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Report of the 4th Meeting of the ICES/ICNAF/IOC Coordinating Group for the North Atlantic
with Representatives of International Marine Research Projects in the North Atlantic

Charlottenlund, Denmark, 30 September 1978

The meeting was opened at 9.30 a.m. by the General Secretary of the International Council for the Exploration of the Sea, who welcomed the participants to the ICES Headquarters. He said that several colleagues had responded to the request of the last meeting, and had provided written statements which had been circulated in advance. He also drew attention to some additional documentation which was available and conveyed to the Group regrets from some project coordinators who were unable to attend.

He suggested that the 3rd Vice-Chairman of IOC, Mr O.J. Østvedt, be elected Chairman of the meeting. This was agreed and Mr Østvedt took the chair. A list of those attending is given in ANNEX I. As at the previous meetings, each participant presented the project he represented and there were brief discussions after each presentation.

1. Dr K. Voigt presented various IOC projects, including the marine activities during FGGE of GARP :

He referred to the relevant decisions of the tenth session of the IOC Assembly (UNESCO, Paris, 27 October - 10 November 1977), in particular support of the oceanographic programme for the First GARP Global Experiment (FGGE) (IOC resolution X-5). Other matters reported concerned the preparation of Geological-Geophysical Atlases of the Atlantic and Pacific Oceans, as well as the status of the compilation of the GATE Oceanographic Atlas. He then illustrated the progress achieved in production of the fifth edition of the General Bathymetric Chart of the Oceans (GEBCO) by presenting GEBCO sheet No. 5.04 (covering the North Atlantic north of 46°40'N and west of the Greenwich meridian).

Further, Dr Voigt, in referring to marine scientific activities in the Mediterranean and the status of existing mechanisms for coordination of scientific research programmes in that region, informed the meeting that IOC will continue to support existing projects under the Cooperative Investigations in the Mediterranean (CIM), in particular the International Bathymetric Chart of the Mediterranean. In this respect, he also pointed out that planning had been initiated for an oceanographic research project during the GARP/ALPEX programme, tentatively scheduled for 1980.

This was supplemented by the following information about the marine activities in the Atlantic Ocean during the FGGE of GARP, made available by Dr J. Meincke:

"For the Atlantic Ocean the SCOR WG 47 - Atlantic Panel (Chairman: Ph. Hisard) has prepared an extensive observation programme which is very briefly described as follows: The modern study of the Tropical Atlantic Ocean began with EQUALANT during the early 1960's, and continued with GATE in the summer of 1974. These experiments had as their objective the understanding of the tropical oceanic circulation and its energy inter-

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change with the atmosphere. The prospect of the First GARP Global Experiment provides an excellent opportunity to continue these efforts. With this in mind, the Tropical Atlantic Ocean Panel of SCOR WG 47 has met on several occasions to formulate and implement a field programme with special emphasis on the FGGE Special Observation Periods in the period January to June 1979. This programme has the following objectives:

- (i) Changes in the kinetic energy spectra as one approaches the equator where equatorially trapped waves are possible; the efficiency with which these waves propagate energy zonally; interactions between the waves and the currents; modifications of these waves by the northern coast of the Gulf of Guinea.
 - (ii) The role of 14 day and 1 month fluctuations, observed during GATE, in the oceanic circulation.
 - (iii) Equatorial and coastal (along the Gulf of Guinea especially) upwelling; possible connections between events in the western and eastern Atlantic; the relation between upwelling and the primary productivity of sea water.
 - (iv) The seasonal cycle; the relation between changes in the wind field and changes in the oceanic currents on this time scale; the heat budget of the tropical Atlantic.
 - (v) The tides of the tropical Atlantic".
2. Dr K. Voigt and Mr T. Winterfeld gave a brief account on recent developments within IOCARIBE and IGOSS, as follows :

"The second session of the IOC Association of the Caribbean and adjacent regions (IOCARIBE-II) was held in San José, Costa Rica, 7-12 August 1978 with twelve of the twenty IOCARIBE Member States represented. Dr Manuel Murillo (Costa Rica) was elected Chairman and Dr Harris B. Stewart Jr (USA) Vice-Chairman.

