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Provisional Report of Scientific Council

Dartmouth, Canada, 8-18 September 1981

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PROVISIONAL REPORT OF SCIENTIFIC COUNCIL

Annual Meeting, September 1981

Chairman: R. H. Letaconnoux

Rapporteur: V. M. Hodder

The Scientific Council and its Standing Committees on Fishery Science and on Publications met at Halifax during 8-11 September and at Dartmouth, Nova Scotia, Canada, during 12-18 September 1981 to consider and report on the various matters listed in the Agenda (Appendix III). Representatives attended from Canada, Cuba, European Economic Community (Denmark, Federal Republic of Germany and France), German Democratic Republic, Japan, Poland, Portugal and Union of Soviet Socialist Republics (USSR), and observers were present from Spain and United States of America (USA) (see Appendix IV). The participants included several scientists who were invited to present papers at the Special Session on Remote-Sensing Methods and their Possible Application to Fisheries Science on 14 September and at the Symposium on Environmental Conditions in the Northwest Atlantic during the 1970-79 Decade on 15-16 September.

The reports of the Standing Committees, as adopted by the Council at this meeting, are given in Appendix I (STACFIS) and Appendix II (STACPUB). Summaries of these reports and other matters considered by the Council are given below.

I. FISHERY SCIENCE (APP. I)

1. Special Session on Remote-Sensing Methods

The Council noted that the Special Session took place on 14 September 1981, with Dr R. Trites (Canada) as Convener. The purpose of the Session was to focus on remote-sensing applications relevant to fisheries research. It also noted the significant advances in and potential utility of such remote-sensing techniques and endorsed the recommendations of STACFIS on these matters.

2. Symposium on Environmental Conditions in the Northwest Atlantic during the 1970-79 Decade

The Council noted that the Symposium was held on 15-16 September 1981, with Dr E. J. Sandeman (Canada) as Convener. The Council reiterates the concern of STACFIS relating to the difficulty of maintaining time series of ocean climate data and the shrinking efforts being devoted to the collection of such data. It was pointed out that the application of remote-sensing techniques might alleviate the problem to some degree, particularly in achieving broad spacial coverage. The Council therefore supported the request of STACFIS that NAFO should consider fisheries requirements for remote-sensing and ensure that these requirements are communicated to those responsible for specifying satellite remote-sensing systems in the future.

The Council also noted the concern of STACFIS that there was no clear focus for discussing environmental matters on a regular basis within its present structure, and agreed to the establishment of a subcommittee within the framework of STACFIS to consider and discuss matters relevant to remote sensing and environmental research on a regular basis. It was unanimously agreed that Dr R. W. Trites (Canada) be appointed chairman of the Subcommittee and that the first meeting be held (1 day) immediately in advance of the regular STACFIS Meeting in June 1982.

3. Georges Bank-Gulf of Maine Larval Herring Program

The Council noted that the Task Force on the Larval Herring Program, with Dr M. D. Grosslein (USA) as Convener had met on 14-15 September 1981, to consider further progress on herring studies as outlined in recommendations from the September 1980 Meeting. Several documents and working papers were reviewed on the biology of herring covering a variety of subjects (see Appendix I, Section III).

The Council welcomed the continuing progress made by the Task Force in evaluating and analyzing the voluminous quantity of data relevant to the larval herring program and agreed that the Task Force

should pursue its original objectives and attempt to conclude its analysis of the data. To achieve this purpose, it was agreed that the Task Force should meet again at the June 1982 Meeting.

4. Flemish Cap Project

The Council noted that the Working Group had met on 12 September 1981, with Dr J. Anderson (Canada) as Convener, and reviewed the results of recent research on a variety of aspects related to environmental influences on the production and survival of cod and redfish larvae and juveniles. The Council endorsed the recommendation of STACFIS that the newly-compiled time series of temperature and salinity data be examined to determine their potential interaction with cod recruitment on Flemish Cap. The Council noted that there were no specific proposals for investigations on Flemish Cap in 1982 and strongly endorsed the recommendation of STACFIS that a reappraisal of the aims of the Flemish Cap Project is urgently needed, if future research is to achieve the desired results.

5. Coordination of Squid Research

The Council noted that the *ad hoc* Working Group on Squid Research, with Mr T. Rowell (Canada) as Convener, met on 9-10 September 1981 to review further information on squid research in 1981 and to plan for continuation of coordinated research in 1982. The Council strongly endorsed the continuation of the research program for 1982, as outlined in Annex 1 of Appendix I. The Council agreed that four days will be allotted for a special session on "Squid Biology and Distribution", to review all available information accruing from national and coordinated research programs and to plan for coordinated squid research in 1983. This meeting should be convened by Mr T. Rowell in the week preceding the June 1982 Meeting of the Scientific Council.

6. Other Matters

The Council endorsed the recommendation of STACFIS that the agenda item relating to mesh size requirements for the interacting fisheries on cod and redfish in Div. 3M be deferred to the June 1982 Meeting, due to inadequate representation at the present meeting of experts involved in selectivity studies.

II. PUBLICATIONS (APP. II)

1. Review of Scientific Publications

The Council noted that the first NAFO issue of Statistical Bulletin (Vol. 29) was ready for distribution, that Vol. 2 of the Journal of Northwest Atlantic Fishery Science would be published in October 1981, and that the NAFO Manual on Groundfish Surveys (Scientific Council Studies No. 2) would be published in December 1981.

2. Editorial Board for the Journal

The Council adopted the recommendation of STACPUB regarding the establishment of the Editorial Board, consisting of Mr V. M. Hodder as Editor, with Dr W. G. Doubleday, Mr A. Lee, Mr E. J. Sandeman and Dr W. Templeman as Associate Editors.

3. Journal Reprints

The Council adopted the recommendation of STACPUB concerning the upgrading of Journal reprints and requested the Executive Secretary to use Volume 2 as a pilot study.

4. Distribution and Promotion of the Journal

The Council, although noting the importance of promoting the widest possible distribution of the Journal, agreed that an efficient distribution policy was required, involving free distribution to fishery scientists and institutes of Contracting Parties of NAFO and partial cost recovery through subscription fees for certain other user sectors of the scientific community. The Council therefore endorsed the guidelines proposed by STACPUB (see Appendix II, Section 5) and requested the Executive Secretary to take appropriate action on this matter.

In order to solicit subscribers to the Journal, the Council also requested the Executive Secretary to investigate the possibilities of advertising the Journal widely by calling on the goodwill of various organizations and subscribing services to include announcements in their publications.

5. Other Matters

The Council endorsed the proposals of STACPUB regarding (a) the possible publication of various papers presented to this meeting as research documents, (b) the development and publication of regional ichthyoplankton manuals, (c) the revision of the NAFO List of Species Items by changing the scientific name of roundnose grenadier from *Macrourus rupestris* to *Coryphaenoides rupestris*, and (d) investigation by the Executive Secretary of the potential benefits of utilizing microfiche or microfilm for storage, retrieval and distribution of meeting documents and publications.

III. RULES OF PROCEDURE

1. Proposal to Amend Rule 3.1 Regarding Election of Officers (SCS Doc. 81/VI/20, page 9)

The Council unanimously agreed to defer this agenda item for consideration at the June 1982 Meeting.

2. Proposal to Amend Rule 4.1 Regarding Distribution of Draft Provisional Agenda 100 Days Before the Opening Date of a Meeting (SCS Doc. 81/IX/25)

The Council noted that the adoption of such a rule would create difficulties, as the time between the June Meeting and the Annual Meeting in September is usually less than 100 days. It was unanimously agreed that the proposal was unacceptable.

IV. FUTURE SCIENTIFIC MEETINGS

1. Mid-term Meeting for Shrimp and Seal Assessments

The Council noted that STACFIS had not been able to provide scientific advice for management in 1981 of the shrimp stocks in Subareas 0 and 1, and it therefore agreed to meet at NAFO headquarters, Dartmouth, Canada, during 20-26 November 1981 for this purpose, allowing the first two days for the Shrimp Ageing Workshop to finish its work. The Council noted that EEC request for advice on the shrimp stock off East Greenland and agreed to undertake this assessment at the November Meeting. The Council was informed that a request had not yet been received for advice on the status of the harp and hooded seal stocks, but agreed to deal with this matter during 23-26 November if a request is received from the coastal states involved.

2. Mid-term Meeting for Assessment of Cod and Capelin

The Council noted its earlier decision to meet in February 1982 should it be necessary to provide further advice on the cod stocks in Div. 3M and 3NO and the capelin stocks in Subareas 2 and 3. However, management measures established for 1982 by the Fisheries Commission at this Annual Meeting eliminates the necessity of a mid-term meeting in February 1982, the relevant assessments being deferred to the June 1982 Meeting.

3. Meeting of *ad hoc* Working Group on Herring Tagging.

The Council noted that STACFIS had set up an *ad hoc* Working Group on Herring Tagging, which will meet during 12-14 January 1982, with Dr W. Stobo (Canada) as Convener, to coordinate the analysis of a large volume of tagging data preparatory to its consideration by the Task Force on Larval Herring at the June Meeting.

4. Regular Meeting in June 1982

The Regular Meeting of the Scientific Council, together with its Standing Committees, Subcommittees and Working Groups will be held at NAFO Headquarters, Dartmouth, Canada, during 2-18 June 1982, the first 4 days being allocated for a special session on "Squid Biology and Distribution". It was agreed

that these dates may be extended, should it be considered necessary when the provisional agenda and timetable for this meeting are being drafted.

V. OTHER MATTERS

1. Provisional Report of the June 1981 Meeting

The Council received and formally approved, after minor editorial amendment, the report of its meeting at Dartmouth, Canada, during 3-19 June 1981 (SCS Doc. 81/VI/20).

VI. ELECTION OF OFFICERS

The Scientific Council confirmed, as a result of a telegraphic vote requested by the Chairman of the Council following the lack of a quorum at the June 1981 Meeting, the election of the following officers to serve until the 1984 Annual Meeting:

1. Scientific Council

Chairman - Mr R. Wells (Canada)

Vice-Chairman - Dr V. A. Rikhter (USSR)

2. Standing Committees

Fishery Science (STACFIS) - Dr J. P. Minet (EEC)

Research Coordination (STACREC) - Dr T. K. Pitt (Canada)

Publications (STACPUB) - Dr V. A. Rikhter (USSR)

3. Executive Committee

The four officers noted above and the Executive Secretary constitute the Executive Committee.

4. Members of Publications Committee

Dr V. A. Rikhter (Chairman)

Mr A. T. Pinhorn (Canada)

Dr J. Messtorff (EEC)

Dr R. G. Halliday (Canada)

Dr J. P. Minet (EEC)

Executive Secretary

Dr H. Hatanaka (Japan)

VII. ADJOURNMENT

The Chairman referred to his concluding remarks on the work of the Scientific Council, made at the closing of the June 1981 Meeting (SCS Doc. 81/VI/20, page 10), and hoped that the incoming officers would note some improvement in the situation during the next two years. He expressed his appreciation to the Director of the Bedford Institute of Oceanography for making meeting rooms available, to the outgoing Chairmen of the Standing Committees and Conveners of Working Groups for their excellent cooperation and support since the Inaugural Meeting of the Scientific Council in March 1979, noting that he had chaired nine meetings of the Council during the period. He also thanked the Executive Secretary and his staff for their efficiency in rendering invaluable services both during and between meetings.

Mr. Sv. Aa. Horsted, on behalf of all members of the Council, expressed appreciation for the excellent guidance rendered by the Chairmen of the Council and its Committees during the past two years.

The meeting was adjourned at 1200 hours on 18 September 1981.

APPENDIX I. REPORT OF STANDING COMMITTEE ON FISHERY SCIENCE (STACFIS)

Chairman: G. H. Winters

Rapporteurs: Various

The Committee met at Halifax on 11 September and at Dartmouth, Nova Scotia, Canada, on 17-18 September 1981 to consider and report on various matters referred to it by the Scientific Council (see Appendix III), relating specifically to the Special Session on Remote Sensing Methods, the Symposium on Environmental Conditions during 1970-79, the Task Force on the Georges Bank-Gulf of Maine Larval Herring Program, the Working Group on the Flemish Cap Project, and the Working Group on Squid Research, all of which met at different times during 10-16 September 1981. The conveners of the various groups acted as rapporteurs in summarizing the results of the discussions at their respective sessions. Scientists attended from Canada, Cuba, EEC (Denmark, Federal Republic of Germany, and France), German Democratic Republic, Japan, Poland, Portugal, Spain, USA and USSR.

