especially of haddock and the same is expected for some cod stocks

(iv) reduced spawning abundance of most of the haddock and cod stocks.

The last feature is possibly the most serious although, even in the best-studied stock, the relation between spawning stock and average recruitment is not well established. However, there seems to be increasing evidence that a substantial reduction in spawning stock may lead to a progressive decline in average recruitment. Therefore, while stressing the need for the specific limitation for Subarea 1 cod, and Subarea 5 haddock and associated limitation of catch in Div. 4X haddock, R&S believes that regulation in these areas should only be the preliminary for a more widely based scheme to at least stabilize the fishing effort on the major demersal stocks over the whole ICNAF Area.

(6) Herring, Subareas 3, 4 and 5

Landings of herring have increased rapidly in all of these Subareas from 1960 to 1968 due to the growth of the offshore fishery. Available data relating to changes in the abundance and composition of the exploited stocks in these areas, especially Georges Bank, were reviewed by the Assessments Subcommittee. While some information points to a decrease in adult stock abundance on Georges Bank in recent years and to a high total mortality rate, data available at this meeting were insufficient for a detailed analysis to be made. In view of the rapid increase in exploitation of herring in the ICNAF Area, R&S considers that further assessments should be made at the next meeting of the Subcommittee on Assessments and urges scientists to supply the available, relevant data for as many years as possible.

(7) Mesh Assessments

R&S calls attention to the continuing importance of mesh assessments and reiterates the statement from its 1968 report that for cod in Subarea 1 and Div. 3N and 3O, at the present level of fishing intensity, there would be increases in catch per recruit with increases in mesh size to at least 150 mm in these fisheries. This is supported by assessments of the most recent data for Div. 3N and 3O cod (Res. Doc. 69/83). It was agreed that Canadian scientists would undertake an analysis of the available data for the cod fisheries in Subarea 2 and the northern part of Subarea 3.

(8) Assessment of Harp Seal Fisheries

These are dealt with in the Report of the Scientific Advisers to Panel A (1969 Meeting Proceedings 2, App.I)

(9) Adequacy of Sampling Data

In an attempt to remedy the principal deficiencies in the sampling coverage for the major ICNAF fisheries, R&S adopted a recommendation of the Subcommittee on Assessments (App.I, Rec.1.)

2. STATISTICS AND SAMPLING (APP.II)

(a) Sampling

Suspecting inadequate sampling for some important ICNAF fisheries, R&S referred the problem of identifying those stocks and areas for which more adequate sampling is needed to the Subcommittee on Assessments.

Documents dealing with the analysis of age/length key date were reviewed. The analysis showed a continuing need for caution in combining age/length keys. The otolith exchanges which have taken place since 1963 may lead to a better comparability between age/length keys.

Reviewing the recommendations regarding publication of herring sampling data arising from a meeting of North American scientists (Res.Doc.69/1), R&S

recommends (16)

(i) that herring length and age/length key data from 1961 to 1968 be published in a special issue of the ICNAF Sampling Yearbook with data for subsequent years included in the Sampling Yearbook on a routine basis;

(ii) that the herring length data be published by country and by month for all ICNAF divisions except Div. 5Y for which the length data should be presented separately for a northern subdivision (from the border between Maine and New Brunswick to the border between Maine and New Hampshire) and for a southern subdivision (from the border between Maine and New Hampshire to Cape Cod);

(iii) that herring lengths be published in cm to the cm below;

(iv) that the herring sampling data should not be reported by type of gear or by vessel size;

(v) that the herring age/length keys be published by quarters for Div. 4X, 5Y and 5Z only, on a trial basis, with frequent review.

(b) Review of ICNAF List of Vessels

It was noted that the "ICNAF List of Vessels for 1968" could not be produced in time for the 1969 Annual Meeting of the Commission because some member countries had not reported their vessel data.

Taking into account the review of the Coordinating Working Party on Atlantic Fisheries Statistics (CWP) on the possibility of producing a joint ICES/ICNAF list of vessels in 1970 or 1971, R&S

recommends (12)

(i) that the CWP Secretary prepare a draft version of a joint ICES/ICNAF list of vessels; this document to be presented to both 1971 ICNAF and ICES meetings;

(ii) that the CWP's doubts regarding the adequacy of vessel characteristics adopted long ago by ICES and ICNAF for the assessment of fishing power, be referred to the 1970 ICES Special Meeting on the Measurement of Fishing Effort;

(iii) that the "ICNAF List of Vessels for 1971" be prepared as in the past unless decisions to the contrary are made at the ICNAF meetings in 1970 and 1971;

(iv) that a final decision about a joint ICES/ICNAF list of vessels be taken at the 1971 ICNAF meeting.

(c) Statistical Reporting

R&S approved the recommendations of the Subcommittee on Statistics and Sampling concerning distinction in the statistics between "alewife" "blueback" "herring" and "other shad" (App.II, Rec. 3) and between "halibut" and "Greenland halibut" (App.II, Rec. 5).

Quantity conversion factors for use in fishery statistics were reviewed (Res.Doc.69/24). R&S supported the proposal that the CWP Secretary prepare another revised version for the 1969 ICES meeting and

"recommends (7)

(i) that all countries which have not yet supplied the CWP Secretary with their revised conversion factors, do so before 15 July 1969;

(ii) that the CWP Secretary remind all countries of the requirements of Section 2.12 of FAO Fisheries Circular FEs/C 201 and Section 5.12 of FAO Fisheries Circular FEc/C 203, (both documents providing notes for the completion of STANA forms) requiring them to report changes in the conversion factors;

(iii) that a final document covering conversion factors currently used by all countries for all North Atlantic species be presented to ICNAF at its 1970 meeting."

R&S welcomed a first attempt to consolidate, with maps and references, all information on the ICNAF Convention Area and

recommends (8)

that the results of the FAO Studies on Classification and Codification of Fishing Areas (Res.Doc. 69/26) after final review by the ICNAF Secretariat, be incorporated for reference purposes in Redbook 1969, Part III.

It was noted that copies of the map are available on request from the CWP Secretary, FAO, Rome.

Terms used for reporting fishing effort statistics were discussed and a

number of recommendations were posed aimed at obtaining better information on fishing effort. It was especially noted that CWP has expressed concern that an appreciable percentage of reported effort data is estimated. R&S therefore

recommends (11)

(i) *that the CWP Secretary obtain from national offices detailed descriptions of the methods used to arrive at these estimates of effort*

(ii) *that the material be submitted to ICNAF at its 1970 meeting and also to the 1970 ICES Special Meeting on Measurement of Fishing Effort.*

The STANA forms for reporting statistics were reviewed and R&S

recommends (15)

that the CWP Secretary investigate the proposal to modify the STANA forms so that they would be compatible to ADP machine processing and following inquiries directed to all reporting national offices, report to ICNAF, ICES AND CWP's Seventh Session on the implementation of this suggestion.

Noting that a large proportion of the flounders being landed from various subareas are not being reported according to species, R&S

recommends (17)

that countries make every attempt to differentiate flounder catches by species.

3. ENVIRONMENTAL (APP.III)

(a) Georges Bank - Gulf of Maine Environmental Survey

Plankton samples collected in the joint USA/USSR survey in 1967 have now been counted and it is hoped to have a paper on the results submitted to the 1970 meeting of R&S. In 1968 surveys on Georges Bank were carried out by the USA to see if it is possible to obtain a haddock egg production curve (Res.Doc. 69/65). A joint plankton survey was carried out by the USA, USSR and Canada (Res.Doc. 69/35). In 1969 attention is being paid to sampling design and analysis. A joint USA/USSR survey is underway to compare grid sampling and random sampling schemes.

(b) Environmental Conditions in the ICNAF Area

National research reports and other pertinent documents were reviewed.

Off West Greenland conditions in 1968 were cold until October due to the large component deriving from the East Greenland Current. Thereafter there was a marked influx of warmer Irminger Current water. The bad ice conditions at Greenland and Iceland in 1968 was discussed and it was noted that an international symposium on sea-ice may be held within the next few years in Iceland.

Off Labrador and on the Grand Banks the Labrador Current was stronger than usual, but at Flemish Cap, Georges Bank and on the Scotian Shelf 1968 was a warm year due to an influx of slope water derived from the Gulf Stream. The downward long-range trend of sea temperatures since the early 1950's in the Georges Bank, Gulf of Maine and Scotian Shelf region was discussed.

It was noted that Canada broadcasts observations of sea surface temperature and other oceanographic data and that Icelandic and Greenlandic stations broadcast ice conditions in the Greenland area.

The need for keeping fluctations in environmental conditions in the ICNAF Area under continuing review was discussed. R&S

recommends (20)

that a review of the environmental conditions in the ICNAF Area during the decade 1960-69 be held by R&S at its meeting in 1971 and that Dr Graham, Dr Alekseev and Mr Lee discuss how to arrange for such a review and report to R&S accordingly.

(c) NORWESTLANT Report

Part I (Text) and Part II (Atlas) of the report of the NORWESTLANT Survey 1963 will be distributed shortly after this Annual Meeting. Part III (Physical Oceanographic Data) will be issued presumably this year. The Subcommittee on Steering and Publications has agreed to consult Mr Lee regarding publication of Part IV (Biological Data) being at present prepared by the Secretariat.

(d) Symposium on Physical Variability in the North Atlantic

This ICES symposium will be held in Dublin, Ireland, 25-27 September 1969 in conjunction with the Statutory Meeting of ICES. Dr Alekseev represents ICNAF on the planning group for this symposium. It was noted that a considerable number of papers will deal with long-term changes of the physical environment in the North Atlantic region.

(e) Other Items

In relation to redfish stock assessment, the continuous plankton survey carried out by the Oceanographic Laboratory, Edinburgh, (Res.Doc.69/18) was considered to be highly important and R&S, therefore

recommends (18)

(i) that the Oceanographic Laboratory, Edinburgh, be invited to submit a paper to the 1970 meeting of R&S on distribution and abundance of redfish larvae as determined by the continuous plankton recorder survey, and

(ii) that the laboratory be invited to send a speaker to the 1971 meeting of R&S to describe the Undulating Oceanographic Recorder which the Laboratory has at present under development.

R&S stressed the importance of making oceanographic data available to all marine scientists through the World Data Centres in Moscow and Washington. In order to familiarize members with the world oceanographic data exchange system, R&S

recommends (19)

that a speaker from one of the World Data Centres be invited to address R&S at its 1970 meeting. It also suggests that the Intergovernmental Oceanographic Commission (IOC) be asked to make copies of its manual on data exchange available to all members of the Committee.

R&S reviewed the suggested arrangements pursuant to Rec.20 of Appendix III for reviewing at its 1971 meeting the environmental conditions in the ICNAF Area during the decade 1960-69 and

recommends (21)

(i) that a two-day symposium be held at the 1971 meeting of R&S to review the environmental conditions in the ICNAF Area during the decade 1960-69,

(ii) that the plans for this symposium be as recommended in the Report of the First Meeting of the Organizing Committee, (App.III, Annex I).

(iii) that the Convenor act in close collaboration with Dr Alekseev (USSR), Dr Graham (USA) and Mr Lee (UK) and the Chairman of the Subcommittee on Assessments,

(iv) that ICNAF look forward to publication of the papers presented at the symposium.

4. GEAR AND SELECTIVITY (APP.IV)

(a) The ICES/ICNAF Working Group on Selectivity Analysis

In accordance with 1968 Rec. 6 this Working Group was established by ICNAF to study inter alia the variability in selection data, including the scientific basis of mesh size differentials for different twine materials.

The Group has made good progress in its study and is expected to prepare a final report at its next meeting for presentation to the 1970 Annual Meeting of ICNAF. R&S noted that only five Member Countries (all from Europe) were able to send representatives to the Working Group meeting in Moscow and invited other interested countries to send representatives to the next meeting of the Working Group, Charlottenlund, 2-6 September 1969.

(b) Summary of Trawl Material and Mesh Size Sampling

R&S took note of the summary for 1968 (Res.Doc. 69/30). All information reported was for trawls made of synthetic material.

(c) Review of Progress to eliminate Topside Chafing Gear

It was reported that most large German stern trawlers are now being equipped with trawls made of extra strong twine which may render superfluous the need for topside chafers. Further developments will be reported next year.