Several Sub-Groups were formed to review the reports of a number of Workshops and mission reports and various follow-up activities were recommended as follows :

- (i) Implementation of oceanographic programmes in support of the Spiny Lobster Programme for Central America and the Pot Fishery Project in the Lesser Antilles;
- (ii) The execution of an IGOSS/MAPMOPP programme in the Caribbean and the Gulf of Mexico;
- (iii) Pilot projects for the Gulf of Paria and the Atlantic coast of Costa Rica on environmental geology;
- (iv) Information dissemination arrangements related to the Aquatic Sciences and Fisheries Information System for the region.

Other recommendations not ship operations and national programme documents in the IOCARIBE region, e.g. by USSR and the Netherlands, Data Exchange, Training, Education and Mutual Assistance in the Marine Sciences, as well as support to FGGE/GARP programmes.

The meeting further decided that the seaward limit of the IOCARIBE region should be defined by a line following the 30°N parallel of latitude from the Atlantic coast of the United States eastward to longitude 75°W; thence approximately east-south-eastward to position 20°N 55°W; thence approximately south-south-eastward to position 7°15'N 48°36'W; and thence south-westward to the international boundary at the coast between Brazil and French Guiana, with the latter line forming the south-eastern seaward boundary of the region".

IOCARIBE activities are continuously reported in the recently started IOCARIBE Newsletter (No.1 issued June 1978).

Dr Voigt and Mr Winterfeld then summarised the recent decisions of the first session of the Joint IOC/WMO Working Committee for the Integrated Global Ocean Station System (IGOSS) (UNESCO, Paris, 18-27 September 1978) which was attended by several project leaders present at this consultation. They referred specially to the concept of implementing IGOSs on the basis of regional contributions and to the establishment of three sub-groups of experts on Marine Pollution Monitoring (MARPOLMON), on Scientific Matters related to IGOSs, and on Operational and Technical Application. The former Joint IOC/WMO Sub-Group of Experts on IGOSs Products of Interest to Fisheries had presented a final report to the JWC/IGOSs. The Joint Working Committee, noting that full joint participation of FAO, with IOC and WMO, is essential for the further development of relevant IGOSs products, invited FAO to submit a summary of fisheries interests in, and needs for, IGOSs products and services on a regional basis.

3. Mr T. Kvinge then gave the following report on the project COST-43:

"The European cooperation within the field of Science and Technical Research - COST - comprises 19 member states. The coordinating and secretariat functions are taken care of by the EEC Commission in Brussels.

Project COST-43 is a project for the setting up of an experimental European Network of Ocean Stations (ENOS) for the purpose of providing meteorological and oceanographic data on near real-time basis.

Groups of experts have dealt with various elements of the project, and a plan for the implementation of the project has been worked out (COST 61/1/77). It forms the basis for an intergovernmental agreement on the implementation of the project and was signed by 11 participating states in December 1977.

The agreement may be summarised as follows :

- The experiment will be carried out in three phases of which the two first ones are directly covered by the agreement.
- Phase 1 includes development, testing and a thorough analysis of the state of the art, and the future demands with respect to data requirements.
- Phase 2 covers the setting up of small experimental networks of ocean stations in selected areas (sub-regions). The technical elements included in this phase are based on national contributions from the participating states. A small common fund will be provided to meet the expenses in connection with administration and coordination. Phase 2 will be implemented as a concerted action.
- Phase 3 is foreseen, when, on the basis of the experiences obtained during the two preceding phases, a European network of ocean stations would be established. The present agreement does not cover the contemplated phase 3, although the technical planning of a possible operational European network is provided for.

The area covered by this project is for the time being limited at the 32°W Longitude, and the European Continent between the Azores and Spitsbergen including part of the Baltic Sea and the Western Mediterranean.

During phases 1 and 2, this area is, for practical purposes, divided into the following 5 sub-regions :

The Azores; the Bay of Biscay; the Faroe/Shetland; the Mediterranean, the North Sea/Baltic.