I. SPECIAL SESSION ON REMOTE-SENSING METHODS AND THEIR POSSIBLE APPLICATION TO FISHERIES SCIENCE

1. Introduction

The Special Session, convened by R. W. Trites (Canada), was held at the Bedford Institute of Oceanography on 14 September 1981 during which 12 contributed papers were presented and discussed. To ensure that the major aspects of remote-sensing application to fisheries science were not overlooked, 5 of the 12 contributions were presented in response to invitations by the convener. The purpose of the session was to focus on remote-sensing methods relevant to fisheries research, thereby informing and bringing participants up to date on both the demonstrated and potential usefulness of such techniques in NAFO's particular fields of interest.

2. General Considerations

Although the Special Session was mainly an information exchange medium, subsequent informal discussions by interested participants led to the following proposals which were considered by STACFIS.

- a) It was noted that the sea-surface thermal maps, showing the position of the Gulf Stream, fronts, eddies, shelf water, etc., are proving to be extremely useful in fisheries research applications, especially the squid research program. However, the present maps issued by the National Environmental Satellite Service are produced in near real-time, whereas a better interpretation can normally be made in hindsight, particularly when a particular area has been cloud-covered for a number of days. Special routine analyses should also be incorporated, such as distance offshore of shelf water-slope water and slope water-Gulf Stream boundaries at intervals of longitude, amount and time of shelf water entrainments, etc. STACFIS therefore

recommends

that the Scientific Council encourage the appropriate agencies involved in remote-sensing technology relevant to sea-surface temperatures in the NAFO area to produce an improved product.

- b) Because of the evident value of recent satellite water-color data from CZCS for productivity and fisheries ecology studies, the archive of collected, but unanalyzed, data needs to be examined and requests made for additional data collection and analyses. Color coverage should be about as frequent as thermal infra-red data is at present, and it should include chlorophyll estimates as well as details of surface-structure not necessarily discernible in thermal products. STACFIS therefore

recommends

that the Scientific Council encourage the analysis of available satellite water-color data for the NAFO area and alert NOAA/NESS (Nimbus NET group) about important geographical areas for which coverage is so far inadequate.

- c) In view of the importance of remote-sensing technology to fisheries science, it was noted that NAFO scientists should plan to be in a position to influence future satellite systems so that they will better serve fisheries requirements. Satellites have a limited number of systems that can be carried, and, unless requests are made clearly and firmly by fisheries interests, other groups are more likely to have their special needs met, which may be of little value to fisheries research. STACFIS notes that there is at present no agency within NAFO to accommodate and promote research on remote-sensing techniques, and strongly

recommends

that the Scientific Council consider a restructuring of its committees to include a clear focus for research on remote sensing relevant to fisheries science.

- d) Noting that the Special Session provided a good overview of remote-sensing techniques and data available, as well as a useful and concise summary of the application of remote-sensing data to fisheries research, STACFIS therefore

recommends

that STACPUB consider for publication in the appropriate NAFO series the papers presented to the Special Session on Remote Sensing, subject to the completion, revision and editing of manuscripts, and the approval of the authors.

3. Papers Presented

- a) General overview of the nature and use of remote sensing data, by J. F. Gower, Institute of Ocean Sciences, Sidney, B. C., Canada. (SCR Doc. 81/IX/)*
- b) Application of satellite infra-red data to analysis of ocean frontal movements and water mass interactions off the Northeastern United States, by J. Lockwood Chamberlin, Atlantic Environmental Group, National Marine Fisheries Service, Narragansett, R. I., USA. (SCR Doc. 81/IX/123)
- c) Visual features of the Kuroshio eddies as seen in the infra-red satellite images from NOAA-6, by K. Kitano, Hokkaido Regional Fisheries Research Laboratory, Yoichi-Machi, Hokkaido, Japan. (SCR Doc. 81/IX/121)
- d) Remote sensing of surface water temperatures on the Great Lakes and off the Canadian Atlantic coast, by J. G. Irbe, R. K. Cross, and A. Saulesleja, Atmospheric Environment Service, Downsview, Ontario, Canada. (SCR Doc. 81/IX/112)
- e) Application of artificial satellites data for fisheries studies in Japan, by I. Yamanaka, Far Seas Fisheries Research Laboratory, 1000 Orido, Shimizu 424, Japan. (SCR Doc. 81/IX/109)
- f) Biological productivity - local versus individual changes: the way the satellite sees it, by Charles Yentsch, Bigelow Laboratory of Ocean Sciences, Boothbay Harbor, Maine, USA. (SCR Doc. 81/IX/)*
- g) On the possibility of observing natural chlorophyll α fluorescence from space, by J. F. R. Gower, Institute of Ocean Sciences, Sidney, B. C., Canada. (SCR Doc. 81/IX/131)
- h) Water colour in inshore areas, by B. J. Topliss, Atlantic Geoscience Centre, Bedford Institute of Oceanography, Dartmouth, N. S., Canada. (SCR Doc. 81/IX/110)
- i) Application of remote sensing techniques in oceanographic studies of the British Columbia salmon fishery, by G. A. Borstad, R. M. Brown and D. Truax, Seakem Oceanography Ltd., 2045 Mills Road, Sidney, B. C., T. R. Mulligan, Pacific Biological Station, Nanaimo, B. C., and J. F. R. Gower, Institute of Ocean Sciences, Sidney, B. C., Canada. (SCR Doc. 81/IX/132)
- j) Application of a satellite-tracked fishing vessel transmitting terminal (FVTT) to fisheries management and science, by J. J. Murray and R. M. Hayes, U. S. Coast Guard Oceanographic Unit, Washington, D. C., USA. (SCR Doc. 81/IX/113)
- k) An application of satellites and remote sensing to studies of surface circulation in NAFO Subareas 3 and 4, by R. W. Trites, D. J. Lawrence and C. K. Ross, Bedford Institute of Oceanography, Dartmouth, N. S., Canada. (SCR Doc. 81/IX/98)
- l) Remote sensing data for the Northwest Atlantic - format, availability and costs - past, present and future, by Howard Edel, Ocean Science and Surveys, Ottawa, Ontario, Canada. (SCR Doc. 81/IX/)*

[* Manuscripts not yet received from authors]

II. SYMPOSIUM ON ENVIRONMENTAL CONDITIONS IN THE
NORTHWEST ATLANTIC DURING THE 1970-79 DECADE

1. Introduction

The Symposium, convened by E. J. Sandeman (Canada), was held at the Bedford Institute of Oceanography on 15-16 September 1981, during which 15 contributed papers were presented and discussed. Several of the papers were solicited by the convener in order to ensure that the major aspects of environmental conditions were adequately covered.

2. Observations on Trends

In the previous symposium on environmental conditions during the 1960-69 decade, it was noted that, following a climatic maximum in the 1950's, the eastern seaboard of North America had experienced a cooling trend which lasted through the decade of the 1960's. Following rather severe conditions in the early years of the 1970-79 decade, a trend to generally warmer conditions can be discerned. However, the decade of the 1970's clearly displayed some remarkable weather conditions. Ocean climate changes and their impacts on fisheries do not lend themselves to simple summarization, and, although there is evidence that long-term changes in indicators such as sea-surface temperature are coherent over space scales of a few thousand kilometers, it seems clear that the NAFO area cannot be described as a single regime.

In West Greenland waters (Subarea 1), the 1970's experienced a reversal of the cooling trend of the 1960's, with a return to warmer conditions in the surface and near-surface waters, which allowed the production of relatively successful year-classes of cod in 1973, 1975, 1977 and 1979. This followed a period of several years when water temperatures in the near-surface layers were too low for good survival of cod eggs and larvae.

In much of the Labrador-Newfoundland area (Subareas 2 and 3), the 1970-72 period was one of generally declining surface temperatures and salinities, the decadal low in temperature having been reached in the most northerly part of the region in 1972, whereas farther southward the cooling trend seems to have persisted at least until 1975. By 1978, surface temperatures appear to have increased to near-normal levels. However, the makeup of the annual temperature signal shows significant regional differences. For example, even though all parts of Subareas 3 and 4 may have experienced a downward trend in average annual sea-surface temperature from the mid-1950's to the mid-1960's, those for the April-July period on the Grand Bank tended to increase during the period, whereas there was a downward trend over all months in the western part of Subarea 4.

Due to the paucity of subsurface hydrographic data, little can be said about space and time variations at subsurface depths throughout Subareas 2, 3 and 4. Data for Station 27 off St. John's, Newfoundland, provide no basis for believing that the long-term trends in either temperature or salinity below the depth of convective winter overturn bear close similarity to the properties of the overlying surface layer.

Oceanographic conditions in Subareas 5 and 6 were characterized by the continuation of a warming trend that began in the late 1960's and peaked in the mid-1970's followed by a decrease in average temperatures. This pattern was observed in both sea-surface and bottom temperatures. The magnitude of the changes was quite large and could have significant effects on the distribution and abundance of fish and invertebrates in the southern part of the region. The trend was not strictly a coastal phenomenon, being also present offshore in Div. 6E although at a reduced magnitude. The significantly different character of the Gulf of Maine-Georges Bank area and the Browns Bank area in Subarea 4 may in part be due to offshore forces, since Gulf Stream eddies are capable of producing major changes in the properties of shelf water over a period of weeks or months. However, the data base (satellite imagery) is still too short to determine year-to-year variation in eddy numbers and location on decadal time scales.

3. General Considerations

Following the presentation of the papers, a general discussion ranged over a variety of topics both related and unrelated to the theme of the Symposium, with the following considerations receiving special attention:

- a) The difficulty of maintaining time series of routine climate-monitoring programs, in the face of the quicker payoff derived from scientifically more attractive, process-oriented and site-specific research, was discussed and concern was expressed on the shrinking efforts being devoted to the former. It was noted that the application of remote-sensing techniques might alleviate the problem to some degree. Not only might remote sensing help in achieving the broad spatial coverage required for the measuring of climate signals but also the use of some of the higher-precision techniques might be applied to some of the site-specific research that is currently being carried out. It seems clear that NAFO should consider fisheries requirements for remote sensing and ensure that these requirements are communicated to those responsible for specifying satellite remote-sensing systems of the future.
- b) Although several NAFO coordinated research projects (Larval Herring Task Force, Flemish Cap Project, Squid Research Program) have brought the disciplines of oceanography and fisheries biology together, concern was expressed by several participants that, whereas under ICNAF the Environmental Subcommittee provided a forum for formally bringing together oceanographers and biologists on a regular basis to discuss environmental matters, there was no clear focus for these sorts of discussions within the present structure of the Scientific Council and papers dealing with environmental matters did not receive the consideration that possibly is warranted. STACFIS therefore

recommends

that the Scientific Council consider the possibility of restructuring its committees to ensure that environmental matters are dealt with on a regular basis.

It was noted that a focus on remote sensing is also required and that perhaps the same restructuring could fulfil this need.

- c) STACFIS noted that papers presented to previous ICNAF-sponsored symposia on environmental conditions during the 1950-59 and 1960-69 decades were published in separate volumes of the ICNAF Special Publication series, and therefore

recommends

that STACPUB consider for publication in the appropriate NAFO series the papers presented to the Symposium on Environmental Conditions during the 1970-79 Decade, subject to completion, revision and editing of manuscripts, and the approval of the authors.