5. AGEING TECHNIQUES

(a) Redfish Otolith and Scale Exchange

This exchange was initiated in accordance with 1968 Rec. 12 but progress has so far been limited to developing standard techniques for preparation of the material. Dr J. Messtorff (Fed.Rep.Germany) reported a promising method for preparation of scales which he hopes to present at the next meeting of R&S.

(b) Age Validation Studies on ICNAF Species

In accordance with 1968 Rec.13, colour transparencies of type otoliths have been lodged with the Secretariat. R&S took note of Res.Doc.69/55 describing the first studies of the age of American plaice.

(c) Report of Herring Otolith Exchange

The results of an age reading validation programme on scales and otolith

photographs for a sample of Canadian herring was reported (Res.Doc.69/29). It was noted in the discussion that the derived levels of agreement between readers are broadly similar to those of validation studies for Northeast Atlantic herring stocks. It was also noted that it would be of benefit to circulate otoliths as well as otolith photographs in any future exchange programme.

6. REVIEW OF THE REPORT OF THE ICES/ICNAF JOINT WORKING PARTY ON NORTH ATLANTIC SALMON, MAY 1969

The ICES/ICNAF Joint Working Party on North Atlantic Salmon met in Charlottenlund at the ICES headquarters 20-21 May 1969. The report of this meeting as given in Res.Doc.69/33 was reviewed by R&S at the present meeting.

The Chairman of the ICES/ICNAF Joint Working Party on North Atlantic Salmon, Mr B.B.Parrish (UK), in his introduction to the Working Party's report, called attention to the fact that the full text of the report had not been seen by all members of the Working Party due to limited time at the meeting, but that all conclusions and the general outline of the report had been agreed upon by the Working Party. He also stressed that the report should be studied in combination with the two published reports from the Working Party (ICES Coop. Res.Rep., Ser.A, No.8 and 12 respectively) because the new report as presented in Res.Doc.69/33 did not reiterate all earlier findings still valid in the light of most recent data.

In the time at its disposal, the Working Party confined its attention to

(a) further consideration of the salmon fishery off West Greenland, and of the assessment of its effects;

(b) making a preliminary appraisal of data available for high seas fishery for salmon in the northeast Atlantic.

The main items in the document are:

A. WEST GREENLAND

1. Catch and Fishing Effort

The latest data show that the catch in the offshore drift net fishery at West Greenland increased further from 305 tons in 1967 to 548 tons in 1968, mainly due to increased number of vessels (11 in 1967, 17 in 1968), but there was a decrease in the inshore catch from 1,283 tons to 579 tons, so that the total West Greenland catch in 1968 was some 400 tons less than in the previous two years. The average catch for vessels in the offshore fishery was slightly higher than in 1967. The decrease in the inshore

fishery seems to have been due to a decrease in the abundance of salmon in the inshore waters.

For those North American and European countries with substantial home waters salmon fisheries, the total catches (salmon plus grilse) were lower in 1968 than in 1967 except in Ireland, where the catch increased slightly due to a substantial increase in the grilse catch in 1968, the salmon (i.e. fish which have spent two or more winters in the sea) catch having decreased, as in Canada, England and Wales, Norway and Scotland. In England and Wales, and Scotland the grilse catch was also lower in 1968. It should be noted that the observed decreases in the catches in the different countries were well within the range of year to year variation observed in previous years.

2. Origin of Salmon at West Greenland

Details of tagging experiments and recaptures are given in Res.Doc.69/33, Tables 3-6.

The additional data for 1968 were in conformity with those for earlier years in showing that the salmon stock at West Greenland in 1968 consisted of fish which, if surviving and returning to home waters, would be salmon of two or more sea winters, and that it comprised a mixture of fish originating from North American and European river systems. They also pointed to salmon originating from rivers off the Norwegian west coast as constituting none, or a very small part of the stock exploited at West Greenland. It should be noted, however, that it is not possible to determine from the tagging data whether salmon from Norwegian rivers flowing into the Skaggerak contribute to the West Greenland stock.

When adjustments are made to compare between years, the rates of return of tags, per ton of salmon caught at West Greenland were approximately the same in 1968 as in 1967 for the countries contributing the largest numbers of tagged fish in the West Greenland catch except for the USA, for which the rate decreased sharply from relatively high level in 1967.

The Working Party noted that the recaptures at West Greenland of fish tagged as smolts have varied widely for different river systems, and between wild and hatchery reared smolts. In the time available, it was not possible to assess fully the influence of these factors on estimates of the relative contributions of the salmon stocks in different countries to the West Greenland stock, but the Working Party decided that further consideration should be given to this problem at its next meeting.

Only 47 salmon were liberated in the tagging experiment at West Greenland in 1968, compared with numbers ranging from 233-729 in the previous three years. This was due mainly to the decision in 1968 to tag only the fish in good condition. Four of these salmon were recaptured in the fishery off West Greenland, mostly within a few days after liberation, and to

date (May 1969) none have so far been recaptured from home waters.

Biochemistry and parasite studies have been continued. Promising results have been obtained but so far it has not in these studies been possible to provide reliable estimates of the relative abundance at West Greenland of fish from various river systems.

3. Assessment of Effects of West Greenland Fishery on Total and Home Waters Salmon Stocks and Yields

(a) Total salmon yields

In its report presented to ICNAF last year, the Working Party concluded that the presence of a fishery at West Greenland, at the level of exploitation there during the period 1963-1967 had resulted in an increase in the total (home-waters plus West Greenland) catch of salmon from European rivers which visit West Greenland, but that the position with regard to salmon from North American rivers was less clear.

The new data available to the Working Party at this meeting provide no grounds for modifying this conclusion. It should be noted, however, that this assessment is based on the assumption that any reduction in the numbers of adult salmon returning to home waters is insufficient to significantly reduce smolt production. Although at present little is known of the relationship between adult stock size and smolt production for Atlantic salmon, the data available suggest that home-water stock size has been relatively high compared with earlier years so that subsequent smolt production is unlikely to have decreased as a direct result of a decrease in spawning stock size.

The situation with regard to the total yield of salmon from North American rivers, visiting West Greenland, is still unclear. However, since losses in total yield would only occur at low rates of natural mortality (i.e. less than 20% during the 10-12 month period of return to home waters and high exploitation rate in home-waters (i.e. more than about 90%), it seems likely that also for salmon returning to North American rivers, taken as a whole, the presence of the West Greenland fishery has resulted in an increase in total yield. It is possible, however, that for the salmon returning to some individual river systems where the rate of exploitation is known to be high, it may have resulted in no increase, and possibly a small loss in total yield.

(b) Home-waters Salmon Stocks and Yields

As indicated in previous reports of the Working Party, precise estimates of the effects of the West Greenland fishery on home-waters

salmon (2+) stocks and catches cannot be made due to the lack of accurate information on the natural mortality rates occurring between West Greenland and home waters and the rates of exploitation in the various river systems to which they return. Only limiting estimates of the effects can, therefore, be attempted based on the range of estimates within which the values of these parameters seem likely to lie.

Between Greenland and home waters natural mortality rate for salmon of Canadian origin probably lies between 0.02 and 0.1 per month and average increase in weight is probably 50%. If these parameters are applied to all salmon, the effect of a West Greenland fishery of 1,340 tons (mean of the catch in the years 1964-67) would probably be so as to reduce total salmon stock in all home waters combined as follows:

Upper estimate (M = 0.02 per month) - 1,667 tons approx.
Lower estimate (M = 0.10 per month) - 667 tons approx.

It is not possible, from the data currently available to estimate the losses more closely than this, but it should be noted that the value of the average increase in weight of 50% might be overestimated for the salmon returning to European rivers. If this is the case, the upper and lower estimates of the losses, given above, would be overestimated.

Estimates of the loss to the overall home-water catches, compared with what they would have been in the absence of a West Greenland fishery will be the loss to the stocks, times the average exploitation rate in home water fisheries. Information on the exploitation rates in home waters are available for very few of the river systems in the countries supplying salmon to West Greenland so that an overall average rate cannot be estimated accurately. It seems likely, however, that this rate does not exceed 0.6. If this value is used, the upper and lower estimates of the losses to the combined North Atlantic home-water catches would be as follows:

Upper estimate (M = 0.02 per month) - 1,000 tons approx.
Lower estimate (M - 0.10 per month) - 400 tons approx.

The data reported in the two published reports of the Working Party indicated that the country contributing the largest proportion of the stock at West Greenland was Canada.

The analysis of the longer series of data for the years 1964-68 point, in fact, to quite large variations from year to year in the rates of recapture of tagged fish at West Greenland, originating from different countries and hence in their apparent contributions of salmon to the exploited stock there. This is evident from the following table,

giving for the years 1964-1968, the numbers of recaptures at West Greenland per 1,000 smolts tagged in different countries per 1,000 tons of salmon caught at West Greenland and the ratios of the recaptures of tagged fish at West Greenland and as salmon in home waters (figures in brackets).

Year of recapture at West Greenland	Canada	USA	England	Scotland	Ireland	Iceland	Sweden
1964	0.74(0.3)	-	0.62(0.3)	0.40(0.06)	-	-	-
1965	0.27(0.1)	-	0.78(0.1)	0.50(0.03)	-	-	-
1966	1.67(0.3)	-	1.60(0.2)	0.61(0.08)	-	-	-
1967	0.68(0.3)	0.31(0.2)	0.36(0.1)	0.79(0.2)	-	0.09(?)	0.40(0.06)
1968	0.62	-	0.38	0.95	0.18	-	0.32

While these figures confirm the earlier conclusions that the major part of the West Greenland stock throughout the period has been derived from rivers in Canada and the UK, it must be recognized that during this period there have been changes in tagging methods, type of tag used, tagging site and that these factors together with differences in the efficiency of different types of tag may introduce substantial errors in the estimates of the relative proportions of salmon at West Greenland, originating from different countries. The Working Party considers, therefore, that it is not possible, from the data currently available to estimate accurately the proportions of the total losses to home-water catches suffered by the fisheries of different countries. However, it seems clear that the largest proportion of the total losses have continued to be experienced by the fisheries for salmon in Canada and the UK.

It is evident from the above results that at present the accuracy of the assessment of the magnitude of the effects of the West Greenland fishery on total and home-water salmon stocks and catches is limited by the lack of information on a number of aspects of the distribution and population dynamics of the salmon visiting West Greenland. More detailed and accurate assessments will only be possible when further information on these processes becomes available from the research programs currently in progress, as outlined in a later section of this report.

B. NORTH-EAST ATLANTIC

1. Norwegian coastal and offshore waters

1.1 Catches and Fishing Effort

Fishing for salmon in Norwegian coastal waters by drift-net has taken place from time to time since the seventeenth century. However, 1958 marked the beginning of a rapid growth in this coastal fishery.

While this fishing has remained mainly within the coastal waters, in some years (1968) it has extended to distances of 30-35 nautical miles off the coast. In the most recent years, however, it has taken place within 6-7 miles of the coast.

In 1965, a fishery by long-line was started in the sea outside Norwegian fishery limits. Catches in 1965 and 1966 were small, but the fishery grew rapidly in 1967 and 1968, with the participation of Danish, Norwegian, Swedish and Faroese vessels. Most of the long-line fishing takes place from about 30 to 150 nautical miles offshore.

The available data on the catches taken in the Norwegian coastal drift-net fishery and the offshore long-line fishery and the number of vessels engaged in the latter are given in Table 7 of the report of the Working Party (Res.Doc.69/33). These data show that coastal drift-net fishery exceeded 300 tons in each of the years 1965 to 1967, but decreased sharply to 228 tons in 1968, while the long-line fishery increased sharply to over 300 tons in 1968.

1.2 Characteristics of the Offshore Norwegian Salmon Stock

Data based on sampling in one year only suggest that the salmon stock exploited in the offshore fishery, like those at West Greenland, consists mainly of fish which, if surviving, will return to home waters as salmon that have spent two or more winters in the sea (almost 90% of the fish sampled were in this category). Only a small proportion (7%) belonged to the grilse age-group. This indicates that any effects of this fishery on home waters stocks is likely to be principally on their large salmon (with 2 or more sea winters) component.

One notable characteristic of the long-line catches seems to be the low condition factor of the fish caught.

