

INTERNATIONAL COMMISSION FOR



THE NORTHWEST ATLANTIC FISHERIES

REDBOOK 1966 PART I

STANDING COMMITTEE ON RESEARCH AND STATISTICS

PROCEEDINGS

FROM THE

1966

ANNUAL MEETING

Note

REDBOOK 1966 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 1965. The third book contains Part III, Selected Papers from the 1966 Annual Meeting.

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PART I. REPORT OF STANDING COMMITTEE ON RESEARCH AND STATISTICS

Chairman: W. Templeman; Rapporteur: B.B.Parrish

The Standing Committee on Research and Statistics (R&S) met in Madrid, Spain, from Monday, 30 May to Friday, 3 June 1966 in the week preceding and on a number of occasions during the 16th Annual Meeting of the Commission. The Joint ICES/ICNAF Working Party on North Atlantic Salmon met during the previous week, on Wednesday and Thursday, 25 and 26 May, and the Assessment Subcommittee met on Friday and Saturday, 27 and 28 May.

The agenda items dealt with at the meetings are set out below:

1. Assessments (Chairman: J. Gulland)
  - (a) Review of latest statistics of catch and effort
  - (b) Trends in total catch and effort
  - (c) Revision of assessments
  - (d) Economic criteria in fishery management (FAO Economic Aspects of Fishery Management, 27-28 September 1965, Rome; ICNAF Assessments, 29-30 September 1965, Rome)
  - (e) Greenland cod (ICNAF Assessments, 29-30 September 1965, Rome; Working Group Greenland cod, Copenhagen, 21-25 February 1966)
  - (f) Greenland salmon (ICES Salmon and Trout Committee, October 1965; ICES/ICNAF Working Party on North Atlantic Salmon, 25-26 May 1966, Madrid)
  - (g) Stock and recruitment (ICNAF Assessments, 29-30 September 1965, Rome) (ICNAF Circular Letter 65-2 of 3 December 1965 by Gulland requesting data)
  - (h) Food chains (FAO/ICNAF/ICES Symposium on Food Chains in the Sea)
  - (i) Future work
2. Sampling and Statistics (Chairman: F. McCracken)
  - (a) Sampling
    - (1) Review of 1964 age/length key data in Sampling Yearbook (Rec.20, 1964)
    - (2) Transfer of age/length key data for 1961, 1962 and 1963 to data processing cards (Rec.38, 1965)
  - (b) Consideration of recommendations from Joint ICES/ICNAF Sampling Meeting, Rome, 1-2 October 1965
    - (1) Reporting length dimensions in Total Length in Subarea 1
    - (2) Adoption by ICNAF of Total Length for species in Subareas 2, 3, 4 and 5
    - (3) Adoption by ICNAF of length measurements for all species to the length interval BELOW

2. Sampling and Statistics (cont'd)

- (4) Grouping of length data with particular reference to 5-cm groupings for cod in (a) whole ICNAF area, (b) Subarea 1 alone
- (5) Reporting of age/length data
- (c) Content of ICNAF List of Vessels for 1965
  - (1) Vessel data (Rec.26, 1965)
  - (2) Summary 1965 effort data (ICNAF Stat.Form 3) (Rec.27, 1965)
  - (3) Summary of trawl material and mesh-size sampling with special reference to grouping mesh sizes measured in English and metric units (Rec.36, 1965)
- (d) Statistical reporting
  - (1) Timeliness of reporting
  - (2) STANA forms (Rec.16, 1965)
  - (3) Summary of 1964 discard information (ICNAF Stat.Form 4a) (Rec.20, 1965)
  - (4) Review of 1965 discard information (ICNAF Stat.Form 4, formerly 4a) (Rec.20, 1965)
  - (5) New or revised conversion factors (Rec.19, 1965)
  - (6) Review of common and scientific names of ICNAF species (Rec.23, 1965)
  - (7) Report on preparation of Stat.Bull.Vol.14 for 1964 and Vol. 15 for 1965
- (e) Consideration of recommendations from the meeting of ICES Statistical Committee, October 1965, and an informal meeting of FAO, ICES and ICNAF statistical experts, Copenhagen, 9-11 February 1966
- (f) Other matters
  - (1) Agenda items for 5th CWP Meeting on North Atlantic Statistics, Autumn 1967
  - (2) Consideration of need for extension southward of statistical collection by ICNAF

3. Gear and Selectivity (Chairman: H. Bohl)

- (a) Review of the report of the ICES Comparative Fishing Committee, October 1965
- (b) Selectivity of different codend materials (Redbook 1965, Pt.I, p.60)
- (c) Length, weight and girth data (Rec.34, 1965)
- (d) Meshing of redfish (Rec.35, 1965)
- (e) Catch size and selectivity (Redbook 1965, Pt.I, p.62)

3. Gear and Selectivity (cont'd)

(f) Developments in gear and fishing methods

- (1) List of trade-named twines (Redbook 1965, Pt.I, p.62)
- (2) Report of trawl material and mesh size sampling (Rec.36, 1965)

(g) Mesh measurement

(h) Topside chafing gear

- (1) Review of effect of approved ICNAF topside chafer
- (2) USSR and Polish experiments with new gear
- (3) Consideration of possible means to eliminate the need for topside chafers

(i) Other matters

- (1) FAO Symposium on Fish Behaviour in relation to Fishing Techniques and Tactics, 1967

4. Environmental (Chairman: A. Lee)

- (a) Report on NORWESTLANT Surveys (ICNAF Sp.Pub.No.7)
- (b) Plans arising from the results of the NORWESTLANT Surveys
- (c) Consideration of USA-USSR proposed plan for environmental survey of Georges Bank-Gulf of Maine area (Rec.28, 1965)
- (d) Environmental aspects of the National Research Reports
- (e) Report on activities of IOC (Rec.29, 1965)
- (f) Report on activities of SCOR
- (g) Oceanographic instrumentation
- (h) Proposed FAO Symposium on Food Chains in the Sea (Rec.30, 1965)
- (i) Publication of ICNAF Environmental Symposium 1964 (ICNAF Sp.Pub. No.6)
- (j) Other matters

- (1) FAO Symposium on Fish Behaviour in relation to Fishing Techniques and Tactics, 1967

5. Herring and Other Pelagic Fish (Chairman: B. Skud)

(a) Herring

- (1) Review of pertinent documents
- (2) Review of fisheries and research
- (3) Sampling results by Georges Bank area (Rec.1, 1965)
- (4) ICES Herring Symposium (Rec.2, 1965)
- (5) Bibliography of Northwest Atlantic (Rec.3, 1965)
- (6) USSR 1965 - monthly catch/effort data (Rec.13, 1965)
- (7) Year-class changes on Georges Bank
- (8) Year-class changes in coastal waters
- (9) Other matters

5. Herring and Other Pelagic Fish (cont'd)
  - (b) Tuna and swordfish catch and research
  - (c) Porbeagle fishery
  - (d) Other matters
  
6. Age-reading (Chairman: E. Bratberg)
  - (a) Cod otolith photograph exchange program (Redbook 1965, Pt.I, para.2, p.71)
  - (b) Possibility of photographing redfish otoliths for exchange purposes (Redbook 1965, Pt.I, para.3, p.71)
  - (c) Inventory of published and unpublished validation studies (Rec.40, 1965)
  - (d) Validation of otolith age reading methods (Rec.40, 1965)
  - (e) Type specimens of otoliths used in validation studies (Rec.40, 1965)
  - (f) Silver hake otolith photograph exchange program (Redbook 1965, Pt.I, para.5, p.72)
  - (g) Consideration of recommendations on ageing matters from Joint ICES/ICNAF Sampling Meeting, Rome, 1-2 October 1965
  - (h) Other matters
  
7. Steering and Publications (Chairman: W. Templeman)
  - (a) Distribution of publications
  - (b) Research Bulletin
  - (c) List of Fishing Vessels
  - (d) Annual Proceedings
    - (1) Cover
    - (2) Printing of National Research Reports
  - (e) Environmental Symposium
  - (f) Environmental Survey
  - (g) ICNAF Handbook
  - (h) FAO/ICES/ICNAF joint index of North Atlantic publications
  - (i) Review of meeting documents for Redbook 1966, Pt.III, and Research Bulletin No.4
  - (j) Status of joint ICES/ICNAF Working Party on North Atlantic Salmon and publication of reports and documents
  
8. Mid-year subcommittee meetings
  
9. Coordination with other organizations
  
10. Election of officers for the ensuing year
  
11. Arrangements for the 1967 Annual Meeting

## 12. Other matters

Following recommendations of the FAO Study Group on Economic Criteria in Fishery Management, Rome, 27-28 September 1965, and the mid-year meeting of ICNAF Assessment Subcommittee, Rome, 29-30 September 1965, the Chairmen of the Commission, Research and Statistics Committee and Assessment Subcommittee agreed that invitations be extended to a number of leading fishery economists to address a special open meeting of the Research and Statistics Committee at 4:30 p.m. on Monday, 6 June 1966. Professor J.A. Crutchfield of the University of Washington, author of the paper "Economic Aspects of Fishery Regulations", presented to the FAO Study Group, has accepted our invitation. In addition, it is hoped that arrangements can be completed to have a Soviet, as well as a western European economist, address the open meeting.

The opportunity will be taken after the R&S Plenary session on Thursday, 2 June 1966, to have Professor Crutchfield and other available fishery economists join the members of the Assessment Subcommittee to discuss informally to what extent economic considerations would alter the conclusions and advice given so far by the Assessment Subcommittee.

### 1. ASSESSMENTS (APP.1)

#### (a) Review of Latest Statistics of Landings and Fishing Activity in the ICNAF Area

The review made last year (Redbook 1965, Pt.I, p.7-8) of the recent changes in landings and fishing activity in the Convention Area was brought up to date by the inclusion of latest statistics on landings in 1965 and fishing effort in 1964. These data show:

- (i) In the northern Subareas 1-3, the main change from 1964 was an increase of over 100,000 tons in cod landings from Subarea 2 due to increased fishing by the offshore trawl fishery in spring in Div.2J, but also partly on previously lightly fished concentrations in the more northerly Div.2G and 2H. This increase constitutes a second major jump in cod fishing in Subarea 2, following the first in the period 1959-61. The cod catches in Subareas 1 and 3 were approximately the same as in 1964, thereby maintaining the high level of production of recent years.

Landings of haddock from Subarea 3 in 1965 were lower than in 1964, thereby continuing the striking downward trend from the level of 1960-61.

- (ii) Average landings-per-unit-effort in Subareas 1-3 in 1964 were somewhat lower and estimated total fishing activity somewhat higher than in 1963.

- (iii) In Subarea 4 in 1965 haddock landings increased substantially from the 1964 level, thereby maintaining the recent upward trend, while the landings of silver hake declined. This was due principally to diversion of effort by USSR trawlers from fishing for silver hake to haddock, partly due to the decline in stocks of the former. Herring landings in 1965 for Subarea 4 also increased substantially, thereby maintaining the recent upward trend.
- (iv) In Subarea 5, the most striking changes in the landings of groundfish in 1965 were the large increases in landings of haddock, which were more than twice as great as in 1964, and silver hake, which increased by nearly 50%, thereby maintaining the striking growth in this fishery since 1961. The main cause of the increase in landings of both species was increased fishing effort by USSR trawlers. In contrast to the groundfish landings for Subarea 5, those of herring decreased sharply in 1965 due to reduced fishing on herring.

#### General Conclusions

These latest data confirm the general situation outlined last year of a trend toward higher exploitation in the traditional fisheries for cod and haddock in the ICNAF Area and continued rapid development of fisheries in the southern part of the area on species which had previously been of relatively minor importance.

In presenting these data to the Commission, R&S wishes to stress that the estimates of fishing activity provide only a general index of the amount of fishing carried out in the area, as a guide to the direction in which fishing effort is changing through time. Since they do not take into account the changes in fishing power of the fleets, the magnitude of the upward trend shown in the "fishing activity" estimates in most of the subareas, probably underestimates the change in effective fishing effort.

#### (b) Revision of Past Assessments in the Light of Latest Information

##### (i) Cod

In the report last year R&S concluded, in confirmation of earlier assessments, that with the possible exception of the fishery in Subarea 2, the fishing intensity in all of the cod fisheries in the ICNAF Area is approaching, or may even be beyond, the level giving the maximum sustained yield per recruit. No new assessments have been made on cod for the other subareas, but it seems likely from the results of Canadian investigations in Subarea 2 that the fishing intensity in Subarea 2, especially on the stock in its southern Div.2J and the northern Div. of Subarea 3, has now also reached this level. R&S accordingly

recommends (1)

*that the scientific investigation of the cod stock in Subarea 2 and Div. 3K and 3L should be intensified, attention being paid especially to (a) tagging of spawning cod in Div. 2G and 2H; (b) the assessment of changes in age compositions and the derived mortality rates of the catches by the offshore trawl fishery; (c) the growth rates of the catches by the offshore trawl fishery; (d) the environmental factors governing the distribution and availability of cod in this area.*

(ii) Haddock

As reported last year, the most recent data support earlier assessments that the fishing intensity on haddock is approaching or may even be beyond the level giving the maximum sustained yield. In this context the large increase in haddock landings in 1965 from Subareas 5 and 4 may be of major significance, and R&S wishes to point out that in any fishery a temporary increase in catch substantially above the maximum sustainable level, by a rapid and substantial increase in fishing intensity is possible, but if this level of fishing intensity were maintained, the catch would fall to a level less than the maximum sustainable one. R&S accordingly

recommends (2)

*that detailed studies of the dynamics of the exploited haddock stocks in Subareas 5 and 4 be continued with special reference to (a) the changes in size and age compositions of catches and in abundance and mortality rates of the exploited stocks, following the recent increases in landings, for which purposes sampling data for the major fleets are essential; (b) the estimation of changes in total fishing intensity on haddock in recent years and that the results of these investigations, and particularly statistics and sampling data, be presented to the next Commission meeting.*

(iii) Redfish

R&S has nothing to add to the statement made last year regarding the position of the major redfish fisheries on the yield curve.

(iv) Silver Hake

The available data are still insufficient for assessments to be made of the effects of fishing on the silver hake stocks in the ICNAF Area. In view of the continued importance of the silver hake fisheries, especially in Subarea 5, R&S stresses the importance of their scientific investigation, with special reference to following changes in the abundance, age composition and mortality of the exploited stocks.

(c) West Greenland Cod Assessment

At the Commission meeting in 1965, Panel 1 recommended

- (i) that the Research and Statistics Committee examine the desirability of further protection of small cod at West Greenland, and in particular in this connection, the effects of a closure of Store Hellefiske Bank to trawling, and
- (ii) that facilities be provided, if required, for a meeting of a small Working Group of experts to examine the matter.

The results of the assessments of this problem, carried out by an expert Working Group set up at the 1965 meeting were considered by the Assessment Subcommittee at this meeting. R&S endorses the conclusions reached by the Working Group and the Assessment Subcommittee, as follows:

- (a) Small cod at West Greenland are growing so rapidly that in the absence of fishing, and with a 20% annual natural mortality rate, the total weight of a year-class would increase four times between 2 and 5 years old. Between 5 and 9 years there would be little change in the total weight of a year-class. With the present intensity of fishing and present level of recruitment the total catch should increase if the small cod were protected until around 4 years old.
- (b) Small fish less than 4 years old, although present in all divisions of West Greenland, are relatively more abundant in Div.1B. Because of the nature of the statistical and other material, it was not possible to consider different grounds within Div.1B separately.
- (c) The precise quantitative gain from measures to protect small fish depends on the proportion of the catch which is discarded (discards in this sense also include fish used only for fish meal), about which the Group did not have as much information as is desirable. It appears that at least 20% by numbers, and possibly more, of the fish caught by trawlers are discarded; some fish are possibly also discarded by liners, but much fewer than by trawlers, and some of these may survive.
- (d) Closure of Div.1B to trawling would tend to increase the total landings from West Greenland.
- (e) Total landings would also be increased even more if Div.1B were closed to both liners and trawlers. It is likely that fishing by liners in Div.1B would increase due both to increased stocks and to less physical interference between trawlers and liners.

- (f) The use of larger meshes by trawlers in Subarea 1 would also increase landings, irrespective of closure of Div.1B. All types of gear would probably benefit from meshes up to 150 mm, but for meshes larger than 150 mm trawl landings are likely to decrease, though the total landings may still increase.
- (g) The greatest benefit should come from closing Div.1B and also using larger meshes throughout Subarea 1. At the most probable discard rate by trawlers of 20% by numbers and an estimated exploitation rate,  $E = 0.7$ , the calculated long-term gains from alternative conservation measures are as follows, as percentages of present landings per recruit. While no claims can be made for high precision in the values given in this table, they are presented to show the likely relative effects of different measures.

<u>Conservation measure</u>	<u>Long-term Gain; %</u>		
	<u>Trawl</u>	<u>Line</u>	<u>Total</u>
150 mm mesh size	5	9	7
Closure of Div.1B to trawls	4	5	4
Closure of Div.1B to all off-shore gears, (trawls and lines)	7	6	7
150 mm mesh size and closure of Div.1B to all offshore gears	11	14	12

In assessing the effect of a given mesh size, it must be emphasized that the calculations have been made in terms of selectivity of a manila codend without chafers. The same effect would be produced by a smaller codend mesh of more selective material, or a larger codend mesh if chafers are used.

R&S also considers that for Subarea 1, the estimates of the probable benefits of conservation measures for small cod in West Greenland waters, given in terms of weight, underestimate the economic benefits because the larger cod are worth more. It also

recommends (3)

*that every effort should be made to supply the further data requested by the Working Group on West Greenland Cod as follows:*

- (i) *data on quantities and size of fish discarded or used for fish meal; (estimates of these quantities should be presented separately);*
- (ii) *data on the present effective mesh size used at West Greenland, and on the types of chafer used, if any;*
- (iii) *data on the hook size in use by liners and the selectivity of hooks;*

- (iv) *data on size composition of all landings and catches, particularly for those fleets for which there is at present little material submitted for the Sampling Yearbook;*
- (v) *data on the possible redistribution of ships at present fishing in Div.1B.*

R&S considers that no further meeting of this Working Group will be necessary in the immediate future unless the Commission requires further detailed information on specific problems not dealt with by the Working Group or unless substantial conservation measures are introduced, the effects of which should be studied in detail.