The planning and scientific topics within each sub-region are dealt with by regional sub-groups, consisting of experts from the participating states. The regional definitions are chosen as convenient limits which may be adjusted if required. Thus, the sub-regions Azores and Bay of Biscay are, for the time being, combined and the North Sea/Baltic is joined with the Faroe/Shetland region.

The various elements of the pilot project (phase 2) are described in detail in COST 61/2/77 Annex 1.

An Interim Management Committee is composed of one representative from each of the participating states. It will function during the interim period which expires when the agreement is ratified.

The Interim Management Committee has decided that the Secretariat function should be divided into two sections :

- an administrative secretariat located at the Commission of the European Communities;
- a technical secretariat at the "Chr. Michelsen Institute" in Bergen, Norway.

The agreement shall remain in force for four years, but may be prolonged in order to complete the project.

The plans for deployment of ODAS in the respective sub-regions are as follows :

Azores (18); Bay of Biscay (8); Faroe/Shetland (6); and North Sea/Baltic (17), which gives a total of 58 ODAS.

The equipment to be used during the COST-43 experiment is very diverse with respect to parameters, sensors, sampling methods and sampling frequency. Compatibility of the data is therefore one of the important problems. The list of parameters covers 13 different parameters. None of the existing codes cover all the necessary parameters in the COST-43 scheme. For this purpose a new code has been constructed, and alternative means for dissemination of the data on near real-time basis are also considered".

4. The Coordinator of the UNEP Regional Seas Programme, Dr S. Keckes reported on the development of the various projects, and particularly the Mediterranean one. He made available to the participants copies of various UNEP reports, most of them related to coordination of pollution studies and control.

This presentation was followed by a discussion where some difficulties in the starting of such coordination projects were identified, and the importance of including the scientists who are active in a region at an early planning stage was stressed.

5. Thereafter, Dr K. Voigt introduced briefly the IOC/WMO Programme for Monitoring Background Levels of Selected Pollutants in Open-cean Waters'. Following the review of comments received from IOC, WMO and UNEP member states, the IOC Secretariat has started preparing the pilot phase of that project which will be composed of an intercalibration exercise, a training programme and a baseline study. In order to avoid overlapping of efforts, ICES has been invited to cooperate closely, in particular as regards the forthcoming first intercalibration exercise.

This was followed by an account of the preparations for an eventual ICES baseline study of the level of contaminants in sea water of the open ocean. These have the need for intercalibration in common with the Open Ocean Monitoring Project of IOC/WMO. The General Secretary of ICES said that ICES had, so far, not committed itself to any further steps than these intercalibrations, which are now under way. Cooperation with IOC will be discussed at this year's meeting and he did not foresee any difficulties with this.

The Environment Officer of ICES reported briefly on the 4 intercalibrations for heavy metals in sea water which had been, or were at present being carried out within ICES; the results show that one has still some way to go before results of work by different laboratories are intercomparable.

Some participants said that they were still not convinced that there was a good enough scientific justification for the costly and ambitious project which was planned, and suggested that available resources could better be employed in coastal waters.

6. Professor G. Kullenberg presented some experience from BOSEX-77 in the Baltic¹⁾ which were :

"The greatly increased possibility of covering several aspects of a problem through the participation of several disciplines, institutions and ships. Not only can the participants complement each other but different techniques and approaches can be used to study similar or even the same feature of part of the system. A wide range of scales can be covered both in time and space.

The necessity of a rigorous planning, which includes defining the objectives. In the BOSEX case, conceptual models clearly showed the need to limit the objectives so that all required observations could be carried out. This implied that the level of sophistication became limited over the whole range of activities. It is also clear that a long time, several years, is required for the planning phase.

During the planning the technical aspects of the field programme must be considered in detail. Although intercalibrated methods may be expected to give the same results when used on different platforms, field conditions may give rise to differences. Therefore, it seems better to allocate specific observations on a continuous basis to one ship only and divide the parameters between the ships, rather than having the ships taking alternating parts of the time series. Overlapping sampling may also be a requirement.

Communication between the ships at sea is essential and should be well planned. A communication center should be agreed upon, and a time schedule for the exchange, as well as on what frequencies.