4. Papers Presented

- a) Twentieth century marine climatic change in the Northwest Atlantic and Subarctic region, by M. J. Dunbar, Institute of Oceanography, McGill University, Montreal, Quebec, Canada. (SCR Doc. 81/IX/128)
- b) Meteorological conditions in the decade 1970-79 and their impacts over the Northwest Atlantic, by A. Saulesleja and D. W. Phillips, Atmospheric Environment Service, Downsview, Ontario, Canada. (SCR Doc. 81/IX/114)
- c) Weather conditions and trends in the Maine-Virginia coastal and offshore area during 1970-79, by M. C. Ingham, Atlantic Oceanographic Group, National Marine Fisheries Service, Narragansett, R. I., USA. (SCR Doc. 81/IX/96)
- d) Sea ice and iceberg conditions, 1970-79, by T. C. Wolford, Coast Guard Oceanographic Unit, Washington, D. C., USA. (SCR Doc. 81/IX/130)
- e) A review of oceanographic conditions in Subareas 0 and 1 in the decade 1970-79, by Erik Buch, Institute of Physical Oceanography, Copenhagen, Denmark. (SCR Doc. 81/IX/102)
- f) Overview of oceanographic conditions within NAFO Subareas 2, 3 and 4 for the 1970-79 decade, by R. W. Trites, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada. (SCR Doc. 81/IX/111)
- g) Autumn temperature anomalies of the Labrador Current between 1969 and 1980, by M. Stein, Institut für Seefischerei, Hamburg, Federal Republic of Germany. (SCR Doc. 81/IX/97)
- h) Variability of oceanographic conditions in the Hamilton Bank area in the autumn period, by V. A. Borovkov, Polar Research Institute of Marine Fisheries and Oceanography (PINRO), Murmansk, USSR. (SCR Doc. 81/VI/78)
- i) Potential temperature and salinity anomalies in the 1970's along the Flemish Cap section, by J. R. Keeley, Marine Environmental Data Service, Ottawa, Ontario, Canada. (SCR Doc. 81/IX/129)
- j) Oceanographic conditions in Subareas 5 and 6 during 1970-79, by D. G. Mountain, National Marine Fisheries Service, Northeast Fisheries Center, Woods Hole, Mass., USA. (SCR Doc. 81/IX/108)
- k) Year-to-year seasonal dynamics of water masses on the Nova Scotia and New England shelves from observations obtained at standard hydrographic sections, by I. K. Sigaev and A. B. Bendik, Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO), Kaliningrad, USSR. (SCR Doc. 81/IX/107)
- l) Fisheries Oceanography and the Nature of Carrying Capacity for Larval Marine Fishes, by S. A. Akenhead, Northwest Atlantic Fisheries Center, St. John's, Newfoundland, Canada. (SCR Doc. 81/IX/142)
- m) Changes in the near-shore ecosystem of the Atlantic coast of Nova Scotia, 1968-1981, by B. B. Bernstein, Welsford Research Group, Halifax, Nova Scotia, Canada, and K. H. Mann, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, N. S., Canada. (SCR Doc. 81/IX/134).
- n) Some biological correlates of environmental conditions around Newfoundland in the decade 1970-79: harp seals, blue whales and fulmar petrels, by D. E. Sergeant, Arctic Biological Station, Ste. Anne de Bellevue, Quebec, Canada. (SCR Doc. 81/IX/135)

- o) Fisheries oceanography on the Labrador Shelf, by W. H. Sutcliffe and R. H. Loucks, Marine Ecology, Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada (SCR Doc. 81/IX/)*

[* Manuscript not yet received from authors]

III. GEORGES BANK-GULF OF MAINE LARVAL HERRING PROGRAM

1. Introduction

The Task Force on the Georges Bank-Gulf of Maine Larval Herring Program was convened by M. D. Grosslein (USA) at the Bedford Institute of Oceanography on 14-15 September 1981, with M. Sinclair (Canada) and G. T. Waring (USA) as rapporteurs. Eleven research documents and several working papers were reviewed, covering a variety of topics, including (i) stock identification and intermixing through studies on tagging, meristics and parasites, (ii) density-dependence of fecundity in spawning stocks, (iii) distribution and production of herring larvae in the southern Nova Scotia stock during 1972-80, and (iv) abundance of herring larvae on Georges Bank and in western Gulf of Maine in 1980.

2. Stock Identification and Intermixing

a) Tagging studies

The status of herring tagging research in the Georges Bank-Gulf of Maine region was reviewed, with special emphasis on the International Herring Tagging Program (SCR Doc. 81/IX/133). It was noted that some progress had been made in meeting the three objectives of the program, particularly in relation to herring migrations, but that two of the objectives (stock resolution and herring mortality) had not been adequately met. Complete analysis of the data base, considered essential before initiating new tagging experiments, was reported to be behind schedule.

A detailed analysis of tagging operations relevant to the International Tagging Program, carried out by scientists of the Northeast Fisheries Center, Woods Hole, was reviewed (SCR Doc. 81/IX/122). A major conclusion of the study is that migration of the Jeffrey's Ledge spawning component seems to be more localized than that of the southwest Nova Scotia stock. Discussion centered on whether migrations and the degree of mixing between stocks during various phases of the life history varied between years.

A report on tagging experiments undertaken by scientists of the Maine Department of Marine Resources in 1980 was presented. Tagged juvenile and adult herring totalling 49,202 were released during 10 June-31 October at sites distributed along the coast from Cape Elizabeth to Pasamaquoddy Bay. Spawning herring (stage VI) were observed in fish schools sampled during 24 September-1 October. Ages 2-4 herring were captured in weirs and stop-seines and ages 4-5 fish were obtained from purse seines. Tag returns (to 5 August 1981) varied from 0.4% to 16.2%. Low returns appeared to be related to extended holding of the fish within pockets of the commercial gear before tagging. The total number of tag returns was 2,492, for an overall recovery rate of 5.1%. Within 60 days of release, 824 tags were returned, the majority of these being from fish which did not move farther than 3.7 km before recapture. Longer-term recoveries indicated a southwesterly movement, especially from release sites in eastern Maine. During the autumn and winter of 1980/81, 68 tags were returned from the areas off Gloucester, Maine, and Point Judith, Rhode Island. These tags were primarily from large herring, but some large fish also moved northeastward from release sites in eastern Maine, as indicated by 6 recoveries from Canadian waters. Work continued on experimental tagging of "brit" herring, seeding experiments in the canneries, and tagging mortality estimates.

A brief report on Canadian tagging operations in Subarea 4 indicated that the tag returns have only recently been computerized and that analysis of the results should be completed by January 1982. It was therefore considered premature to summarize conclusions concerning the herring populations in Subareas 4-6.

In view of the desirability to evaluate all of the tagging data as soon as possible, STACFIS

recommends

that an ad hoc Working Group be convened during 12-14 January 1982 to summarize all Canadian and USA tag releases and recoveries relevant to the herring stocks in Subareas 4, 5 and 6 and to review analyses related to movements of adults and juveniles, stock identification, and mortality rates.

It was suggested that W. Stobo (Canada) should convene this Working Group meeting and coordinate the formats of data summaries and analyses so as to maximize possibilities for comparing and combining results of the various tagging studies.

b) Meristic studies

An extensive analysis of meristic characteristics of herring stocks in the Gulf of Maine region was reviewed (SCR Doc. 81/IX/127). It was noted that some characters were better than others for stock identification purposes due to differences in the timing of ossification of the various characters normally used, pectoral fin-ray counts being considered to be the most appropriate. Specific conclusions concerning the mixing of stocks were not made at this stage but the method shows promise of helping to clarify stock structure and inter-mixing, particularly when comparison with complete analyses of the tagging data becomes possible. Further analysis of the meristic data and publication of the results were strongly encouraged.

The participants were reminded of a paper published in *ICNAF Redbook* 1970, Part 3, on vertebral numbers of Bay of Fundy herring (T. D. Iles). It was noted that this study revealed persistent differences in mean vertebral counts of 2-year-old herring between the New Brunswick side and the Nova Scotia side of the Bay of Fundy, fish in the latter area having the higher counts. It was hypothesized at that time that the juveniles on the Nova Scotia side of the Bay were from spawning in Nova Scotian waters whereas those on the New Brunswick side of the Bay were from spawning groups to the west. However, it was noted that similar studies on the 1976 and 1977 year-classes of herring at age 2 showed an apparent reversal in the mean vertebral counts. This was hypothesized by T. D. Iles to have been due to a "vacuum" created in the Bay of Fundy stock by the reduction in the Georges Bank stock. There was some discussion of the problem of interpreting the significance of relatively small differences in vertebral averages based on large sample sizes.

c) Parasite studies

Studies by Canadian and USA scientists on the occurrence of parasites in herring were briefly reviewed. An evaluation of nematode (*Anisakis* sp.) occurrence in herring spawning populations of the Gulf of Maine region in 1963-69 based on unpublished USA data showed a steady increase in infection with age and a significant difference in infection between western Gulf of Maine and southwest Nova Scotia herring. It was noted that a recently initiated Canadian study involves the cataloging of parasites found in various size groups of herring (juveniles and adults) collected from Passamaquoddy Bay, Grand Manan, southwest Nova Scotia and Gulf of St. Lawrence. A total of 330 fish have so far been examined, and the study is planned to continue until May 1984.

A prospectus for studies on parasites as biological tags in herring of the Gulf of Maine region was reviewed (SCR Doc. 81/IX/125). The study is focused on the quantitative estimation of the infestation levels in various ages and groups of herring throughout the year and their migration routes, and sampling is already in progress along the Maine coast and on Jeffrey's Ledge. It was suggested that parasite infestation should be measured for prespawning and spawning herring off southwest Nova Scotia, because tagging studies have shown this area to be one of mixing of southwest Nova Scotia and Gulf of Maine spawners, and that the winter-spring fisheries should also be sampled. Discussion of the plan centered on the benefits that could be derived from a coordinated USA-Canada effort and the desirability of good liaison between Canadian and USA scientists to promote the exchange of information and samples from critical areas and stock components.

d) General observations

It was noted that, in general, both meristic and parasite studies have the potential for providing quantitative estimates of stock intermixing if a number of biological conditions are met (and certain biological knowledge obtained). By contrast, the tagging approach has already confirmed intermixing in a qualitative way, but it is plagued by serious difficulties associated with estimation of fishing mortality and tag return rates in sufficiently small units of time and space for the provision of quantitative measures of mixing. Consequently, meristic and parasite methods should be examined for their potential with the completion of the requisite biological studies before large-scale intensive field sampling is undertaken.

3. Fecundity Studies

Two analyses were presented on fecundity of herring in the western Gulf of Maine and southwest Nova Scotia stocks. Density-dependent fecundity was noted for the western Gulf of Maine (and Georges Bank), but it was not evident in the data for southwest Nova Scotia due to the narrow range in stock size. Year-to-year variability in fecundity for the southwest Nova Scotia stock was considered sufficient to warrant further detailed study. It was suggested that the results of both studies should be documented.

4. Larval Herring and Related Studies

Progress continues on analyses of growth and mortality studies of herring larvae from the ICNAF series of data, and final revisions of two research documents presented at the September 1980 Meeting (SCR 80/IX/129 and SCR 80/IX/131) are in progress for publication. Analysis of biological and oceanographic data from the 1978 patch study is continuing at the Woods Hole Laboratory and further papers are expected.

ted in 1982. In addition, analysis of ichthyoplankton data and environmental indices (particularly wind) from the ICNAF series is planned for 1982. Meanwhile, available reports on recent studies on larval herring were reviewed.

a) Southwest Nova Scotia

A hypothesis relating persistence and size of discrete spawning stocks of herring to the location and size of specific larval retention areas was described (SCR Doc. 81/IX/126). Retention areas of the Georges Bank, Gulf of Maine, southwest Nova Scotia and Bay of Fundy region were shown to be associated with physical oceanographic characteristics thought to be most important for larval transport (tidal and residual circulation patterns, drift, stratification or vertical mixing). Larval herring surveys off southwest Nova Scotia confirmed that dispersal of larvae followed general circulation patterns in that area, and larval production was shown to be well correlated with spawning stock size. Vertical migration of larvae is thought to be involved in their retention in such areas, but empirical data are insufficient at present to provide the basis for testing specific hypotheses.

b) Western Gulf of Maine

Two studies on larval herring along the Maine coast were reviewed. Differential vertical movement of larvae under varying light conditions was shown to be a source of bias in the results of the 1961-66 spring larval herring surveys where depth of sampling was restricted to 20 m (SCR Doc. 81/IX/138). From the 1980-81 larval herring surveys, the characteristics (abundance and size) of the 1980 year-class appeared to be comparable to larval data collected in the 1974 and 1976 year-classes, indicating that the harvest of the 1980 year-class at age 2 in 1982 may be comparable to those of the 1974 and 1976 year-classes, i.e. about 12,000-13,000 tons (SCR Doc. 81/IX/140).

c) Georges Bank

MARMAP ichthyoplankton surveys in 1980 and 1981 indicated that, for the fifth consecutive year, production of herring larvae was very poor or non-existent on Georges Bank (SCR Doc. 81/IX/115). A description of total ichthyoplankton abundance, diversity and spatial distribution patterns has been completed for the entire 1971-77 series of data from the ICNAF larval herring surveys (SCR Doc. 81/IX/136). Three faunal zones were defined and related to water mass types, and geographical displacements of the faunal groups were found to be consistent with patterns of mean residual flow and broad-scale incursions of slope water onto the southern part of the bank. A data report, upon which this faunal analysis was based, contains a summary of the 0.333 mm net catches of larvae (all species) for all cruises of the ICNAF series. This report may be obtained upon request from the Northeast Fisheries Center, Woods Hole (National Marine Fisheries Service, Reference Document 81-08, 446 p.).

Stomach contents and morphological condition of more than 7,000 herring larvae were summarized for samples collected during 15 surveys in the 1974-76 spawning seasons (SCR Doc. 81/IX/137). Feeding incidence and prey selectivity were examined in relation to availability of prey. Higher larval condition factors and occurrence of food in 1976 were associated with larger mean size of larvae and increased overwinter survival.