(d) West Greenland Salmon Fishery

The draft Report of the joint ICES/ICNAF Working Party on North Atlantic Salmon, set up following last year's Annual Meeting, to study the state of the stocks of Atlantic Salmon and the effects of the West Greenland fishery on salmon catches in the North Atlantic was considered in detail by the Assessment Subcommittee. R&S endorses the conclusions contained in the draft Report of the Working Party which were as follows:

"On the basis of the working assumption which was applied throughout the Report that the salmon in the stocks fished in West Greenland behave like salmon visiting other ocean areas, and if they survive will return to their native rivers, certain preliminary conclusions can be reached:

- (a) The West Greenland salmon fishery as operated at present has no direct influence on the abundance of grilse returning to home waters.
- (b) The proportions of salmon appearing in the stocks exploited at West Greenland vary widely for different countries: probably the proportion from Canada is greater than that from the UK, while few, if any, of the fish in the stocks exploited at West Greenland come from the north or west coasts of Norway.
- (c) Between the time of the West Greenland fishery and assumed return to home waters the fish of the sizes caught in the present West Greenland fishery increase in weight by about 50%. Therefore if more than about 70% of the fish present in West Greenland waters would, in the absence of the Greenland fishery, be caught in home waters, then a West Greenland fishery would reduce the total catch (West Greenland plus home waters). If less than 70% would be caught, then a West Greenland fishery would increase the total catch. The percentage which would be caught in home waters depends on the exploitation rate in home waters, and on the losses (mortality, including any failure to navigate) between West Greenland and home waters. At present

no good estimate of the rate of loss is possible, and the home rate of exploitation, which can only be estimated very approximately, seems to vary greatly between countries.

- (d) If the assumption concerning the return of fish from West Greenland to home waters is correct, the West Greenland fishery will reduce the total catches of large salmon in home waters.
- (e) Because of probable differences in the proportion of fish visiting West Greenland and in the home exploitation rates, the proportional reduction in North American catches will probably be greater than in European catches.
- (f) There is no direct evidence on the probable effect of increased exploitation on subsequent natural production of smolts. The West Greenland fishery may reduce spawning stocks but if this reduction is small, the effect on smolt production will be negligible."

R&S further endorses the recommendations of the Working Party regarding future work and

recommends (4)

*that ICNAF scientists should give every assistance in carrying out the recommendations of the ICES/ICNAF Joint Working Party on North Atlantic Salmon.*

In doing so it draws special attention to Recommendation 9 in the draft Report of the Working Party and

recommends (5)

*that ICNAF scientists, especially those in countries not regularly engaged in salmon fishing, should take every opportunity to obtain and record biological data regarding Atlantic salmon taken in offshore waters during fishing operations for other species.*

Problems concerning the handling of the draft Report of the Joint Working Party, and the results of its future work, were considered, and R&S

recommends (6)

*that the course of action*

*(1) for the 1966 Annual Meeting be*

- (a) *The draft Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon will be presented to ICNAF as Res.Doc.66/79. R&S will refer this to the Assessment Subcommittee, whose Chairman is an ex officio member of the Working Party. The Assessment Subcommittee will report back to R&S, which reports to the Commission.*
- (b) *The Working Party is not authorized to make any statements to the press until they have been approved by the Chairmen of ICNAF and ICES.*
- (c) *The Report of the Assessment Subcommittee will include a part on salmon and this will be published in the Redbook in the usual way, except that the part on salmon will not be published until cleared by ICES.*
- (d) *The full Report of the Salmon Working Party will be presented for clearance by ICNAF and ICES before distribution or publication.*
- (e) *200 copies of the revised and approved Report will be submitted to ICES and 20 copies to each member of the Working Party. Copies will be distributed to ICNAF meeting participants as Res.Doc.66/79 (Revised).*
- (f) *Since the Chairman of the Working Party is working under the dual sponsorship of ICES and ICNAF and is thus placed in a potentially confusing position from conflicting requirements, it is suggested that he should develop a suitable set of working procedures and clear them with the Chairmen of the two agencies. It was further noted that the Working Party was a precedent and that procedures developed might become precedents for future joint working groups.*

*and*

*(2) for future meetings be*

- (a) *Reports of future meetings of the Working Party will be processed in a special series of meeting documents to be submitted to the first Annual Meeting of the Commission following the meeting of the Working Party. Such documents will be considered by R&S, referred to Assessment, etc. in the usual way.*
- (b) *It will be the responsibility of the Chairman of the ICNAF Assessment Subcommittee (the ICNAF representative on the Working Party) to ensure that the most up to date landing statistics and other pertinent information on salmon is presented to the Annual Meeting of ICNAF.*

(e) FAO/ICES/ICNAF/UNESCO/IBP Symposium on Tropho-dynamics of Marine Communities (referred to in Redbook 1965 as Symposium on Food Chains in the Sea)

Consideration was given by the Assessment, Environmental and Herring and Other Pelagic Fish Subcommittees to the plans for this symposium, as outlined verbally by Dr L.M.Dickie, a member of the group of experts planning the symposium. He intimated that, although the plans for the symposium had not yet been finalized, the present intention was to arrange for the publication of its proceedings and papers to be sought through a private publishing house, in which event the publishing costs which the Commission undertook to meet last year would not arise.

R&S reaffirms its strong interest in the subject matter to be covered by the symposium, and of its importance to the biological stock assessment work in the Commission area. It accordingly

recommends (7)

*that ICNAF reaffirm its willingness to co-sponsor the Symposium on Tropho-dynamics of Marine Communities and that the funds originally approved for publication costs be used to defray general symposium costs.*

Noting also the desirability of the final prospectus for the Symposium being distributed prior to the 1967 Commission meeting, it further

recommends (8)

*that the Chairman of the Commission, the Executive Secretary and the Chairman of R&S review the draft prospectus for the Symposium on the Tropho-dynamics of Marine Communities and, when satisfied, grant it ICNAF approval.*

(f) Economic Criteria in Fishery Management

Following Recommendation No.14 (Redbook 1965, p.10 and 34), passed at the 15th Annual Meeting, discussions were held by the Assessment Subcommittee with the participation of economists regarding economic criteria in fishery management on the basis of Comm.Doc.66/17 and Res.Doc.66/19. R&S noted that, as reported in previous years, the intensity of fishing on some stocks of particular species in the Convention Area, such as the cod in Subarea 1, has already approached, or even passed, the level giving the maximum sustainable yield. This means that the present catch of these species might be taken with a smaller fishing effort and hence with reduced costs.

R&S felt that it would be helpful for the Commission in its further review of possible conservation actions for the Convention Area if an

assessment were made of the likely effects of such actions on the yield of the fisheries in the Convention Area by a group of fishery biologists and economists working closely together. This collaboration is desirable because economic consequences are an important feature of the results of regulatory measures and because biological assessments constitute an essential background for economic analysis, in that they provide the necessary information on the actual and potential output from the resource. R&S therefore

recommends (9)

*that the Chairman of R&S and the Executive Secretary arrange for a joint assessment by biologists and economists of the effects of possible conservation actions in the Convention Area. This assessment should be made in collaboration with any other appropriate international body willing to contribute and should be prepared for submission to the Commission at its 17th Annual Meeting. The Chairman of the Standing Committee on Finance and Administration is requested to arrange for suitable budgetary provisions.*

In addition to the discussions held by the Assessment Subcommittee with the participation of economists, regarding economic criteria in fishery management, an open meeting of R&S was held on Monday, 6 June, at which Dr J.A. Crutchfield, Professor of Economics at the University of Washington, Seattle, Washington, USA, addressed the meeting on economic aspects of fishery management in international fisheries on common property marine resources. In the discussion which followed, there was a widely ranging and lively exchange of views on the importance and practicability of the use, by ICNAF, of economic criteria, and the results of combined economic and biological analyses, in its deliberations on the need for, and choice of, regulatory measures. R&S accordingly

recommends (10)

*that Dr Crutchfield's address on economic aspects of fishery management to the 1966 open meeting of R&S be prepared and circulated to all meeting participants, along with an abstract of the discussions which took place.*

(g) Future Work in Assessments

Examination by the Assessment Subcommittee of the current data reported to the Commission on nominal catch, fishing effort, length and age compositions, discards and effective mesh size in use, which are essential for assessment work, revealed many important gaps in the available data. R&S therefore strongly

recommends (11)

*that where the data submitted on nominal catches, fishing effort, length, age, discards etc. from any fleet taking a substantial catch from any one of the major ICNAF stocks are incomplete, the countries concerned should be strongly urged to make every effort to collect and submit such data to ICNAF.*

*The Executive Secretary, in consultation with the Chairman of the Assessment Subcommittee, should draw the attention of countries to the present, main gaps in the data.*

2. STATISTICS AND SAMPLING (APP.11)

(a) Timeliness of Reporting Statistical Data

R&S expresses its appreciation of the promptness with which member countries submitted their nominal catch data for 1965 which permitted drafts of Tables 1 and 3 of the Statistical Bulletin to be ready in time for this Annual Meeting. It further expresses its appreciation to the Secretary of the Continuing Working Party on Fishery Statistics in the North Atlantic Area (CWP) for his valuable assistance in the statistical work of the Commission. In view of the advantages of having statistical data available to the Scientific Advisers to Panels in advance of their annual meetings, R&S

recommends (12)

- (i) that the deadline for national reporting offices to submit the completed STANA 2 (ICNAF Summary) forms to the CWP Secretary, with copies to the ICNAF Secretariat, be 15 April of the year following the calendar year to which the statistics refer;*
- (ii) that, on or before 15 April, member countries provide the Secretary of the CWP with a listing of the five ICNAF subareas showing whether or not their fishing craft have fished in these subareas during the preceding year;*
- (iii) that the deadline for submitting the completed STANA 1W to the ICNAF Secretariat with copies to the CWP Secretary be changed to 15 June.*

(b) Extension of ICNAF Statistics Collection Southwards

Consideration was given by the Statistics and Sampling Subcommittee to the need for, and possible methods of, collecting catch and fishing effort statistics for main ICNAF species in areas off the North American east coast to the south of the Convention Area, as provided in Article VI of the Convention. R&S endorses this subcommittee's view that there is an urgent need for such statistics in the region

between the Convention Area and Cape Hatteras, and that the CWP is the most appropriate body to work out an appropriate statistics collection scheme. It accordingly

recommends (13)

- (i) *that the ICNAF Secretariat request countries to report to the ICNAF Secretariat and the CWP Secretary, catch and effort statistics for 1966, for the region southward of the ICNAF Convention Area to the latitude of Cape Hatteras, such reporting to be on forms and by deadlines prescribed for the ICNAF region and to include in this reporting the species contained in the ICNAF species list;*
- (ii) *that the ICNAF Secretariat obtain from the USA details of its statistical reporting divisions for fishing areas in waters south of the ICNAF Area extending to the latitude of Cape Hatteras and submit the material to the Fifth Session of the CWP;*
- (iii) *that the Secretary of the CWP present to the Fifth Session of the CWP statistical tables showing nominal catches by countries, species and possibly also fishing areas for the region between the present ICNAF Area and the latitude of Cape Hatteras;*
- (iv) *that the information suggested in (ii) and (iii) be distributed (revised as necessary) as documents for the 1967 Meeting of R&S together with a document giving the CWP's advice on the introduction of a suitable inter-agency statistical reporting scheme for these waters;*
- (v) *that a suitable and clear designation for this statistical area (and its possible divisions) should be introduced.*

(c) ICNAF List of Vessels (1965)

Data from all but two member countries have been received for inclusion in the ICNAF List of Vessels for 1965. R&S endorses the recommendation in the Report of the Statistics and Sampling Subcommittee (App.II) concerning the list of items to be requested for inclusion in future vessel lists.

It notes that consideration is being given by ICES to the preparation of a Vessel List and reaffirms Rec.25 of Redbook 1965, Part I, that a combined list of ICES and ICNAF vessels for the North Atlantic region would be desirable, but wishes to maintain a complete list of vessels fishing in the ICNAF Area, including those below 150 tons. R&S

recommends (14)

*that the Continuing Working Party be asked to make the necessary arrangements for a joint North Atlantic Vessel List, if ICES decides to participate in such an undertaking.*

(d) International Cooperation between Statistical Offices of ICNAF, ICES, and FAO

R&S noted the recommendation passed at a mid-term meeting of officers of the ICES Statistical Office with the Secretary of the CWP that such mid-term meetings, in the years when the CWP does not meet, are valuable for considering and coordinating various important statistical matters not related to the activities of the CWP. R&S supports the need for such meetings and accordingly

recommends (15)

*that allowance be made in the 1968 budget for the attendance of an ICNAF representative at a meeting on FAO, ICES and ICNAF statistics, probably to be held in Europe at the time of the ICES Liaison Committee's mid-season meeting.*

R&S noted that the Fifth Session of the CWP is scheduled provisionally for the end of April 1967, and will possibly be held in Reykjavik, Iceland.

(e) Other Statistical and Sampling Matters

R&S endorses the recommendations of the Statistics and Sampling Subcommittee, as set out in Appendix II, on items concerning the STANA reporting system, the reporting of statistics of discards, the collection of statistics for long range factory trawlers, common and scientific names of species and on the reporting of age-length key data.

3. GEAR AND SELECTIVITY (APP.III)

(a) Selectivity of Different Codend Materials

Further selectivity data for codends made from polypropylene, polyethylene and polyamide fibres showed that the differences in selectivity between them were 10% or less, though the results for polyethylene were variable. R&S considers that further experiments to determine the selectivities of these materials would be desirable, especially for polyethylene, and possibly involving comparisons of the selectivities of nets used from stern and side trawlers. However, it points out that the differences of 10% or less between the observed selectivities of these materials are within the normal range of experimental variation for experiments with each material,

so that more precise estimates of differences would not be possible without many more experiments.

Consideration was given to the possible need for a change from the use of a manila standard for mesh sizes. R&S considers that in view of the proposed regulations which define specific mesh size equivalents for other materials, this may not be necessary, but it wishes to bring to the Commission's attention the fact that manila codends are now seldom used in the fisheries in the ICNAF Convention Area.

(b) Trawl Material and Mesh Size Sampling

R&S considers that information on trawl materials and codend mesh sizes in use in the ICNAF Area is of major importance in the Commission's scientific work. Consideration was given to improving the design and layout of the form for reporting these data and R&S endorses the recommendations of the Gear and Selectivity Subcommittee (App.III) concerning such improvements. It also reaffirms its earlier recommendation that this information should be published, although it now considers that the List of Vessels is not the most appropriate publication in which to include it, as previously recommended. Instead, R&S

recommends (16)

*that the 1964 and 1965 submissions of trawl material and mesh size sampling data should be summarized by the Secretariat and included in Redbook 1966, Part III. Thereafter, this information should be presented annually by the Secretariat as a meeting document and summarized and published in the Redbook every third year, beginning with the Redbook 1969.*

(c) List of Trade-names of Twines used in Fishing Gears

R&S welcomes the list of trade-names of twines used in fishing gears, prepared by Dr Klust (Germany), and requests the Secretariat to distribute it widely amongst member countries. It also agreed that the list, restricted to those fibres used in marine fishing gear, should be revised every two years and printed on the Trawl Material and Mesh Size Sampling Summary Form. R&S also notes the need for a compilation of suitable methods for field identification of synthetic fibres used in fishing gears.

(d) Topside Chafing Gear

The results of experiments on the effects of codend selectivity of the approved ICNAF topside chafer, of a large meshed chafer, as designed in Poland, and of a tightly fitting chafer with the same mesh size as the codend, as used in USSR, were noted. R&S wishes to inform the Commission that, from the scientific evidence available, it seems that the type of topside chafer on which Poland has

carried out selectivity experiments in the ICNAF Area, having a mesh size at least twice as large as the codend mesh size and a width at least as great as that of the codend, has a negligible effect on codend selectivity. It also

recommends (17)

- (i) *that selectivity experiments with topside chafers of the Polish type should be continued;*
- (ii) *that selectivity experiments with topside chafers of the Soviet and other types used in the ICNAF Area, and, wherever possible experiments on means of eliminating the need to use topside chafers, should also be continued.*

(e) Mesh Measurement

Consideration was given to the problem of the adoption of a standard mesh measuring gauge for both scientific and enforcement purposes and note was taken of the difficulties in some countries of the adoption of the ICES gauge for the latter purpose. R&S has no new advice to offer the Commission on this matter.

(f) FAO Meeting on Fish Behaviour in Relation to Fishing Techniques and Tactics (considered in meetings of the Gear and Selectivity, Environmental and Herring and Other Pelagic Species Subcommittees)

R&S noted the development in plans for the proposed FAO Meeting on Fish Behaviour in Relation to Fishing Techniques and Tactics as outlined in Res.Doc.66/54. R&S expresses its keen interest in, and support for, this meeting, but feels that the provisional program for the meeting is too broad in scope. It considers that the main objectives would be better accomplished at this stage by limiting the meeting to the consideration of the behaviour of fish to major fishing gears, excluding those used in fisheries for salmonids and invertebrates.

4. ENVIRONMENTAL STUDIES (APP.IV)

(a) Report of NORWESTLANT Surveys

R&S regrets that Parts 1 and 2 of the Report of the NORWESTLANT Surveys, which should have been ready by the end of January 1966, are still incomplete, but publication of Part 3 on the physico-chemical oceanographic data will take place at the end of September 1966.

(b) The USA-USSR Proposed Plan for an ICNAF Georges Bank Survey

Consideration of the proposed plans for this survey (Recommendation

28, Redbook 1965, Part I), given in Res.Doc.66/50 indicated that some revision of its scope may be necessary in the light of the limited research vessel facilities likely to be available. R&S accordingly endorses the proposals of the Environmental Subcommittee and its Working Group on the Georges Bank Survey concerning the future course of action on this scheme, and

recommends (35)

- (i) that Dr Graham prepare a revision of the plan for the survey (Res.Doc.66/50), circulate it to the other members of the Working Group and then submit it to the 1967 Meeting of the R&S Committee;
- (ii) the USSR and the USA begin exchanging information on the work they are now doing in the area. Of particular interest are the sampling programs and the types of gear used;
- (iii) the USA report to the Working Group as soon as possible on results of gear comparison experiments planned for 1967 and on the results of studies of the vertical distribution of eggs and larvae;
- (iv) the R&S Committee invite papers on (a) statistical plankton sampling designs which might be of use in laying out the station pattern and time schedule for the proposed survey; (b) the sampling precision required in order to obtain results of worthwhile value to the Assessment Subcommittee in its studies of stock and recruitment;
- (v) the UK submit to the Working Group a report on the collections made in the area with its continuous plankton recorder survey;
- (vi) Canada report to the Working Group on herring research planned for the Bay of Fundy with emphasis on problems of recruitment;
- (vii) the Working Group meet immediately before the 1967 meeting of the R&S Committee to discuss sampling design and standardization of gear;
- (viii) a mid-year meeting be held although it is not clear how this can be arranged. Members of the Working Group should take whatever opportunities arise out of other international meetings to discuss various aspects of the planning of the proposed survey.

(c) Meteorology in Relation to Fishery Research and Future Environmental Work

The exploited fish stocks and the success of fishing operations on them are markedly affected by conditions of the environment, many of which are directly governed by meteorological factors. R&S supports the view of the Environmental Subcommittee that closer contact is needed between meteorologists, physical oceanographers and biologists working in the ICNAF Area and

recommends (18)

*that countries be requested to take steps to ensure that physical oceanographers and marine meteorologists working in the fishery research field in the ICNAF Area attend future meetings of R&S and its Working Groups.*

It further

recommends (19)

*that the Chairman of the Environmental Subcommittee take steps to obtain from the appropriate experts (a) further information about the environmental factors that may have affected the growth of cod in Subarea 2; (b) a synthesis of hydrographic and meteorological fluctuations in the ICNAF Area in recent years, and report back to the 1967 Meeting of R&S.*

5. HERRING AND OTHER PELAGIC SPECIES (APP.V)

(a) Review of Herring Fisheries and Research

In 1965, herring landings from the Commission Area were lower than in 1964 due to a sharp decline in the Soviet fishery for herring on Georges Bank. On the other hand Canadian landings increased, thereby maintaining an upward trend from 1961.