Navigation is crucial and it seems advantageous to have common charts and maintain an updated plot of events, mooring etc. The topography of the experimental area is often very important. It is of great value to have a detailed topographic mapping carried out before mooring positions and others are fixed.

Meteorological observations should be carried out as much as feasible. The weather conditions are crucial for the interpretation of the observations.

The data exchange and analysing phase will require as much momentum as the planning phase. In the BOSEX case it is planned to generate something similar to the FLEX Atlas, which seems to be very useful. It is further planned to have ad hoc groups for working up and integrating various sets of the observations".

8. This was followed by a presentation by Dr A. Svansson of JONSDAP-76, and the follow-up of the field work phase²⁾:

"Looking at the preliminary results there are at least two outcomes which make me feel satisfied with J-76: a) the long-time series of chemical and biological parameters measured at the central point in the FLEX box and b) the close and clear connection between atmospheric conditions and the circulation even in the Norwegian Rinne, plus the probability of reproducing this circulation with a barotropic model (Alan Davies).

To compute the budget of nutrients, carbon, etc. in the FLEX box is a huge problem. Hopefully, with the enormous amount of data collected it shall be possible to get results which make us feel that real progress has been made.

After the field campaign, meetings have continued, now to present continuously developing results. The original aim was a maximal usage of each other's data through rather advanced data storage and exchange techniques. There are still practical difficulties to overcome in this respect.

¹ See also Document C.M. 1978/C: 24

² See also Document C.M. 1978/C: 44

The draft FLEX Atlas with some INOUT contributions has turned out to be a very valuable tool in distributing knowledge about the outcomes of J-76 internally. But also scientific papers stemming from J76 data have already been published; they are being allotted a J76 contribution number".

9. Dr J. Crease gave a brief account of the two months' field work of JASIN which had been completed a few weeks ago.
10. It was also agreed to include in this report the following statement received from Dr J. Meincke on MONA:

"The ICES-Project MONA emerged from the international "Overflow-73" expedition. It was designed to provide a longer term data basis for the study of the fluctuating overflow of arctic and sub-arctic waters across the Greenland-Scotland ridge. The activities are summarised as follows :

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|--|--|
| 1) May 75 - July 76 : | Successful deployment of near bottom current meters at 5 positions between Greenland and Scotland; |
| October 76 - June 77: | Unsuccessful deployment of one mooring; |
| June 77 - July 78: | Unsuccessful deployment of six moorings. |
| 2) June 76, October 76, June 77, July 78 : | Intensive hydrographic surveys of the Iceland-Faroe ridge and the Faroe-Shetland Channel. |
| 3) July-September 76, August 77 : | XBT-tracks from Iceland to the Faroes by ferry "Smyril". |

The project is planned to be continued in 1979 with an intensive XBT-survey along the Iceland-Faroe ferry track. First results of MONA have been presented to ICES as conference papers".

11. From Dr F.-W. Tesch the meeting had received the following statement on the International Eel Expedition:

"The expedition to the spawning places of both Atlantic eel species in the Sargasso Sea has been recommended by the ICES/EIFAC(FAO) Eel Symposium in Helsinki in 1976. A Planning Group was established by ICES and a more concrete schedule is now available. Originally it was intended to conduct the expedition in spring 1979. But application for ship-time of the large vessels requires three years and it was therefore decided to have the main expedition in spring 1981. A pre-expedition to establish meteorological requirements will take place from February to April 1979.

Some of the objectives and methods have been presented at the 1976 meeting of the Planning Group. The main objectives of the expedition now include :

- 1) delimiting the spawning areas of the American and European eels;
- 2) determination of the spawning period of the two species;
- 3) determination of patterns of larval drift and species separation in the North Atlantic;
- 4) determination of rates of feeding and growth related to drift in the North Atlantic;
- 5) capture of adult eels in the spawning areas;
- 6) determination of movements of migrating eels.

In the 1979 pre-expedition at least two vessels will be involved; they will cover an area including at least 70 sampling stations between 20° and 32°N and 54° and 65°W. Among the activities planned are catches of larvae by different methods, midwater trawlings to capture adult eels, zooplankton sampling, tracking of hormone treated adult eels, Sargassum weed investigations (including sampling of different

organisms), neuston hauls, bacteriology and hydrography. Sampling profiles between the Sargasso Sea and Europe will provide eel larvae on their drift to the continent as well as an ichthyological survey down to a depth of 2 000 m.