5. Coordination of Future Research on Herring

With the completion of the analysis and summarization of the ICNAF larval herring data series in the next year or two and the need for relating these results to other aspects of herring research, STACFIS considered that the time had come to broaden the scope of the Task Force to cover all phases of herring biology, and therefore

recommends

that a working group on herring biology be formed to coordinate all on-going and future research on herring in the NAFO Area.

IV. FLEMISH CAP PROJECT

1. Introduction

The *ad hoc* Working Group on the Flemish Cap Project was convened by J. T. Anderson (Canada) at the Bedford Institute of Oceanography on 12 September 1981. The convener pointed out the recommendation from the September 1980 Meeting "that high priority should be placed on the analysis of all existing biological and hydrographic data relevant to the objectives of the Flemish Cap Project, for consideration at the June 1981 Meeting" (NAFO Sci. Coun. Rep. 1979-80, page 124), noting that the meeting of the Working Group was subsequently deferred from June to September 1981.

2. Summary of Work Undertaken in 1981

Review of research work carried out on Flemish Cap in 1981 indicated a high level of research activity and the successful completion of three special projects. Five Canadian research cruises were carried out during January-August 1981, one involving a two-ship survey. It was noted that the results of a cruise in January were presented at the February 1981 Meeting (SCR Doc. 81/II/13). From the specialized sampling carried out during a two-ship survey in June-July, it is hoped to quantitatively describe the temporal and spatial variation that may occur when sampling the standard grid on Flemish Cap. Additional work included the successful deployment of a moored satellite-communicating thermistor chain and the exchange of plankton sampling gear with the USSR vessel *Gemma* for purposes of intercalibration. USSR research in 1981 included ichthyoplankton surveys during March-May and four hydrographic surveys, the results of which will be reported at the 1982 meeting of the Working Group.

3. Review of Recent Analyses

a) Hydrography

Geostrophic current patterns computed from USSR data obtained in the spring and summer of 1980 on Flemish Cap (SCR Doc. 81/VI/79) indicated the existence of non-stationary meanders which could remove a considerable portion of the ichthyoplankton from the bank with a consequent loss of cod larvae. Recently acquired Canadian data from a moored satellite-communicating thermistor chain on Flemish Cap during May-June 1981 showed seasonal warming only to depths less than 45 m.

As recommended at the September 1980 Meeting, a time series of March-September values of average temperature and salinity of the 0-20 m water layer for the 1955-80 period was presented (SCR Doc. 81/IX/120), but it was not known if these data represented good correlation with cod recruitment on Flemish Cap. STACFIS therefore

recommends

that a study be undertaken to determine whether a relationship exists between cod recruitment and biomass on Flemish Cap and environmental indices based on temperature and salinity data available in the MEDS data base.

STACFIS noted that MEDS had reported on oceanographic data transmitted from the Flemish Cap area in 1979-80 (SCR Doc. 81/VI/83). It was further noted that IGOSS transmission of data to MEDS had fallen to a low level during 1981. The Committee agreed that there was no continuing requirement for participants in the Flemish Cap Project to transmit messages through IGOSS on a mandatory basis, but that they should be continued on a voluntary basis in view of the usefulness of such messages for other programs.

b) Ichthyoplankton

Length frequency data from Canadian ichthyoplankton surveys (SCR 81/IX/116, 117) indicate that peak extrusion of redfish occurs in April. In 1978, 1979 and 1980, the abundance of larvae increased exponentially from mid-March to late April, followed by an exponential decrease to July. In contrast to distributions in 1978 and 1979, redfish larvae were found to be concentrated over the shallow area of Flemish Cap in 1980. Larval abundance in July decreased over the three years, the estimated level in 1980 being about 40% of that in 1978. Growth estimates were 0.14-0.15 mm per day for larvae taken in the 1979 and 1980 surveys. Examination of larval redfish otoliths showed the existence of pre-extrusion rings, but no significant difference in growth rate was observed between the 1979 and 1980 data.

c) Juvenile redfish

Catches of juvenile redfish in Canadian groundfish surveys on Flemish Cap were relatively large in 1979 and 1981 and low in 1978 and 1980 (SCR Doc. 81/IX/119). The largest concentrations occurred in the southwest quadrant at depths less than 330 m. The majority of these fish were aged by otoliths as 2-year-olds (<10 cm long), but their relative abundance did not correspond with abundance estimates from larval surveys. Data from these surveys indicated some evidence of redfish cannibalism.

Analysis of the contents of cod stomachs showed that juvenile redfish were most abundant in an arc around the western slope of Flemish Cap in depths less than 310 m (SCR Doc. 81/IX/118). Predation by cod on young redfish may have a significant effect on redfish recruitment. Consumption of small redfish was low in 1978 and 1980 and high in 1979 and 1981. This pattern corresponded with information from the larval fish surveys if the cod were feeding on 1-year-old fish but not to the information from juvenile surveys where most of the young were aged as 2-year-olds by otoliths. In order to resolve this problem, one or more autumn surveys were considered necessary to obtain juveniles for ageing.

d) Adult fish

USSR investigations on cod biology (SCR Doc. 81/VI/76) indicated seasonal differences in feeding which resulted in a buildup of fat content in the winter, but no marked year-to-year changes due possibly to the isolation of the area and stability of the environment. It was stated that cannibalism was not prevalent in cod. Discussion of some Canadian data on cod maturity, growth and seasonal changes in components of its biology resulted in a request that further analysis be carried out and the work presented as a research document at a future meeting.

An analysis of juvenile cod (ages 1 and 2) abundance from USSR bottom trawl surveys in 1968-79 and mean water temperature in the 0-50 m layer on USSR hydrographic section 4-A indicated an inverse relationship between year-class strength and temperature, with a prediction that the 1980 year-class will be below the long-term mean level (SCR Doc. 81/VI/77). There was discussion on the strength of the correlation which was not indicated, and it was suggested that the analysis be extended to include other age-groups.

4. Cod Stock-Recruitment Relationship

It was difficult to evaluate a stock-recruitment relationship for cod on Flemish Cap because the larval surveys only commenced in 1978 and numbers of eggs and larvae were extremely low. Preliminary calculations indicated that about 30% of the estimated number of eggs spawned in 1979 were available to the ichthyoplankton survey. It was agreed that more sampling (ichthyoplankton and adults) during and after the spawning period would refine the estimation of egg and larval abundance and indicate whether the ichthyoplankton surveys can provide quantitative estimates of the spawning products.

5. Calibration of Sampling Techniques

No reports were available on the inter-calibration of ichthyoplankton and groundfish sampling techniques. It was noted that a comparison of Canadian and USSR plankton sampling gear was carried out on board of the *Gemma* in 1981 and that a report will be presented at the next meeting of the Working Group. Although data exist for estimates of groundfish abundance based on fixed-station and stratified-random surveys and a recommendation by STACREC at the June 1981 Meeting indicated that calibration of these data should be carried out (SCS Doc. 81/VI/20), work on this project has not yet been done.

6. Progress and Future Research

There were no specific proposals for investigations on Flemish Cap during 1982. However, it was noted that a USSR plan of activity in Div. 3M, taking into account the discussions at the present meeting would be formulated soon and forwarded to the Secretariat early in 1982.

Several points were discussed regarding the future of the Flemish Cap Project. These pertained to several areas of concern which are summarized as follows: (i) the almost complete absence of cod eggs and larvae in the Canadian ichthyoplankton surveys in 1979, 1980 and 1981; (ii) the low level of cod stock biomass and the uncertainty about studying recruitment mechanisms when the stock is at such a low level; (iii) difficulties in studying the larval phase of redfish by itself to determine the causes of fluctuations in year-class strength; (iv) the state of the oceanographic program following the curtailment of the moored current meter program in 1979; and (v) the fact that Flemish Cap is in international waters where fishing effort has been high and where regulation and monitoring of catch and effort is poor.

STACFIS noted that the original aim of the Flemish Cap Project was to study the causes and mechanisms controlling year-class strength of demersal fishes in the area. However, in view of the present low level of the cod spawning stock, the inability to accurately assess recruitment and biomass variations due to poor monitoring of catches and fishing effort, and the inability during current surveys to capture significant numbers of cod larvae, STACFIS agreed that the original aim of the Working Group was no longer achievable and accordingly

recommends

that participants of the Flemish Cap Working Group initiate discussions with a view to redefining the project's objectives as soon as possible so that maximum coordination of 1982 surveys can be achieved.

V. COORDINATION OF SQUID RESEARCH

1. Introduction

As agreed at the June 1981 Meeting (SCS Doc. 81/VI/20), the *ad hoc* Working Group on Squid Research was convened by T. W. Rowell (Canada) during 9-10 September 1981 to carry out a more complete review of the 1981 survey results and to develop a program for 1982. While national commitments to the 1982 research program were established at the meeting, very little additional information relevant to the 1981 surveys was available. The full report of the Working Group is given in Annex 1.

2. New Information on Squid Research in 1981

Further analysis of data from the February-March 1981 survey in oceanic waters south of Grand Bank (SCR Doc. 81/IX/104) indicated that the greatest concentrations of juvenile *Illex* were in Slope Water near the northern boundary of the Gulf Stream, suggesting that spawning probably occurs in the vicinity of the Gulf Stream rather than on the continental slopes. Distribution and abundance data from a bottom trawl survey of the Scotian Shelf in June 1981 (SCR Doc. 81/IX/100) indicated that squid were in the early immigration phase, with the highest catch rates along the southern part of the Shelf at bottom temperatures of 8-12°C, but a similar survey in August-early September 1981 indicated a sharp decline in squid abundance relative to that in 1980. Three size-groups were apparent, with the large maturing individuals predominating. Juvenile squid, observed mainly on the most southerly part of the Shelf, were interpreted as late arrivals to the area. An attempt to correlate squid abundance indices and bottom temperatures from Canadian bottom-trawl surveys on the Scotian Shelf in July of 1970-80 (SCR Doc. 81/IX/99) gave no clear relationship on a year-to-year basis, but the overall data indicated higher catch rates at 8-12°C.

3. Review of 1981 Program

Five hypotheses regarding the life cycle of *Illex*, developed at the September 1980 Meeting (NAFO Sci. Coun. Rep. 1979-80, pages 129-130) were reviewed in relation to the information provided to both the June 1981 and September 1981 Meetings. Although none were definitively rejected or accepted, it was possible to focus more clearly on the relative merits of the information available and possible implications for the hypotheses, as follows: migration of juveniles from the Gulf Stream to the continental shelf was found to be most prevalent at depths of 50-100 m; no adults were captured in any of the water masses sampled to 1,000 m (considered to be the maximum depth of the Gulf Stream), thus lessening the probability that spawning occurs in these waters; the capture of larvae and juveniles favors the hypothesis of spawning in the region of the Gulf Stream; the areas where larvae were captured and the long-distance tagging results favor a southern spawning area (Subareas 5 and 6) with northward transport of larvae and juveniles; information on temperature requirements for fertilization (>7°C), embryonic development (>10°C) and larval growth lessens the probability of spawning in areas near the continental shelf in winter, particularly in the northern part of the region.

4. Coordinated Research Program for 1982

From the review of coverage of the 1981 surveys, it was agreed that the 1982 program should continue to emphasize the broadest possible coverage of Subareas 3-6 from the edge of the continental shelf through the Gulf Stream into the Sargasso Sea (56° to 74°W), with extensive surveys in Subareas 5 and 6 as far south as Cape Hatteras. Research effort will be divided between broad coverage of the entire region and intensive surveys of the water masses in the vicinity of the Gulf Stream. Four vessels (two Canadian, one Japanese, one USSR) appear to be committed to the program, and, with increased gear capabilities, it will be possible to obtain greater depth coverage (to 1500 m) and sampling of discrete water masses and depth regimes. The survey design will differ from that of 1981 but the biological and hydrological sampling regimes will be similar (see Annex 1). Data collection formats and reporting procedures will not be standardized except as mutually agreed among participating scientists.