Comparison of data on the age compositions of samples taken by different countries revealed differences in the relative contributions of the different year-classes in the catches taken by Canada and the other countries. To determine whether this is attributable to differences in age reading, R&S

recommends (20)

*that Canada, Poland and the USA exchange herring otoliths to compare ageing techniques. Canada will initiate this exchange and report on the results next year.*

(b) Fisheries for Other Pelagic Species

Landings of swordfish, tuna and sharks from the Convention Area in 1965 were lower than in 1964, while mackerel landings were slightly larger. Note was taken of the Report of the ICES Bluefin Tuna Working Group and especially of the inter-relations between the bluefin concentrations fished in the Western and Eastern Atlantic. R&S considers that the development of the tuna fishery in the Western Atlantic should be followed closely.

R&S also notes with interest the developments in the establishment of an Atlantic Tuna Commission and considers that its future course should be followed closely.

6. AGE-READING TECHNIQUES (APP.VI)

The program of otolith exchange for redfish and silver hake, initiated at last year's meeting, has been pursued successfully during the year. R&S endorses the recommendations of the Age-Reading Techniques Subcommittee regarding future steps in this program, and on the adoption of January 1st as a standard birthday date in age reading.

7. PUBLICATIONS (APP.VII)

(a) FAO/ICES/ICNAF Index of Scientific Publications

R&S

recommends (21)

*that ICNAF allocate \$350 for its share of the publication costs of the FAO/ICES/ICNAF index of scientific publications of the North Atlantic and that this amount be added to the \$200 already allocated for preparation of the index.*

(b) National Research Reports

R&S

recommends (22)

*that the National Research Reports be published in the 1966 Annual Proceedings.*

The ICNAF format for these reports is considered satisfactory and countries which have not followed this format are urged to do so.

(c) Meeting Documents

R&S

recommends (23)

*that authors be invited to submit the following documents for publication in the Redbook or Research Bulletin: Res.Docs. 66/15, 18, 21, 22, 23, 28, 29, 43, 44, 49, 51, 53, 56, 58, 60, 63, 67, 72, 77 and Salmon Documents 66/9, 12, 13.*

8. MID-YEAR SUBCOMMITTEE MEETINGS

Since the 1965 meeting, two meetings of members of the Assessment Subcommittee have taken place, a general meeting at the time of the ICES meeting in September 1965, and a meeting of West Greenland Cod Working Group in Copenhagen in February 1966. R&S believes that these meetings were of considerable assistance in its task of supplying advice to the Commission and would emphasize that the only two fisheries for which detailed advice is given in this report (West Greenland cod and West Greenland salmon) are those for which small expert working groups of scientists met apart from the regular meetings of ICNAF. While no general meeting of the Assessment Subcommittee is believed to be necessary in 1966/67, if the Commission desires detailed advice on particular fisheries, this can only be done by separate meeting of working groups of those scientists particularly concerned. In this connection, R&S draws attention to the following Working Group meetings scheduled to take place in 1966/67: (a) the working group on the assessment of the effects of possible conservation actions in the Convention Area; (b) the meeting of the Continuing Working Party on Fishery Statistics in the North Atlantic, at which the Commission will be represented by a member of the Secretariat staff and the Chairman of the Statistics and Sampling Subcommittee.

9. COORDINATION WITH OTHER ORGANIZATIONS

It was agreed that Dr H.A.Cole (UK) be asked to represent R&S at the forthcoming meeting of ICES, and Mr A. Lee (UK) at the meetings of SCOR and IOC.

10. ELECTION OF OFFICERS FOR THE ENSUING YEAR

- (a) Dr W. Templeman (Canada) was unanimously re-elected Chairman of R&S;
- (b) The following were nominated to serve on the Steering and Publications Subcommittee:

France, Italy, Portugal and Spain	Dr R. Monteiro
Iceland, Norway, USSR	Mr E. Bratberg
Denmark, Germany, Poland and UK	Dr P. Hansen
Canada	Dr J. Hart
USA	Dr H. Graham

(e) The following subcommittee chairmen were appointed:

Assessments	Mr B.B.Parrish
Environmental	Mr A.J.Lee
Statistics and Sampling	Dr F.D.McCracken
Gear and Selectivity	Dr H. Bohl
Herring and Other Pelagic Species	Dr S.A.Studenetsky
Ageing Techniques	Mr E. Bratberg

The Chairman expressed the Committee's appreciation of the excellent services of the retiring subcommittee chairmen, Mr Skud (Herring and Other Pelagic Species) and Mr Gulland (Assessment).

## 11. ARRANGEMENTS FOR THE 1967 ANNUAL MEETING

R&S

recommends (24)

- (a) *that R&S should meet throughout the week preceding the 1967 Annual Meeting of the Commission;*
- (b) *that the Assessment Subcommittee should meet on the Thursday and Friday, and the Statistics and Sampling Subcommittee on the Friday and Saturday, of the week preceding the meeting of R&S;*
- (c) *that the Steering and Publications Subcommittee should meet on the Sunday of the week of the R&S meeting.*

## 12. OTHER MATTERS

At the close of the meeting, the Chairman expressed the Committee's thanks to the Spanish authorities for providing such excellent facilities and for their cooperation and generous assistance throughout the R&S meeting.

APPENDIX I - REPORT OF THE SUBCOMMITTEE ON ASSESSMENTS

Chairman: J.A.Gulland; Rapporteur: B.B.Parrish

The Subcommittee met on 24 and 28 May 1966 and at intervals during the following week. Representatives from most member countries attended the meetings.

The following items were dealt with by the Subcommittee:

- (1) Review of latest statistics of landings and fishing activity in the ICNAF area;
- (2) Revision of past assessments in the light of latest information;
- (3) Greenland cod assessment;
- (4) ICES/ICNAF West Greenland Salmon Working Party;
- (5) FAO/ICES/ICNAF Symposium on Food Chains in the Sea;
- (6) Stock and recruitment;
- (7) Economic criteria in fishery management;
- (8) Mid-term meetings;
- (9) Future work.

Item 6 was dealt with in a joint meeting with the Environmental Subcommittee.

1. Review of Latest Statistics of Landings and Fishing Activity in the ICNAF Area

The series of data on landings, landings-per-unit effort and "fishing activity" in each subarea, drawn up at the last meeting of the Subcommittee (Redbook 1965, Pt.I, App.II, Tables 1-5, and Figs. 1 and 2) was extended to include the provisional landings data for 1965 and the landings-per-unit effort and "fishing activity" for 1964. In the case of Subarea 1 a new series of "fishing activity" estimates, back to 1957, was prepared based on the fishing effort of trawlers only, rather than on the combined effort of trawlers, liners and dory vessels, as in last year's report. These data, for each subarea, are given in Tables 1-5. In presenting them, the Subcommittee wishes to stress that estimates of fishing activity provide only a general index of the amount of fishing in the area, as a guide to the direction in which fishing effort is changing through time; they do not necessarily represent the best estimates of effective fishing effort for use in detailed assessment work. Since they do not take into account the changes in fishing power of the fleets (e.g. thro' changes in their size composition), the magnitude of the upward trend shown by the "fishing activity" estimates in most of the subareas probably underestimates the change in effective fishing effort.

The main recent changes in the fisheries in each of the subareas, shown in Tables 1-5, are as follows:

### Subarea 1

The provisional data on landings from Subarea 1 for 1965 (Table 1) show no major changes compared with 1964. However, in the case of both cod and redfish, the landings remained substantially lower than the peaks reached in 1961-63. Furthermore, the landings-per-unit effort has declined and the estimated total "fishing activity" has increased steadily since these peak years.

### Subarea 2

The data in Table 2 show that there was a large increase in landings of over 100,000 tons from Subarea 2 in 1965, from the 1963-64 level. This was due almost entirely to an increase in the offshore spring fishery for cod by European trawlers, partly on the spawning concentrations in Div.2J, but also partly on previously lightly fished concentrations in the more northerly Div.2G and 2H. This increase constitutes a second major jump in cod fishing in this subarea, following the first in the period 1959-61. Landings from the Canadian inshore summer trap and net fishery increased slightly in 1965 to about the 1962-63 level.

The landings per unit effort data for 1964 indicate a drop for all classes of trawlers from the level in 1963, and for the smallest class of trawlers (501-900 GRT) it continued a general downward trend since 1958-59. Estimated "fishing activity" also reached its highest value in 1964.

Data presented in Res.Doc.66/23, on the Canadian inshore fishery for cod in Subarea 2, which is based on feeding concentrations of the same stock as is fished offshore by the trawlers, show that in this fishery the catch-per-unit effort has decreased steadily since 1959-60.

The improvement in redfish catches in 1964 over the 1962-63 levels was maintained in 1965, while flounder catches increased substantially.

### Subarea 3

Total landings from Subarea 3 in 1965 (Table 3) changed very little from the high level reached in 1964. While cod landings decreased somewhat from 1964 (but remained substantially higher than for previous years), redfish and flounders showed a continuation of the upward trend which started in 1963 (although the redfish landings were far short of the level reached in 1959). At the same time the landings of haddock continued the striking downward trend, which started in 1962, to reach its lowest postwar level.

The "fishing activity" data show that the large increase in total landings which took place in 1964 was due mainly to increased fishing in the subarea, especially on cod, over the fairly steady level for

the previous 8-10 years.

#### Subarea 4

The total groundfish landings, from Subarea 4, in 1965 (Table 4) were maintained at the high level reached in 1963 and 1964. Amongst the main species fished, the main changes were (a) for haddock, the landings of which increased substantially, thereby continuing the upward trend starting in 1963, (b) for silver hake, the landings of which declined substantially, thereby continuing the downward trend from 1964.

The increase in the haddock landings and the decline in silver hake in 1965 was due principally to diversion of effort by USSR trawlers from fishing for silver hake to haddock, partly due to the decline in the stocks of the former (Res.Doc.66/39). This haddock fishing was concentrated in relatively shallow water, in the second half of the year.

Herring landings in 1965 also increased substantially, thereby maintaining the recent upward trend.

The estimated "fishing activity" in the subarea in 1964, although lower than in 1963, was high relative to earlier years of lower total production.

#### Subarea 5

Total groundfish landings from the subarea in 1965 were more than 50% greater than in 1964 (Table 5). This increase was the largest in the recent, sharp upward trend since 1961. This rise was due almost entirely to much higher landings of haddock, which were more than twice the 1964 level, and of silver hake, which increased by nearly 50%, thereby maintaining the striking growth in this fishery since 1961.

While the rise in haddock landings was due partly to an increased stock abundance due to good recruitment by the strong 1963 year-class (Res.Doc.66/41), the main cause was increased effort on haddock by USSR trawlers (Res.Doc.66/41). The rise in silver hake landings was also mainly due to increased effort. This is shown by the provisional estimates of fishing activity in the subarea.

In contrast to the groundfish landings in Subarea 5, those of herring decreased sharply in 1965, due to the reduced fishing in the offshore area

#### General Conclusions

In summary, therefore, these most recent data confirm the general situation outlined last year of (a) a trend towards higher exploitation in the traditional fisheries for cod and haddock in the ICNAF

area, (b) the continued rapid development of fisheries in the southern part of the area on species which had previously been of relatively minor importance.

In preparing these summaries of landings and fishing activity some difficulties were found in determining the precise manner in which the statistics for earlier years had been summarized. In order to reduce such difficulties in the future, it was agreed that prior to each Annual Meeting the Chairman of the Assessment Subcommittee should nominate one member of the subcommittee for each subarea to examine the statistics and summaries. In particular, it was agreed that the USA should examine the available series of data to determine the most useful index of fishing activity in Subarea 5.

## 2. Revision of Past Assessments in the Light of Latest Information

### (a) Cod

In its report last year, the Subcommittee concluded in confirmation of earlier assessments that with the possible exception of the fishery in Subarea 2, the fishing intensity in all of the cod fisheries in the ICNAF area is approaching, or may even be beyond, the level giving the maximum sustained yield per recruit. No new assessments have been made on cod for the other subareas but it seems likely that the fishing intensity in Subarea 2, especially on the stock in its southern Div.2J, has now also reached this level.

The results of Canadian investigations (Res.Docs.66/23, 66/24, 66/26) on the inshore fishery in this subarea show that with the large increase in offshore trawling, the catch-per-unit effort has decreased and the total mortality rate, determined from offshore research vessel data, has increased. These conclusions are supported by data from the offshore fishery where, despite the fact that continuing developments in the fishery have tended to increase the catch per day's fishing from a given stock abundance, the 1964 catch per day of trawlers showed for the first time a clear decrease from the previous year. Also, while the data available are not good enough to estimate precise mortality rates, old fish (more than, say, 10 years old) seem to be considerably scarcer in recent offshore samples than in 1960-61 when the fishery was developing. Further, the growth rate of the older age groups of cod has increased, perhaps as a result of a reduction in stock abundance due to the increased rate of exploitation by the offshore fishery. Assessment of the equilibrium yield per recruit for the present growth and mortality parameters, derived from these investigations, suggest that the fishing mortality rate is close to that giving the maximum sustained yield per recruit.

The Subcommittee

recommends (1)

*that the scientific investigations of cod stocks in Subarea 2 and Div. 3K and 3L should be intensified, attention being paid especially to (a) tagging of spawning cod in Div. 2G and 2H, (b) the assessment of changes in age compositions and the derived mortality rates of the catches by the offshore trawl fishery, (c) the growth rates of cod sampled in the offshore fishery, (d) the environmental factors governing the distribution and availability of cod in this area.*

(b) Haddock

The Subcommittee noted the conclusions reached from earlier assessments that in the main haddock fisheries in the ICNAF area, the fishing intensity is approaching or may even be beyond the level giving the maximum sustained yield. In this context, the large increases in haddock landings in 1965 from Subareas 5 and 4 may be of major significance. While it is known from US scientific investigations that recruitment of haddock on Georges Bank in 1965 was well above average (Res. Doc. 66/41), which contributed to the increase, it is evident that there was also a large increase in fishing intensity which, in the fisheries in both Subareas 5 and 4, was probably centred mainly on the smaller fish. In any fishery a temporary increase in catch substantially above the maximum sustainable level by a rapid and substantial increase in fishing intensity is possible, but if this level of fishing intensity were maintained, the catch would fall to a level less than the maximum sustainable one.

The Subcommittee emphasizes the importance of further detailed studies and

recommends (2)

*that detailed studies of the dynamics of the exploited haddock stocks in Subareas 4 and 5 be continued, with special reference to (a) the changes in size and age compositions of catches and in abundance and mortality rate of the exploited stocks following the recent increases in landings, for which purposes adequate sampling data for the major fleets are essential, (b) the estimation of changes in total fishing intensity on haddock in recent years, and that the results of these investigations and particularly statistical and sampling data be presented to the next Commission meeting.*

The possible interaction of haddock with other species in the area, such as silver hake, is also important.

(c) Redfish

The Subcommittee has nothing to add to the statement made last year regarding the position of the major redfish fisheries on the yield curve.

(d) Silver hake

As reported in the previous section, the large growth in the silver hake fishery in Subarea 5 continued in 1965, while that in Subarea 4 decreased further. The available data are still insufficient for assessments to be made of the effects of fishing on these stocks and of the main causes of the decline in abundance of the stock in Subarea 4, although information presented by USSR scientists (Res. Doc.66/39) indicate that this can be attributed, at least in part, to a decrease in recruitment. In view of the continued importance of the silver hake fisheries, especially in Subarea 5, the Subcommittee stresses the importance of their scientific investigation, with special reference to following the changes in the abundance, age composition and mortality of the exploited stocks.

3. West Greenland Cod

At the 1965 meeting of ICNAF, Panel 1 recommended:

- (i) that the Research and Statistics Committee examine the desirability of further protection of small cod at West Greenland, and in particular in this connection, the effects of a closure of Store Hellefiske Bank to trawling and
- (ii) that facilities be provided, if required, for a meeting of a small working group of experts to examine the matter.

Some of the scientists concerned had preliminary discussions at Halifax, and at the mid-term meeting of the Assessment Subcommittee in Rome in September 1965. The main meeting of the Working Group was held in Copenhagen from 21-25 February 1966, and the report of this meeting is given in ICNAF Res.Doc.66/18. The Group could not conclude all the studies and calculations considered necessary, and these were continued by individual members of the Working Group. The results of the work are given in reports by Horsted and Gulland (Res.Doc.66/72 and 66/56). The Group met finally in Madrid on 30 May 1966, when it considered the above documents and other information on the Greenland fishery.

The Subcommittee considered the reports of the Working Group and of its individual members (Res.Docs.66/18, 66/56, 66/72 and 66/77). It supports the main conclusions of the group, which were as follows:

- (a) Small cod at West Greenland are growing so rapidly that in the absence of fishing, and with a 20% annual natural mortality rate the total weight of a year-class would increase four times between 2 and 5 years old. Between 5 and 9 years there would be little change in the total weight of a year-class. With the present intensity of fishing and present levels of recruitment, the total catch should increase if the small cod were protected until around 4 years old.
- (b) Small fish less than 4 years old, though present in all subdivisions of West Greenland, are relatively more abundant in Div.1B. Because of the nature of the statistical and other material, it was not possible to consider different grounds within 1B separately.
- (c) The precise quantitative gain from measures to protect small fish depends on the proportion of the catch which is discarded (discards in this sense also include fish used only for fish meal), about which the Group did not have as much information as is desirable. It appears that at least 20% by numbers and possibly more of the fish caught by trawlers are discarded; some fish are possibly also discarded by liners, but much fewer than by trawlers, and some of these may survive.
- (d) Closure of Div.1B to trawling would tend to increase the total landings from West Greenland.
- (e) Total landings would also be increased even more if Div.1B were closed to both liners and trawlers. It is likely that fishing by liners in Div.1B would increase due both to increased stocks and to less physical interference between trawlers and liners if fishing were closed to trawlers alone.
- (f) The use of larger meshes by trawlers in Subarea 1 would also increase landings irrespective of the closure of Div.1B. All types of gear would probably benefit from mesh sizes up to 150 mm, but for meshes larger than 150 mm trawl landings are likely to decrease, though the total landings may still increase.
- (g) The greatest benefit should come from closing Div.1B and also using larger meshes throughout Subarea 1. At the most probable discard rate by trawlers of 20% by numbers and an estimated exploitation rate,  $E = 0.7$ , the calculated long-term gains from alternative conservation measures are as follows, as percentages of present landings per recruit. While no claims can be made for high precision in the values given in this table, they are presented to show the likely relative effects of different measures.