1.3 Origin and Distribution of the Offshore Norwegian Salmon Stock

Norway has maintained a salmon-smolt tagging programme, in which about 20,000 smolts are tagged each year, for many years. In 1967, 8 of these fish (representing 1.7% of the total recaptures) were recaptured in the offshore fishery and, in 1968, 49 recaptures (10.5% of the total) were recorded.

Recaptures have also been recorded, in this fishery, of smolts tagged in countries other than Norway (Sweden, Denmark).

The occurrence of hooks in the mouths and stomachs of salmon caught in rivers has been reported in 1967 and 1968 in Norway (182 reported occurrences), the USSR (22 reported occurrences) and in Scotland (4 reported occurrences).

The information at present available suggests that the stock fished by the off-shore long-line fishery off the Norwegian coast (and by the drift-net fishery in coastal waters) is composed mainly of salmon which if surviving will return to Norwegian rivers though, as the tag recaptures and hook observations suggest, fish from other countries' rivers are also present.

2. Faroese Waters

In 1968 the Faroese research vessel carried out an experimental long-lining cruise for salmon in the waters around Faroe. Between 8th and 23rd April lines were shot on 7 occasions and 182 salmon were caught. Most of the salmon caught were small (55-59 cm), but a few were over 100 cm long and weighed more than 9 kg. A small sample of scales from the catch was examined. The results indicated that the small salmon which predominated in the catch were one-sea-winter fish, which were just beginning their second year's growth in the sea.

Commercial catches in this area in 1968 did not exceed 5 tons.

In April 1969, a second cruise was carried out in the same area as in 1968. Lines were fished on 7 occasions and a total of 426 salmon were caught, of which 74 were tagged and released. The catch per unit effort was again very high averaging almost 80 salmon (1000 hooks during the cruise). The length-frequency distribution was very similar to that recorded in 1968.

To date, eight salmon tagged in other areas, have been recaptured off Faroe, four from Norway and two from Scotland and two from Iceland.

C. FUTURE RESEARCH PROGRAMME

The Working Party briefly reviewed the research programme proposed for 1969, at West Greenland. This will again be a cooperative programme between Canada, Denmark and the U.K.

Research in connection with the North East Atlantic fishery will be conducted by Denmark, Norway and Sweden.

The smolt tagging programmes will be continued as in previous years.

D. FUTURE MEETING

The Working Party recommends that it should meet for not less than two days prior to the ICNAF meeting in 1970.

In the discussion of the Salmon Working Party's report, R&S noted that there has been an overall increase in landings of salmon in home waters in the years since the West Greenland fishery became important. However, there is no evidence in the statistics to show what effect this fishery may have had upon the home water catches. It was noted in particular that the West Greenland catches contain only fish which if returning to home waters would be salmon, not grilse, whereas the statistics for most home waters does not separate grilse and salmon. The two statistics are therefore not strictly comparable. Moreover the trends in catches could have been influenced by natural fluctuations in the stock or by an increase in the production of hatchery-reared smolts and, in 1968 especially, by the incidence of UDN disease (ulcerative dermal necrosis) in some rivers.

R&S also noted that the Working Party had made some assessment based on a single mean exploitation rate for home waters, there being no evidence that F has changed. R&S considered that "home water" authorities implementing management policy may have influenced F in the past and may do so in future to offset the influence of fishery in other areas. In this relation, R&S stresses the necessity of implementing the suggestions for future work.

R&S noted in particular the recommendation for further work on the relation between the size of the spawning stock and smolt production in home waters, and that this aspect of the assessment has not been fully evaluated in the reports so far presented to the Commission nor is it mentioned in the stated programme of future research. R&S wishes to stress the importance of this part of the programme. R&S also stresses the need of estimating exploitation rate over a broad range of home water fisheries.

Following this discussion, R&S adopted the report of the Joint Working Party, it being understood that editorial changes could be proposed by the Working Party.

R&S considers it is not necessary to publish the report of the Working Group as given in Res.Doc. 69/33.

7. PUBLICATIONS AND REPORTS

(a) Stock-Recruitment Symposium

This symposium organized by ICES with the collaboration of FAO and ICNAF is arranged to take place in the week of 6-12 July 1970 at the University Aarhus, Denmark. R&S

recommends (22)

that ICNAF accept the invitation of ICES to participate in the Stock-Recruitment Symposium in July 1970 and that it provide $5,000 to help defray the costs of publication.

(b) ICNAF Publications

An analysis of the cost of ICNAF publications is given in Comm.Doc.69/26. R&S agreed that the Subcommittee on Steering and Publications should consult Mr Lee regarding the publication of Part IV, Biological Data Records, of Special Publication No.7, the NORWESTLANT Survey.

R&S noted that the Steering and Publications Subcommittee had prepared a list of research documents to be considered for publication in the ICNAF Redbook 1969 and Research Bulletin No.7.

(c) Marine Food Chains Symposium

Papers from this symposium will be published by the University of California Press and Oliver & Boyd in autumn 1969.

(d) Index of ICNAF Publications and Documents

R&S

recommends (23)

that efforts be continued to complete an ICNAF index by 1971 which, for publications, would be compiled by subject and authors as in the Fisheries Research Board of Canada index.

8. ORGANIZATION OF R&S

(a) Officers for 1969/70

(i) Chairman of R&S

Mr Sv. Aa. Horsted (Denmark) was unanimously re-elected Chairman of R&S.

(ii) Subcommittee Chairmen

The following were elected to serve for the coming year and at the 1970 Annual Meeting:

Assessments:	Mr R. Hennemuth (USA)
Environmental:	Dr H. W. Graham (USA)
Statistics and Sampling:	Dr A. W. May (Canada)

(iii) Representatives on the Steering and Publications Subcommittee

Germany, Denmark, UK	Dr A. Schumacher (Fed.Rep.Germany)
USSR, Romania, Poland	Dr F. Chrzan (Poland)
France, Portugal, Spain	Mr J. Morice (France)
Iceland, Norway, Italy	Mr E. Bratberg (Norway)
Canada	Dr W. Templeman (Canada)
USA	Dr H. W. Graham (USA)

(b) Timing of R&S Meetings

R&S reviewed the recommendations of the Subcommittee on Financial and Administrative Matters relating to the timing of R&S meetings (Comm.Doc. 69/5). Discussion which followed emphasized the advantage of holding the main meeting of the Assessments Subcommittee in mid-term, i.e. in January. Such timing would allow Member Governments more time before each Annual Meeting to study up-do-date assessment results and to obtain well-considered advice on policies and positions to be adopted. That fishery statistics for the previous year would not be available until mid-April was not considered to be a serious disadvantage since assessments are based on statistics over a number of years. The report of the Assessments Subcommittee to R&S at the Annual Meeting would then contain the results of the mid-term deliberations with up-to-date statistical information and any adjustments to the assessments as a result of further studies by the assessment scientists. If provisions are made for such a mid-term meeting R&S considers it would not be necessary to change the present duration of the R&S meeting immediately before the Annual Meeting of the Commission.

R&S

recommends (24)

(1) that there be a mid-year meeting of an Assessments group at a time and place to be determined by the Chairman of the Assessments Subcommittee in consultation with the Executive Secretary;

(2) that the outgoing Chairman of the Assessments Subcommittee (Mr B.B. Parrish) and the newly elected Chairman (Mr R. Hennemuth) draw up a list of assessment objectives and arrange for allocation of the work to be done before the mid-term meeting;

(3) that some attention be given at the mid-term assessments meeting to the scientific data necessary for proper assessments relating to catch quotas and closed areas;

(4) that preliminary discussions be held at the mid-term assessments meeting regarding the need for integrated multi-ship research surveys for predicting the strength of year-classes;

(5) *that there be no changes in the general period allowed for the R&S meeting and that the exact date and timetable be arranged with the Executive Secretary.*

9. COORDINATION AND COOPERATION WITH OTHER ORGANIZATIONS

Mr Gulland (FAO) drew attention to the establishment of the International Commission for the Conservation of Atlantic Tuna (ICCAT). In preparatory work prior to the Convention being ratified, a FAO assessment group examined the state of the Atlantic Tuna stocks including the bluefin tuna fishery of the Northwest Atlantic. In respect of this fishery, the FAO assessment group has recommended for consideration under the Convention that

> "Pending better assessments of the bluefin tuna fishery of the Northwest Atlantic, the landing of fish less than 10 kg in weight by the commercial fishery should be discouraged."

R&S noted that part of the bluefin tuna fishery referred to takes place within the ICNAF Convention Area, but R&S has not had an opportunity to examine the proposal in detail.

10. OTHER MATTERS

Meeting documents not discussed under the approved agenda were reported upon during the R&S session. Res.Doc.69/55 concerned American plaice in Subareas 4 and 5. Res.Doc.69/48 concerned immature herring in the Bay of Fundy and Res.Doc.69/60 compares fecundity of herring from Georges Bank, the Gulf of Maine and Nova Scotia.

Dr Cole (UK) agreed to act as R&S observer at ICES and Mr Lee (UK) as observer at IOC and SCOR.

The Chairman thanked Mr Parrish for his excellent and arduous work as Chairman of the Assessment Subcommittee for the past three years and hoped that he would give his valuable assistance and advice to the new Chairman of Assessments.

The Chairman also thanked his rapporteurs, his Subcommittee Chairmen and rapporteurs for their outstanding work at this meeting and expressed his thanks to the Secretariat for their efficient work. On behalf of the R&S Committee, he thanked the Polish delegates and Poland for the excellent facilities and notable entertainment provided at the Warsaw meeting. Dr Graham thanked the Chairman of R&S for his fine organization of the work and his leadership of R&S during the period of the meeting.

APPENDIX I - REPORT OF THE SUBCOMMITTEE ON ASSESSMENTS

Chairman: B.B. Parrish Rapporteur: J. Møller Christensen

In accordance with the decision taken at the 1968 Annual Meeting, a mid-term meeting of the Subcommittee took place in London from 22-25 January 1969, and further meetings were held in Warsaw on Saturday, 24 May 1969, and at intervals during R&S week.

1. Review of Latest Statistics of Landings (Nominal Catches) and Fishing Effort in the ICNAF Area

The series of data on landings (nominal catch), in each Subarea which has been compiled in recent years has been updated to include the provisional* landings data for 1968 and are given in Table 1 for Subareas 1-3, and in Table 2 for Subareas 4 and 5. In addition to the landings from the Convention Area given in these Tables, catches of some of the main ICNAF species were also taken in Statistical Subarea 6. These included 28,000 tons of herring, 15,000 tons of silver hake and 24,000 tons of sea scallops. The herring catch was six times larger than in 1967. In previous years, estimates of landings-per-unit-effort and total fishing activity, based on data on days fished, have been included in the tables. However, in recent years, particularly in the northern Subareas, changes in the pattern of fishing including a tendency for fishing to be concentrated in the areas and seasons of highest apparent abundance, and in the efficiency of the vessels, have meant that the numbers of days fished do not always provide a satisfactory measure of fishing mortality. Equally, without suitable adjustment, catch-per-day may be an unsatisfactory measure of stock abundance. These data have therefore been omitted from this year's tables.

Subarea 1

Total landings of cod from Subarea 1 in 1968 (353,000 tons, excluding non-members' catch) decreased about 16% from 1967 to about the same level as in the period 1964-66.

Catch per day fished (based on trawlers' catch) increased considerably from 1966 to 1967 and may well have remained at a high level or even continued to increase from 1967 to 1968. This can, however, not be taken as an indication of increased stock size but is due mainly to the main trawler fleets tending to concentrate their effort more and more in the season giving the highest catch per day, i.e. in the first half of the year, when the fishery is based mainly on concentrations of large fish.

* No data available from non-member countries in 1968. Total nominal catch in 1967 was over 141,000 metric tons.

The concentration of fishing effort in the best season does not mean that a decrease in activity will be followed by a decrease in fishing mortality rate.

Redfish landings (about 9,000 tons) continued to decrease in Subarea 1 and are now on the same level as in the early 1950's.

Subarea 2

Cod landings in 1967, at 298,000 tons, were approximately 12% lower than in 1966, but they increased again sharply in 1968 to 406,000 tons, the highest annual yield so far recorded in this Subarea. This increase was mainly due to increased landings from Div.2J.