5. Future Meetings

STACFIS noted that considerable time would be required at the time of the Scientific Council Meeting in June 1982 to review all new information from the 1982 surveys, including outstanding data from the 1981 cooperative research program, and to plan a cooperative program for 1983. STACFIS therefore

recommends

- i) *that a special 4-day session on squid biology and distribution be included in the scheduling of the June 1982 Meeting in order to review all available information from national programs and the cooperative research program;*
- ii) *that planning for cooperative research in 1983 be undertaken at this meeting; and*
- iii) *that participating countries ensure that scientists involved in the cooperative research program on squid be available to attend this meeting.*

VI. OTHER MATTERS

1. Evaluation of Scientific Advice Provided for Management of Northwest Atlantic Cod Stocks

A paper entitled "Management of Canadian cod stocks" (SCR Doc. 81/IX/141), prepared for the Joint Session of the Fish Committees at the 1980 ICES Annual Meeting, was presented and discussed. It was noted that insufficient time had elapsed since the extension of fisheries jurisdiction in 1977 to draw conclusions about the effectiveness of scientific advice and management measures in the Canadian fisheries

zone. Preliminary evidence indicated that catch rates and stock biomasses have increased for the cod stocks fished entirely within the 200-mile zone, whereas neighboring stocks on Flemish Cap and overlapping the 200-mile limit on Grand Bank remained at low levels of abundance.

2. Evaluation of the Impact of Changes in Mesh Size on the Interacting Fisheries for Cod and Redfish in Division 3M.

STACFIS noted the importance of this agenda item, but, in the absence of most of the experts involved in selectivity studies on cod and redfish,

recommends

that the assessment of changes in mesh size on the interacting fisheries for cod and redfish be deferred for consideration at the June 1982 Meeting.

3. Adjournment

The Chairman expressed his appreciation to Dr. R. W. Trites who convened the Special Session on Remote Sensing, to Mr. E. J. Sandeman who convened the Symposium on Environmental Conditions during the 1970-79 Decade, to Dr M. D. Grosslein who convened the Task Force on the Larval Herring Program, to Dr J. T. Anderson who convened the Flemish Cap Working Group, to Mr. T. W. Rowell who convened the Working Group on Squid Research, to the rapporteurs and participants for their keen interest and cooperation during the various sessions, and to the Secretariat for their usual efficient work. Noting that a new chairman would be presiding over the next meeting of STACFIS, the participants expressed their gratitude to Dr G. H. Winters for his guidance during the past two years.

ANNEX 1. REPORT OF AD HOC WORKING GROUP ON SQUID RESEARCH

Convener: T. W. Rowell

At the June 1981 Meeting of the Scientific Council, the Working Group reviewed all currently available information on the biology and distribution of *Illex illecebrosus*, including the preliminary results of the coordinated research surveys in 1980 and early 1981 (SCS Doc. 81/VI/20). Because of the need for further analysis of some data as the basis for full evaluation of the 1981 coordinated research program and the need to develop specific plans for the continuation of this research in 1982, it was agreed that the Working Group should meet during the September 1981 Meeting. Consequently, the Group met at Halifax, Nova Scotia, Canada, during 9-10 September 1981, with scientists in attendance from Canada, Cuba, European Economic Community, Japan, Portugal, Poland, Spain, USSR and USA.

1. Consideration of New Information

a) Off-shelf distribution and abundance of juveniles

Further analysis of the results from a Canadian survey in February-March 1981 in oceanic waters south of Grand Bank (SCR Doc. 81/IX/104) indicated that the greatest concentrations of juvenile *Illex* were found in Slope Water near the northern boundary of the Gulf Stream with rare occurrence in Gulf Stream water. This implies that spawning occurs in the vicinity of the Gulf Stream rather than at the edge of the continental shelf.

b) Pre-season distribution and abundance

Data on distribution and abundance from a Canadian bottom-trawl survey on the Scotian Shelf in June 1981 (SCR Doc. 81/IX/100) indicate that squid were in the early immigration phase. Largest catches occurred at depths of 92 and 183 m on the southern part of the Shelf where bottom temperatures were 8-12°C.

c) Mid-season distribution and abundance

Preliminary results from a French bottom-trawl survey on the Scotian Shelf during 28 August-7 September 1981 were orally presented. These data for strata in depths of 92-370 m indicated a much lower abundance of squid than in September 1980 (SCR Doc. 81/VI/38). Length-frequency data indicated the presence of three size groups with large maturing individuals predominating. However, juveniles were observed mainly on the most southwesterly part of the Shelf and were interpreted as late arrivals to the area.

d) Environmental influence on squid abundance

An analysis of the relationship between squid abundance indices and bottom temperatures from Canadian surveys on the Scotian Shelf in July during 1970-80 (SCR Doc. 81/IX/99) did not show a clear correlation on a year-to-year basis, but the combined data indicated that the highest catch rates were obtained in areas where bottom temperatures were 8-12°C.

e) Stock definition

Preliminary results of a gel electrophoretic study on polymorphic enzymes as a possible means of distinguishing different populations of *Illex*, utilizing a small sample collected on the Scotian Shelf in June 1981, indicated the absence of polymorphism (SCR Doc. 81/IX/103). The Working Group agreed that further studies of this nature are warranted and proposed that future analyses should be made on samples from a wider area.

2. Review of 1981 Program

a) Hypotheses to be tested

The five hypotheses developed at the September 1980 Meeting were examined and an attempt made to assess their relative merits on the basis of recently acquired data. None could definitely be rejected or accepted. The hypotheses are restated below, followed by observations on each.

- i) "Adults move to the edge of the continental shelf and spawn demersally in deep water; larvae are transported at depth or undergo vertical migration and then are transported in near-surface layers to the northwestern border of the Gulf Stream; juveniles later migrate to the continental shelf."

No data were presented for further evaluation of this hypothesis.

- ii) "Adults move offshore to spawn pelagically near the northwestern border of the Gulf Stream; larvae remain in the region and juveniles migrate to the continental shelf at unknown depths."

Data presented allow this hypothesis to be modified by removing the phrase "at unknown depths" as migration appears most prevalent at depths of 50-100 m. However, no *Illex* adults have yet been captured in the upper 1,000 m of these waters.

- iii) "Adults move offshore through or under the Gulf Stream and spawn in the Sargasso Sea; larvae and juveniles move shoreward through or under the Gulf Stream or by warm-core eddy transport, with the juveniles eventually reaching the continental shelf."

No data were presented for evaluation of this hypothesis, but no adult *Illex* have yet been captured in the upper 1,000 m of these waters.

- iv) "Adults move offshore to spawn pelagically in the Gulf Stream, with subsequent migration of juveniles to the continental shelf."

Existing data lessen the probability of this hypothesis being valid as no adults have been captured in Gulf Stream waters, but these waters have not yet been intensively sampled.

- v) "Adults move to deep water at the edge of the continental shelf in Subareas 5 and 6 and spawn demersally; larvae move outward to the northwestern edge of the Gulf Stream either at depth or in the surface layer; some of the larvae and juveniles are transported northward to areas bordering the Scotian Shelf and Grand Bank from where they migrate shoreward."

The available data tend to support this hypothesis, as most larval captures have been in southwestern waters. Furthermore, results indicate late-season movement of adults to the southwestern part of the NAFO Area.

As very few *Illex* larvae have been captured and only a fraction of these have been identified as *Illex illecebrosus*, it is doubtful that hypotheses relating to larval distribution and transport will be tested in the near future. The distribution and movement of juveniles are becoming better understood. Highest densities are found in the upper 100 m of Slope Water on the north side of the Gulf Stream. An increase in size of juveniles is apparent from the Gulf Stream area towards the continental shelf. Laboratory experiments show that fertilization does not occur at temperatures below 7°C and that temperatures greater than 10°C are required for embryonic development. These temperature requirements essentially rule out winter spawning near the edge of the continental shelf. Warm-core eddies do not seem to be directly responsible for juvenile transport as only small numbers of juveniles have been taken within them.

b) Area of survey and sampling regime

The Working Group reviewed its earlier discussion on the area to be surveyed for studies on the spawning and on the distribution of larval and early juvenile stages of *Illex*, and reiterates its earlier conclusions on the importance of sampling the broadest possible area of Subareas 3-6 from the edge of the continental shelf through the Gulf Stream and into the Sargasso Sea.

The Working Group also considered the research plans and availability of vessels of Canada, Japan and USSR and agreed that greater research benefits would accrue if the national efforts were divided between broad synoptic surveys and intensive surveys of the Slope Water-Gulf Stream-Sargasso Sea interfaces. It was also agreed that the biological and hydrographic sampling proposed for 1981 should be used as a guide for 1982 sampling.

3. Proposed Program for 1982

The cooperative research program for 1982 involves broadening the area of geographical coverage to include extensive surveys in Subareas 5 and 6 as far south as Cape Hatteras (see SCR Doc. 81/VI/20, page 20, for earlier statement of future research efforts). In addition, research effort will be divided between broad-scale surveys covering the entire area of study and more intensive surveys of the water masses in the immediate area of the Gulf Stream. Increased vessel and gear capabilities will also permit greater depth coverage (to 1,500 m) and the sampling of discrete water masses and depth intervals. Although a somewhat different survey design is planned for 1982, participating research vessels are expected to use the 1981 biological and hydrological sampling regime as a guideline for 1982 surveys.

a) Vessels

Vessel availability and timing of participation in the 1982 surveys are as follows:

Country	Vessel	Time of survey	Subareas
Canada	Lady Hammond ¹	Feb. 2-25	4
Canada	Gadus Atlantica	Feb. 20-Mar. 11	3
Japan	Kaiyo Maru	Jan. 16-Mar. 5	3-6
USSR	Atlant	Jan. 20-May 20	3-6

¹Preliminary schedule.

Although USA scientists could not commit vessels to the project, the possibility exists for use of MARMAP survey data for Subareas 5 and 6, and USA scientists will be invited to participate in the Japanese and USSR studies in these subareas.

b) Area of operation and survey design

- i) *Lady Hammond*. Assuming the availability of this vessel, intensive surveys will be conducted within a small geographical area (vicinity of 63°W) in the region of the Slope Water-Gulf Stream-Sargasso Sea interfaces, in general accordance with the design used in Phase I of the 1981 program (Sci. Coun. Rep. 1979-80, pages 139-140) but with greater emphasis on hydrographic sampling and water-mass definition in relation to abundance and transport of *Illex*.
- ii) *Gadus Atlantica*. Intensive surveys similar in design to those outlined above for the *Lady Hammond* will be conducted in the vicinity of 56°W longitude, using a series of short transects through the Slope Water and Gulf Stream-Sargasso Sea interfaces.
- iii) *Kaiyo Maru*. Two series of widely-spaced transects will be sampled in the area between approximately 74° and 56°W longitude, covering waters from the edge of the shelf to the Sargasso Sea, using three specially designed midwater sampling gears (one research trawl, and two smaller, rigid-frame sampling nets). The sampling regime will be in general accordance with Phase I of the 1981 proposal, with intention to sample larvae, juveniles and spawning adults to depths as great as 1,500 m.
- iv) *Atlant*. A series of widely-spaced transects will be sampled in the area between approximately 75° and 56°W longitude, covering waters from the edge of the shelf to the Sargasso Sea, using essentially the same sampling design and procedures as were employed during Phase II of the 1981 surveys. In addition to this broadscale survey, the *Atlant* may carry out experiments (proposed for 14-28 April 1982) on the catchability and selectivity of research gear for *Illex* juveniles.

c) Data collection, exchange and reporting

Having considered the difficulties encountered in attempts to standardize data collection and reporting formats for the 1981 program, the Working Group agreed that participating scientists from different countries should ensure that data formats and exchange arrangements are mutually acceptable. Analysis and reporting arrangements are also left for mutual agreement between the cooperating scientists.

4. Other Matters

The Working Group advises that four days will be required during the June 1982 Meeting to review new information on squid biology and distribution arising from the proposed 1982 cooperative program, including any outstanding data from the 1981 program. It should also be possible at that time to plan for a cooperative research program for 1983.

APPENDIX II. REPORT OF STANDING COMMITTEE ON PUBLICATIONS (STACPUB)

Chairman: R. G. Halliday

Rapporteur: V. M. Hodder

The Committee met at Halifax on 11 September and at Dartmouth, Nova Scotia, Canada, on 17 September 1981 to consider and report on various matters referred to it by the Scientific Council (Agenda Item III). The members in attendance were: R. G. Halliday (Chairman), J. Messtorff (EEC), J. P. Minet (EEC), A. T. Pinhorn (Canada) and H. Hatanaka (Japan). The Chairman of the Scientific Council (R. H. Letaconnoux) and the Assistant Executive Secretary (V. M. Hodder) also attended the sessions. The Executive Secretary, Capt. J. E. Cardoso, attended during consideration of Item 5 below.

1. Review of Scientific Publications Since June 1981

a) Statistical Bulletin, Vol. 29 for 1979

The Committee noted that printing of the first NAFO issue of the Bulletin (292 pages) was completed in August 1981, that bound copies were received from the book-binders in early September and that distribution would take place immediately following this meeting.

b) Journal of Northwest Atlantic Fishery Science, Vol. 2

It was initially hoped that two issues of Volume 2 could be achieved in 1981, the first number being scheduled for printing in July-August 1981. However, the delay in receipt of some manuscripts in the final stages of processing, due to the 6-week disruption in the Canadian postal service, resulted in rescheduling production to October 1981 and the decision to publish Volume 2 in only one issue. Meanwhile, the volume was enhanced by the acceptance of three additional short articles. STACPUB requested that an outline of editorial policy and the names of the Editorial Board be included in the forthcoming issue.