<u>Conservation measure</u>	<u>Long-term Gain %</u>		
	<u>Trawl</u>	<u>Line</u>	<u>Total</u>
150 mm mesh size	5	9	7
Closure of Div.1B to trawls	4	5	4
Closure of Div.1B to all offshore gears (lines and trawls)	7	6	7
150 mm mesh size and closure of Div.1B to all offshore gears	11	14	12

In assessing the effect of a given mesh size, it must be emphasized that the calculations have been made in terms of selectivity of a manila codend without chafers. The same effect would be produced by a smaller codend mesh of more selective material, or a larger codend mesh if chafers are used.

The Subcommittee also considers that for Subarea 1 the estimates of the probable benefits of conservation measures given in terms of weight under-estimate the economic benefits because the larger cod are worth more.

The Subcommittee also

recommends (3)

*that every effort should be made to supply the further data requested by the Working Group on West Greenland Cod, as follows:*

- (i) data on quantities and size of fish discarded or used for fish meal; (estimates of these quantities should be presented separately);*
- (ii) data on the present effective mesh size used at West Greenland, and on the types of chafer used, if any;*
- (iii) data on the hook size in use by liners and the selectivity of hooks;*
- (iv) data on size composition of all landings and catches, particularly for those fleets for which there is at present little material submitted for the Sampling Yearbook;*
- (v) data on the possible redistribution of ships at present fishing in Div.1B*

The Subcommittee also agrees with the Working Group's opinion that no further meeting of the Working Group would be necessary in the immediate future unless the Commission required further detailed information on specific problems not covered by the present report, or unless substantial conservation measures are introduced, the effects of which should be studied in detail.

#### 4. West Greenland Salmon Fishery

Small quantities of Atlantic salmon have been taken on the West Greenland coast for many years, but the present fishery, mainly using fixed gill nets, close inshore, built up from a catch of 115 tons in 1961 to 1,400 tons in 1964. The catch fell to 740 tons in 1965, apparently because changes in salmon and cod prices caused a reduced effort.

The recoveries in the West Greenland fishery have included fish marked in Canada, USA, Sweden, Ireland, Scotland and England. To examine the effect of the West Greenland catches on the catches and stocks of other countries, the ICES/ICNAF Working Party on North Atlantic Salmon was established in 1965 and held its first meeting during the present Annual Meeting of ICNAF.

The Subcommittee considered the draft report of the Working Party (Res.Doc.66/79).

The conclusions presented were obtained from data that in many respects were much less complete than is desirable. Some of the calculations were included rather as examples of the techniques that might be used as further data are collected, rather than for the value of the precise estimates obtained. However, on the basis of the assumption which was applied throughout the work that the salmon in the stocks fished in West Greenland behave like salmon visiting other ocean areas, and if they survive will return to their native rivers, certain preliminary conclusions can be reached:

- (a) The West Greenland salmon fishery as operated at present has no direct influence on the abundance of grilse returning to home waters.
- (b) The proportions of salmon appearing in the stocks exploited at West Greenland varies widely for different countries; probably the proportion from Canada is greater than that from the UK, while few, if any, of the fish in the stocks exploited at West Greenland come from the north or west coasts of Norway.
- (c) Between the time of the West Greenland fishery and assumed return to home waters the fish of the sizes caught in the present West Greenland fishery increase in weight by about 50%. Therefore if more than about 70% of the fish present in West Greenland waters would, in the absence of the Greenland fishery, be caught in home waters, then a West Greenland fishery would reduce the total catch (West Greenland plus home waters). If less than 70% would be caught, then a West Greenland fishery would increase the total catch. The percentage which would be caught in home waters depends on the exploitation rate in home waters, and on the losses (mortality,

including any failure to navigate) between West Greenland and home waters. At present no good estimate of the rate of loss is possible, and the home rate of exploitation, which can only be estimated very approximately, seems to vary greatly between countries.

- (d) If the assumption concerning the return of fish from West Greenland to home waters is correct, the West Greenland fishery will reduce the total catches of large salmon in home waters.
- (e) Because of probable differences in the proportion of fish visiting West Greenland and in the home exploitation rates, the proportional reduction in North American catches will probably be greater than in European catches.
- (f) There is no direct evidence on the probable effect of increased exploitation on subsequent natural production of smolts. The West Greenland fishery may reduce spawning stocks but if this reduction is small, the effect on smolt production will be negligible.

The Subcommittee agrees with the recommendations of the Working Party regarding future work and

recommends (4)

*that ICNAF scientists should give every assistance in carrying out the recommendations of the ICES/ICNAF Joint Working Party on North Atlantic Salmon.*

In doing so, it draws special attention to Rec.9 of the Report of the Working Party (Res.Doc.66/79) and

recommends (5)

*that ICNAF scientists, especially those in countries not regularly engaged in salmon fishing, should take every opportunity to obtain and record biological data regarding Atlantic salmon taken in offshore waters during fishing operations for other species.*

5. FAO/ICES/ICNAF/UNESCO/IBP Symposium on Tropho-dynamics of Marine Communities

The Subcommittee considered the verbal report from Dr L.M.Dickie on the meeting of the planning group for this Symposium. It reaffirms the opinions expressed that such quantitative studies of the food chains in the sea were of direct relevance to the work of the Assessment Subcommittee. It noted that ICNAF at its 1965 meeting indicated its willingness to co-sponsor this symposium and to give

financial support for publication. Recent progress in planning the symposium suggests that there may not be a publication cost to be borne by the sponsoring organizations. The Assessment Subcommittee therefore

recommends (7)

*that ICNAF indicate its continued willingness to co-sponsor this Symposium, and that the funds originally specified for publication support be used to defray general symposium costs.*

The Subcommittee also noted that the final prospectus for the symposium should ideally be distributed prior to the 1967 Commission meeting. In order to permit such circulation, the Subcommittee

recommends (8)

*that ICNAF designate the Chairman of the Commission, the Chairman of R&S, and the Executive Secretary as a committee empowered to signify ICNAF approval of the draft prospectus for the tropho-dynamic symposium.*

6. Stock and Recruitment

This was discussed in a joint meeting with the Environmental Subcommittee. The Assessment Subcommittee emphasized the importance of understanding the relation between stock and recruitment in providing reliable advice to the Commission on the effect on catches of changes in mesh size and particularly the effects of changes in the total amount of fishing.

Data on adult stock and subsequent recruitment for a long series of years for Georges Bank haddock, showed that the impression from data before 1931 that recruitment is greatest at intermediate stocks, and low for very large and possibly also for small stocks, was not confirmed by data since 1931. However, none of the adult stocks since 1931 were as large as those giving the low recruitment in the pre-1931 period. It was felt that the proposed Georges Bank Survey might give valuable information on both the specific problems of recruitment on Georges Bank haddock and the general stock and recruitment problem. However, before embarking on a large extensive program, it was felt that the data on variability of catches of larvae, etc. should be examined to determine whether a survey on a feasible scale would give estimates of larval mortality etc. which would be sufficiently precise, and in particular whether, over the range of adult stocks likely to be observed during the years of the survey, differences in mortality could be measured with sufficient accuracy to be correlated with changes in adult population.

## 7. Economic Criteria in Fishery Management

Following approval of Rec.14, 1965 (Redbook 1965, Pt.I, p.34), discussions were held by the Assessment Subcommittee with the participation of economists regarding economic criteria in fishery management on the basis of Comm.Doc.66/17 and Res.Doc.66/19. The Subcommittee noted that, as reported in previous years, the intensity of fishing on some stocks of particular species in the Convention Area, such as the cod in Subarea 1, has already approached or even passed the level giving the maximum sustainable yield. This means that the present catch of these species might be taken with a smaller fishing effort, and hence with reduced costs.

The Subcommittee felt that it would be helpful for the Commission in its further review of possible conservation actions for the Convention Area if an assessment were made of the likely effects of such actions on the yield of the fisheries in the Convention Area by a group of fishery biologists and economists working closely together. This collaboration is desirable because economic consequences are an important feature of the results of regulatory measures and because biological assessments constitute an essential background for economic analysis, in that they provide the necessary information on the actual and potential output from the resource.

The Subcommittee therefore

recommends (9)

*that the Chairman of R&S and the Executive Secretary arrange for a joint assessment by biologists and economists of the effects of possible conservation actions in the Convention Area. This assessment should be made in collaboration with any other appropriate international body willing to contribute, and should be prepared for submission to the Commission at its 17th Annual Meeting. The Chairman of F&A is requested to arrange for suitable budgetary provisions.*

## 8. Mid-term Meetings

Since the 1965 Annual Meeting, two meetings of members of the Assessment Subcommittee have taken place - a general meeting at the time of the ICES meeting in September, and a meeting of the West Greenland Cod Working Group in Copenhagen in February. The Subcommittee believes that those meetings were of considerable assistance in its task of supplying advice to the Commission, and would emphasize that the only two fisheries for which detailed advice is given in this report (West Greenland cod and West Greenland salmon) are those for which small working groups of scientists, experts in the field, met apart from the regular meetings of ICNAF. While no general meeting of the Assessment Subcommittee is believed to be necessary in 1966/67, if the Commission desires detailed advice on particular fisheries, this can only be done by a separate meeting of

a working group of those scientists particularly concerned.

9. Future Work

Essential to any future work of the Assessment Subcommittee is the existence for each major fishery on a stock of a full series of landings and effort statistics, sampling data for length and age, effective mesh size in use, and discards. Members of the Subcommittee examined the current data as presented in the Statistical Bulletin, the Sampling Yearbook for 1964 and Res.Doc.66/16, 66/11 and 66/76. The availability of these data are summarized in Tables 6a-e, which also give the total catches of the major species by each fleet. It appears that for every stock there are substantial gaps in the data available. Some of the gaps can be filled from data from other fleets. The length composition of the catches of one fleet of large trawlers may be estimated reasonably well from those of another fleet of trawlers with similar market demands. However there are many gaps in the data which cannot be adequately filled, and the Subcommittee therefore

recommends (11)

*that where the data submitted on nominal catches, fishing effort, length, age, discards, etc. from any fleet taking a substantial catch from one of the major ICNAF stocks are incomplete, the countries concerned are strongly urged to make every effort to collect and submit such data to ICNAF. The Executive Secretary, in consultation with the Chairman of the Assessment Subcommittee, will draw the attention of countries to the main gaps in the present series of data.*

Table 1. Subarea 1. Landings (=Nominal catches), landings per unit effort and fishing activity, 1957-1965.

	1957	1958	1959	1960	1961	1962	1963	1964	1965 <sup>a)</sup>
Landings (000's tons)									
All Gears	269	320	234	243	345	451	406	350	358
Cod	28	18	33	44	54	60	47	30	24
Redfish									
Total	304	345	273	295	414	526	474	413	405
(all species)									
Otter Trawl									
Cod	140	173	110	101	171	247	244	250	-
Total	169	192	143	147	236	318	306	290	-
(all species)									
Landings (tons) of Otter Trawlers (all size groups) per day on ground (all groundfish species)	19.6	19.6	16.1	17.7	18.7	22.4	19.7	-	-
Landings (tons) of Otter Trawlers per day fished (all groundfish species)	-	-	-	-	-	29.1	25.1	20.3	-
Estimated total fishing activity for all ground-fish species	7,614	9,781	8,864	8,286	12,618	14,165	15,519	-	-
Days on ground									
Days fished						10,928	12,185	14,282	-
All ground-fish species	15,500	17,600	18,200	16,200	22,100	23,400	24,100	-	-
Days on ground									
Days fished						18,100	18,900	20,050	-

(a) Provisional figures

Table 2. Subarea 2. Landings (=Nominal catches), landings per unit effort and fishing activity, 1957-1965.

	1957	1958	1959	1960	1961	1962	1963	1964	1965
Landings (000's tons)									(a)
Cod	20.4	29.1	41.1	171.5	246.4	230.6	191.0	197.2	(306)
Inshore	11.7	11.1	18.9	16.7	18.6	24.6	24.7	15.6	(25)
Total	32.1	40.2	60.0	188.2	265.0	255.2	215.7	212.8	331.5
Redfish	-	77.6	52.8	82.9	25.6	7.3	6.1	27.1	24.2
Haddock	-	-	-	-	+	0.1	0.1	+	+
Flounder	-	-	0.1	1.5	1.1	0.4	0.3	2.2	7.2
Total (all groundfish species)	32.1	118.6	113.7	279.3	296.1	265.9	223.5	244.6	375.0
Landings (tons) per day fished (all groundfish species)									
Otter T. > 1800 GRT	-	32.1	21.7	39.3	36.6	36.0	44.6	40.5	-
Otter T. 901-1800 GRT	16.4	10.3	12.7	25.4	23.4	29.0	29.4	23.8	-
Otter T. 501-900 GRT	-	38.7	43.0	36.4	29.2	(46.4)	(22.0)	14.3	-
All Otter T. over 500 GRT	(16.4)	22.6	31.7	30.0	28.0	30.5	30.8	22.2	-
Total estimated fishing activity for groundfish in days fished									
	1,960	5,247	3,585	9,311	10,575	8,719	7,255	11,018	-

(a) Provisional figures (b) Estimates based on reported effort data for all trawlers over 500 GRT

Table 3. Subarea 3. Landings (=Nominal catches), landings per unit effort and fishing activity, 1954-1965.

Landings (000's tons)	(a)											
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Cod	471.6	429.0	389.7	448.8	293.6	425.3	470.0	460.6	389.0	466.4	581.4	504.3
Haddock	55.3	104.5	84.2	68.1	44.4	35.0	67.1	79.7	35.1	14.4	12.4	8.5
Redfish	37.2	17.6	29.8	57.7	158.7	246.1	99.3	89.9	61.3	68.7	94.6	108.6
Halibut	1.3	0.9	1.4	2.2	2.1	2.4	2.8	2.4	1.8	1.3	1.8	2.1
Flounders	11.4	19.4	17.6	26.3	24.5	25.1	35.1	30.0	27.2	34.4	53.7	80.0
Other												
Groundfish	9.6	9.4	8.6	8.1	8.8	19.1	17.1	10.9	7.9	7.1	6.9	18.8
Total												
Groundfish	586.4	580.8	522.5	611.2	532.1	753.0	691.4	673.5	522.3	592.3	750.8	722.3
Herring	7.7	5.2	4.2	7.6	10.8	4.5	5.4	4.1	5.2	5.8	3.3	8.1
Others (b)	15.9	15.3	14.5	7.7	9.3	5.4	6.4	6.0	5.0	6.3	5.4	4.6
Herring and Others	23.6	20.5	18.7	15.3	20.1	9.9	11.8	10.1	10.2	12.1	8.7	12.7
Total (c)												
(all species)	610.5	601.8	541.7	627.0	552.0	763.6	704.3	684.0	533.3	605.3	769.5	737.3
Landings (tons) per day fished (all groundfish species)	17.1	18.2	18.6	18.9	17.5	19.3	18.0	18.7	16.1	17.9	16.6	(18.7)
Estimated fishing activity for groundfish in days fished by trawlers	34,300	31,900	28,100	32,300	30,400	39,000	38,400	36,000	32,400	33,100	45,200	(40,200)

(a) provisional figures (b) includes capelin and "Other Pelagic Fish" (c) includes all fish species (d) figures in brackets are estimates for European trawlers only, other figures refer to combined Canadian and European trawl fishery (e) Top figure based on catch/day of combined Canadian and European fishery, figure in brackets based on European fishery only. Estimates of fishing activity based on all trawlers except that the days fished by USSR trawlers (150-575 GRT) were estimated in terms of equivalent days by larger (>1800 GRT) USSR trawlers; also hours fishing by UK trawlers for years up to 1963 converted to days fished using the ratio Hours fishing/days fished for trawlers of other countries.

Table 4. Subarea 4. Landings (=Nominal catches), landings per unit effort and fishing activity, 1957-1965.

	1957	1958	1959	1960	1961	1962	1963	1964	(a) 1965
Landings (000's tons)	187.8	213.3	213.5	218.5	212.0	218.8	218.5	229	225
Cod	47.7	48.9	53.4	46.3	46.9	44.0	51.3	60.0	85.2
Haddock	54.8	54.9	42.3	49.7	41.9	43.2	58.6	52.6	68.4
Redfish	2.8	2.6	2.5	2.7	2.4	2.3	2.1	2.2	2.3
Halibut	16.3	17.0	19.6	26.1	27.0	25.3	30.5	32.2	47.9
Flounders	-	-	-	-	-	8.8	123.0	81.1	50.0
Silver hake	368.2	403.2	395.2	405.5	376.2	422.6	585.9	548.2	565.0
Total	91.4	92.5	101.5	105.0	81.1	115.6	111.4	139.6	180.4
Herring									
Landings (tons) (b)									
per day fished	14	15	14	13	13	12	13	14	
(all groundfish species)									
Estimated fishing activity for groundfish in days fished	26,400	27,100	27,900	31,000	28,800	35,200	45,000	39,100	

(a) provisional figures. Landings include all species reported in Table 3 of Statistical Bulletin excluding shellfish and herring

(b) based on catch per day of all otter trawlers over 50 gross tons and all pair trawlers. Catches of herring are excluded from the estimates of landings per day and fishing activity.

Table 5. Subarea 5. Landings (=Nominal catches), landings per unit effort and fishing activity, 1954-1965.

	1957	1958	1959	1960	1961	1962	1963	1964	1965 (a)
Landings (000's tons)									
Cod	13	16	16	14	18	26	30	28	42
Haddock	55	45	41	46	52	59	60	70	155
Redfish	18	16	16	11	14	14	10	8	8
Flounders	23	26	25	27	29	38	48	50	57
Silver hake	57	48	50	47	42	86	147	220	323
Total (b)	310	262	276	221	228	300	391	475	723
Herring: inshore	23	81	48	69	27	71	70	28	35
offshore	-	-	-	-	68	151	97	131	40
Landings (tons) of (c)									
groundfish per day fished	-	7.3	7.0	6.5	7.3	8.2	7.9	7.0	(5.4)
Catch (tons) of herring (d)									
per hour fished (offshore)	-	-	-	-	-	1.2	0.8	1.9	?
Estimated fishing (c)									
activity for groundfish	-	36,000	39,000	34,000	31,000	36,000	50,000	68,000	(134,000)
in days fished									
Estimated fishing activity (d)									
for herring (offshore) in									
hours fished							130,000	123,000	67,000 ?

(a) provisional figures (b) includes all species in Table 3 of Statistical Bulletin, except shellfish and herring (c) estimates based on US trawlers of 50-150 GRT. For 1957-64, estimates of activity obtained for Div.5Y-5Z separately and summed; for 1965, single estimate obtained from the activity of US Otter Trawlers of all sizes in the whole subarea. (d) estimates based on USSR middle-sized trawlers. This class of vessel did not operate on herring in 1965.