Estimated total fishing activity in the Subarea in 1967 was slightly lower than in 1966, due mainly to a reduction in the fishing effort by medium-sized trawlers; in fact, the effort by larger trawlers increased. Although fishing effort data are not available, it seems likely from the catch data that the fishing activity increased again in 1968.

Subarea 3

Total groundfish landings in Subarea 3 in 1967 exceeded 1,000,000 tons for the first time and were only slightly below this level in 1968. This represents a doubling of the groundfish catch since 1962. The principal species contributing to this increase was cod, the landings of which exceeded 700,000 tons in 1967 and 1968, compared with less than 300,000 tons in 1962. The increase in the cod landings in 1967 took place in all divisions of the Subarea but was especially marked in the offshore fisheries in the Grand Bank area (Div.3L, 3N and 3O). In Div.3N and 3O, in particular, the cod catch in 1967 was three times the 1962-1966 average. It decreased by 30% in these divisions in 1968, but remained high in Div.3L and increased by more than 50% in Div.3K.

Estimated fishing activity in 1967 by the tonnage class of trawlers above 500 GRT increased from the 1966 level; the estimated total fishing activity being over 30% greater, and slightly above the estimate of 1965. Catch per day, however, was substantially greater in 1967 than in 1965, due largely to increased catch-per-unit-effort for large trawlers.

In addition to the increase in the groundfish landings, there was a major increase in herring landings from 50,000 tons in 1966 to over 150,000 tons in 1968.

Subarea 4

Landings of groundfish in Subarea 4 in 1968 increased quite sharply, with an increase of 90,000 tons (21%) from the 1967 level. Most of the

increase resulted from increased catches of cod, redfish and flatfish. Cod landings were somewhat above the long-term average from 1957-1968, while redfish and flatfish landings were much above the long-term average.

Haddock landings declined slightly to 46,000 tons, a little below the long-term average. Most haddock were taken from Div.4X where the good 1963 year-class was dominant in the fishery.

Overall fishing activity in the groundfish fisheries remained about the same in 1967 as in 1966. A marked reduction in activity by trawlers over 1800 tons (from 3,077 to 471 days fished) was counter balanced by the increased activity of trawlers of 501-1800 tons.

Herring catches in 1968 increased 33% to a new high level of 348,000 tons. Most of the increase resulted from increased activity in Div.4T and 4X. In addition, about 10,000 tons of herring were landed from Div.4V in what appears to be a new fishery.

Subarea 5

Total groundfish landings and fishing activity in Subarea 5 did not change much from 1967 to 1968. Haddock landings dropped to 44,000 tons; silver hake landings decreased again for the third consecutive year and red hake landings also decreased by half to 20,000 tons.

Mackerel and alewives showed substantial increases (2 to 3 times) with landings in 1968 of 47,000 and 22,000 tons, respectively.

The long-term decline in redfish landings continued, and the landings were only 7,000 tons in 1968. Contrary to other species, however, the reduced effort of the past 10-15 years has allowed the redfish stocks to increase substantially in abundance.

Cod landings increased slightly, the total now being nearly three times that taken in 1959-60.

Herring landings increased by nearly 50% to 337,000 tons. Increases in both inshore and offshore landings occurred.

2. Further Assessments of the State of the Exploited Stocks in the ICNAF Area in relation to Questions posed by Standing Committee on Regulatory Measures

In its report last year, the Subcommittee provided some preliminary answers to questions posed by the Standing Committee on Regulatory Measures regarding the present state of the exploited stocks in the Convention Area in relation to the need for and possible introduction of regulatory measures controlling fishing mortality rate. Further consideration was given at the January 1969 meeting (Res.Doc.69/46) to important aspects of these questions,

relating principally to assessments of the state of the cod stock in Subarea 1 and the haddock stock in Subarea 5 and the estimation of annual catches in the immediate future at specified levels of fishing mortality rate. These considerations were extended to other fisheries and stocks at the present meeting. The results of these assessments are set out below.

(a) Subarea 1 Cod

In its report in 1968, the Subcommittee indicated that any increase in fishing beyond the present level would not result in any long-term increase in average annual yield, and that a reduction of fishing mortality rate of up to 25% would not result in any significant reduction in yield and would increase the catch per unit effort. At the mid-term meeting, estimates were made, on this basis, of the catch that should be taken in 1968 and 1969 in order to secure a 25% reduction in fishing mortality rate assuming a preceding level, $F = 0.8$. These estimates were prepared before the provisional statistics of landings in 1968 itself became available, and therefore involved prediction of the catch in that year, also with $F = 0.8$. This prediction of 349,000 tons of cod was very close to the reported landings of 353,000 tons in 1968 (excluding landings by non-member countries, not yet reported), so lending support to the estimates of fishing mortality rate which were used. This agreement is probably better than can be expected on the average.

This assessment of the level of fishing mortality required to maximize yield per recruit was based on a constant parameter model assuming, inter alia, that fishing mortality rate in any year is constant for all exploited age groups. New data have provided estimates of the variation of fishing mortality rate with age caused by the recruitment of a year-class taking place over a span of years. Also, changes in the pattern of fishing itself, e.g. the more recent trend of concentrating effort on aggregations of mature, spawning and post-spawning fish, and the redeployment of fishing effort from one ICNAF area to another, could lead to changes in the fishing mortality rate between age groups. The Subcommittee concluded that these variations would alter the shape of the yield curve and the value of fishing mortality giving the greatest yield per recruit. However, taking into account the recent increases in fishing effort, the present fishing mortality rate is probably close to that giving the maximum yield-per-recruit with the distribution of fishing occurring in 1968. It remains true, however, that a reduction of the present fishing mortality rate by up to 25% would not result in any significant loss of total catch per recruit and would increase the catch-per-unit-effort.

It must also be stressed that regulation of fishing mortality at this

In making this suggestion, the Subcommittee recognizes that the assessments for many of the stocks fall far short of scientific certainty. At the present relative rates of the development of the fisheries, and of the accumulation of research information (particularly sampling information on sizes and ages of fish caught by certain major fleets), it is probable that, with the large mobile fishing fleets fishing in the Convention Area able to switch effort rapidly from one area or species to another, completely reliable assessments will only be made after the fisheries are in very serious trouble.

(f) Subareas 3, 4 and 5 Herring

In its 1968 report to the Commission, R&S drew attention to the substantial increase in the exploitation of herring in the Convention Area in recent years and to the fact that this was due principally to the growth of herring fishing in Subareas 3, 4 and 5. The data in Tables 1-5 of this report show that this increase continued in 1968, to over 850,000 tons for the Convention Area as a whole. The growth of this fishery is indicated by the following landing data by subareas, in the years 1960-1968.

Herring landings by subareas in '000's metric tons

Year \ Subarea	3	4[b]	5[c]	6	Total
1960	5	105	69 (0)	-	180
61	4	81	95 (68)	-	179
62	5	116	222(151)	-	344
63	6	111	167 (97)	-	285
64	3	140	159(131)	-	302
65	8	180	74 (40)	-	263
66	23	236	166(137)	-	425
67	78	261	250(213)	5	594
68[a]	155	348	337(295)	28	868

a) Not including landings by non-member countries
b) Figures refer to "adult" and juvenile herring fisheries combined; landings of juveniles - 50-60,000 tons annually
c) First figures refers to landings of "adult" and juvenile herring combined; second figures to landings of "adults" only

These data show that the landings of herring have increased rapidly in all of these subareas in this period, due to the growth of the offshore fisheries for "adult" herring. During this time the landings of juvenile herring in the Canadian and USA inshore fisheries for "sardine" herring in Subareas 4 and 5 have fluctuated without trend about an average of around 90,000 tons. The countries concerned in the developing adult fisheries are Canada, Federal Republic of Germany, Poland, Romania, USA and USSR and non-member countries.

An examination of the available data relating to changes in the abundance and composition of the exploited stocks in these areas, especially in the offshore fishery on Georges Bank in Subarea 5, for which the longest series of data are available, showed the following main features:

(a) Catch-per-unit-effort

While changes in the composition of the fishing fleets and the fishing methods used in the herring fisheries on Georges Bank and in other areas fished from year to year present difficulties in obtaining a comparable series of estimates during the main period of growth of the fishery there, data for USSR medium trawlers indicate a decrease in catch-per-unit-effort from an average of over 10 tons per day up to 1966 to 6.5 tons per day in 1968 (during which time the landings increased from 166,000 to 337,000 tons). For other countries and for the fisheries in the other subareas, the series of data for any class of vessel were too short for any trends to be followed.

(b) Age composition

Age composition data in years prior to the development of intensive fishing on Georges Bank indicated that the adult stock there was dominated by 3-, 4- and 5-year-old herring. In 1964, the strong 1960 year-class recruited to the fishery and has been the dominant one in the subsequent years, so that during these years, the average age of the catches has tended to increase, especially on the northern part of Georges Bank. The available age composition data for the Georges Bank catches point to the 1963, 1964, 1965 year-classes, which recruited to the fishery in 1967 and 1968, being relatively weak ones.

(c) Mortality rates

Although a comprehensive series of data on the changes in abundance of year-classes with age during the period of intensive fishing on Georges Bank and in other areas is not available, estimates of the total mortality rate (Z), obtained from age abundance data for some years during the period were between 1.0-1.3 (60-70%) for the fully recruited age-groups. Similar estimates were obtained from Soviet data on spawning stock size, derived from egg surveys on Georges Bank.

While this information points to a decrease in adult stock abundance on Georges Bank in recent years and to a high total mortality rate, the data available at this meeting were insufficient for a detailed analysis to be made of the effects of the recent increases in fishing

on the herring stocks in the three subareas. Of particular importance for such an analysis is the relationship between the adult herring stocks in the different fishing areas, and between the stocks of juvenile herring exploited in Canadian and US coastal waters and the adult stocks offshore.

In view of the rapid increase in exploitation of herring in the Convention Area, the Subcommittee agreed that further assessments should be made at its next meeting of the state of the exploited herring stocks and it urges the scientists in the countries with herring fisheries in the ICNAF Area to supply the available, relevant data, for as many years as possible, on

(a) the statistics of catch and fishing effort, for the juvenile and "adult" herring fisheries;

(b) the results of investigations on the identity and degree of separation between the exploited adult stocks in different areas;

(c) information on the origin of the exploited stocks of juvenile herring (i.e. from which adult stocks they are derived);

(d) length and age composition of the catches in each main fishing area;

(e) the results of investigations (e.g. egg and larval surveys, accoustic surveys, etc.) on changes in the abundance of the adult and juvenile stocks in each area.

3. Mesh Assessments

In its 1968 report the Subcommittee pointed out that recent assessments of the need for and effects of regulations controlling fishing mortality rate have been made on the basis of the mesh size regulations remaining as at present (or pending), and that the results of mesh assessments presented at previous meetings, especially for the cod fisheries in Subareas 1 and Div. 3N and O still apply. They indicated that, at present levels of fishing intensity, there would be increases in catch-per-recruit with increases in mesh size to at least 150 mm (6") in these fisheries. This is supported by the results of an assessment of the most recent data for the Div. 3N and O cod, (Res.Doc.69/83), which showed that long-term increases in catch-per-recruit would be expected for both the trawl and line fisheries with increases in mesh size from 114 mm (4½ in.) at present in force to 130 mm (5 in.) and 150 mm (6 in.).

The Subcommittee noted that no comparable recent mesh assessments have been made for cod in Subarea 2 and the northern part of Subarea 3 since the major increase took place in the cod fishery in these areas. In view

of the results of the latest assessments for the Div. 3NO and Subarea 1 cod and the present practice of the fishing fleets of several countries in rapidly switching from one area to another, it was agreed that the Canadian members of the Subcommittee would undertake an analysis of the available data for the cod fisheries in this area and present the results to the next meeting of the Subcommittee.

4. Assessment of Harp Seal Fisheries

Arrangements were made for members of the Subcommittee to meet with the Scientific Advisers to Panel A to consider aspects of the assessment of the state of the exploited seal stocks in the Convention Area. Their results are dealt with in the Report of the Scientific Advisers to Panel A. (1969 Meeting Proceedings No.2, App.I).