The Editor reported that five manuscripts were already in hand for Volume 3 and several others were expected before the end of 1981. With the assistance of the Editorial Board, it seemed realistic to aim for March 1982 for the publication of Volume 3 (No. 1), the intention being that Volume 3 would contain two issues.

c) Scientific Council Studies, No. 2

The Committee noted that technical editing of the NAFO Manual on Groundfish Surveys was nearly completed and that publication in Studies No. 2 was scheduled for November or December 1981.

2. Editorial Board for the Journal

In accordance with the request of STACPUB at the June 1981 Meeting, the Chairman of STACPUB and the Editor contacted the various nominees for appointment to the Editorial Board and reported that the following had agreed to serve as Associate Editors, if appointed:

Mr Arthur Lee (biological oceanography)
Dr Wilfred Templeman (vertebrate fisheries biology)
Mr Edward J. Sandeman (invertebrate fisheries biology)
Dr William G. Doubleday (biomathematics)

STACPUB was extremely pleased that these well-known scientists had agreed to serve on the Editorial Board and accordingly

recommends

that the Editorial Board be formally established with the appointment of Dr W. G. Doubleday, Mr. A. Lee, Mr E. J. Sandeman and Dr W. Templeman as Associate Editors to assist the Editor (V. M. Hodder) in the evaluation and processing of papers for the Journal of Northwest Atlantic Fishery Science.

3. Journal Reprints

As requested at the June 1981 Meeting, the Executive Secretary further investigated the feasibility of upgrading Journal reprints. It was reported that a method had been worked out whereby the additional cost of producing folded reprints would be about 10-12%, relative to the cost of materials and supplies for producing Volume 1 (110 pages). It was noted that a portion of this additional cost could be recovered by increasing the price charged for reprint orders in excess of the number of reprints provided free to authors. STACPUB therefore proposed that the Executive Secretary be requested to use Volume 2 as a pilot study in upgrading the quality of Journal reprints.

4. Abstracting of Documents and Periodicals

The Committee noted that abstracts of ICES meeting documents are published by FAO in its ASFAL Series and considered whether the same procedure should be followed for the NAFO research documents. As these meeting documents contain on the front page the statement "Not to be cited without prior reference to the author(s)", are not distributed very widely, and often contain very preliminary analyses, the merit of abstracting such documents for world-wide distribution by FAO was questioned. The Committee noted that some of its members would be attending the forthcoming ICES meeting in October 1981 and proposed that they arrange to discuss with ICES the basis for inclusion of meeting documents in FAO's ASFAL Series.

The Committee requested the Editor to arrange for the inclusion of abstracts of the Journal and Studies articles in FAO's ASFAL and Biological Abstracts.

5. Distribution of the Journal

The Committee considered it essential to promote the widest possible distribution of the Journal to publicize the work of the Scientific Council and to establish its publication as a primary international fisheries journal. It was realized that increased distribution would result in increased costs and that indiscriminate distribution was not a cost-effective method of meeting this objective. The Committee therefore proposed that an efficient distribution policy, combined with partial cost recovery through subscription fees to certain user sectors of the scientific community, be established. It was presumed that the General Council would continue to cover, in the annual budget, the costs associated with providing a supply of Journal copies to members commensurate with their identified need.

The Committee proposed that the Scientific Council provide guidelines for the organization and control of the free issue of the Journal to its members through representatives of Contracting Parties on the Scientific Council. These representatives should be provided with the current national distribution list by the Executive Secretary and be requested to approve that list or provide a revised version. That process should be completed by 31 December 1981 and then repeated on an annual basis.

In reviewing the lists, representatives should be asked to note that the Scientific Council was not proposing to place a limit on the number of copies supplied to each Contracting Party. That would be considered, however, if the aggregate total of free copies requested exceeded the historical average of about 800 copies per issue. They should also be asked to note that the Scientific Council considers its obligation to be limited essentially to the representatives and employees of governments constituting the Contracting Parties of NAFO. However, recognizing that different situations exist among members with regard to contributions to the work of the Scientific Council by other levels of government and public institutions such as universities, free distribution to employees of these organizations should be based on the recommendations of the national representatives and agreement by the Council. Experience has shown that bulk mailing was an uncertain and inefficient distributional method in some cases and that it was preferable to adopt a method of direct mailing to individual recipients. Representatives should therefore be urged to provide lists of individual scientists, where practical, rather than institutions, with the exception of library copies.

It was proposed that all other routine distribution (with the exceptions provided for below) should be on a subscription basis. Subscription fees should be on a Journal volume (i.e. annual) basis and be set by the Executive Secretary at a level which approximated the costs of production but not so high as to discourage subscription by individual scientists. Exceptions to this distribution policy should be made for other international fisheries agencies to which small numbers of copies would be distributed free or preferably on a publication exchange basis. An exception should also be made for the United States of America, based on its special status as a coastal state in the Convention Area and on the substantial contribution made to the work of the Scientific Council despite its non-member status. Up to 50 free copies should be distributed free as requested by the Director of the Northeast Fisheries Center, Woods Hole, based on the same principles as outlined above regarding distribution.

As the Secretariat does not maintain a library, the present practice of accepting publication exchange arrangements is generally not productive. Exchanges with other international agencies which provide necessary reference material for the work of the Scientific Council and the Secretariat are the exception, as noted above. With the introduction of subscription fees, all other exchange agreements should be cancelled and no new ones entered into.

In order to measure the success of the recommended policy, statistics on production costs and revenues from subscriptions would be required, as well as statistics on Journal distribution, on an annual basis. The Committee proposed that the Executive Secretary be therefore requested to take the steps necessary to be able to report these statistics to the Scientific Council on a fiscal year basis.

6. Promotion of the Journal

The Committee proposed that all previous recipients of ICNAF publications who are not now included in the revised free distribution list be solicited to subscribe to the Journal. However, this would not

expand the Journal distribution in relation to the ICNAF Research Bulletin and special measures were required. It was proposed that the Executive Secretary investigate possibilities for advertising the Journal widely and present a plan of action to the June 1982 Meeting. Specifically, STACPUB had in mind calling on the goodwill of other organizations to distribute information to their members and on other journals and on abstracting services to include announcements in their issues. Much of this should be achievable at little or no cost.

7. Papers Nominated for Possible Publication

The Committee reviewed the research documents presented to the September 1981 Meeting and requested that the Editor invite the authors of the following documents to submit suitably revised manuscripts for possible publication in the Journal or Studies series: SCR Doc. 81/IX/117, 127, 136 and 137.

The Committee noted the recommendations of the Conveners of the Special Session on Remote Sensing and the Symposium on Environmental Conditions during the 1970-79 Decade and agreed that the relevant contributions be published in separate issues of Studies. The Conveners agreed that they would, in collaboration with the Editor, ensure that all relevant manuscripts are completed and subjected to general scientific editing prior to publication.

Regarding the voluminous review paper by C. J. Sindermann entitled "Status of the Northwest Atlantic Herring Stocks", the Committee was informed of the difficulty in obtaining experts willing to review this paper. STACPUB agreed that the author be invited to submit the paper for publication in Studies.

8. Proposed Ichthyoplankton Identification Manual

As agreed at the June 1981 Meeting, an *ad hoc* working group of ichthyoplankton systematic experts was convened by Dr D. F. Markle (Canada) to advise on the value and practicality of producing an identification manual. STACPUB accepted the report of the Working Group (Annex 1) and accordingly

recommends

that the publication of peer-reviewed regional ichthyoplankton identification manuals be implemented, starting with one for the mid-Atlantic Bight area for which a suitable manuscript is available.

It was agreed that Dr D. F. Markle should organize and convene, when necessary, a Working Group on the Production of Ichthyoplankton Manuals. The group would solicit and oversee the preparation of future manuals, with two to four being envisaged, should the Scientific Council approve the project.

Noting that further research is required on the systematics and identification of problem ichthyoplankton groups and in problem geographical areas, STACPUB

recommends

that the Scientific Council take steps to encourage research on ichthyoplankton identification problems in the Northwest Atlantic in order to enhance the value of future volumes of the proposed manual.

9. Other Matters

a) Correction to Scientific Name for Roundnose Grenadier

The Committee agreed that the scientific name for roundnose grenadier in the NAFO List of Species should be revised from *Macrourus rupestris* to *Coryphaenoides rupestris*, as the latter is currently the generally accepted generic name for this species.

b) Utilization of Microfiche/Microfilm for Storage, Retrieval and Distribution of Scientific Council Documents and Publications

The potential value of utilizing this technology was raised, and it was proposed that the Executive Secretary be asked to investigate the potential benefits of microfiche or microfilm and costs of its utilization for further consideration by STACPUB at its June 1982 Meeting. It was further proposed that the Executive Secretary be requested to solicit comments from representatives concerning their capability to utilize this technology and their opinions on its adoption.

c) Adjournment

The Chairman thanked the Committee members and the Secretariat for their contribution to the work of STACPUB over these most important and busy first two years of the Organization. The Chairman, who retired at the end of the Meeting, was also thanked by the Committee for his contribution.

ANNEX 1. REPORT OF AD HOC WORKING GROUP ON ICHTHYOPLANKTON MANUALS

Convener: D. F. Markle

Rapporteur: L. Van Guelpen

The *ad hoc* Working Group was established at the June 1981 Meeting of the Scientific Council to review the state of knowledge of ichthyoplankton identification in the Northwest Atlantic, to decide on the feasibility of producing a manual on ichthyoplankton identification, and to propose mechanisms for production of a manual if the project was a practical and worthwhile venture. Consequently, a small group of scientists met at NAFO headquarters, Dartmouth, Canada, on 17 September 1981 to consider the matter. The Working Group consisted of D. F. Markle, L. Van Guelpen and M. Fahay, who attended the entire session, with Sv. Aa. Horsted, J. Anderson, R. G. Halliday and V. M. Hodder attending for only part of the session due to concurrent meetings.

1. Background

The Chairman of STAC PUB (Dr R. G. Halliday) presented a brief account of the history leading to the formation of the Working Group within the Standing Committee on Publications. He noted that the Committee had discussed the possibility of compiling a loose-leaf, standard format manual on ichthyoplankton identification and distribution for the Northwest Atlantic as a whole, perhaps similar to the sheets occasionally produced by ICES.

2. State of Knowledge on Ichthyoplankton

The Group began a point-by-point discussion of zoogeographical areas and taxonomic groups with the intention of deciding (i) whether there existed sufficient primary literature for an ichthyologist to identify eggs and larvae, and (ii) whether manuals existed for the NAFO geographical areas or parts thereof.

The Group noted that the continental shelf from Cape Hatteras to the Gulf of St. Lawrence had a fauna whose larvae were reasonably well known. North of the Gulf of St. Lawrence, the problems are greater with important gaps in knowledge of egg and larval taxonomy (e.g. *Sabastes* and *Gadus*). The Slope Water region was considered to be a geographical area with a distinct fauna whose larvae are mostly undescribed. Young fish in the Gulf Stream are usually developed enough by the time they enter the NAFO area that adult characteristics can frequently be used. The oceanic area east of the Gulf Stream contains poorly known taxa as well as those whose larvae have been described in excellent systematic monographs. The Group also noted that major taxonomic problems remain with eggs and larvae of important commercial species (e.g. Gadidae, Scorpaenidae, Clupeidae, and the percoids) and other ecologically-important groups (Ammodytidae, Cottidae, Liparidae, Bothidae, Lumpenidae, Cynoglossidae) were a few examples mentioned).

Considerable concern was expressed about geographical variation. It was noted that some *Scomber scombrus* larvae from the Gulf of St. Lawrence differed in a diagnostic pigment character from those south and in fact resembled *S. japonicus*. Other examples included the larvae of *Pseudopleuronectes americanus* and eggs of *Scophthalmus aquosus*. This area of larval taxonomy has not yet been properly studied.

Seasonal variation, as most commonly seen in changes in egg diameter, was also noted as a source of error in identification. A better understanding of this variation would help to establish the point in the egg production cycle that is sampled.