Table 6. Sampling and other data available. (Where data have been collected, but not reported in the relevant ICNAF document, the fact is noted in brackets).

a. Subarea 1

Species	Country	Gear	1965 catch		Data Available			Remarks
			'000 tons	Length	Discard	Mesh	Age	
Cod	Germany	Trawl	104	Yes	Yes	Yes	Yes	
	Denmark (F)	Line ) Trawl)	66	No Yes	No (Yes)	- No	No Yes	Statistics by Divi- sions not available
	Portugal	Dory ) Trawl)	61	No	No	No	No	
France	Norway	Trawl	40	No	No	No	No	
		Line ) Trawl)	33	(Yes) (Yes)	No No	- No	No No	Full statistics by Divisions not available
Denmark (G)	Mixed							
		(not trawl)	24	Yes	(Yes)	-	Yes	
UK		Trawl	14	Yes	No	No	Yes	
Others		Trawl	16	Yes	No	Yes	Yes	USSR Research Vessel data
Total			359					
Redfish	Germany	Trawl	16	No	(Yes)	No	No	
	Others	Trawl	5	Yes	No	Yes	Yes	USSR Research Vessel data
Total			21					

Note: For cod, collection of age data is probably adequate, but further data on all other points are required, especially on discards, and on the catch statistics by Divisions by liners

Table 6 (continued)

b. Subarea 2

Species Cod	Country	Gear	1965 catch			Data Available			Remarks
			'000 tons	Length	Discard	Mesh	Age		
Portugal		-	73	No	Yes	No	No		
Spain		Trawl	59	Yes	Yes	Yes	No		
USSR		Trawl	54	Yes	No	Yes	Yes	Research Vessel data	
Germany		Trawl	39	(Yes)	Yes	No	No		
Canada		Mixed	26	Yes	-	Yes	No		
France		Trawl	26	No	No	No	No		
Poland		Trawl	12	No	Yes	No	No		
UK		Trawl	11	(Yes)	Yes	No	(Yes)		
Others		Trawl	31	No	No	No	No		
Total			332						

Other species: Total catch of other species in 1965 was 44,000 tons, mostly redfish. Length data for redfish and American plaice are available.

c. Subarea 3

Species Cod	Country	Gear	1965 catch			Data Available			Remarks
			'000 tons	Length	Discard	Mesh	Age		
Canada		Mixed	243	Yes	Yes	Yes	Yes		
USSR		Trawl	144	Yes	No	Yes	Yes	Research Vessel data	
Spain		Trawl	126	Yes	Yes	Yes	(Yes)		
France		Trawl	59	No	No	No	No		
Portugal		Mixed	49	Yes	Yes	Yes	No	Only 3 length samples	
UK		Trawl	30	(Yes)	No	No	No		
Poland		Trawl	29	Yes	Yes	No	No		
Denmark (F)		-	16	No	No	No	No	No statistics by Divisions	
Germany		Trawl	10	No	Yes	Yes	No		
Others		?	39						
Total			746						

Note: There are several stocks in the area. The data for individual stocks has not been examined.



Table 6 (continued)

d. Subarea 4 (continued)

Species	Country	Gear	1965 catch				Data Available				Remarks
			'000 tons	Length	Discard	Mesh	Age	Yes	No	Yes	
Haddock	Canada	-	32	Yes	No	Yes	No	Yes	No		
	USSR	-	45	No	No	No	No	No	No		
	Others	-	8	Yes	No	No	No	No	No	Research samples	
	Total		85								
Redfish	Canada		36	Yes	Yes	Yes	No	Yes	No		
	USA		30	Yes	No	No	Yes	Yes	No		
	Others		2	No	Yes	No	No	No	No	Discards from German trawlers	
	Total		68								
Silver hake	USSR	-	50	Yes	No	No	Yes	Yes	Yes	Discards probably negligible	
	Total		50								
American plaice	Canada		15								
	Total		15								
Witch	Canada		11								
	Total		11								
Pollock	Canada		25	Yes	Yes	Yes	No	Yes	No		
	Others		3								
	Total		28								

Other species: Length data from Canadian catches of cusk available.

e. Subarea 5

Species	Country	Gear	1965 catch				Data Available				Remarks
			'000 tons	Length	Discard	Mesh	Age	Yes	No	Yes	
Cod	USA	Trawl	15	No	No	No	Yes	No	No		
	USSR	"	14	No	No	No	No	No	No		
	Canada	"	11	No	No	No	Yes	No	No		
	Others	"	2	No	Yes	Yes	No	No	No		
	Total		42								

Table 6 (continued)

e. Subarea 5 (continued)

Species	Country	Gear	1965 catch '000 tons	Data Available				Remarks
				Length (Yes)	Discard (Yes)	Mesh	Age	
Haddock	USSR	Trawl	82	No	No	No	No	(Joint long-term studies (between USA and Canada
	USA	"	57	Yes	Yes	Yes	Yes	
	Canada	"	15	No	No	Yes	No	
	Total		155					
Silver hake	USSR	Trawl	281	Yes	No	Yes	Yes	
	USA	"	42	Yes	No	Yes	No	
	Total		323					
Red hake	USSR	Trawl	59	(Yes)	No	No	(Yes)	
	USA	"	13	No	No	No	No	
	Total		72					
Yellowtail Flounder	USA	-	37	Yes	Yes	Yes	Yes	
	USSR	-	36	(Yes)	No	Yes	(Yes)	
	USA	-	34	Yes	-	-	Yes	
Herring	USSR	-	36	(Yes)	No	Yes	(Yes)	
	USA	-	34	Yes	-	-	Yes	
	Others		3					
	Total		73					

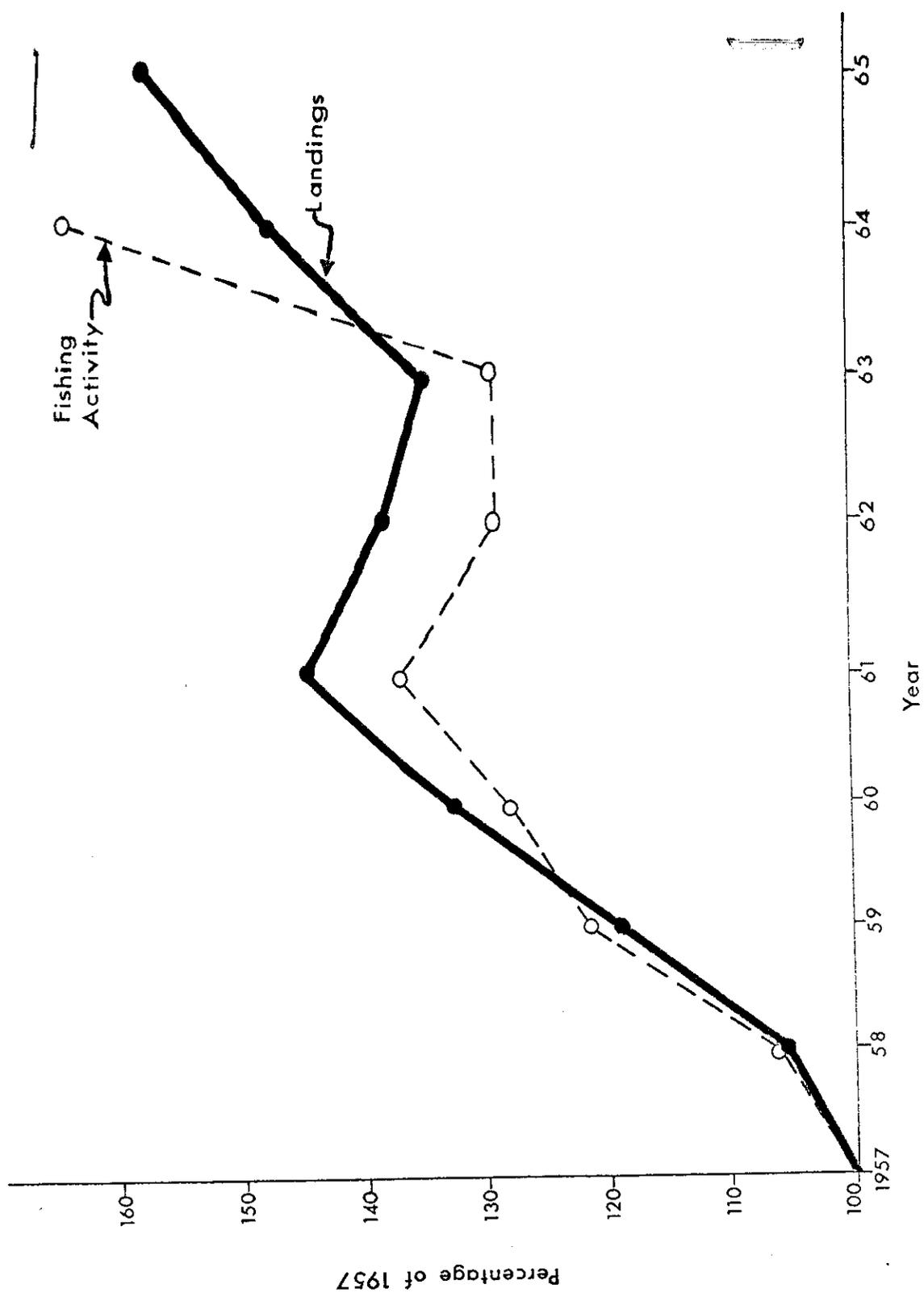


Fig. 1. Groundfish landings and fishing activity relative to 1957 for Subareas 1, 2 and 3 combined.

APPENDIX II - REPORT OF THE SUBCOMMITTEE ON STATISTICS AND SAMPLING

Chairman: F.D.McCracken; Rapporteurs: L.P.D.Gertenbach, L.K.Boerema

The Subcommittee met on 30 May and 1 and 2 June 1966.

The Subcommittee expressed a cordial welcome to Dr Boleslaw Kowalewski, the new Assistant Executive Secretary. The agenda was adopted with minor additions and some change in the order of dealing with the items.

1. Timeliness of Reporting Statistical Data

Mr Gertenbach (FAO), Secretary of the Continuing Working Party on Fishery Statistics in the North Atlantic Area (CWP), reported that all member countries submitted 1965 STANA 2 forms (ICNAF Summary) on time and that this excellent response enabled FAO to prepare in time for the Annual Meeting of R&S, Tables 1 and 3 showing nominal catch data, for 1965, by species, Subareas, Divisions and countries (FAO Fisheries Circulars Nos.81 and 82 and ICNAF Res.Doc.66/3).

The Subcommittee expressed its appreciation for this prompt reporting and rapid processing and asked the Secretary of the CWP to provide similar documents for the 1967 Annual Meeting of ICNAF. Mr Gertenbach agreed and foresaw no difficulties provided that the national offices submit the STANA 2 data for 1966 by 15 April 1967.

The Subcommittee agreed that the work of the Chairmen of the Scientific Advisers to Panels would be facilitated if the nominal catch data (similar to those appearing in FAO Fisheries Circulars 81 and 82 for the subarea with which they are concerned) could, in future, be made available to them at least a few days before the R&S meeting. The Secretary of the CWP informed the Subcommittee that this would be possible provided that national offices inform him in time about the ICNAF subareas fished by their countries in the year concerned. The Subcommittee

recommends (12)

- (i) *that the deadline for national reporting offices to submit the completed STANA 2 (ICNAF Summary) forms to the CWP Secretary, with copies to the ICNAF Secretariat, be 15 April of the year following the calendar year to which the statistics refer;*
- (ii) *that, on or before 15 April, member countries provide the Secretary of the CWP with a listing of the five ICNAF subareas showing whether or not their fishing craft have fished in these subareas during the preceding year;*

- (iii) that the deadline for submitting the completed STANA 1W forms to the ICNAF Secretariat with copies to the CWP Secretary, be changed to 15 June.

## 2. Use of STANA Reporting Forms and Instructions

The Subcommittee considered ICNAF Res.Docs.66/4 and 66/5 and noted that all changes in the Notes for Completion of STANA 2 and 1W Forms (Rec. 16, 18, 19 (iii) and 21, 1965) had been made. It noted with appreciation that not only the European countries but also Canada and the USA are now using the STANA forms for reporting their statistics data.

The Subcommittee decided that the only change in the STANA forms or Notes should be a change in the gear categories. Since it appears useful to show effort and catch data on the STANA 1W forms separately for (a) otter trawls used by side trawlers and (b) otter trawls used by stern trawlers, the Subcommittee

### recommends (25)

- (i) that before 15 August 1966, the Secretary of the CWP write to ICNAF member countries and other countries fishing in the ICNAF area to ask any country which can distinguish between (a) side trawlers and (b) stern trawlers to make this distinction when reporting 1966 nominal catch data on STANA 1W forms by 15 June 1967;
- (ii) the CWP Secretary should at the same time ask all countries not able to make the distinction between side trawlers and stern trawlers when reporting 1966 data, to start making this distinction in collecting catch/effort data for their trawler fleets as from 1 January 1967 and to show this distinction when reporting 1967 data on STANA 1W for submission on or before 15 June 1968;
- (iii) that no further changes be made in either the STANA 2 and 1W forms or in any of the Notes except these changes shown in (i) and (ii) above.

## 3. Information on Discards and on Industrial Fish turned into Fishmeal at Sea

The Subcommittee discussed the reports on discards (ICNAF Stat.Form 4) for 1964 (Res.Doc.66/10) and the ambiguities contained therein. It concluded that reporting of discards might be improved by a modification of the design of the reporting forms. A new form (ICNAF Stat. Form 4 (Revised)) was prepared (Annex I) and the Subcommittee

recommends (26)

- (i) that the new form, ICNAF Stat. Form 4 (Revised), be adopted for the reporting of 1966 data and that instructions for completion should be given on the back of each form;
- (ii) that copies of the new form showing hypothetical examples be sent to each national office providing the discard data in order to illustrate the way in which the forms should be used;
- (iii) that the Executive Secretary then contact each national office to find out whether they still have queries concerning the correct use of the forms;
- (iv) that data reported on the new form indicate separately estimates of (a) whole fish returned to the sea, and (b) whole fish turned at sea into fish meal;
- (v) that the deadline for submitting completed copies of the new form to the ICNAF Secretariat be 15 July.

It should be understood that while STANA forms will continue to provide information on the total nominal catch, including fish used for fish meal, the new ICNAF Statistics Form 4 will provide information necessary for biological studies.

4. Conversion Factors

The Subcommittee noted that appropriate parts of its Rec.19, 1965, have been carried out by the ICNAF Secretariat and the Secretary of the CWP. It agreed that various intergovernmental agencies are concerned with these matters and that the most effective documentation probably could be produced through cooperation between the CWP and these agencies. Thus it again endorses the consideration of conversion factors as an item for the Agenda of the Fifth Session of the CWP, and reaffirms its Rec. 19(iv) and (v), 1965.

5. Review of Common and Scientific Names

The Subcommittee noted that the ICNAF Secretariat and the CWP Secretary have implemented relevant parts of Rec.16, 17, 18 and 23, 1965. The Subcommittee reviewed FAO Fisheries Circular No.79 (Res. Doc.66/2), which FAO proposes to issue in time for the ICES meeting in October 1966 as a Bulletin of Fishery Statistics (North Atlantic Species Names). The Subcommittee considered this Bulletin most useful and endorsed the FAO proposal.

The Subcommittee expressed concern about the apparent confusion in designations of the red and white hakes (*Urophycis* spp.) by different nations (Res.Doc.66/55). The Subcommittee

- (a) The ICNAF Secretariat will use the STANA 1W forms to check Tables 1 and 3 prepared by FAO on the basis of STANA 2 forms and published as FAO Fisheries Circulars 81 and 82;
- (b) ICNAF will revise these circulars where necessary and provide FAO with the final version of ICNAF Bulletin Tables 1 and 3 by 15 October 1966;
- (c) FAO will include these revised figures of nominal catches by species, subareas and countries in the Bulletin of Fishery Statistics "Catches in the North Atlantic, 1965";
- (d) ICNAF will complete the manuscript of Tables 2, 4 and 5 for Volume 15 of its Statistical Bulletin by early 1967.

B. Requests for and processing of the data for 1966 -

- (a) The Secretary of the CWP will send out by 15 January 1967 requests for completion and return of STANA 2 (ICNAF Summary) by 15 April 1967 and of STANA 1W by 15 June 1967;
- (b) The CWP Secretary is to prepare Fisheries Circulars similar to Nos. 81 and 82 (ICNAF Res. Doc. 66/3) so as to have them available at, or preferably before, the 1967 ICNAF meeting, taking into account the need to submit subarea details to various Chairmen of Panel Advisers;
- (c) Then proceed as in A (a), (b), (c) and (d) above for the 1966 compilations.

8. Extension of ICNAF Statistics Collection Southward

The Subcommittee interpreted this item to be within its field and considered questions about collection and publication of catch/effort data by country, species and fishing area for the region off the east coast of North America south of the ICNAF Convention Area. From Article VI of the Convention, paragraphs 1(b) and 1(f), ICNAF is empowered to request such information. The Subcommittee was informed by the CWP Secretary that FAO collects, for publication, total nominal catch figures by countries and species for the Western Central Atlantic, a region which includes the area of most interest to ICNAF. The Subcommittee recognized an urgent need for catch/effort statistics for the region between the ICNAF Convention Area and Cape Hatteras, and agreed that a joint statistics collection scheme for this region should be worked out. It considered that the CWP was the most appropriate body to advise ICNAF in this matter. The Subcommittee therefore

recommends (27)

- (i) that FAO be informed of ICNAF's endorsement of the FAO proposal to produce a Bulletin of Fishery Statistics entitled "North Atlantic Species Names";
- (ii) that the ICNAF List of Species appearing in the Statistical Bulletin (Vol.14) should be included as a part of the proposed FAO Bulletin in the same way as the ICES List of Names is to be incorporated;
- (iii) that the code number "43" (previously used for Molva molva), deleted from the ICNAF List by Rec.23(i), 1965, be assigned to the "Argentines (Silver smelts) - Argentina spp.";
- (iv) that ichthyologists from Canada, the USSR and the USA should study the two species - white hake (Urophycis tenuis) and red hake (Urophycis chuss) - and report on the feasibility of distinguishing between catches of these two species within and south of the present ICNAF Statistical Area.

6. Preparation of ICNAF Statistical Bulletin, Volume 14, 1964

The Executive Secretary reported on progress made with preparation and printing of the manuscript of Volume 14. Resignation of the Commission Statistician had delayed this manuscript. Tables 1 and 3 were prepared near the end of 1965, using temporary help. Financial arrangements were made with FAO for its Fishery Statistics and Economic Data Branch to prepare the manuscript of Tables 2, 4 and 5 of Volume 14, and manuscript copies of Tables 1, 2 and 5 were distributed to the meeting. It is hoped to distribute the copies of Volume 14 (1964 data) by August 1966.

The Executive Secretary reported on improvements in design and layout of the tables, including the improvements suggested in 1965 Rec.17. He noted that the two columns "Other Groundfish" and "Other Pelagic Fish" have not yet been added to Table 5 but that these additions will be made in Volume 15. In Tables 4 and 5 "Others" has not yet been changed to "Other Fish" and "Shellfish"; this change will also be introduced in Volume 15.