5. Adequacy of Sampling Data

In its replies at the 1968 meeting to the questions posed by the Standing Committee on Regulatory Measures, the Subcommittee stressed the importance in assessment work of adequate fishery statistics and biological sampling data on the composition (especially of age and length) of the exploited stocks, and of the catches from them by each major section of the fishery. As pointed out at previous Annual Meetings, the sampling data currently available for some components of the major fisheries in the Convention Area fall short of the desired level for these purposes. The Subcommittee accordingly

recommends (1)

that in an attempt to remedy the principal deficiencies in the sampling coverage for the major fisheries, the ICNAF Secretariat in consultation with the Chairman of the Subcommittee and those of its members most concerned with assessments in the different subareas, should approach the appropriate authorities in those member countries in which the sampling data for specific fisheries in the Convention Area are currently lacking or inadequate, and that further consideration should be given to this problem at the next meeting of the Subcommittee in the light of the replies received.

6. Changes in Environmental Conditions in ICNAF Area

The Subcommittee took note of the discussions which took place at the meeting of the Environmental Subcommittee on changes in the environmental conditions in parts of the ICNAF Area in recent years. In view of the possible influence of changes in features of the environment on the distribution, abundance and life processes of exploited fish stocks, it welcomes the recommendation of that Subcommittee to review, at its meeting in 1971, the environmental conditions in the ICNAF Area in the decade 1960-1969.

Table 1. Landings (nominal catches) in 000's metric tons by main species from Subareas 1, 2 and 3, 1957-1968.

			1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968[a]
Subarea 1	All Gears	Cod	269	320	234	243	245	451	406	350	360	366	429	353
		Redfish	28	18	33	44	54	60	47	30	19	17	13	9
		Total Groundfish	304	345	273	295	414	526	475	409	399	396	454	372
	Otter Trawl	Cod	140	173	110	101	171	247	244	250	209	188	269	239
		Total Groundfish	169	192	143	147	236	318	306	290	238	209	288	250
	% change in total groundfish landings relative to 1959		118	134	100	103	165	222	214	203	167	146	201	174
Subarea 2	Cod	(Otter trawl	-	-	41	171	246	230	191	197	307	313	268	390
		(Inshore (fishery	-	-	19	17	19	25	25	16	26	24	27	13
		(Other Gears						+		+		1	3	3
		(Total	-	-	60	188	265	255	216	213	333	338	298	406
	Haddock		-	-	+		+	+	+	+	+	+	+	+
	Redfish		-	-	53	83	26	8	6	27	23	14	17	5
	Halibut (including Greenland halibut)		-	-	+	+	+	+	+	+	1	1	3	3
	Flounders		-	-	+	2	1	+	+	3	7	3	5	5
	Other Groundfish		-	-	1	6	4	2	1	2	12	9	4	4
	Total Groundfish		-	-	114	279	296	265	223	245	346	365	327	423
	Other Fish		-	-	+	1	1	1	+	6	1	1	1	4
	Total Fish		-	-	114	280	294	266	223	251	377	366	328	427
	% change in total Groundfish landings relative to 1959		-	-	100	245	260	233	196	215	330	320	287	371
Subarea 3	Cod	(Otter trawl	-	-	160	186	235	175	223	307	261	283	473	?
		(Inshore (fishery	-	-	180	184	136	150	155	144	114	112	102	114
		(Other Gears	-	-	85	101	90	64	88	130	121	104	146	?
		(Total	-	-	425	471	461	389	466	581	496	499	721	743
	Haddock		-	-	35	67	80	35	15	12	9	10	11	6
	Redfish		-	-	246	99	90	61	69	95	112	79	89	48
	Halibut (including Greenland halibut)		-	-	3	3	2	2	1	2	1	1	7	7
	Flounders		-	-	25	35	30	27	34	54	81	111	151	149
	Other Groundfish		-	-	19	17	11	8	7	7	17	11	23	29
	Total Groundfish		-	-	753	692	674	522	592	751	716	711	1,002	982
	Herring		-	-	5	5	4	5	6	3	8	23	78	155
	Other Pelagic Species		-	-	+	+	1	1	1	2	1	1	2	1
	Total Pelagic Species		-	-	5	5	5	6	7	5	9	24	80	156
	Other Fish		-	-	6	7	5	5	6	14	6	7	11	17
	Total Fish		-	-	764	704	684	533	605	770	731	742	1,064	1,155
	% change in total Groundfish landings, relative to 1959		-	-	100	91	90	69	79	100	95	94	133	130

[a] Landings in 1968 excluding non-member countries

Table 2. Landings (nominal catches) in 000's metric tons by main species in Subareas 4 and 5, 1957-1968.

		1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968[a/]
Subarea 4	Cod	188	213	214	218	212	219	218	229	225	215	204	247
	Haddock	48	49	53	46	47	44	51	60	85	66	49	46
	Redfish	55	55	42	50	42	43	59	53	68	106	87	103
	Halibut	3	3	2	3	2	2	2	2	2	2	2	2
	Flounder	16	17	20	26	27	25	30	34	48	55	41	72
	Silver hake	-	-	-	-	-	9	123	81	50	10	2	3
	Total Groundfish	369	403	395	406	387	412	586	548	565	541	419	516
	Percentage change in groundfish landings relative to 1959	93	102	100	103	98	104	148	139	143	137	106	131
	Herring	91	92	102	105	81	116	111	140	150	236	261	348
Subarea 5	Cod	13	16	16	14	18	26	30	25	42	57	42	49
	Haddock	55	45	41	46	52	59	60	70	155	127	57	44
	Redfish	18	16	16	11	14	14	10	8	8	9	11	7
	Flounders	23	26	25	27	29	38	46	58	57	54	49	53
	Silver hake	57	48	50	47	42	86	147	220	323	162	101	80
	Total[b/]	310	262	276	221	228	300	391	475	728	613	389	394
	Percentage change in groundfish landings relative to 1959	112	95	100	80	83	109	142	172	260	222	141	142
	Herring Inshore 5Y	23	81	48	69	27	71	70	28	34	39	250 31	53
	Herring Offshore 5Z	-	-	-	-	68	151	97	131	40	137	250 213	276

a/ Landings in 1968 excluding non-member countries.

b/ Includes all species except shellfish and herring.

APPENDIX II - REPORT OF STATISTICS AND SAMPLING SUBCOMMITTEE

Chairman: A.W. May; Rapporteur (Statistics): L.P.D.Gertenbach;
Rapporteur (Sampling): F.D.McCracken

The Subcommittee met on 26 May 1969 - morning and afternoon. The following documents were pertinent to the agenda and work of the Subcommittee and were reviewed during the discussion: (Res.Doc. 69/1-4, 20-27, 38, 47, 56, 73, 87.

1. Report on the Statistical Activities of the Secretariat

The Assistant Executive Secretary, commenting briefly on Res.Doc.69/20, reviewed the activities of the Secretariat in the field of statistics during 1968/69. The Subcommittee expressed its appreciation of the work done. Many of the topics under this heading are commented on and reported in detail under other agenda items.

2. Statistical Bulletin Vol.17 for 1967

The Subcommittee noted that this volume was distributed in May 1969, a little later than in recent years, due to late receipt at the Secretariat of the data for an important non-member country.

The Subcommittee also noted that various improvements and similar editorial changes recommended in 1968 by R&S have been included in this volume. It also noted that the need for the Secretariat to act on Rec.(3) of Redbook 1968 Pt.I did not yet arise but that the Secretariat would continue to study the design and layout of the Bulletin and make such changes as are necessary in Volume 18 to incorporate a breakdown of Statistical Subarea 6 statistics by divisions.

The Subcommittee in reviewing the Report of the 6th Session of the CWP (1969) (Res.Doc.69/3) noted the proposals in Section 15 dealing with the standardization of tabular symbols, and was informed that FAO and ICES intend also to use these symbols. The Subcommittee therefore

recommends (2)

that the ICNAF Secretariat introduce, in the Statistical Bulletin and other documents presenting tabular materials, the symbols and related material described in Appendix IV of the Report of the 6th Session of the CWP.

3 List of ICNAF Species and Names of Species

The Subcommittee noted the rearrangement of species in Statistical Bulletin Volume 17 as recommended in Rec. 28 Redbook 1968, Pt.I, p.73.

The Subcommittee reviewed the proposals of the Secretariat with respect to Alosa and Pomolobus species and

recommends (3)

(i) that ICNAF distinguish (a) "alewife" Alosa pseudoharengus and (b) "blueback" Pomolobus aestivalis from "herring" Clupea harengus and the other "shad" spp. Alosa mediocris, Alosa sapidissima, Dorosoma cepedianum;

(ii) that "blueback" Pomolobus aestivalis be introduced in the ICNAF list under the "Other Fish" heading;

(iii) that any "blueback" catches be included with "alewife" catch statistics, and that footnotes indicate such inclusions and mixtures;

(iv) that "blueback" and its scientific name Pomolobus aestivalis also be introduced by the CWP Secretary in appropriate places in the notes for the completion of STANA forms.

The Subcommittee was informed that catches of "rough scad", also known as "horse mackerel" and "jack mackerel", *(Trachurus* sp.*)* have been reported for 1968, and the scientific name *Trachurus trachurus* given by the reporting country. Noting that this scientific name is not mentioned in the American Fisheries Society list, the Subcommittee

recommends (4)

that the "rough scad" Trachurus lathami Nichols be added to the "Other Fish" group in the ICNAF list and that the CWP Secretary also introduce this new entry in the notes for the completion of the STANA forms.

The Subcommittee was informed that the CWP Secretary hopes to obtain replies from all countries on the problem of adequately distinguishing between "Halibut" *Hippoglossus hippoglossus* and Greenland halibut *Reinhardtius hippoglossoides* in the North Atlantic catch data reported to ICNAF, ICES and FAO. It

recommends (5)

that all countries investigate the halibut question thoroughly and, in addition to reporting through the CWP Secretary to the 1970 ICNAF meeting, try to distinguish in their statistics between the Halibut and Greenland halibut species.

The CWP Secretary reported to the Subcommittee that it is hoped to make good progress on codification of species on an international and inter-regional basis. The Subcommittee

recommends (6)

that no rearrangement of species groupings be undertaken until the FAO study is submitted. The Subcommittee expressed the hope that the results of this FAO study would be available at its 1971 meeting, if not at its 1970 meeting.

4. Conversion Factors

The Subcommittee noted with satisfaction the design and layout of Res. Doc.69/24 presenting quantity conversion factors for use in fishery statistics in the North Atlantic. It also noted that this document contained the first revisions of the original version presented to the 6th session of the CWP (February 1969).

The Subcommittee supported the proposal that the CWP Secretary prepare another revised version for the October 1969 ICES meeting, and

recommends (7)

(i) that all countries which have not yet supplied the CWP Secretary with their revised conversion factors, do so before 15 July 1969;

(ii) that the CWP Secretary remind all countries of the requirements of Section 2.12 of FAO Fisheries Circular FEs/C 201 and Section 5.12 of FAO Fisheries Circular FEc/C 203, (both documents providing notes for the completion of STANA forms) requiring them to report changes in the conversion factors.

(iii) that a final document covering conversion factors currently used by all countries for all North Atlantic species be presented to ICNAF at its 1970 meeting.

5. ICNAF Statistical Areas

The Subcommittee expressed its satisfaction with Res.Doc.69/26 representing a first attempt to consolidate with maps and references, all information on the ICNAF Convention Area, adjacent statistical areas, and their breakdown into subareas, divisions and subdivisions.

Noting the usefulness of this paper, the Subcommittee

recommends (8)

that Res.Doc.69/26, after a final review by the ICNAF Secretariat, be incorporated for reference purposes, in Redbook 1969, Part III.

The Subcommittee noted that copies of the map are available on request

from the Secretary, CWP on Atlantic Fishery Statistics, Department of Fisheries, FAO, 00100 Rome, Italy.

6. Fishing Effort Statistics

The Subcommittee noted the CWP's proposal (Section 19.4 of the Report of the CWP, 6th Session, February 1969; Res.Doc. 69/3) to consider deleting "days on ground" from its lists of effort measures. The Subcommittee, after discussion

recommends (9)

(i) that the definition of "days on ground" as it now appears in Section 4.2 (line 4) of FAO Fisheries Circular FEs/C 203, (Notes for the completion of form STANA 1W) be retained;

(ii) that all countries reporting effort data on line 4 of STANA 1W against the entry "days on ground" be requested by the CWP Secretary to define their interpretation of this heading;

(iii) that the CWP Secretary approach the authorities in the Faeroe Island (Denmark) to determine whether or not it is possible for them to report either "hours fished" (line 1 of STANA 1W) or "days fished" (line 3 of STANA 1W), instead of "days on ground";

(iv) that the usefulness of the effort measure "days on ground" be considered at the 1970 ICES Special Meeting on the Measurement of Fishing Effort.