The final schedule of the 1979 pre-expedition will be presented during the 66th Statutory Meeting of ICES; a discussion on the planning of the 1981 expedition will be included".

There was a discussion in connection with some of these reports, about how organisations like ICES, ICNAF and IOC can support projects of this type. They are all characterised by having originated from informal and direct contacts between scientists in the different fields that were involved. In some cases such contacts had been established within existing working groups (as for BOSEX and MONA), in other cases the projects took contact with an established organisation at some later stage (as with JONSDAP), or remained independent (as JASIN). In all cases, it was agreed that the organisations can give very valuable support by one or more of the following services: Secretarial assistance, data center service, "post-office work", etc. Most important, perhaps, is the providing of a forum for discussions of plans, and presentation of progress reports. In some cases, assistance with final publication is provided.

It was asked whether the establishment by these projects of ad hoc data centers would cause difficulties for the established system for data storage and exchange, but it was agreed that as far as the North Atlantic is concerned, there were no such difficulties. On the contrary, the development of the global data exchange system takes place to a large extent through the activities related to such projects when there is a pressing need for developing methods for collecting, storing and exchanging data which are still unconventional, but which later on are, or will be, included in the global systems.

12. The Council's Hydrographer reported then briefly on the coordination and inventoring of oceanographic work by the North Atlantic Weather Stations.
13. M R. Letaconnoux gave a brief account of the CINECA project which has now been terminated after a duration of 10 years:

"Le Symposium déboucha sur un projet de recherches en commun dans le Nord-Est de l'Atlantique central, qui fût adopté par la Commission Océanographique Intergouvernementale en 1969 et dont la réalisation fût confiée au Conseil sous le signe de CINECA.

Pour le mener à bien, un groupe de coordination fût réuni à Paris, au siège de l'UNESCO en avril 1970, puis à Casablanca en mai 1971, réunions au cours desquelles furent définies les 2 composantes majeures de CINECA :

- le projet 1 visant à une étude descriptive de la Région entre 35°N et 10°N, de la côte à 300 milles au large;
- le projet 2, plus particulièrement orienté vers l'analyse des phénomènes d'upwelling et de leurs conséquences biologiques.

Avec l'aide de la COI et de la FAO, le Conseil a pu mener à bien le projet CINECA dont la phase active se situe essentiellement entre 1970 et 1975, période pendant laquelle près de 70 campagnes océanographiques eurent lieu. Elles furent réalisées, d'une part, grâce à l'aide apportée par les pays riverains: Espagne, Maroc, Mauritanie et Sénégal, qui mirent leurs navires et leurs moyens à terre à la disposition des autres participants, et grâce, d'autre part, à la collaboration active entre les Instituts de Recherche de ces pays avec ceux des Etats-Unis d'Amérique, de la France, du Japon, de

la Norvège, de la Pologne, de la République Démocratique Allemande, de la République Fédérale d'Allemagne et de l'URSS.

Nombre de ces croisières furent entreprises au départ dans le cadre des programmes nationaux, mais les échanges d'informations et de personnels favorisèrent une collaboration internationale de plus en plus efficace, grâce à la grande spécialisation des laboratoires intéressés, la qualité des équipements scientifiques utilisés et l'importance des moyens mis en oeuvre.

Plus de 26 navires de recherches participèrent aux travaux, au moins directement, si l'on ne tient pas compte, en effet, des navires qui ne travaillèrent qu'occasionnellement dans la zone ou se consacrèrent à des disciplines, de géophysique par exemple, n'intéressant qu'indirectement le programme CINECA.

Dans le cadre des opérations descriptives du courant des Canaries 7 navires participèrent, en février et en août 1973, à la réalisation d'un réseau de stations couvrant l'ensemble de la zone CINECA: "Météor", "Cornide de Saavedra", "Bakhchisaray", "Vassili Golovnin", "Thalassa", "Capricorne" et "Laurent Amaro", tandis que l' "Alexander von Humboldt" effectuait des croisières identiques chaque année.