7. Proposals for the Preparation of ICNAF Statistical Bulletin Volume 15 (1965) and Related Statistical Publications

The Subcommittee was informed by the Executive Secretary and the CWP Secretary of the internal arrangements made to process these data, based on the experience gained in dealing with the various ICNAF and FAO statistical publications, during the past twelve months. The Subcommittee took note of the following procedures:

A. Processing of the data for 1965 -

recommends (13)

- (i) *that the ICNAF Secretariat request countries to report to the ICNAF Secretariat and the CWP Secretary catch and effort statistics for 1966, for the region southward of the ICNAF Convention Area to the latitude of Cape Hatteras, such reporting to be on forms and by deadlines prescribed for the ICNAF region and to include in this reporting the species contained in the ICNAF species list;*
- (ii) *that the ICNAF Secretariat obtain from the USA details of its statistical reporting divisions for fishing areas in waters south of the ICNAF Area extending to the latitude of Cape Hatteras and submit the material to the Fifth Session of the CWP;*
- (iii) *that the Secretary of the CWP present to the Fifth Session of the CWP statistical tables showing nominal catches by countries, species and possibly also fishing areas for the region between the present ICNAF Area and the latitude of Cape Hatteras;*
- (iv) *that the information requested in (ii) and (iii) be distributed (revised as necessary) as documents for the 1967 Meeting of R&S together with a document giving the CWP's advice on the introduction of a suitable interagency statistical reporting scheme for these waters;*
- (v) *that a suitable and clear designation for this statistical area (and its possible divisions) should be introduced.*

9. Content of ICNAF List of Vessels (1965)

The Executive Secretary reported that all member countries but two had submitted the data for inclusion in the ICNAF List of Vessels for 1965. Countries reporting to date have been able to supply information on most of the items requested.

The Subcommittee noted the Proforma of a Proposed ICES List of Fishing Craft based on the ICNAF pattern and prepared by the CWP Secretary for submission to the 1966 ICES meeting.

The Subcommittee reviewed the items requested by ICNAF for its List of Vessels and

recommends (28)

- (i) *that for future vessel lists an additional request be made for a distinction between side and stern trawlers;*

- (ii) that the terms "sonar" and "echo sounder" be replaced by "Echosounder: horizontal or ranging" and "Echosounders vertical" respectively;
- (iii) that the Secretary of the CWP be informed of these changes in the ICNAF Vessel List for consideration and that the information be communicated to ICES.

As far as the information on side and stern trawlers can be readily obtained for the 1965 vessels it will be included in the List. Members of the Subcommittee will in many cases be able to provide the Executive Secretary with this information concerning the fleets of their countries.

The Subcommittee reiterated its opinion expressed in Rec.25, 1965, that a combined list of ICES and ICNAF vessels for the North Atlantic region would be desirable. It was agreed that ICES should be informed of ICNAF's desire to maintain a complete list of vessels fishing in the ICNAF Area including those below 150 tons in its list, and that the form of a joint publication, if agreed upon, could be worked out later.

The Subcommittee

recommends (14)

*that the Continuing Working Party be asked to make the necessary arrangements for a joint North Atlantic Vessel List if ICES decides to participate in such an undertaking.*

The Subcommittee asked the Executive Secretary to provide the forthcoming meeting of the CWP with the available information on reporting of effort data in the ICNAF Area with the request to the CWP to review and appraise this information and to report on its findings for discussion at the next meeting of the Subcommittee. In the meanwhile, it was decided that the information such as submitted for the year 1964 was useful, and the Subcommittee reiterated its Rec.27, 1965, that the Secretariat make an extra effort to obtain complete information on fishing effort for 1965 on ICNAF Statistics Form 3, and that if successful, the 1965 summaries should be published in the 1965 List of Vessels. The Executive Secretary and the Chairman of the Subcommittee are to decide whether or not the collection of effort data has been successful. The deadline for the submission of 1965 effort data has been put at 15 July 1966.

On advice from the Subcommittee on Gear and Selectivity, it was agreed that the List of Vessels is not the appropriate place to publish summary data on types of trawl material and codend mesh sizes, etc. The Subcommittee decided to rescind Rec.28, 1964, while recognizing the need for publication of these data. It supports, therefore, the recommendation from the Subcommittee on Gear and Selectivity

that the 1964 and 1965 summary data be published in Redbook.

#### 10. Factory Trawler Statistics

The Subcommittee again noted the growing problems involved in the collection of statistics for long-range factory trawler fleets, and joined the ICES Statistical Committee (a) in endorsing the recommendation adopted by the CWP at its Fourth Session that the Secretary of the CWP should initiate, through FAO, a study of this problem on a world-wide basis, and (b) in expressing the hope that countries facing these problems will take all possible steps to introduce effective statistical collection services for these vessels.

#### 11. International Cooperation

The Subcommittee wishes to record its appreciation of the exchange of information with the ICES Statistical Committee and expressed a desire that this exchange be continued.

After discussion of various items contained in the Report of a Meeting on FAO, ICES and ICNAF statistics, Charlottenlund, February 1966 (Res.Doc.66/12), the Subcommittee agreed that future meetings of that kind, to be held in those years in which the CWP does not meet, would be useful for the consideration and coordination of statistical matters of a domestic nature.

The Subcommittee

recommends (15)

*that allowance should be made in the 1968 budget for the attendance of an ICNAF representative at a meeting on FAO, ICES and ICNAF statistics, probably to be held in Europe at the time of the ICES Liaison Committee's mid-season meeting.*

The Subcommittee was informed that the Fifth Session of the CWP is scheduled provisionally for the end of April 1967 and possibly to be held in Reykjavik, Iceland.

#### 12. Sampling Yearbook and Age/Length Key Data

Due to the fact that the Sampling Yearbook Vol.9 was unavailable for distribution prior to the meeting, the review of the 1964 age/length key data in the Yearbook was postponed for consideration at the 1967 meeting.

It was reported that the data are often incomplete for assessment purposes. The general problem of incomplete reporting for this and other items was noted and the Subcommittee agreed that the Chairman of R&S should be informed of these problems.

The meeting was informed that the Woods Hole Laboratory of the U.S. Bureau of Commercial Fisheries had nearly completed the task of transferring the age/length key data for 1961, 1962 and 1963 to punch cards. It was agreed that Messrs. K. Allen and A. May (Canada) should try to carry out a first analysis on part of the data, and to study the heterogeneity of the material with a view to preparing summary tables for study and eventual publication. It was suggested that such an analysis could be most usefully started on the data for cod.

13. Consideration of Recommendations of the Joint ICES/ICNAF Sampling Meeting (Rome, 1-2 October 1965) (Res.Doc.66/13)

The meeting started with a general discussion of the problem. The USSR, which had not been represented at the joint meeting, reported that, in the ICNAF Area, the length dimension measured for all species is total length, with the exception of herring for which fork length is measured, and that all measurements are taken to the nearest interval.

The Subcommittee agreed that the available time did not allow it to arrive at a considered decision on the various recommendations concerning length measurements and grouping of length data, and decided to postpone further discussion to the 1967 meeting where these items will be given first priority.

The Subcommittee agreed that for the time being no change in the forms on which age/length keys are reported are necessary, and

recommends (29)

*that countries, in reporting the 1965 age/length data, make every effort to fill in all items of the standard forms, and submit the data to the ICNAF Secretariat before 1 August 1966.*

ICNAF STATISTICS FORM 4

Annex I

For reporting weights of whole fish discarded (thrown overboard at sea) or turned into fish meal at sea - in metric tons round fresh -

Vessel Type	Tonnage Class	Main Species Sought	Country	Year	Method Used for Obtaining Information (check which ones)			
					Log Book	Boat Observer	Dockside Interview	Other (Specify)

ICNAF Division	Disposition	Calculated Total Weight for the Year						% of nominal catch, or of total number of trips, sampled for discard or industrial use information	
		Cod	Had-dock fish	Red-fisher	Flounder	Silver Hake	Others (Specify)		
discarded industrial								Mixed (State Principal Species)	Species Unknown
discarded industrial									
discarded industrial									
discarded industrial									
discarded industrial									
discarded industrial									
discarded industrial									

APPENDIX III - REPORT OF SUBCOMMITTEE ON GEAR AND SELECTIVITY

Chairman: H. Bohl; Rapporteur: A.W.May

The Subcommittee met on Tuesday, 31 May, Wednesday, 1 June, and Thursday, 2 June. The agenda, as distributed, was reviewed by the Chairman and adopted by the Subcommittee, with an added proposal to discuss the proposed FAO Meeting on Fish Behaviour in Relation to Fishing Techniques and Tactics in connection with the 1965 Report of the ICES Comparative Fishing Committee.

1. Report of ICES Comparative Fishing Committee

The Chairman reviewed this report (Res.Doc.66/16) and noted that the ICES Committee wished to maintain its liaison with this Subcommittee. The Subcommittee agreed that such liaison was useful and

recommends (30)

*that review of the Report of the ICES Comparative Fishing Committee be a continuing agenda item for meetings of this Subcommittee.*

The Chairman noted that R&S had requested this Subcommittee to consider present information on the FAO Meeting on Fish Behaviour in Relation to Fishing Techniques and Tactics. Mr Boerema (FAO) reviewed plans to date for this meeting, noting that details of proposals have been circulated within ICNAF (Res.Doc.66/54), and further that those planning this symposium would be grateful for comments and advice. The Subcommittee welcomed this information and expressed interest in the proposed agenda. It was felt however that the scope of the meeting might be too broad, thereby endangering full realization of its objectives. It was agreed that the meeting might be more useful for the present if discussions were limited to major fishing gears and behaviour in relation to these, excluding fisheries for salmonids and invertebrates.

2. Selectivity of Different Codend Materials

Documents pertinent to this topic (Res.Docs.66/28 and 66/67) were presented and discussed. It was noted that the mesh size equivalent from Polish experiments with polyamide was close to that recommended by the 1964 *ad hoc* Committee on Mesh Regulations. Mr Horsted (Denmark) expressed appreciation on behalf of the Greenland Cod Working Group for the data presented by Dr Bohl (Germany) in Res.Doc. 66/67 "Selection of cod by bottom-trawl codends on Store Hellefiske Bank". These confirmed earlier findings that differences in selection factors between polypropylene, polyethylene and polyamide were 10% or less, though results from polyethylene could be more variable than with the other materials. It was agreed that in view of

material presented in Res.Doc.66/67 further studies of this nature would be desirable, especially for polyethylene, and possibly involving comparisons of side and stern trawlers. At the same time it was noted that differences of 10% or less in selection factors were within the normal range of experimental variation for any of these materials, and that more precise estimates of differences would not be possible without a great number of additional experiments.

The question of a change from the manila standard for mesh sizes was discussed. It was considered that in view of proposed regulations which include specific mesh size equivalents for other materials (Ann.Proc.14, 1964), such a change might not be necessary. However, it should be brought to the attention of the Commission that manila codends are now very seldom used in the Convention Area.

### 3. Length, Weight and Girth Data

Pertinent Research Documents (66/25, 66/28, 66/63 and 66/67) were presented and discussed. It was noted that the length-weight relationship might alter in large mature cod. It was further noted that such a change had earlier been described in the girth-length relationship of this species. It was agreed that greater detail was needed in analysis of such changes, and again

recommends (31)

*that the collection of girth, weight and length data, especially in Subareas 1 and 2, be continued. The results should be submitted to the Secretariat or presented as meeting documents. Measurements of girth should be as stated in Rec.24, Redbook 1963, Part I.*

### 4. Meshing of Redfish

There were no papers dealing with this subject. It was recognized that this matter could be of some importance if mesh size were increased and the Subcommittee accordingly

recommends (32)

*that countries should report in meeting documents on the meshing of redfish, especially data for large-meshed codends.*

### 5. Catch Size and Selectivity

It was agreed that information on the effect of catch size on selectivity was of continuing importance. While some information is available, more is needed, especially for redfish.

6. Developments in Gear and Fishing Methods

(a) List of trade names of twines used in fishing gears

The revised list (Res.Doc.66/73) was reviewed. The Subcommittee expressed its appreciation to Dr Klust (Germany) for completing this list. The Subcommittee requested that this important information be given wide distribution by the Secretariat. It was agreed that the list should be limited to those fibres used in marine fishing gears, that it should be revised every 2 years, and that the revised list should be printed on the back of the Trawl Material and Mesh Size Sampling Summary Form. It was pointed out that there is a continuing problem in identification of those various materials by enforcement officers. The Subcommittee would welcome, in connection with the next revision of this list, a compilation of methods suitable for field identification of synthetic materials used in marine fisheries.

(b) Trawl Material and Mesh Size Sampling

The Subcommittee agreed that information on trawl materials and mesh sizes in use in the ICNAF Area is of considerable importance. However the present form of reporting could be improved. The Subcommittee accordingly

recommends (33)

- (i) *that when information for trawls fished in various sub-areas and for more than one species is presented on a single form, countries should state specifically that the trawl materials and mesh sizes reported are identical for those subareas and species;*
- (ii) *that a space should be provided on the form to state whether information applies to stern or side trawlers. This would mean completion of separate forms for these two vessel types;*
- (iii) *that the column for new codends should be deleted. It was noted that those countries reporting data for new codends also provided data for used codends. The Subcommittee felt that the information on used codends is of greater use to the Commission, though countries which could not provide such information should be encouraged to submit data on new codends;*
- (iv) *that for type of chafer the form should contain the following choice:*

ICNAF type  
 Multiple flap type  
 Other types

*The type in use should be circled. It would be useful if countries using chafers other than the approved types could submit detailed descriptions of these;*

- (v) *that in the detailed table heading, the words "by average mesh size group" should be deleted. The words "number codends measured" should be brought up into the heading of the form so that it is clear that this information is desired;*
- (vi) *that on the back of the form explanatory note 2(c) should read "Mesh size groups represent the number of codends with average mesh sizes of codends in each mesh size group".*

The Subcommittee felt that this information should be periodically made available in a more permanent form than in Research Documents. However it was thought that the ICNAF List of Vessels was not the most appropriate place to list this other information though this was earlier recommended (Redbook, 1964, Part I, Rec.28). Instead, it

recommends (16)

*that the 1964 and 1965 submissions of trawl material and mesh size sampling data should be summarized by the Secretariat and included in Parts II and III of the 1966 Redbook. Thereafter this information should be presented annually by the Secretariat as a meeting document, and summarized and published in the Redbook every third year beginning with Redbook 1969. The Subcommittee noted that for the immediate summary, USSR will attempt to provide average rather than individual mesh size data for 1965.*

7. Mesh Measurement

There were no documents in this subject. The Chairman drew attention to the section of the report of the ICES Comparative Fishing Committee dealing with this topic. After some discussion on the feasibility of adopting a standard gauge and standard pressure, it was agreed that although the ICES gauge at 4 kg is the standard for research purposes, some problems existed in adoption of standards for enforcement procedures and that this question should be reviewed further next year.

8. Topside Chafing Gear

(a) Review of effect of approved ICNAF topside chafer

Pertinent documents (Res.Doc.66/15 and 66/29) were reviewed and discussed. It was noted that a properly rigged ICNAF-type chafer had little or no effect on selectivity of cod or had-dock. Selectivity would however be reduced if the chafer were too narrow, the mesh sizes too small or if the chafer were of excessive length.

(b) USSR and Polish experiments with new gear

Results of experiments with topside chafers other than the ICNAF type were presented and discussed (Res.Doc.66/21 and 66/58). Further information from studies to be presented to ICES by UK and from unpublished Norwegian studies was also noted. These studies were particularly welcomed by the Subcommittee, which noted that reports of these experiments by Poland (Res.Doc.66/71) and other countries with topside chafers having meshes at least twice as large as the codend mesh size, and with width of chafer at least as wide as width of codend, indicate negligible effects on the escape of small fish.

The Subcommittee therefore

recommends (34)

*that R&S inform the Commission that from the scientific evidence available, it seems that the type of topside chafer on which Poland has carried out selectivity experiments in the ICNAF Area, having a mesh size at least twice as large as the codend mesh size and a width at least as great as that of the codend, has a negligible effect on codend selectivity.*

It further

recommends (17)

- (i) that selectivity experiments with topside chafers of the Polish type should be continued;*
- (ii) that selectivity experiments with topside chafers of the Soviet and other types used in the ICNAF Area, and, wherever possible, experiments on means of eliminating the need to use topside chafers should also be continued.*

APPENDIX IV - REPORT OF THE ENVIRONMENTAL SUBCOMMITTEE

Chairman: A.J.Lee

The Subcommittee met on 31 May and 2 June.

1. Report on NORWESTLANT Surveys

The Chairman reported on progress toward the completion of the NORWESTLANT Report. He said that Parts 1 and 2 (Text and Atlas), which should have been ready by the end of January 1966 according to the decisions reached at the 1965 meeting of R&S, were still incomplete in that he had not received the sections on Zooplankton, Bathymetry, and Eggs and Larvae of American plaice. He understood that the Zooplankton section would be ready by the end of May. Dr Templeman reported that the section on Eggs and Larvae of American plaice would be completed by Dr Wells by mid-June. Mr Day said he would ask Dr Loncarevic to hasten the completion of the Bathymetry section. Publication of Part 3, the physicochemical oceanographic data, would now take place at the end of September 1966; the original date of March 1966 could not be met as the Canadian Oceanographic Data Centre had not received the material until well after 1 September 1965, the target agreed to at the 1965 meeting of R&S.

The Chairman raised the question as to whether the individual members of each subject co-ordinating group should be allowed to read and comment on the report submitted by their subject reporters: this had not been the case so far. Such a procedure would further delay publication of the Report as a whole and would give rise to a large amount of photocopying, etc. It was agreed that some form of refereeing was essential to ensure a soundly based report and it was left to the Chairman and the Executive Secretary to arrange for two referees to see each subject report but, if possible, not to delay publication of the Report beyond the 1967 Commission meeting. They should also make arrangements for any national correspondent to see his appropriate subject report should he so wish.

2. Plans arising from the results of the NORWESTLANT Surveys

As the Report on the Surveys had not yet appeared, no plans for further work could be discussed.

3. Consideration of the USA/USSR proposed plan for an ICNAF Georges Bank Survey

This item was discussed in conjunction with the Assessment Subcommittee after a general discussion of the stock-recruitment problem starting with Res.Doc.66/74 by Mr Grosslein (USA) on the Georges Bank haddock (see para.8 of Assessment Subcommittee Report). Studies of the problems for other stocks in Canadian waters, the North Sea and

Barents Sea were described. Dr Graham (USA) submitted the proposal for the Georges Bank Survey (Res.Doc.66/50). Dr Cole (UK) suggested that by incorporating studies of herring and silver hake as well as haddock, the survey had been made so large as to make its execution impossible owing to lack of resources. He suggested limiting the survey to haddock studies only. In reply to the Chairman, Dr Graham said that he thought that the survey should run for 3 years starting in 1968, but Dr Templeman (Canada) preferred 5 years in order to have more chance of studying a good year-class. Mr Parrish (UK) suggested that a survey over one year followed by an appraisal of the data collected would be a wiser approach in view of the high costs involved, and Mr Gulland (UK) said that this procedure would also allow for an evaluation of techniques and would enable one to see whether they had sufficient precision to allow meaningful estimates of the sizes of larval mortality and other population parameters to be calculated. Mr Parrish asked for a study of predators to be included in the primary objectives of the survey and Mr Gulland suggested that laboratory studies of, for example, larval feeding, growth and behaviour should be run in parallel with the survey. The Chairman said that the FAO/ICES/ICNAF/UNESCO Symposium on the Tropho-Dynamics of Marine Communities scheduled for 1968 might yield information of value in planning the survey and, at his request, Dr Dickie, a member of the group planning the Symposium, gave details of the ground to be covered, particularly as it relates to the proposed Georges Bank Survey. He also described the administrative arrangements made so far for the convening of the Symposium and the publication of the papers presented.