The Subcommittee noted that Res.Doc. 69/27, giving details of the effort measure definitions currently used in the notes for the completion of the STANA forms 1W and 1E, and description of the gear types used in the notes together with material proposed by Dr von Brandt, was submitted to the CWP's 6th Session, February 1969. The Subcommittee

recommends (10)

(i) that all countries endeavour to comment on Res.Doc.69/27 through the CWP Secretary before mid December 1969;

(ii) that, taking into account all the comments received, Dr von Brandt and the CWP Secretary be asked to prepare a final version for submission to the 1970 meeting of ICNAF.

(iii) that the final version, with ICNAF comments, be submitted to the 1970 ICES Special Meeting on the Measurement of Fishing Effort.

The Subcommittee noted the CWP concern than an appreciable percentage of

reported effort data is estimated, and it has requested that the attention of both ICNAF and ICES be drawn to this. The Subcommittee

recommends (11)

(i) that the CWP Secretary obtain from the national offices detailed descriptions of the methods used to arrive at these estimates of effort;

(ii) that the material be submitted to ICNAF at its 1970 meeting and also to the 1970 ICES Special Meeting on Measurement of Fishing Effort.

7. Main Species Sought

This concept, used to distinguish between different "classes of fishing units" when reporting catch-effort data on STANA 1W forms, was reviewed at the 1968 meeting of this Subcommittee. The Assistant Executive Secretary reported (Res.Doc.69/20) on the results of a circular sent out in accordance with Rec. 26, Redbook 1968, Pt.I, p.71.

The Subcommittee, after debating these questions at some length decided that the box "main species sought" be retained on form STANA 1W and that the instructions for completing this box, as described in Section 2.14 of the notes for the completion of form STANA 1W be left unchanged.

8. ICNAF List of Vessels, 1968

The Subcommittee noted the "ICNAF List of Vessels for 1968" could not be produced in time for the 1969 meeting because three member countries had not reported their vessel data. The 1968 list will now be published as soon as all submissions have been received.

The Subcommittee, taking into account the CWP's review of the possibility of producing a joint ICES/ICNAF list of vessels either in 1970 or 1971, preferably following the introduction of a flexible automatic data processing system,

recommends (12)

(i) that the CWP Secretary prepare a draft version of a joint ICES/ICNAF list of vessels; this document to be presented to both 1971 ICNAF and ICES meetings;

(ii) that the CWP's doubts regarding the adequacy of vessel characteristics adopted long ago by ICES and ICNAF for the assessment of fishing power, be referred to the 1970 ICES Special Meeting on the Measurement of Fishing Effort;

(iii) that the "ICNAF List of Vessels for 1971" be prepared as in the past unless decisions to the contrary are made at the ICNAF meetings in 1970 and 1971;

(iv) that a final decision about a joint ICES/ICNAF list of vessels be taken at the 1971 meeting.

The Subcommittee noted that several aspects relevant to these questions might be raised at the July 1969 meeting of the ICES Working Group on Vessel Characteristics in Relation to Fishing Effort and the OECD - convened meeting (June 1969) on fishing fleet statistics.

9. Other ICNAF Publications and Documents

The Subcommittee noted that Vol. 12(1967) of the "Sampling Yearbook" was distributed in May and contains the additional tabulations requested in Rec. 22, Redbook 1968, Pt. I, p.70.

The Subcommittee also noted the availability of statistical summaries in Part III of the Redbook 1968 (p.29-36) as requested by Rec. 27, Redbook 1968, Pt. I, p.72.

The Subcommittee welcomed the distribution, before the 1969 Meeting, of Res.Doc.69/21 presenting preliminary data of catches by countries fishing in the Northwest Atlantic during the 1968 calendar year.

The Subcommittee reviewed Res. Doc. 69/23, containing summary data on fish discarded whole at sea or reduced to fish meal and oil, and

recommends (13)

that the discards portion of the summary document on discards and industrial fish be continued to be published annually in Redbook, Pt.III, and further that countries make every effort to report quantities of fish used for industrial purposes.

10. Notes for the Completion of STANA Forms

The Subcommittee welcomed the availability of Res.Doc. 69/25 (FAO Fisheries Circulars FEs/C 201, 203, 206 and 208) presenting the notes for the completion of Form STANA 2 (ICNAF Summary) and Form STANA 1W.

Various changes, to be implemented by the CWP Secretary, have been pointed out in other sections of the Subcommittee's report and several of those are also specified in Section 12.1 of the Report of the 6th Session of the CWP (Res.Doc.69/3). The Subcommittee

recommends (14)

that the notes for the completion of the STANA forms, as revised from time to time, be available at all future sessions of the Subcommittee together with recommendations of the ICNAF Secretariat and the CWP Secretary, for any desirable changes.

The Subcommittee noted with interest the suggestion that the format of the STANA forms might at this stage be modified, if feasible, to be used for the printing of the data by ADP machines and

recommends (15)

that the CWP Secretary investigate the proposal to modify the STANA forms so that they would be compatible to ADP machine processing and following inquiries directed to all reporting national offices, report to ICNAF, ICES and the CWP's Seventh Session on the implementation of this suggestion.

11. Sampling Yearbook, Vol. 12 for 1966

The Subcommittee did not have Sampling Yearbook Vol.12 generally available for consideration at this meeting. However, inadequate sampling for some important fisheries was suspected. The Subcommittee referred to the Assessments Subcommittee the problem of identifying those stocks and areas for which more adequate sampling is needed. If this can be done before the 1970 Annual Meeting it may be possible to suggest ways and means to increase sampling in specific areas and by particular countries.

12. Analysis of Age/Length Key Data

The Subcommittee reviewed Res.Doc.69/73 and 69/87 which deal with this subject. Res.Doc. 69/73 considered in general terms some properties of estimates which may be obtained from age-length keys. Res.Doc. 69/73 made some comparisons for the 1961-63 data which have been processed. These comparisons showed rather marked variations between countries for age-length keys from the same divisions and same month (although average size at age was quite similar in some divisions). The analysis pointed out a continuing need for caution in combining age-length keys. The Subcommittee noted, however, that many otolith exchanges have taken place since 1963 and that age-length keys in subsequent years may be more comparable. No new analyses were specifically planned.

13. Publication of Herring Sampling Data

The Subcommittee reviewed the recommendations arising from a meeting of North American herring scientists in December 1968 (Res.Doc. 69/1) and

recommends (16)

(i) *that herring length and age/length key data from 1961 to 1968 be published in a special issue of the ICNAF Sampling Yearbook with data for subsequent years included in the Sampling Yearbook on a routine basis;*

(ii) *that the herring length data be published by country and by month for all ICNAF divisions except Div. 5Y for which the length data should be presented separately for a northern subdivision (from the border between Maine and New Brunswick to the border between Maine and New Hampshire) and for a southern subdivision (from the border between Maine and New Hampshire to Cape Cod);*

(iii) *that herring lengths be published in cm to the cm below;*

(iv) *that the herring sampling data should not be reported by type of gear or by vessel size;*

(v) *that the herring age/length keys be published by quarters for Div. 4X, 5Y and 5Z only, on a trial basis, with frequent review.*

It was noted in connection with part (ii) of the recommendation that separation of data from Div. 5Y was less important in offshore than in inshore areas.

14. Conversions

The Subcommittee reviewed Res.Doc. 69/2 and 69/38 which presented information about changes in length and weight of several species as a result of freezing or storage in ice, and conversions between fork and total length for cod. The Subcommittee continues to encourage recording and submission of such material.

15. Species Separation for Flounders

The Subcommittee noted that a large proportion of the flounders being landed from various subareas (Res.Doc. 69/21) are not being separated according to species. The Subcommittee

recommends (17)

that countries make every attempt to differentiate flounder catches by species.

16. Relationships and Co-operation with Other International Organizations

The Subcommittee was happy to note that the very close cooperation and

time would prevent the adverse effects on long-term yield that could follow a substantial increase of fishing in the Subarea should a strong year-class be recruited to the stock in the future. Such regulation would also mitigate any effect that the reduction of spawning stock due to fishing might have upon subsequent recruitment.

From the information on the numbers of cod caught in a given year, the fishing mortality rates, the mean weight at age of the fish and the number of new recruits entering the exploited stock, it is possible to estimate from the information available for one year, the total catch which can be taken with a given fishing mortality rate in the next year.

There was some increase in fishing mortality in 1966 and 1967 and the level of fishing mortality rate in 1968 could have been as much as F = 0.8. Estimates of these catches have been made for the cod fishery in Subarea 1 for 1968 and 1969, based on observed catch data for 1967 and the estimated fishing mortality rate as calculated from the base year 1965.

The year-classes since 1963 that are now recruiting to the Subarea 1 cod fishery are weak, so that the catch rate is likely to decrease in the immediate future, whatever course of action is adopted. Catch quotas for 1968 to give specified fishing mortalities would have been:

To achieve F = 0.80	-	349,000 tons
To achieve F = 0.72	-	314,000 tons
To achieve F = 0.60	-	285,000 tons

Estimates of the catch for 1969 have been calculated, using the same basic data as for the 1968 estimates. The 1969 catch estimates are therefore set with less confidence than those for 1968. Taking a level of F = 0.80 as the basis, the estimates of catches to achieve specified levels of F in 1969 are as follows:

To achieve F = 0.80	-	293,000 tons
To achieve F = 0.60	-	238,000 tons

Had the 1968 fishing mortality been reduced to F = 0.60, the level of catch to achieve F = 0.60 in 1969 would have been 286,000 tons. These figures show that, with the reduction in fishing mortality rate, the estimated catches, (i.e. the catch quotas) in both 1968 and 1969 would, of course, be less than at the higher, unchanged rate. However, had F been reduced by 25% from the 1967 level in both 1968 and 1969, the estimated catch in this second year would have been only slightly less than if F had remained constant at F = 0.8 (286,000 tons compared to 293,000 tons) but the catch-per-unit-effort would have been higher.

This indicates that most of the initial loss caused by the reduction in fishing mortality rate would have been made up by the end of the second year.

It has not been possible to make similar estimates for 1970 at the present meeting since the appropriate data for 1968 were not available.

It is emphasized that the above estimates are only examples of the catch quotas to achieve a cutback in fishing mortality rate of 25% in 1969. They do not represent the quotas applying if regulations are first introduced in 1970 or subsequently. These will depend on the values of the population parameters (e.g. mortality rates, growth and, especially, recruitment) applying at that time. As mentioned above, the year-classes recruiting in 1968 and 1969 are known from pre-recruit surveys to be weak ones and the available data point to the one recruiting in 1970 also being weak. With continued high fishing, unless a considerable immigration from southeast Greenland should take place, a further decrease in catch to a level lower than in 1969 will occur in 1970. This would necessitate setting lower quotas than those indicated above.

(b) Subarea 5 Haddock

The state of this stock has been reviewed in previous reports, including that of the January 1969 meeting of the Subcommittee (Res.Doc. 69/46). A fairly steady US fishery for haddock existed between 1935 and 1960. The average annual effort was 7,000 standard days, which generated a fishing mortality rate (F) of 0.5. This fishing rate results in a yield per recruit close to the maximum and, with average recruitment, a yield of about 50,000 tons. Following the recruitment in 1965 of a very good 1963 year-class, the effort increased greatly resulting in extremely high catches of 155,000 and 127,000 tons in 1965 and 1966, respectively. The catch declined markedly in 1967 and amounted to 44,000 tons in 1968. In the 1967 assessment report it was shown that one effect of the increased fishing was probably to reduce by 22 to 30% the total possible yield from the 1962 and 1963 year-classes. The effort level, as in 1935-1960, would have spread the improved catches over a period up to 1971-72. The increased effort also reduced markedly the abundance of the older age-groups (age 4+) so that by 1967 the major part of the spawning stock consisted of the remainder of the 1963 year-class. This effect is now particularly important because the five year-classes since 1963 have all been poor or extremely poor and the stock is now extremely small with no immediate prospect of rapid recovery.