Dans le cadre de l'analyse des phénomènes d'upwelling, les nombreuses études entreprises se concrétisèrent par l'opération JOINT-I qui eut lieu dans la région du Cap Blanc, de février à mai 1974, et à laquelle participèrent 8 navires et par l'opération Auftrieb-75 à laquelle participèrent le "Météor" et le "Discovery" en février-mars 1975.

Quant aux opérations concernant l'étude et l'évaluation des ressources, elles furent surtout conduites par les pays riverains, l'Espagne et la France, permettant ainsi de couvrir les grandes lignes du programme adopté en 1970.

La réalisation du programme CINECA aura mis en oeuvre des moyens importants, plus de 26 navires recensés et près de 70 campagnes océanographiques identifiées, ce qui représente un potentiel de recherche considérable compte tenu du développement des techniques et des moyens instrumentaux au cours des récentes années.

Par ailleurs, plusieurs avions basés à Nouadhibou, en Mauritanie, ont participé aux opérations comme pendant JOINT-I et Auftrieb-75 et de nombreuses observations ont été faites grâce aux satellites automatiques comme NOAA 2 ou ERTS-I en 1973 et 1974, ou grâce à la collaboration des astronautes de Skylab III en 1973.

Signalons encore les services rendus par le Centre Météorologique de Casablanca qui, depuis 1971 et pendant toute la durée du projet, a diffusé des cartes périodiques des températures en surface.

Sur le plan des échanges scientifiques enfin il faut mentionner les conférences organisées à Barcelone (mars 1970), à Marseille (mai 1973) et à Kiel (août 1975) pour l'étude des écosystèmes d'upwelling et qui toutes connurent un succès certain.

Quant à l'information, elle fût assurée par la série CINECA Newsletter publiée par le Conseil, et en complément, par CUEA Newsletter du Laboratoire Maritime de l'Université Duke, Beaufort (USA).

Cette brève énumération peut paraître schématiser à l'extrême une opération qui s'est relevée en fait extrêmement vivante et variée et qui a donnée lieu déjà à un grand nombre de publications scientifiques et qui s'est surtout traduite par un essor remarquable d'activités scientifiques, des contacts étroits et profitables entre chercheurs dans une région particulièrement intéressante pour l'étude des phénomènes qui gouvernent la productivité océanique.

C'est une constatation qui méritait d'être faite au moment où s'achève le projet CINECA et je dois remercier très sincèrement tous ceux qui ont contribué à sa réalisation et permis son succès".

In this connection, there was again a discussion about the difficulties one meets with in projects of this character, particularly when organisations with different ways of working are involved. In this case, one had particularly felt the lack of direct contact between the coordinating machinery and the active scientists. A system of "national coordinators", where only a few of them were actively involved in the work, and several were not scientists themselves, would not be effective. For various and good reasons it had also not been possible to involve the coastal countries sufficiently in the operations.

14. The Assistant Executive Secretary of ICNAF, Mr V.M. Hodder presented the environment studies carried out under ICNAF auspices :

"At the 1976 Meeting of the ICES/ICNAF/IOC Coordinating Group for the North Atlantic, the ICNAF representatives reported on the proposed initiation of two major research projects to determine the causes of variation in the production of year classes for the major commercial fish species in the Northwest Atlantic. The regions selected for study were the Georges Bank-Gulf of Maine area (ICNAF Subarea 5) with emphasis on herring, and the Flemish Cap area (ICNAF Division 3M) with emphasis on cod and redfish. These coordinated investigations involve not only the biology of the fish species concerned, but also the effects of the environment which may affect their life history and population dynamics.

In the Georges Bank-Gulf of Maine area, a comprehensive international project began in 1975 with studies on larval and juvenile herring being conducted each year usually from September to April by research vessels of Canada, Federal Republic of Germany, Poland, USSR and USA. The main aspect of the programme is the repeated occupation in the autumn of a network of oceanographic stations which include the sampling of herring larvae, and the plankton and trawl surveys are carried out in the winter and spring to assess the abundance of juvenile herring.