The Chairman asked which countries might be able to participate in the survey in addition to the US and USSR. Dr Cole indicated the UK's interest. Dr Dickie and Dr Templeman said that Canadian laboratories would prefer to wait for the results of a one year survey before committing themselves. A working group consisting of representation from USA, USSR, UK and Canada, was then set up under Dr Graham to revise the original USA/USSR proposal in the light of the resources known to be available and the comments made on the proposal so far. The report of this working group forms Annex 1. It was discussed by the Subcommittee at its second meeting and adopted. The Subcommittee

recommends (35)

*that the suggestions 1-8 in the Report of the Working Group on the Georges Bank Survey Proposal (Annex 1) be implemented.*

4. Environmental Aspects of the National Research Reports

The National Research Reports (Res.Doc.66/30 to 66/41) were considered together with Res.Doc.66/43, 66/49, 66/51, 66/53 and 66/68. The cod egg surveys being carried out annually by Norway off West Greenland were noted with interest as they form a time-series which includes the NORWESTLANT Survey. In a number of documents and in

the subsequent discussion, marked fluctuations in hydrographic conditions in recent years were noted. For example, (1) changes in temperature off West Greenland in the autumn-spring period in 1964-5 and 1965-6 seem to have affected the depth of the spawning cod there (2) severe ice conditions and storms off East Greenland in the early part of 1966 have prevented fishing there (3) pronounced changes in temperature in the area of the Georges and Browns Banks from 1963 to 1964 were associated with changes in silver hake abundance.

5. Reports on the activities of the Intergovernmental Oceanographic Commission (IOC) and the Scientific Committee on Oceanic Research (SCOR)

The Chairman has prepared reports on recent meetings of IOC and SCOR. These are given in Comm.Doc.66/11, 66/18 and 66/21. The Chairman outlined the main points arising from these reports and indicated that the IOC's plans for working an international standard section in the North Atlantic and for a comprehensive study of that ocean were not likely to be put into action in the near future. He had, therefore, taken no action on Rec.29(1) of the 1965 R&S meeting. Members of the Subcommittee showed interest in the findings of the SCOR/ICES/UNESCO Working Group on Zooplankton and it was therefore decided to photocopy this group's latest report and attach it to Comm.Doc.66/21.

The Chairman described the findings of the March ICES meeting on the future of the ICES Service Hydrographique. He pointed out that it had been recommended that publication of the ICES Oceanographic Data Lists, which contain the European countries' data for the ICNAF Area, should cease but that the data should be stored on punched cards by ICES. He also said that it had been recommended that the Service Hydrographique should from now on concentrate on data analysis and reported that ICES was having difficulty in exchanging data for the ICNAF Area with the Canadian Oceanographic Data Centre and the World Data Centres due to differing punched card formats, but that an IOC *ad hoc* group had been set up to deal with this problem. This group contains representatives of all the data centres involved.

6. Oceanographic Instrumentation

The Chairman drew attention to two forthcoming meetings on oceanographic instrumentation. One is to be held by the Institution of Electronic Engineers (UK) in Southampton in September 1966. The other is a joint meeting of the Hydrographical & Plankton Committees of ICES in Copenhagen in October 1966.

7. FAO/ICES/ICNAF/UNESCO/IBP Symposium on Tropho-dynamics of Marine Communities

As described above, Dr Dickie (Canada) described plans for this Symposium during the discussion on the Georges Bank Survey. It is

proposed that the Symposium be held in Europe during the summer of 1968. He pointed out that a private publishing house might publish the papers and the proceedings. That being so, no cost would fall to ICNAF which has agreed with the other co-sponsors to bear two-thirds of the publishing costs. The Subcommittee agreed that this Symposium is of great importance to the work of R&S and

recommends (7)

*that ICNAF reaffirm its willingness to co-sponsor the Symposium on Tropho-dynamics of Marine Communities and that the funds originally specified for publication costs might well be offered to defray other Symposium costs, the way in which this should be done being left to the Steering & Publications Subcommittee of R&S,*

Dr Dickie also reported that the prospectus giving notice of the Symposium would be completed before the 1967 meeting of R&S and that it was undesirable to postpone its issue until after that meeting. There was therefore a need for a small group of people to review the draft prospectus once it was ready. The Subcommittee therefore

recommends (8)

*that the Chairman of the Commission, the Executive Secretary and the Chairman of R&S review the draft prospectus for the Symposium on the Tropho-dynamics of Marine Communities and, when satisfied, grant it ICNAF approval.*

8. Publication of ICNAF Environmental Symposium 1964 (ICNAF Sp.Pub.6)

The Executive Secretary reported that this publication was now being issued. Delays had occurred owing to the printer having difficulty with paper supplies. He described a prospectus which he had prepared in order to advertise and so sell the publication. The Chairman thanked the Secretariat for their hard work in preparing this large book for publication.

9. FAO Meeting on Fish Behaviour in Relation to Fishing Techniques and Tactics

Res.Doc.66/54 was noted. It was agreed that this meeting did not greatly concern the Subcommittee.

10. Meteorology in Relation to Fishery Research

Dr Meyer (Germany) pointed out that fluctuations in the atmospheric pressure field affect the ocean, fishing success and fish stock. For example, the wind system over East Greenland determined the position of the ice-field there and thus the chances of fishing. He asked that meteorologists be brought into closer contact with the Environmental Subcommittee. In the subsequent discussion, a number

of speakers supported the view that more research in the meteorological field was necessary but stressed that it would be better if more physical oceanographers could attend the Subcommittee's meeting as they had contact both with the meteorologists on the one hand and fisheries biologists on the other. The Subcommittee therefore

recommends (18)

*that countries be requested to take steps to ensure that physical oceanographers and marine meteorologists working in the fishery research field in the ICNAF Area attend future meetings of the R&S Committee and its working groups.*

11. Future Work of the Environmental Subcommittee

Mr Gulland raised the question of the direction in which the work of the Subcommittee should go in future. He said that the Assessment Subcommittee has a need for certain types of environmental information. For example, there is a need to know more whether the recent increase in growth of the Subarea 2 cod can be explained in terms of a change in the "environment". Again, there is a need for a synthesis of the fluctuations in the hydrography of the ICNAF Area over a number of years. Mr McKernan (USA) said that if the Subcommittee was to supply this type of information the Assessment Subcommittee would have to sharpen up their questions. Dr Meyer (Germany) asked whether an individual scientist could be nominated to make a synthesis of the fluctuations in the atmospheric and oceanic circulations of the ICNAF Area over recent years and Dr Alekseev (USSR) suggested that WMO might help in this respect. Dr Hart (Canada) raised the question as to how much useful information could be obtained by working standard sections a few times a year. The Chairman said that in his opinion such sections might give a qualitative view of the degree of abnormality of a particular season but not a sound quantitative one, and that there was a danger of very short period fluctuations of high amplitude masking the longer period fluctuations of low amplitude. Dr Posgay (USA) said that the charts being produced at the US Fleet Numerical Weather Facility in Monterey might be of help in providing a picture of hydrographic fluctuations and he undertook to look into this possibility. Mr Gulland (UK) agreed to examine whether the Assessment Subcommittee needed information on any other environmental matters. In the meantime the Subcommittee

recommends (19)

*that the Chairman of the Environmental Subcommittee take steps to obtain from the appropriate experts (a) further information about the environmental factors that may have affected the growth of cod in Subarea 2, (b) a synthesis of hydrographic and meteorological fluctuations in the ICNAF Area in recent years, and report back to the 1967 meeting of R&S.*

Report of Meeting of Working Group on the Georges Bank Survey Proposal

Participants: H.W.Graham (USA), Chairman; J. Hart (Canada); H.A.Cole (UK); A.J.Lee (UK); A. Alekseev (USSR); S.A.Studenetsky (USSR); A. Posgay (USA).

Following the suggestion of the Environmental Subcommittee, the Working Group met 1 June and discussed a revision of the proposed program for the Georges Bank Survey as outlined in Res.Doc.66/50, taking into consideration the various comments from the last meeting of the Subcommittee.

Acknowledging that only four vessels may be available for the study, it was agreed that the proposal be revised. The Working Group has in mind the possibility of a pilot study to be conducted in 1968. It suggests that:-

1. Dr Graham should prepare a revision of the plan for the survey (Res. Doc.66/50), circulate it to the other members of the Working Group and then submit it to the 1967 meeting of R&S.
2. USSR and USA should begin exchanging information on the work they are now doing in the area. Of particular interest are the sampling programs and the types of gear used.
3. USA should report to the Working Group as soon as possible on results of gear comparison experiments planned for 1967 and on the results of studies of the vertical distribution of eggs and larvae.
4. R&S should invite papers on (a) statistical plankton sampling designs which might be of use in laying out the station pattern and time schedule for the proposed survey (b) the sampling precision required in order to obtain results of worthwhile value to the Assessment Subcommittee in its studies of stock and recruitment.
5. UK should submit to the Working Group a report on the collections made in the area with its Continuous Plankton Recorder Survey.
6. Canada should report to the Working Group on herring research planned for the Bay of Fundy with emphasis on problems of recruitment.
7. The Working Group should meet immediately before the 1967 meeting of R&S to discuss sampling design and standardization of gear.
8. A mid-year meeting would also be desirable although it is not clear how this can be arranged. Members of the Working Group should take whatever opportunities arise out of other international meetings to discuss various aspects of the planning of the proposed survey.

APPENDIX V - REPORT OF SUBCOMMITTEE ON HERRING AND OTHER PELAGIC FISHES

Chairman: B.E.Skud; Rapporteur: A.W.May

The Subcommittee met on 30 May and following days:

1. Herring: Pertinent Documents

The Chairman listed the following documents as being of interest to the Subcommittee: Res.Doc.66/30, 66/36, 66/39, 66/41, 66/48, 66/49, 66/50, 66/54, 66/62, 66/68 and Comm.Doc.66/8 (Item 5).

2. Review of Herring Fisheries and Research

Canadian herring landings have increased steadily from 87,000 metric tons in 1961 to 183,000 tons in 1965. The 1964 catch was 140,000 tons. In 1965 catches were 8,128 tons in Subarea 3, 174,497 in Subarea 4 and 30 tons in Subarea 5. Most of the increase took place in the Bay of Fundy region where the catch reached a record high of 116,000 tons, an increase of 29% from 1964. Other areas showing increases were the southern Gulf of St. Lawrence and the southwest and west coasts of Newfoundland.

Samples of Canadian herring catches were examined from the Bay of Fundy, Georges Bank, southwest Nova Scotia and Newfoundland. Samples from the Bay of Fundy sardine fishery showed 3% opaque otoliths indicating this proportion of spring spawners. The 1963 year-class dominated (77%) the samples of this fishery and other year-class contributions in order, were 1962, 1961, 1964, 1960. Samples from the northern edge of Georges Bank also showed 3% spring spawners. Representation was 66% for the 1961 year-class, 23% for the 1962, 8% for the 1960 and the remaining percentage for the 1959 and 1963 year-classes. Samples taken through the summer from southwest Nova Scotia showed about 4% of the otoliths to be of the spring spawning type. The 1961 year-class was dominant accounting for 56%, followed by 1963 with 18% and 1960 with 16%. Other year-classes back to 1957 were also represented.

Herring research in Newfoundland was resumed in 1965 following a lapse of several years. Almost all herring in samples from Div.4R in early November were fall spawners. Samples from Div.3P in December were about two-thirds fall spawners and one-third spring spawners. Growth rates have not changed appreciably since earlier investigation.

A study of fat content was initiated in Nova Scotia on pre-spawners between 15 June and 3 August. Values ranged rather erratically between 9.7% fat in total weight to 17.3%. This work will be continued and expanded. During the latter part of July 2,086 herring were tagged with yellow spaghetti tags. The object of the

experiment was to determine the origin of fish from New Brunswick which were 3 years old and older, by recovery on the spawning grounds. There were 86 (4.1%) recoveries by December. None of the fish had travelled more than a few miles and none were taken on known spawning areas.

Canada reported that 3% of the otoliths examined from Georges Bank indicated spring spawning fish. Poland, USSR and USA had not any evidence of spring spawning from this area. Stages of maturity showed that all the fish were fall spawners, and though some fish might spawn in early winter, all samples of adults on Georges Bank in the spring were spent fish. USA did report some spring spawning in the coastal areas of the Gulf of Maine, but this was extremely limited and the coastal fish are generally classed as fall spawners.

Polish vessels operated for herring during 8 trips in Subarea 5. Seven of these were by medium-size side trawlers, 1 by a large stern trawler. All were equipped with freezing facilities. The yield per effort of side trawlers in September was 87 tons per 100 hours fished. Observations on temperature at a series of depths were made over Georges Bank in late August and September. (See table in Res. Doc.66/36). Surface to bottom plankton samples were also taken. Herring sampling from bottom trawls on Georges Bank was carried out from August 29 to October 1. There were essentially no differences in size and state of maturity from the various regions of Georges Bank; 85% of the herring measured were from 28-32 cm in length. More than 50% of those sampled were of the 1960 year-class. The length-weight relationship and rate of growth were determined.

USSR herring catches declined sharply in 1965 as a result of reduced effort due to decline in demand. Most herring were taken on Georges Bank in June, September and October. Catch per hour by freezer trawlers was 2.0 tons in June, 2.5 tons in October and 10.4 tons in September. About half the catch was made up of the 1960 year-class, followed in importance by the 1959 and 1961 year-classes. The 1961 and 1962 year-classes were comparatively poor and it is predicted that the bulk of herring catches on Georges Bank in 1966 will be composed of the 1960 year-class. Most spawning on Georges Bank took place in September in two areas in the northern part of the Bank. Water temperatures were 5° to 6°C at time of spawning and 8° to 10°C in the period of egg development.

The US catch of herring was 32,000 tons and was dominated by fish of the 1963 year-class which contributed 90% of the total catch. The 1964 and 1962 year-classes contributed 2.6% and 6.1% respectively. The US fishery concentrates on immature fish (1-3 years of age) for sardine canning. The amount of gear used in this fishery continued its past decline and only 63 weirs were fished in 1965, a decrease from 135 weirs in 1960. Stop seines declined to 104 in 1965 from 165 in 1960. The yearly catch from 1947-60 averaged 60,000 tons and has averaged 35,000 tons since 1961. The 1964 catch was 27,000 tons.

Samples of herring from Georges Bank showed on an annual basis that 48.8% of the fish were from the 1960 year-class, followed in percentage occurrence by the 1961, 1962, 1959, 1963, 1958 and 1957 year-classes. Samples collected from Cultivator Shoals and the southwest part of Georges Bank were dominated by the 1963 year-class. Samples of adult fish from the coastal areas of the Gulf of Maine were also dominated by the 1960 year-class (43.6%). Other year-classes, in order of importance, were 1962, 1961, 1959, 1958, 1963, and 1957. Analysis of maturity stages on Georges Bank indicated a spawning peak in October and some recently spawned fish were observed in the early winter.

USA is continuing its research on blood types and serum differences and has begun the analysis of meristic data collected during the past years. Counts for meristic characters of the 1960 year-class were appreciably higher than other year-classes taken in coastal waters. Behaviour studies of immature herring have shown that individuals can detect and select waters of preferred temperature and salinity. Attempts to relate the results of these laboratory tests to field observations will be conducted in the coming year. Monitoring the seasonal abundance of zooplankton in coastal waters showed that mean volumes were significantly higher in 1965 than in the previous 2 years, primarily due to the abundance of *Calanus finmarchicus*. Several studies were continued in the coastal waters and concentrated on the relationship of larval distribution and abundance to hydrographic conditions. Post-larvae were taken in quantity on Georges Bank in April, providing evidence that all larvae are not swept from the Bank after autumn spawning.

The following tables summarize the catches in metric tons, round fresh, by Subarea and country in 1965 and review the catches by countries from 1962-1965.

Herring nominal catches by countries for 1962-65

	1962	1963	1964	1965
Denmark			18	3
Canada	111,649	114,222	141,021	182,655
Poland	277	256	35	1,447
USSR	160,404	100,036	133,195	42,295
USA	71,779	70,111	27,984	34,454
<u>Non-members</u>				<u>1,982</u>
Total	344,109	284,625	302,253	262,836

Herring nominal catches by countries and subareas for 1965

	Denmark	Canada	Poland	USSR	USA	Non-Members	Total
Subarea 1	3						3
" 2							-
" 3		8,128					8,128
" 4		174,497		5,946			180,443
" 5		30	1,447	36,349	34,454	1,982	74,262
Total	3	182,655	1,447	42,295	34,454	1,982	262,836

3. Sampling Results from Georges Bank Area

Poland, USSR and USA presented data on the changes of size and age composition during different months and at different areas of Georges Bank. Res.Doc.66/49 (USSR) provided the greatest detail, including monthly charts of herring distribution during 1963, 1964 and 1965. Graphs of length frequencies by area and month were also presented in this paper, which concluded that the best indication of age/length composition of the mature herring is the analysis of autumn catches on the spawning grounds. The seasonal movements of herring were also discussed in this document, stating that during the winter the bulk of fish were distributed from 37°N to 40°N and during summer and autumn on Georges Bank. The report indicated that the migrations were connected with fluctuations of zooplankton occurrence which in turn are influenced by the fluctuations in the border of hydrological fronts.

4. ICES Herring Symposium

The Chairman called attention to the 1965 Report of the ICES Herring Committee and the planned "Symposium on the Biology of Early Stages and Recruitment Mechanisms of Herring". It was reported that the agenda would concentrate on herring of the Northeast Atlantic but that contributions from herring workers in other geographic areas would be included. Critical reviews of the methods used for investigating the young stages of herring would be solicited. The subject matter of the Symposium has four major divisions (1) spawning stock, (2) eggs, (3) larvae and (4) adolescents. Contributions will be concerned with the estimates of mortality at the various stages of the life history; the relations of environmental factors to mortality; the effects of intrinsic factors on survival; the relations of population size to distribution; stock and recruitment; etc.

5. Bibliography of Northwest Atlantic Herring

The Subcommittee agreed that there was no need at this time to prepare a supplement to the Herring Bibliography compiled by ICNAF in 1963. It was noted that ICES maintains a current list of publications on herring and that ICNAF countries do contribute new titles to ICES on an annual basis, so that a current listing of papers from the North Atlantic is available.