The present and projected (to 1970) state of the stock is indicated in the following table which takes account of observed removals in 1968. If the fishing mortality in 1969 and 1970 was F = 0.5, which

provides the maximum yield per recruit, then the 1969 catch would be 16,000 tons, and, given that, 13,000 tons in 1970. This level of catch does not allow any increase in stock density through 1970; and, in fact, decreases it from 1969.

Estimates of Available Population Removals and Recruitment for Georges Bank Haddock

	1935-1960 Average	1968	1969 Projected estimates at F = 0.5	1970 Projected estimates at F = 0.5
Available Population (No's of Fish x 10^6)	132	47	30	16
Removals:				
(No's x 10^6)				
TOTAL	56	33	15	14
FISHING	38	28	11	9
NATURAL	18	5	4	5
(Tons x 10^3)				
TOTAL	73	50	22	21
FISHING	48	44	16	13
NATURAL	23	7	6	8
Recruitment				
(No's x 10^6)				
(AT AGE 2)	49	16	1	16

It is not known why the 1964-1968 year-classes are poor, but the spawning stock in the later years was poor and over the whole period of the fishery there has been observed a general tendency for poor year-classes to be more consistently associated with small rather than with moderate spawning stocks. The Subcommittee therefore advises that there is now a considerably reduced probability of producing good year-classes, and to increase this the adult stock must be allowed to recover to nearer its average level in 1935-60. This will require no or a very little fishing for a period of not less than 4-5 years. The duration will depend on the time until a moderate to strong year-class has recruited and grown to spawning size.

There is no guarantee that even complete closure for a period will produce good recruitment. However, the possible benefits of such action, if it results in increased recruitment, would be very much greater than the losses in yield from the present poor year-classes through exploiting them at a rate rather less than that giving the maximum yield per recruit.

The application of closed season and area regulations as alternatives to catch quotas were considered by the Subcommittee. It was indicated that closure during March and April in the principal spawning areas, when catch rates are highest on adult fish, would alone reduce landings by about 20% annually, providing the distribution of fishing effort remained the same as that observed in 1967-68. A major problem is the inability to forecast exact annual mortality rates resulting from a closed season or closed area because of the probable redistribution of fishing effort. It was also noted that such closures in conjunction with a catch quota would help to spread the catch more evenly through the remaining part of the year. Unless trawling for all other species (cod, silver hake, herring) on Georges Bank were banned, some incidental by-catch of haddock would be inevitable. Cod catches might contain from 10 to 20% haddock, while the herring and silver hake fisheries might obtain 1 to 5%. It was noted that 6,000 of the total 44,000 tons in 1968 were by-catches of these other fisheries.

(c) Div.4X Haddock

Because of the recent decline of the haddock stocks in Subarea 5 and Div.4V-W, the stock in Div.4X forms the only remaining sizable haddock resource in the Convention region. The decline in these stocks is likely to result in a diversion of haddock effort into Div.4X. This diversion is the more likely since the catch rates in Div.4X, at least during 1969, are likely to remain at the present level because of the availability of the strong 1963 year-class (the haddock in Div.4X are slower growing than those in Div.5Z, and recruitment occurs two years later). Because of the increased fishing effort in the last few years, the 4X haddock are now fully exploited. Increased effort will give no sustained increase in yield. Also, as in Subarea 5, the year-classes since 1963 have been weak. Thus, the prospects for the immediate future (1970-74) are poor unless reasonable numbers of the 1963 year-class are allowed to survive. It is clear, therefore, if no action is taken to restrict fishing on haddock in Div.4X, it is likely that in 1970 or 1971 the fishery on that stock will be faced with a problem similar to that now faced by the Georges Bank haddock fishery. The Subcommittee has not, at this time, data available to make a good estimate of the best catch rate, or indeed any very precise assessment of the state of the stock. It believes, however, that if action is not taken to avoid catches greater than the previous long-

term average annual landings of 20-25,000 tons over at least the next five years, a rapid and serious decline in stock density will occur.

(d) Subareas 2 and 3 Cod

Assessments made last year for cod occupying Div.2G to 3L indicated that fishing had risen to a level producing at least 80% of the maximum sustainable yield. Catches in 1968 increased more than 30% from 1967, approaching 900,000 tons. Although definite assessments for this area are difficult to make, the present information indicates that it is unlikely that long-term yield can be maintained at this level.

Cod catches in Div.3NO exceeded 200,000 tons in 1967, representing a tripling of the 1962-66 average landings. Catches in this area in 1968 declined to 160,000 tons, possibly because of decreased effort. The change in landings in 1967 was about proportional to the change in fishing effort, and landings in 1967 and especially in 1968 consisted largely of the abundant 1964 year-class. In Div. 3NO, year-classes since 1964 have been considerably less abundant. Thus, catch rates of cod for 1969 and 1970 are likely to be much reduced from the 1967-68 level. The total yield from the 1964 year-class will be less than it would have been had fishing effort not increased so greatly at the time the year-class was first recruited to the fishery as 3-year-olds. The increased effort if sustained will also cause larger year to year variations in yield from this stock because of the increased dependence on the recruiting year-class.

(e) General state of groundfish stocks in Convention Area

Following a fairly steady level of cod catch from the Convention Area of around 900,000 tons from 1952 to 1958, catches have increased to about 1,850,000 tons in 1968 (including estimated catches by non-member countries). Though precise assessments are not available for all cod stocks, it is doubtful whether this latter level of catches can be sustained. The high 1967-8 catches, most noticeable in Subareas 2 and 3, are due partly to good year-classes and partly to the removal of an accumulated stock of older age groups. So far as year-classes are concerned, the immediate prospects in the major North Atlantic cod and haddock stocks are not good. Data on year-class strengths are summarized, for the major stocks, overleaf:

Year-class strengths in some major North Atlantic demersal stocks

Region	Species	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
W.Greenland	Cod	M	VG	P	P	G	VG	M	P	G	G	P	M	P	M	P	?	?
Labrador				Generally moderate to good but														
and 3KL	Cod			little variation														
3NOP	Cod							P	P	P	M	M	M	VG	G	G	M	?
Gulf of St.																		
Lawrence	Cod	M	G	VG	G	VG	VG	M	M									
NE Arctic	Cod	P	M	G	M	M	G	G	M	M	P	P	VG	G	P	P	P	P
Iceland	Cod	M	G	M	M	VG	M	G	M	M	G	M	M	VG	?	?	?	?
Georges Bank	Haddock	G	M	G	M	M	M	G	G	M	M	VG	VG	P	P	P	P	P
4X	Haddock		M	-	G	M	-	G	G	M	P	M	VG	P	P	P	P	P
4VW	Haddock	VG	P	P	M	G	G	P	M	P	P	M	VG	P	P	P	P	?
NE Arctic	Haddock	P	M	P	P	VG	VG	M	P	G	VG	P	M	M	P	P	P	P
North Sea	Haddock											VG	P	P	P	G	VG	?

VG=Very Good; G=Good; M=Moderate; P=Poor

For three of these stocks (NE Arctic cod and haddock, and Georges Bank haddock), the four or five most recent year-classes have been poor, and at West Greenland the last five for which data are available are no better than moderate.

The effect of weak year-classes on the catches of the next few years will be made worse in some areas by the heavy fishing which has taken place on the preceding good year-classes. This heavy fishing has probably reduced to some extent the total yield from the good year-classes during their life-span in the fishery. It has also concentrated this yield into fewer years. The variability of catch of haddock has been greatly increased and the same is expected for some cod stocks. A possibly much more serious effect is the reduction in spawning abundance of most of the cod and haddock stocks. Though the relation between spawning stock and average recruitment is not well established even in the best studied stock, there is increasing evidence that a substantial reduction in spawning stock may lead to a progressive decline in average recruitment.

The Subcommittee, therefore, believes that there is a need to at least stabilize the fishing effort on the major demersal stocks over the whole Convention Area. It recognizes that, for various reasons fishing effort limitation may initially be most easily introduced for limited areas or stocks, but while stressing the need for specific limitation for Subarea 1 cod, and Subarea 5 haddock and associated limitation of catch in Div.4X haddock, it believes that regulation of fishing mortality rate in these areas should only be the preliminary for a more widely based scheme.

liaison with ICES and FAO, especially within the CWP framework, are being maintained to the mutual benefit of all the agencies involved.

It also noted that the results of the investigations now being undertaken by FAO to increase comparability between the data published on species, effort, craft, etc. will as soon as available be transmitted to ICNAF for consideration either directly or through the CWP.

APPENDIX III - REPORT OF ENVIRONMENTAL SUBCOMMITTEE

Chairman: Dr H.W. Graham Rapporteur: Mr A.J. Lee

The Environmental Subcommittee met on 27 May under the Chairmanship of Dr H.W. Graham. Mr A.J. Lee was elected Rapporteur. The agenda was adopted with the addition of an item "Timing of a Review of Environmental Conditions in the ICNAF Area."

1. ICNAF Georges Bank - Gulf of Maine Environmental Survey

Mr Posgay reported progress of this survey. The investigation of plankton samplers is continuing and the plankton samples collected at the end of 1967 by the two-ship USA-USSR survey have now been counted at the Biological Laboratory, Woods Hole and ATLANTNIRO, Kaliningrad. A very preliminary examination of the results indicates little difference between (a) catches of the two ships (b) counts by the two sorting laboratories. It is hoped to submit a paper on this experiment to the 1970 meeting of R&S.

In 1968 the USA carried out seven surveys of Georges Bank to see if it is possible to obtain a haddock egg production curve. Spawning was found to be later than in the early 1950's when the water was warmer (Res.Doc. 69/65). A three-ship plankton survey was also carried out in 1968 by the USA, USSR and Canada. This is reported upon in Res.Doc. 69/35. Further, Res.Doc.69/66 deals with the differences in catch between the Bongo net and the Gulf III samplers found by the Boothbay Harbor Laboratory. The former catches more small plankters than the latter and this is thought to be due to an extrusion effect in the Gulf III. Mr Parrish reported that German workers had obtained similar results for herring larvae caught by cased and uncased Gulf III samplers. The Subcommittee discussed the need for more rapid counting methods for zooplankton samples in order to carry out environmental surveys on even a small scale.

In 1969 attention is being paid to sampling design and analysis. A two-ship survey was carried out in April by the USA and USSR in order to compare grid sampling and random sampling schemes, but a mishap to the US ship prevented its completion. A second survey has just started.

2. National Research Reports

The environmental aspects of the national research reports were discussed and certain related papers (Res.Docs. 69/36, 39, 51, 53 and 62) were considered. An additional contribution by Dr Konstantinov (USSR) was also taken. It dealt with the distributions of cod produced by differing degrees of winter cooling in the Barents Sea and Labrador areas. Off Labrador this cooling forces the cod into deeper water, and in cold years extends to a greater depth and so leads to a longer trawl fishery.

The national research reports showed that off West Greenland conditions in 1968 had been cold until October due to the large component deriving from the East Greenland Current. Thereafter there had been a marked influx of warmer Irminger Current water. Off Labrador and on the Grand Banks the Labrador Current had been stronger than usual. But at Flemish Cap, Georges Bank and on Scotian Shelf 1968 had been a warm year due to an influx of slope water derived from the Gulf Stream. The bad ice situation at Greenland and Iceland in 1968 was discussed and it was noted that an international symposium on sea-ice may be held within the next few years in Iceland.

The Subcommittee also noted that daily broadcasts of sea surface temperature, bathythermograms and wave data for Subareas 3, 4 and 5 are made by Canada and that similar broadcasts of ice conditions in the Greenland area are made by Icelandic and Greenland stations.

The continuous plankton survey carried out by the Oceanographic Laboratory, Edinburgh (Res.Doc. 69/18) was thought to be highly important to the work of R&S, particularly in relation to redfish stock assessment and the Subcommittee therefore

recommends (18)

(i) that the Oceanographic Laboratory, Edinburgh, be invited to submit a paper to the 1970 meeting of R&S on the distribution abundance of redfish larvae as determined by the continuous plankton recorder survey and

(ii) that the Laboratory be invited to send a speaker to the 1971 meeting of R&S to describe the Undulating Oceanographic Recorder which the Laboratory has at present under development.