The available secondary literature (manuals and bibliographies) was considered to be reasonably good, but there were mixed feelings on their usefulness. The "Checklist of Fishes of the Northeastern Atlantic and the Mediterranean" was mentioned as a thorough bibliography, but it requires prior knowledge of the problems. "Development of Fishes of the Mid-Atlantic Bight" was mentioned as the best available manual, but it also requires some prior knowledge of taxonomically-unrelated but similar-looking species. Manuals, especially those that are compendiums, were criticized as vehicles that perpetuate errors. On the other hand, the cost of completely original work may be prohibitive. It was considered that manuals should be critical compilations with diagrams redrawn and diagnostic characters revised to suit the situation in the region covered by the manual.

3. Recommendations

The Working Group agreed that there was a natural progression in the increase of knowledge of a taxonomic group. Initially, there were scattered descriptions of certain species. Subsequently, there were wide-spread or oceanic reviews of entire taxa (genera, subfamilies, families, etc.) Since the 1950's, there has been a slow increase in the number of these revisionary works on egg and larval taxonomy. As the primary literature base grows and expertise becomes available, the Working Group agreed that it would be practical and worthwhile to compile and publish regional ichthyoplankton manuals. The Working Group therefore

recommends

- a) that the Scientific Council should encourage its members to pursue the systematic study of egg and larval taxonomy in the Northwest Atlantic, especially on problem ichthyoplankton groups and in problem geographical areas and publish the results of such studies in the primary literature;
- b) that an ad hoc working group of experts be established to solicit and oversee the preparation of regional manuals for the Northwest Atlantic, which should be (i) based on knowledge of the fauna in particular regions, (ii) subjected to peer-review by NAFO scientists, (iii) cross-reference other manuals in the series when dealing with geographical variation, and (iv) generally follow the style of the first manual in the series but with some freedom by authors to alter the style to suit particular needs, and
- c) that the nearly-completed manuscript by M. P. Fahay on early stages of marine fishes in the southern part of the NAFO Area be considered as the first manual in the series.

It was agreed that, if the above recommendations are accepted by the Scientific Council, Dr D. K. Markle, Mr. L. Van Guelpen and Mr M. Fahay should constitute the Working Group to oversee the preparation of manuals in consultation with the NAFO Secretariat and submit a progress report to the June 1981 Meeting.

APPENDIX III. AGENDA

Scientific Council Meeting - September 1981

I. Opening (Chairman: Mr R. H. Letaconnoux)

1. Appointment of rapporteur
2. Adoption of Agenda
3. Plan of work

II. Fishery Science (Chairman: Dr G. H. Winters)

1. Special session on remote-sensing methods and their possible application to fisheries science (Convener, Dr R. W. Trites)
 - a) General introduction and overview of the nature and use of remote-sensing data
 - b) Use of satellites for mapping sea surface temperatures, fronts and eddies
 - c) Water color as it relates to chlorophyll and primary production
 - d) Fluorescence and luminescence techniques and measurements
 - e) Remote-sensing data for Northwest Atlantic - format, availability and costs - past, present and future
 - f) Other considerations
2. Symposium on environmental conditions in the Northwest Atlantic during the 1970-79 decade (Convener: Dr E. J. Sandeman)
 - a) Historical review of ocean climate in the Northwest Atlantic and events leading up to the decade
 - b) Meteorological conditions during the decade
 - c) Ice and icebergs during the decade
 - d) Oceanographic conditions during the decade - regional overviews
 - i) Subareas 0 and 1
 - ii) Subareas 2, 3 and 4
 - iii) Subareas 5 and 6
 - iv) General considerations
 - e) New insights about fisheries and oceanography
 - f) Other considerations
3. Task Force on Larval Herring Program (Convener: Dr M. D. Grosslein)
 - a) Herring stock interrelationships in Gulf of Maine region
 - b) Studies of spawning stocks in Gulf of Maine
 - c) Larval herring and related zooplankton studies
 - d) Status of Larval Herring Program data base, publications, etc.
 - e) Other matters
 - f) Recommendations to NAFO
4. *Ad hoc* Working Group on Flemish Cap Project (Convener: Dr J. T. Anderson)
 - a) Evaluation of existing data base
 - b) Review of results from recent surveys
 - c) Stock-recruitment relationship for cod
 - d) Calibration of different sampling techniques - plankton and groundfish
 - e) Other matters
5. *Ad hoc* Working Group on Squid Research (Convener: Mr T. W. Rowell)
 - a) Further evaluation of data from 1981 surveys
 - b) Coordination of research surveys for 1982
 - c) Other matters
6. Other matters
 - a) Special contribution on evaluation of scientific advice provided for management of the Northwest Atlantic fish stocks, with particular reference to cod.
 - b) Evaluation of the impact of changes in mesh size on the interacting fisheries for cod and redfish in Div. 3M

III. Publications (Chairman: Dr R. G. Halliday)

1. Further review of editorial policy
2. Establishment of editorial board
3. Proposed ichthyoplankton identification manual
4. Selection of papers for possible publication
5. Other matters

IV. Adoption of Reports

1. Standing Committee on Fishery Science (STACFIS)
2. Standing Committee on Publications (STACPUB)
3. Provisional Report of June 1981 Meeting of Scientific Council (SCS Doc 81/VI/20)

V. Rules of Procedure

1. Proposal to amend Rule 3.1 regarding election of officers (SCS Doc. 81/VI/20)
2. Proposal to amend Rule 4.1 so that a draft provisional agenda is sent 100 days before the date fixed for the opening of the meeting (SCS Doc 81/IX/25)

VI. Review of Future Meeting Arrangements

1. Mid-term meeting for assessment of shrimp and seals (20-26 November 1981)
2. Mid-term meeting for assessment of cod and capelin (mid-February 1982, if necessary)
3. Regular meeting, June 1982

VII. Election of Officers

VIII. Other Matters

IX. Adjournment

APPENDIX IV. LIST OF PARTICIPANTS

Scientific Council Meeting - September 1981

CANADA

S. A. Akenhead	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
T. Amaratunga	Invertebrates Division, Dept. of Fisheries and Oceans, P. O. Box 550, Halifax, N. S.
J. T. Anderson	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
J. S. Beckett	Fisheries Research Branch, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
G. A. Borstad	* Seakem Oceanography, 2045 Mills Road, Sidney, B. C.
P. F. Brodie	* Marine Ecology Laboratory, BIO, P. O. Box 1006, Dartmouth, N. S.
E. L. Dalley	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
E. G. Dawe	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
W. G. Doubleday	Fisheries Research Branch, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
K. Drinkwater	* Marine Ecology Laboratory, BIO, P. O. Box 1006, Dartmouth, N. S.
M. J. Dunbar	* Institute of Oceanography, McGill University, 3620 University Ave., Montreal, Que.
H. R. Edel	* Marine Sciences and Information, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
P. Fontaine	Direction de la Recherche Scientifique et Technique, 2700 Rue Einstein, Ste. Foy, Que.
J. A. Gagne	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
J. Gagnon	* Marine Environmental Data Service, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
C. A. Gavaris	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
J. F. R. Gower	* Institute of Ocean Sciences, P. O. Box 6000, Sidney, B. C.
R. G. Halliday	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
T. D. Iles	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
J. R. Keeley	Marine Environmental Data Service, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
R. G. Kingsley	* Fisheries Technology Div., Newfoundland Dept. of Fisheries, P. O. Box 4750, St. John's, Nfld.
J. A. Koslov	* Dept. of Oceanography, Dalhousie University, Halifax, N. S.
G. R. Lilly	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
W. D. McKone	Fisheries Research Branch, Dept. of Fisheries and Oceans, 240 Sparks St., Ottawa, Ont.
R. Mahon	* Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
D. F. Markle	Huntsman Marine Laboratory, St. Andrews, N. B.
R. K. Mohn	Invertebrates Division, Dept. of Fisheries and Oceans, P. O. Box 550, Halifax, N. S.
B. Nakashima	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
A. T. Pinhorn	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
A. A. Rosenberg	* Dept. of Oceanography, Dalhousie University, Halifax, N. S.
C. K. Ross	* Atlantic Oceanographic Laboratory, BIO, P. O. Box 1006, Dartmouth, N. S.
T. W. Rowell	Invertebrates Division, Dept. of Fisheries and Oceans, P. O. Box 550, Halifax, N. S.
E. J. Sandeman	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
A. Saulesleja	* Atmospheric Environmental Service, 4905 Dufferin St., Downsview, Ont.
D. E. Sergeant	* Arctic Biological Station, 555 St. Pierre Blvd., Ste. Anne de Bellevue, Que.
M. Sinclair	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
W. T. Stobo	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
B. J. Topliss	* Atlantic Geosciences Center, BIO, P. O. Box 1006, Dartmouth, N. S.
R. W. Trites	Marine Ecology Laboratory, BIO, P. O. Box 1006, Dartmouth, N. S.
L. Van Guelpen	Huntsman Marine Laboratory, St. Andrews, N. B.
D. E. Waldron	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, N. S.
R. Wells	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.
A. W. White	Marine Fish Division, Biological Station, St. Andrews, N. B.
K. A. Wilson	New Brunswick Dept. of Fisheries, P. O. Box 6000, Fredericton, N. B.
G. H. Winters	Northwest Atlantic Fisheries Center, P. O. Box 5667, St. John's, Nfld.

CUBA

E. Fraxedas Flota Cubana de Pesca, Ave la Pesquera, Habana

EUROPEAN ECONOMIC COMMUNITY

H. Dupouy	Institut Scientifique et Technique des Peches Maritimes, B. P. 1240, St. Pierre et Miquelon
Sv. Aa. Horsted	Grønlands Fiskeriundersøgelse, Tagensvej 135, Sal. 1, Kobenhavn, Denmark
R. H. Letacounoux	Institut Scientifique et Technique des Peches Maritimes, B. P. 1049, Nantes-Cedex, France
J. Messtorff	Institut für Seefischerei Fischkai, Bremerhaven 29, Federal Republic of Germany
J. P. Minet	Institut Scientifique et Technique des Peches Maritimes, B. P. 1240, St. Pierre et Miquelon
R. Noe	Commission of the European Communities, 200 Rue de la Loi, 1049 Brussels, Belgium
P. Vallette	Institut Scientifique et Technique des Peches Maritimes, B. P. 1240, St. Pierre et Miquelon

GERMAN DEMOCRATIC REPUBLIC

W. Mahnke Institut für Hochseefischerei, 251 Rostock-Marienehe, German Democratic Republic

JAPAN

H. Hatanaka Far Seas Fishery Research Laboratory, 1000 Orido, Shimizu 424

POLAND

A. J. Paciorkowski Morski Instytut Rybacki, Skr. Pózt. 184, 81-345 Gdynia

PORTUGAL

M. L. M. Coelho Instituto de Investigacao das Pescas, Av. de Brasilia, Alges-Praia, 1400 Lisbon
M. Lima Dias Instituto de Investigacao das Pescas, Av. de Brasilia, Alges-Praia, 1400 Lisbon

UNION OF SOVIET SOCIALIST REPUBLICS

V. N. Kletnoy Welsford Place, 2074 Robie St., Suite 2202, Halifax, N. S., Canada

OBSERVERS

V. C. Anthony Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Mass. 02543, USA
D. L. Chamberlin * Atlantic Environmental Group, National Marine Fisheries Service, Narragansett, R.I. 02882, USA
M. P. Fahey Sandy Hook Laboratory, National Marine Fisheries Service, Highlands, N. J. 07716, USA
J. J. Graham Fisheries Research Laboratory, West Boothbay Harbor, Maine 04575, USA
M. D. Grosslein Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Mass. 02543, USA
R. M. Hayes * Coast Guard Oceanographic Unit, Building 159E, Navy Yard Annex, Washington, D. C. 20593, USA
A. M. T. Lange Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Mass. 02543, USA
M. G. Larraneta Instituto Investigaciones Pesqueras, Muelle de Bouzas, Vigo, Spain
D. G. Mountain * Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Mass. 02543, USA
M. Sissenwine Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Mass. 02543, USA
D. Stevenson Fisheries Research Laboratory, West Boothbay Harbor, Maine 04575, USA
G. T. Waring Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, Mass. 02543, USA

* Participants in the special sessions on remote sensing and environmental conditions.

APPENDIX V. LIST OF MEETING DOCUMENTS

A. RESEARCH DOCUMENTS (SCR)

SCR Doc. 80/II/1 to 80/II/15 were issued at the February 1981 Meeting, and SCR Doc. 80/VI/16 to 80/VI/84 were issued at the June 1981 Meeting of the Scientific Council.