6. Georges Bank catch/effort data, 1965

The USSR fishing effort in the Georges Bank herring fishery was reduced substantially in 1965 because of the decline in consumer demand for herring. Herring were taken as a by-catch throughout the year by some of the USSR fleet, and catch/effort data for the herring fishery were only available for a few months. Unless there is a change in consumer demand, no increase in effort during 1966 is anticipated.

Catch/effort by Soviet BMRT vessels in 1965

	<u>Days Fished</u>	<u>No. Trawl Hours</u>	<u>Catch (tons)</u>	<u>Catch/day</u>	<u>Catch/hour</u>
June	34	482	977.4	28.8	2.0
September	31	173	1803.1	58.2	10.4
October	31	382	949.6	30.6	2.5

Poland reported an average yield of 87 tons per 100 hours trawling from three side-trawlers in 1965.

7. Year-Class Changes on Georges Bank

The Chairman reviewed ICNAF documents from earlier years which had been submitted by Canada, Poland, USSR and USA and summarized the contributions of various year-classes for the past six years. In 1960, nearly 50% of the samples were from the 1955 and 1956 year-classes. In 1961, the 1957 year-class accounted for more than 40% of the samples and was followed by the 1958 year-class which contributed about 30%. These year-classes (1957-1958) continued to dominate the fishery in 1962 and during most of 1963. During the latter half of 1963, the 1960 year-class dominated the catches and has continued to be the most important year-class in the last two years, contributing over 60% in 1964. The following table summarizes the year-class information provided in the reports presented at the 1966 meeting.

Year-class contributions from Georges Bank samples, 1965

	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>
Canada (autumn)		8%	66%	23%
Poland (autumn)	16%	53%	13%	6%
USSR (spring)	23%	57%	20%	
USSR (autumn)	15%	50%	11%	
USA (annual)	5%	49%	20%	18%

There is general agreement as to the contribution of year-classes, except for the Canadian data concerning, in particular, 1960 and 1961. Canada suggested an exchange of otoliths to determine whether there was any discrepancy in ageing techniques. USSR pointed out that their ageing is done with scales. Poland and USA do use otoliths for ageing and were willing to exchange. Recognizing the importance of clarifying this matter, the Subcommittee

recommends (20)

*that Canada, Poland and USA exchange herring otoliths to compare ageing techniques. Canada will initiate the exchange and report on the results next year.*

8. Year-Class Changes in Coastal Waters

The interest in year-class fluctuations in coastal waters is two-fold. First, the inshore fishery concentrates on immature fish, and an early indication of year-class strength may be indicative of future abundance in the offshore fishery. Second, the comparison of year-class composition in inshore and offshore adults may be useful in determining the relationship of these stocks.

The catch of immature fish in the coastal waters is not always a reliable indication of the year-class strength, as the canners prefer fish of a certain size and the fishery selects 2-year-old fish when possible. In some years, however, it is possible to obtain comparative information about year-class strength. For example, the 1960 year-class appeared in the 1961 fishery in greater abundance than usual for 1-year-old fish; it also contributed a greater percentage of the catch in 1962 than usual, and was still relatively high in abundance as 3-year-olds in 1963. This same year-class has dominated the adult catches - both inshore and offshore - for the last two years, 1964 and 1965.

In general, the dominant year-classes in the inshore adult samples have reflected a similar contribution in the offshore fishery. Coastal samples in 1960 and 1961 were dominated by the 1957 year-class. In 1962 and 1963, the 1958 and 1959 year-classes were present in the greatest abundance; and the most recent year, 1964 and 1965, showed the strong contribution of the 1960 year-class.

The USA plans to continue the comparison of inshore and offshore fluctuation in year-class strength and is studying ways of more reliably determining the relative abundance of immature herring.

9. Swordfish and Tuna Catches and Research

Canadian swordfish landings (nominal catch) in 1965 which were a little over 5,000 metric tons were down 34% from the 1964 catch. Catches were concentrated along the 100 fathom line (180 m) and extended from the Grand Banks and Newfoundland to Cape Hatteras and beyond. The average weight of fish landed has decreased steadily since 1959 when it was 91 kg to 65 kg in 1965. Fish and squid were found to be the main foods. Other studies on swordfish covered the exploration for fishing grounds and attempts to find nursery grounds to the south. The following table summarizes the records of the fishery:

Canadian Swordfish Log Records

	1959 <sup>(a)</sup>	1963 <sup>(b)</sup>	1964 <sup>(b)</sup>	1965 <sup>(b)</sup>
Total no. trip records	40	205	329	354
Av. no. days at sea per trip	13	10	13	15
Av. no. fishing days per trip	10	7	9	10
Av. no. fish caught per trip	73	121	99	95
Av. wt. of individual fish (kg)	91	79	41	65
Av. landing per trip (kg)	6588	9456	6906	6188

(a) 1959 harpoon fishery

(b) 1963-65 longline fishery

Canadian tuna landings were down to 651 tons. To a large extent, line-caught tuna are a by-catch of the swordfish longline fishery and consist mainly of bluefin and big-eye tuna. Tagging of tunas and other large pelagics was as follows: swordfish 23, bluefin 296, skipjack 6, other tuna 60, dolphin 1, sunfish 1, blue sharks 174, mackerel sharks 14 and other sharks 28.

US tuna and swordfish landings were also down in 1965. The catch of bluefin tuna was 2,400 tons, including catches south of the ICNAF Area. Swordfish landings totalled 294 tons. Skipjack catches were only 6 tons whereas 1,000 tons were taken in 1964. A total of 1,810 bluefin tuna were tagged in 1965. The return rate of 10% was about half of those obtained in 1963 and 1964. This decrease may have been due to the brief period of availability and to the decrease in the seining fleet from 21 vessels in 1964 to 13 in 1965. On the other hand, the rate of return from 1964 tagging was as high as in previous years, these were second-year recoveries and apparently represent the effectiveness of the new tags. From the 1964 tagging of 465 young bluefin, 28% have been recovered.

Skipjack failed to appear in quantity along the US coast in 1965 and

and only 4 returns were obtained from the 437 fish tagged. Sampling indicated that the catch consisted mainly of fish in the 6-pound class. There were 7 returns from white marlin.

10. Porbeagle and Other Shark Fisheries

The shark catch of the Norwegian fleet was down from 8,060 tons in 1964 to 4,045 tons in 1965. Only 2,760 tons of the 1965 catch were porbeagles, the rest being brown sharks and other species. Norway presented the catch/effort data of porbeagles for the past several years and suggested that the decrease in catch may be due to a stock decline. In 1961, the catches averaged 488 kg per 100 hooks; in 1962, 494 kg; in 1963, 296 kg; and in 1964, 178 kg. Shark catches by other countries were Canada, 28 tons; Denmark, 1,078 tons; Germany, 153 tons; Poland, 7 tons; USSR, 188 tons and USA, 2,382 tons.

11. Mackerel Fisheries

There was little change in the Canadian mackerel fishery with 11,082 tons taken in 1965 and 10,026 in 1964. Studies of size distribution at different ports gave quite a clear indication of a northward migration along the Nova Scotia coast and into the Gulf of St. Lawrence with the largest fish arriving first. Most of the mackerel were of the 1961 year-class. At Caraquet, New Brunswick, (Div.4T), all mackerel sampled were spent by 10 August. Catches of mackerel by other countries were: France, 3 tons; Poland, 1 ton; USSR, 2,862 tons; and the USA, 1,231 tons.

12. Other Matters

The Chairman called for reports and plans on pertinent meetings and symposia.

(a) FAO Meeting on Fish Behaviour in Relation to Fishing Techniques and Tactics

It was stated that discussions are still in progress at FAO concerning the scope and the program of the Behaviour Meeting, and that the advice from a number of international experts on the subject is being sought. It was pointed out that the meeting was scheduled as a world meeting for participation by experts from all FAO member countries. Comments on the draft program as circulated to ICNAF (Res.Doc.66/54) were invited.

The general objectives of the meeting are to provide a coordinated background on fish behaviour in relation to fishing gear and fishing operations in general, and to stimulate further studies through the opportunity for exchange of information between various fields of study. It is proposed that the meeting be held about September of 1967, possibly in Norway or in conjunction with the ICES Meeting in Hamburg.

After some discussion the Subcommittee felt that the present plan was too broad. Because of the many disciplines represented, national delegations would have to be impractically large and adequate representation in various fields could not be ensured. The Subcommittee felt that the meeting should be more restricted in scope and should be limited to an exchange between experts. A larger meeting could follow in a few years, with a broader scope and attendance. It was noted that similar views were expressed at the last ICES meeting.

(b) NEAFC - North Sea Herring Stocks

The Chairman called attention to Item 5 in Comm.Doc.66/8.

The Liaison Committee of ICES has been asked to advise NEAFC on a program of experiments to determine the causes of the decline in the Downs herring stock. NEAFC agreed that further investigation was necessary to decide on the measures needed to arrest the decline of herring stocks. ICES was asked to consider this matter at their next meeting and to report whether a closure of the Sandettie and Bløden grounds for one month each year would benefit the stock.

(c) FAO/ICES/ICNAF/UNESCO/IBP Symposium on Tropho-Dynamics of Marine Communities

Plans for this Symposium were mentioned briefly, as detailed discussions were scheduled at other sessions. The importance of tropho-dynamics to workers on pelagic species was noted and the Subcommittee expressed its interest in the Symposium.

(d) Atlantic Tuna Commission

A meeting was held in Rio de Janeiro from May 2-14, 1966, to consider an International Convention for the Conservation of Atlantic Tuna. There were 17 countries represented at the meeting and the Tuna Convention will come into force when 7 countries sign. Three countries - Brazil, Spain and USA - signed at the meeting. The Tuna Commission will expect participating countries to carry on their own researches but will also have the authority to conduct its own research.

The Subcommittee agreed that it should follow the development of the Commission closely.

(e) Report of ICES Bluefin Tuna Working Group

This report was called to the attention of the Subcommittee by the Chairman. It was published by ICES as Statistical News Letter No.26 and was issued in February 1966. The report summarizes the development of the bluefin tuna fishery from

1950-1964 and includes the catch and effort data by country and area, as well as size composition data. Catches of bluefin tuna along the east coast of North America were 1,000 tons or less during the period from 1950-1957. Since 1958 catches have averaged well above 2,000 tons and the catch in 1963 was 5,500 tons.

In the conclusions of the report, the parallel of year-class fluctuations on both sides of the Atlantic was discussed, as was the migration from west to east indicated by tagging experiments in the Western Atlantic. US sampling has been limited and may not be entirely representative, but on the basis of size and age composition data it was concluded that the European tuna fishery in the Atlantic may depend much more on the size of the western Atlantic stock than has previously been supposed. It was the view of the ICES Tuna Working Group that the development of the western Atlantic fishery should be watched closely. But, it was stressed that the decrease in the European tuna catches could not be attributed to the US purse seine fishing, since this fishery is now 2 or 3 years old and generally has been utilizing fish of a younger age than those taken in the eastern Atlantic.

APPENDIX VI - REPORT OF THE SUBCOMMITTEE ON AGEING TECHNIQUES

Chairman: E. Bratberg; Rapporteur: L.M.Dickie

The Subcommittee met on 1 June. The following Research Documents were referred to: 66/13, 66/22, 66/48, 66/57, 66/69.

1. Cod Otolith Photographic Exchange Program (Res.Doc.66/69)

The exchange program has resulted in considerable improvement toward standardized methods of interpretation. However, some fundamental differences still exist. It was concluded that the photographic exchange program be continued for Subareas 2, 3, 4, 5 prior to future study by a working party.

2. Redfish Otolith Photograph Exchange (Res.Doc.66/69)

Mr Blacker (UK) and Dr Messtorff (Germany) have considered the feasibility of photographing redfish otoliths for exchange, and were of the opinion that the photos would at least serve as a basis for discussion of interpretations. The Subcommittee

recommends (36)

*that photographs and otoliths of redfish be circulated to experts for their opinions on readability, prior to initiation of an exchange program.*

3. Silver Hake Photograph Exchange (Res.Doc.66/69)

Mr Blacker (UK), in cooperation with US scientists, concluded that satisfactory photographs can be produced; hence photographic exchange is feasible.

The Subcommittee noted with pleasure that the Woods Hole Laboratory of the U.S. Bureau of Commercial Fisheries is still interested in forwarding the exchange program, and requests that they initiate this exchange including the undertaking of the photography.

The Subcommittee expressed its great appreciation of Mr Blacker's services to the ICNAF photographic otolith exchange program, and expressed its hope that he would be able to provide further assistance in the coming year.

4. Inventory of Validation Studies (Res.Doc.66/57)

Canada and US have responded to the 1965 recommendation for compilation of a bibliography of all age-reading validation studies (Rec. 40(1), 1965). The Subcommittee noted the importance of such studies and

recommends (37)

*that the Secretariat again ask member countries for references to published or unpublished information on age-reading validation methods from other areas which might be helpful to ICNAF work.*

5. Further Validation Studies (Res.Doc.66/22)

Dr May (Canada) reported on the nature of validation studies, with special reference to cod in Subarea 2. He noted that the hyaline zone is formed mainly from January to June and the opaque zone mainly from September to November. However, in some fish the "next year's" hyaline zone may begin formation as early as September. In age-readings for Subarea 2, therefore, a hyaline edge in autumn should not be counted (using the 1 January birthday convention).

The Subcommittee again

recommends (38)

*that validation studies be continued in member countries for all species and areas, and be reported to ICNAF as published papers or meeting documents.*

6. Distribution of Type Otoliths

The Secretariat has not received type otoliths from member countries (Rec.40(iii), 1965). The difficulty of choosing type specimens was noted, and the suggestion made that the subject of describing "types" is part of a larger study, including types, validation methods and results, and interpretation of rings for all areas and species, perhaps compiled in the form of a handbook. It was the consensus that this cannot be done in the near future and the Subcommittee therefore continues to

recommend (39)

*that upon completion of validation studies, experts involved should distribute suitably annotated and described photographs of types to member countries, or deposit them with the Secretariat.*

7. Consideration of Recommendations from Joint ICES/ICNAF Sampling Meeting, Rome, 1965 (Res.Doc.66/13)

The Subcommittee noted the recommendation of the Sampling Meeting for adoption by all countries of a standard convention for birthday date. It strongly endorsed this proposal and accordingly

APPENDIX VII - REPORT OF STEERING AND PUBLICATIONS SUBCOMMITTEE

Chairman: W. Templeman; Rapporteur: H.W.Graham

The Subcommittee met on 29 May and on several other occasions to discuss organizational matters relating to R&S and to consider items concerning publications. Many of these items have already been considered by R&S. The following have not been covered by other subcommittees or involve the expenditure of funds and are minuted here.

1. Distribution of Publications

The Executive Secretary has asked all countries to revise their mailing lists using the new convenient card form prepared for this purpose. Some countries have not yet replied.

2. Research Bulletin

The Executive Secretary reported that Number 3 is in galley proof and that papers are now being accepted for Number 4. There appears to be at this time no need to publish more than one number per year.

3. National Research Reports

The Subcommittee

recommends (22)

*that the National Research Reports be included in the Proceedings of the 1966 Annual Meeting. The ICNAF format for these reports is considered satisfactory and countries which have not followed this format are urged to do so.*

4. ICNAF Handbook

No proposals for modifying the Handbook were made. The map showing ICNAF regulation areas and regulations prepared by the USSR was inspected and admired as was the folder prepared by the Secretariat.

5. FAO/ICES/ICNAF Joint Index of North Atlantic Publications

This will be reported by FAO. The Commission agreed in 1965 to finance this project to the extent of \$200. It now appears that the cost will be \$550. The Subcommittee therefore

recommends (21)

*that ICNAF allocate \$350 to cover its share of the additional publication costs of the FAO/ICES/ICNAF index of scientific publications of the North Atlantic and that this amount be added to the \$200 already allocated for preparation of the index.*

6. FAO/ICES/ICNAF/UNESCO/IBP Symposium on Tropho-dynamics of Marine Communities

Referring to the recommendation of R&S that "ICNAF should reaffirm its willingness to co-sponsor the Symposium - and that the funds originally approved for publication costs be used to defray general Symposium costs", the Subcommittee estimates the ICNAF share of these costs to be \$5,000. The Symposium will be held in 1968.

7. Next Annual Meeting

The Subcommittee

recommends (24)

*that the Assessment Subcommittee meet on Thursday and Friday, the Statistics and Sampling Subcommittee on Saturday, and the Steering and Publications Subcommittee on Sunday preceding the R&S meeting week.*

8. ICES/ICNAF Joint Working Party on North Atlantic Salmon

Problems relating to the Greenland Salmon Working Party were reviewed. The Subcommittee

recommends (6)

(1) *that the course of action for the 1966 Annual Meeting be*

- (a) *The draft Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon will be presented to ICNAF as Res.Doc.66/79. R&S will refer this to the Assessment Subcommittee whose Chairman is an ex officio member of the Working Party. The Assessment Subcommittee will report back to R&S which reports to the Commission.*
- (b) *The Working Party is not authorized to make any statements to the press until they have been approved by the Chairmen of ICNAF and ICES.*
- (c) *The report of the Assessment Subcommittee will include a part on salmon and this will be published in the Redbook in the usual way except that the part on salmon will not be published until cleared by ICES.*

- (d) *the full report of the Salmon Working Party will be presented for clearance to ICNAF and ICES before distribution or publication.*
- (e) *200 copies of the revised and approved Report will be submitted to ICES, and 20 copies to each member of the Working Party. Copies will be distributed to ICNAF meeting participants as Res.Doc.66/79 (Revised).*
- (f) *Since the Chairman of the Working Party is working under the dual sponsorship of ICES and ICNAF and is thus placed in a potentially confusing position from conflicting requirements, it is suggested that he should develop a suitable set of working procedures and clear them with the chairmen of the two agencies. It was further noted that the Working Party was a precedent and that procedures developed might become precedents for future joint working groups.*

and

(2) *for future meetings*

- (a) *Reports of future meetings of the Working Party will be processed in a special series of meeting documents to be submitted to the first Annual Meeting of the Commission following the meeting of the Working Party. Such documents will be considered by R&S, referred to Assessments, etc. in the usual way.*
- (b) *It will be the responsibility of the Chairman of the ICNAF Assessment Subcommittee (the ICNAF representative on the Working Party) to ensure that the most up to date landing statistics and other pertinent information on salmon is presented to the Annual Meetings of ICNAF.*

The ICNAF Secretariat stands ready to assist in preparation and distribution of documents and reports and in arranging for meetings whenever needed.

9. Publication of Research Documents presented at 1966 Annual Meeting

After reviewing the meeting documents, the Subcommittee

recommends (23)

*that authors be invited to submit the following documents for publication in the Redbook or Research Bulletin: Res.Doc.66/15, 66/18, 66/21, 66/22, 66/23, 66/28, 66/29, 66/43, 66/44, 66/49, 66/51, 66/53, 66/56, 66/58, 66/60, 66/63, 66/67, 66/72, 66/?? and ICES/ICNAF Salmon Doc.66/9, 66/12, 66/13.*

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