The Subcommittee noted the large amount of physical oceanographic data which is being collected in the ICNAF Area and stressed the importance of making this available to all marine scientists through the World Data Centres in Moscow and Washington. In order to familiarize members with the world oceanographic data exchange system it

recommends (19)

that a speaker from one of the World Data Centres be invited to address R&S at its 1970 meeting. It also suggests that the Intergovernmental Oceanographic Commission (IOC) be asked to make copies of its manual on data exchange available to all members of the Committee.

3. Cooperative Systematic Studies in the North Atlantic

Mr. Posgay reported on the discussion between ICNAF, ICES and IOC held at the time of the ICES meeting in October 1968. (Com.Doc.69/4).

4. Report of 56th Statutory Meeting of ICES

Res. Doc. 69/4, para. 1 (Canadian Contribution to the ICES Annales Biologiques) was considered. It was agreed that (i) ICES should be informed that the Environmental Subcommittee will keep under review the question of providing annually a concise summary of hydrographic conditions in the ICNAF Area for publication in the Annales Biologiques and (ii) that ICES should be invited to arrange for the Hydrography Committee to discuss how such a summary could best be married to a review of conditions in ICES Area.

5. Environmental changes in relation to fisheries

Res. Docs.69/1, 44 and 63 were taken and the downward long-range trend of sea temperatures since the early 1950's in the Georges Bank, Gulf of Maine and Scotian Shelf region was discussed. Work at present being carried on in the USA, USSR and Denmark on the long-range forecasting of climatic changes was described.

The need to have hydrographers actively associated with the work of the Subcommittee was again stressed and it was also felt that it would be to the advantage of the Subcommittee if scientists in various disciplines and studying the links between the physical environment and the distribution and abundance of fish could attend its meetings.

6. NORWESTLANT Report

Mr Lee reported that Part I (Text) was now out and that Part II (ATLAS) had passed the proof stage. Both parts would be distributed in the next few weeks. The Canadian Oceanographic Data Centre hoped to issue Part III (Physical Oceanographic Data) within a few months and Part IV (Biological Data) was being prepared by the Secretariat for printing.

7. Symposium on Physical Variability in the North Atlantic

Dr Alekseev and Mr Lee reported on progress in convening this symposium. It was noted that there was a considerable number of papers on the long-term changes of the physical environment in the North Atlantic region and that these would probably occupy two days of the meeting.

8. Review of Environmental Conditions in the ICNAF Area

The Subcommittee discussed the need to keep fluctuations in environmental conditions in the ICNAF Area under continuing review. This had last been done at the 1967 meeting. Dr Alekseev suggested that the next review should be carried out in 1971 and should deal with the 1960's. This suggestion was adopted and the Subcommittee

recommends (20)

that a review of the environmental conditions in the ICNAF Area during the decade 1960-69 should be held by R&S at its meeting in 1971. It asked Dr Graham, Dr Alekseev and Mr Lee to discuss how to arrange for such a review and to report to R&S accordingly (Annex I).

Report of the First Meeting of the Organizing Committee for the Symposium on Environmental Conditions in the ICNAF Area

The Committee, consisting of the Chairman of the Subcommittee on Environmental Studies (H.W. Graham), its Rapporteur (A. Lee) and Dr A. Alekseev, met on 28 May 1969 to discuss the symposium suggested by the Subcommittee. After discussing the various aspects of planning such a symposium they made the following recommendations:

1. That the Subcommittee Chairman select a Convenor as soon as possible. A list of prospective candidates was prepared.

2. That two days be set aside for the symposium.

3. That the following subjects be covered:

    1. Atmospheric pressure fields and winds;

    2. Air temperature regimes;

    3. Ice limits and icebergs;

    4. Temperature anomalies at different sea levels and at the bottom;

    5. Characteristics and intensity of important currents in the ICNAF Area;

    6. Intermediate cold layers in West Greenland;

    7. Hydrographic conditions on Georges Bank;

    8. Time of vernal plankton bloom;

    9. Year-class abundance of important species.

4. That the Convenor ask each Laboratory to suggest names of participants and to make available to all participants all the data which they have that might be useful for the preparations of the various reviews.

5. That ICNAF look forward to publication of the papers presented at the symposium.

APPENDIX IV - REPORT ON GEAR AND SELECTIVITY ITEMS CONSIDERED BY R&S

1. Review of ICES Gear and Behaviour Committee Report (Com. Doc. 69/12 and Res. Doc. 69/4)

In reviewing recent selectivy experiments, Dr Bohl (Fed.Rep. Germany) drew particular attention to the need to distinguish between the real differences in the selection properties of the trawl and artifacts that may arise following long-term changes in the girth of fish during the period of experimental comparisons, which may also affect selectivity factors. Experiments have confirmed that the selection factors of polyamide continuous twine are approximately 10% lower than for various types of polypropylene twine which itself has selection properties similar to manila (Res.Doc. 69/36). ICES has set up a working group to study the problems of evaluating characteristics of fishing vessels in terms of their fishing power.

2. ICES/ICNAF Working Group on Selectivity Analysis (Rec. 68/6)

This working group established by ICNAF in 1968 met in Moscow, USSR, 26-29 March 1969, with Dr Treschev (USSR) convenor and Mr Holden (UK) secretary and rapporteur. The working group plans to meet again in Charlottenlund, Denmark, 2-6 September 1969, to prepare a final report to be presented to the 1970 Annual Meeting of ICNAF and ICES.

Mr Holden reviewed the progress and plans of the working group. The analysis has been divided into four sections, viz.

(i) Preparations of materials and the effect of trawl design;

(ii) The variability of the results of selectivity experiments;

(iii) A compilation of available data for cod, haddock and redfish with an evaluation of differentials in selection characteristics;

(iv) A bibliography of data on mesh selection in trawls.

From its analysis the working group has now concluded inter alia that manila is seldom used in trawl constructions and therefore thinks that a standard based upon the selection properties should be adopted. The report of the working group will contain recommendations related to this.

Mr Holden stressed that only five countries (all from Europe) were able to send representatives to the working group and invited other interested countries, for example from North America, to send representatives to the next meeting of the working group.

3. Summary of trawl material and mesh size sampling

R&S took note of the summary for 1968 presented in Res.Doc. 69/30. All information reported referred to trawls made of synthetic material.

4. Review of progress to eliminate topside chafing gear

One experiment was reported (Res.Doc. 69/36) reconfirming the effect of topside chafers but no new evidence was presented relative to the design of chafers authorized by ICNAF. Dr Bohl (Fed.Rep.Germany) reported that most large German stern trawlers are now being equipped with trawls made of extra strong twine which it is expected will allow them to dispense with the need for topside chafing gear although the effect of unusually large knot sizes in such heavy twine upon the selectivity has still to be evaluated. This development will be reported at the 1970 meeting.

5. Other Matters

(i) Mr Hennemuth (USA) described the design and capability of a prototype electronic device embedded in a trawl float to measure fishing time and fishing depth on a fishing trip. (Res.Doc. 69/88).

(ii) R&S noted that, although no new data were presented at the present meeting, several topics are of particular concern, particularly in view of the influence of changes in girth upon selectivity characteristics. R&S noted in particular the need for information on

(a) length/weight/girth relationship for different species
(b) the meshing of redfish
(c) the effect of size of catch upon selectivity
(d) the influence of mesh size on the fishing power of gear of given overall dimensions.

APPENDIX V - STANDING COMMITTEE ON RESEARCH AND STATISTICS - AGENDA

1. Introduction

   (a) Adoption of Agenda
   (b) Appointment of Rapporteur
   (c) Plan of work of Research and Statistics, its subcommittees and Scientific Advisers to Panels

2. Reports from:

   (a) ICES (Dr H.A. Cole)
   (b) SCOR and IOC (Mr A. Lee)
   (c) FAO (Mr J. Gulland)

3. Assessments (Chairman: B.B. Parrish)

   (a) Review of latest statistics of catch and fishing activity
   (b) Trends in total catch and fishing effort
   (c) Further consideration of stock assessments with special reference to recommendations from STACREM
   (d) Further consideration of provisional estimates of catch quotas for Subarea 1 cod and Subarea 5 haddock (mid-term assessments meeting, London, 22-25 January 1969)
   (e) Review of adequacy of sampling (Redbook 1968, Pt.I, p.31-33)
   (f) Reports of ICES/ICNAF Joint Working Party on North Atlantic Salmon, Copenhagen, October 1968 (Res.Doc. 69/5) and Copenhagen, May 1969
   (g) Assessment of harp seal fisheries (Res.Doc. 69/31 and Res.Doc.69/32)
   (h) Future Assessment work
   (i) Other matters

      (1) Herring
      (2) Hakes

4. Statistics and Sampling (Chairman: A.W.May)

   (a) Sampling

      (1) Review of Sampling Yearbook Vol.12, 1967 and 1967 Sampling in relation to catch
      (2) Report on analyses of age/length data for 1961, 1962 and 1963 (Redbook 1968, Pt.I, p.69)
      (3) Review of herring length measurements
      (4) Consideration of recommendations from Canadian and US herring scientists' meeting, St.Andrews, 19 December 1968

   (b) List of Vessels

      (1) Review of ICNAF List of Vessels, 1968

(c) Statistical reporting

(1) Report on statistical activities by the Secretariat
(2) Summary of 1967 discard data (ICNAF Stat.4)
(3) Review of Statistical Bulletin 17 for 1967 and format of future Statistical Bulletins
(4) Summary of 1966, 1967 and 1968 effort data from ICNAF Stat.3 (in List of Vessels 1968)

(d) Consideration of the report of the ICES Statistical Committee, October 1968
(e) Consideration of the report of the FAO Statistical activities
(f) Consideration of report and recommendations of the 6th Session of the CWP
(g) Designation of Atlantic and Greenland halibuts
(h) Definition of "Main Species Sought"
(i) Other matters

5. Gear and Selectivity

(a) Review of the report of the ICES Gear and Behaviour Committee, October 1968
(b) Progress on joint ICNAF/ICES selectivity data summaries
(c) Report of ICES/ICNAF Joint Working Group on Selectivity Analysis, Moscow, 26-29 March 1969
(d) Summary of trawl material and mesh size sampling data, 1968
(e) Review of progress to eliminate topside chafing gear
(f) Other matters

6. Environmental (Chairman: H.W. Graham)

(a) Progress report on ICNAF Georges Bank-Gulf of Maine environmental survey
(b) Environmental aspects of the national research reports
(c) Report on cooperative systematic studies in the North Atlantic (ICES, ICNAF and IOC)
(d) Consideration of the report of the ICES Hydrographical Committee, October 1968
(e) Environmental changes (atmospheric and oceanic) in relation to fisheries
(f) Timing of a Review of Environmental Conditions in the ICNAF Area
(g) Other matters

(1) Progress report on publication of NORWESTLANT Surveys (ICNAF Sp. Pub. No.7)
(2) Symposium on Physical Variability in North Atlantic, Dublin, 25-27 September 1969

7. Ageing Techniques

   (a) Report on the redfish otolith and scale exchange
   (b) Reports on age validation studies on ICNAF species
   (c) Report on further results of herring otolith exchange

8. Steering and Publications (Chairman: Sv. Aa. Horsted)

   (a) Function and organization of R&S and committees
   (b) Consideration of pertinent recommendations of ICNAF Subcommittee on Financial and Administrative Matters
   (c) Extent of participation in Symposium on Stock Recruitment with ICES, Denmark, July 1970
   (d) Review of ICNAF publications 1968/69 (Res.Bull.5 and 6; Ann.Proc. Vol.18; Redbook 1968; Sampling Yearbook Vol.12; Stat.Bull. Vol.17; Sp.Pub. 7; FAO/ICES/ICNAF Joint Index of North Atlantic Publications; ICNAF Handbook; 2nd ICES/ICNAF Salmon Report)
   (e) Progress report on publication of FAO/ICES/ICNAF/UNESCO/IBP Marine Food Chains Symposium, Aarhus, Denmark, 23-27 July 1968
   (f) Proposals for comprehensive index of ICNAF publications and documents
   (g) Consideration of papers for Redbook 1969, Pt.III, Research Bulletin' and Annual Proceedings
   (h) Other matters

9. Mid-year meetings

10. Coordination and cooperation with other organizations

11. Election of officers for the ensuing year

12. Arrangements for the 1970 meetings

13. Other matters

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