SCR Doc.	Serial		
81/IX/85	N378	<u>MARÍ, A. and E. VALDÉS.</u>	Age and Growth of Silver Hake, <i>Merluccius bilinearis</i> , on the Scotian Shelf. (7 pages)
81/IX/86	N379	<u>MARÍ, A. and R. COYULA.</u>	Mortality Rates for O-Group Silver Hake on the Scotian Shelf. (3 pages)
81/IX/87	N380	<u>NIKESHIN, K. N., V. G. KOVALENKO, Yu. A. KONDRATYUK, and A. S. GORSHKOVA.</u>	Selectivity of Bottom and Midwater Trawl Codends When Fishing for Deepwater Redfish in the Northwest Atlantic. (17 pages)
81/IX/88	N381	<u>NIKESHIN, K. N., V. G. KOVALENKO, and Yu. V. ISHCHENKO.</u>	Trawl Codend Selectivity Relative to Fishing for Roundnose Grenadier in NAFO Division 3K. (11 pages)
81/IX/89	N382	<u>CHUMAKOV, A. K., K. N. NIKESHIN, and A. S. GORSHKOVA.</u>	Bottom Trawl Codend Selectivity for Greenland Halibut in NAFO Subarea 0, Div. 2H, 2J, and 3K. (21 pages)
81/IX/90	N388	<u>FITZGERALD, J. L., and J. L. CHAMBERLIN.</u>	Anticyclonic Warm Core Gulf Stream Rings off Northeastern United States During 1980. (18 pages)
81/IX/91	N389	<u>CRIST, R. W., and J. L. CHAMBERLIN.</u>	Bottom Temperatures on the Continental Shelf and Slope South of New England During 1980. (6 pages)
81/IX/92	N390	<u>HILLAND, J. E.</u>	Variation in the Shelf Water Front Position in 1980 from Georges Bank to Cape Romain. (8 pages)
81/IX/93	N391	<u>HUGHES, M. M., and S. K. COOK.</u>	Water Column Thermal Structure Across the Shelf and Slope Southeast of Sandy Hook, New Jersey in 1980. (12 pages)
81/IX/94	N392	<u>INGHAM, M. C., and D. R. McLAIN.</u>	Sea-surface Temperatures in the Northwestern Atlantic in 1980. (10 pages)
81/IX/95	N393	<u>CHUMOKOV, A. K.</u>	Trawl Survey of Greenland Halibut Stocks in the Northwest Atlantic (Subareas 0 and 2 and Division 3K) from 23 November 1980 to 30 January 1981. (16 pages)
81/IX/96	N394	<u>INGHAM, M. C.</u>	Weather Conditions and Trends in the Maine-Virginia Coastal and Offshore Area During 1970-79. (15 pages)
81/IX/97	N395	<u>STEIN, M.</u>	Autumn Temperature Anomalies of the Labrador Current between 1969 and 1980. (5 pages)
81/IX/98	N396	<u>TRITES, R. W., D. J. LAWRENCE, and C. K. ROSS.</u>	An Application of Satellites and Remote Sensing to Studies of Surface Circulation in NAFO Subareas 3 and 4. (14 pages)
81/IX/99	N397	<u>MOHN, R. K.</u>	Indices of Abundance and Bottom Temperature Relationships for Squid in Div. 4VWX. (10 pages)
81/IX/100	N399	<u>AMARATUNGA, T. and F. BUDDEN.</u>	Pre-season Distribution and Abundance of Squid <i>Illex illecebrosus</i> on the Scotian Shelf, 1981. (10 pages)
81/IX/101	N400	<u>GODHINO, M. L.</u>	Portuguese Biological Research on Cod in Division 3M, 1981. (4 pages)

SCR Doc.	Serial	
81/IX/102	N402	<u>BUCH, E.</u> A Review of the Oceanographic Conditions in Subareas 0 and 1 in the Decade 1970-79. (32 pages)
81/IX/103	N405	<u>ROMERO, M. C. L. and T. AMARATUNGA.</u> Preliminary Results of Biochemical-genetic Population Structure Study of the Squid <i>Illex illecebrosus</i> . (5 pages)
81/IX/104	N406	<u>DAWE, E. G.</u> Further Notes on Distribution of Young Short-finned Squid (<i>Illex illecebrosus</i>) in Relation to Water Masses, February-March 1981. (6 pages)
81/IX/105	N409	<u>NASKOV, A. S.</u> Results of Studies Conducted by the USSR in NAFO Divisions 4VWX in 1980. (7 pages)
81/IX/106	N410	<u>SAVVATIMSKY, P. I. and I. S. SHAFRAN.</u> Status of Roundnose Grenadier Stock and Possibilities for Their Commercial Removal in the Northwest Atlantic. (29 pages)
81/IX/107	N411	<u>SIGAEV, I. K. and A. B. BENDIK.</u> Year-to year Seasonal Dynamics of Water Masses on the Nova Scotia and New England Shelves from Observations Obtained at Standard Hydrographic Sections. (13 pages)
81/IX/108	N412	<u>MOUNTAIN, D. G.</u> Oceanographic Conditions in Subareas 5 and 6 During 1970-79. (9 pages)
81/IX/109	N413	<u>YAMANAKA, I.</u> Application of Artificial Satellites Data for Fisheries Studies in Japan. (25 pages)
81/IX/110	N414	<u>TOPLISS, B. J.</u> Water Colour in Inshore Areas. (14 pages)
81/IX/111	N417	<u>TRITES, R. W.</u> Overview of Oceanographic Conditions within NAFO Subareas 2, 3, and 4 for the 1970-79 Decade. (67 pages)
81/IX/112	N418	<u>IRBE, J. G., R. K. CROSS and A. SAULESLEJA.</u> Remote Sensing of Surface Water Temperatures on the Great Lakes and off the Canadian Atlantic Coast. (16 pages)
81/IX/113	N419	<u>MURRAY, J. J. and R. M. HAYES.</u> Application of a Satellite-tracked Fishing Vessel Transmitting Terminal (FVTT) to Fisheries Management and Science. (12 pages)
81/IX/114	N420	<u>SAULESLEJA, A. and D. W. PHILLIPS.</u> Meteorological Conditions in the Decade 1970-79 and their Impacts over the Northwest Atlantic. (32 pages)
81/IX/115	N421	<u>SMITH, W. G., D. G. MCMILLAN, and A. WELLS.</u> The Distribution and Abundance of Atlantic Herring Larvae in the Gulf of Maine Region as Determined from MARMAP Surveys During Autumn and Winter, 1980-81. (7 pages)
81/IX/116	N422	<u>ANDERSON, J. T.</u> Larval Fish Surveys on Flemish Cap, 1980. (14 pages)
81/IX/117	N423	<u>PENNEY, R. W. and J. T. ANDERSON.</u> Otolith Analysis of Age and Growth of Larval Redfish (<i>Sebastes</i> sp.) on Flemish Cap, 1979 and 1980. (15 pages)
81/IX/118	N424	<u>LILLY, G. R.</u> Distribution and Relative Abundance of Juvenile Redfish on the Flemish Cap in 1978-81 Based on Recoveries from Cod Stomachs. (15 pages)
81/IX/119	N425	<u>GAVARIS, C. A. and W. E. LEGGE.</u> Distribution and Abundance of Small Redfish on the Flemish Cap. (12 pages)
81/IX/120	N426	<u>AKENHEAD, S. A.</u> Local Sea-surface Temperature and Salinity on the Flemish Cap. (7 pages)
81/IX/121	N427	<u>KITANO, K.</u> Visual Features of the Kuroshio Eddies as Seen in the Infrared Satellite Images from NOAA-6. (5 pages)
81/IX/122	N428	<u>WARING, G. T.</u> Results of the International Herring Tagging Program Conducted by USA in the Gulf of Maine, Georges Bank and Contiguous Waters from 1976-1978. (24 pages)
81/IX/123	N429	<u>CHAMBERLIN, J. L.</u> Application of Satellite Infrared Data to Analysis of Ocean Coastal Movements and Water Mass Interactions off the Northeastern United States. (15 pages)

<u>SCR Doc.</u>	<u>Serial</u>	
81/IX/125	N431	<u>SINDERMANN, C. J.</u> A Prospectus and Plan of Action for Herring Stock Identification Using Parasite Tags. (6 pages)
81/IX/126	N432	<u>SINCLAIR, M. and T. D. ILES.</u> Oceanographic and Atlantic Herring Life History Distributions of Interest in Relation to the Herring Stock Problem in the Georges Bank, Gulf of Maine and Bay of Fundy Areas. (26 pages)
81/IX/127	N433	<u>ANTHONY, V. C.</u> The Use of Meristic Counts in Indicating Herring Stocks in the Gulf of Maine and Adjacent Waters. (37 pages)
81/IX/128	N434	<u>DUNBAR, M. J.</u> Twentieth Century Marine Climatic Change in the Northwest Atlantic and Subarctic Region. (45 pages)
81/IX/129	N435	<u>KEELEY, J. R.</u> Potential Temperature and Salinity Anomalies in the 1970s Along the Flemish Cap Section. (16 pages)
81/IX/130	N436	<u>WOLFORD, T. C.</u> Sea Ice and Iceberg Conditions, 1970-79. (10 pages)
81/IX/131	N437	<u>GOWER, J. F. R.</u> On the Possibility of Observing Natural Chlorophyll <i>a</i> Fluorescence from Space. (3 pages)
81/IX/132	N438	<u>BORSTAD, G. A., R. M. BROWN, D. TRAU, T. R. MULLIGAN and J. F. R. GOWER.</u> Application of Remote Sensing Techniques in Oceanographic Studies of the British Columbia Salmon Fishery. (9 pages)
81/IX/133	N439	<u>ANTHONY, V. C.</u> Status of Herring Tagging Research in the Gulf of Maine. (3 pages)
81/IX/134	N440	<u>BERNSTEIN, B. B. and K. H. MANN.</u> Changes in the Near-Shore Ecosystem of the Atlantic Coast of Nova Scotia, 1968-1981. (11 pages)
81/IX/135	N441	<u>SERGEANT, D. E.</u> Some Biological Correlates of Environmental Conditions Around Newfoundland in the Decade 1970-79: Harp Seals, Blue Whales and Fulmar Petrels. (8 pages)
81/IX/136	N442	<u>BOLZ, G. R. and R. G. LOUGH.</u> Ichthyoplankton Abundance, Diversity, and Spatial Pattern in the Georges Bank-Nantucket Shoals Area, Autumn and Winter Seasons 1971-1977. (23 pages)
81/IX/137	N443	<u>COHEN, R. E. and R. G. LOUGH.</u> Larval Herring Food Habits over Three Spawning Seasons (1974-76) in the Georges Bank-Nantucket Shoals Area. (37 pages)
81/IX/138	N444	<u>GRAHAM, J. J. and D. B. SAMPSON.</u> Factors Affecting the Depth Distribution of Larval Herring (<i>Clupea harengus</i> L.) in Coastal Maine Waters. (9 pages)
81/IX/139	N446	<u>STEIN, M.</u> Hydrographic Conditions off West Greenland during Autumn 1980 and March 1981. (5 pages)
81/IX/140	N447	<u>GRAHAM, J. J. and B. J. JOULE.</u> Preliminary Evaluation of the 1980 Larval Year Class Strength of Coastal Maine Herring. (22 pages)
81/IX/141	N449	<u>MAY, A. W., R. G. HALLIDAY, R. WELLS and E. DUNNE.</u> Management of Canadian Cod Stocks. (18 pages)
81/IX/142	N449	<u>AKENHEAD, S. A.</u> Fisheries oceanography and the nature of carrying capacity for larval marine fishes. (27 pages)

B. SUMMARY DOCUMENTS (SCS)

SCS Doc. 80/II/1 to 80/II/2 were issued at the February 1981 Meeting, and SCS Doc. 80/VI/3 to 80/VI/20 were issued at the June 1981 Meeting of the Scientific Council.

<u>SCS Doc.</u>	<u>Serial</u>	
81/IX/21	N376	<u>NAFO</u> . Report by the Scientific Council to the Fisheries Commission on its review of gear definitions (2 pages).
81/IX/22	N383	<u>FRAXEDAS, E. and O. LEIVA</u> . Cuban research report, 1980 (4 pages).
81/IX/23	N384	<u>SANDEMAN, E. J., J. S. SCOTT, and J. BOULVA</u> . Canadian research report for 1980 (19 pages).
81/IX/24	N445	<u>PACIORKOWSKI, A. J.</u> Polish research report, 1980 (8 pages).
81/IX/25	N314	<u>NAFO</u> . Canadian Proposal re change to rules of procedure for the Scientific Council (1 page).
81/IX/26	N448	<u>DANKE, L.</u> German Democratic Republic research report for 1980 (3 pages).
81/IX/27	N452	<u>NAFO</u> . Provisional Report of the Scientific Council, Dartmouth, Canada, 8-18 September 1981.