A major multi-disciplinary, multi-ship larval herring patch experiment is planned for the autumn of 1978, involving identifying on the spawning ground and following a relatively small and isolated patch of larvae to provide real time estimates of larval growth, mortality and dispersion relative to short-term variations in the physical and biological environment. The study involves intensive vertical and horizontal sampling, measuring as many of the biological and physical properties as feasible. This special study is additional to the usual broad-scale larval surveys which will be continued.

The Flemish Cap project was somewhat delayed in getting started, as a comprehensive proposal for coordinated research did not evolve until the Environmental Working Group Meeting at Murmansk, USSR, in May 1977. Three major problem areas were identified as critical to knowledge about year class survival in cod and redfish: (a) effect of water circulation patterns and the abundance and size composition of the planktonic food supply on the retention and survival of fish larvae; (b) the effect of intraspecific and interspecific predation on the survival of juvenile fish; and (c) improved assessments of the size of the spawning stocks. A grid of 50 stations was established for oceanographic and ichthyoplankton work to be occupied twice monthly from February to June, measuring temperature, salinity, oxygen, nutrients, and zooplankton. Moored buoys will also be used to determine current velocities during the spawning and larval development period. Three hydrographic sections will also be occupied frequently, and additional data will be obtained from satellite tracking of drifting buoys and remote-sensing techniques. Studies on juvenile fish survival and spawning stock abundance will be made from bottom and pelagic trawl surveys in the spring and summer, with additional information from intensive sampling of commercial catches.

Following the decision to initiate the project at the 1977 Annual Meeting of ICNAF, a review of research activity at the 1978 Annual Meeting revealed that work was more extensive than had been envisaged, with results on research being reported by Canada, Poland, USSR and USA. Research plans for 1979 will involve the active participation of vessels from these four countries and Cuba during February to August, with investigations focused on the adult fish and ichthyo-

plankton communities as well as achieving a satisfactory description of the oceanographic regime in the area. Emphasis will be placed on the rapid exchange of data and participating countries are urged to transmit data by radio using the IGOSS system.

The Canadian Marine Environmental Data Service (MEDS) operates as the regional data center for the ICNAF Area, and a large amount of oceanographic data, including data obtained by research vessels on fisheries surveys but not reported to World Data Centers, has been obtained from the national archives of several countries, particularly German Democratic Republic, Poland and USSR. The main efforts of MEDS during 1977 and 1978 were concentrated on reviewing a possible mechanism for the rapid exchange of oceanographic data via IGOSS, and the production of a variety of data reports, including synoptic information for the Flemish Cap area.

ICNAF has adopted a series of standard oceanographic sections and stations for international use in conducting environmental surveys on the continental shelves and slopes, extending from West Greenland (ICNAF Subarea 1) to the southern part of the ICNAF Area (Subarea 5). The positioning of these sections has been determined on the basis of the need for monitoring environmental conditions in the areas of concentration of major demersal and pelagic fish stocks. The complete list of sections and stations has been published in ICNAF Selected Papers No. 3, pages 109-117".

15. Finally, the Environment Officer of ICES reported briefly on the progress in the pollution studies (other than intercalibration) carried out by ICES.

After the presentations there was a discussion concerning the desirability of further meetings of this kind. It was recalled that when the first of these meetings was held, it brought together representatives of several large, multi-national projects in the North Atlantic which had been developed outside the established organisations, together with coordinators of projects developed within them. Several of the projects had now been terminated, or were in a follow-up phase, and there was perhaps not now the same need for coordination between the projects. One could therefore run the risk that the meetings would be repetitions of presentations of results which were made in other fora. It was therefore agreed that the Chairman of the Hydrography Committee of ICES would consult with his colleagues during the coming year about their interest in continuation of these meetings, and a recommendation to the three sponsoring organisations would be made next year. It was also suggested that if further meetings were held, other organisations should also be invited, as for instance SCOR.

Before closing the meeting, the Chairman thanked all who had contributed to making it a useful exchange of views and ICES for hosting it.

The meeting was closed at 14.15 hours.

List of Participants

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