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the Northwest Atlantic Fisheries

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Report on the Third 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, 2 October 1976

The meeting was opened at 10.00 hrs by the General Secretary of the International Council for the Exploration of the Sea, who welcomed all attendants, and particularly those who had not taken part in a meeting at ICES headquarters before. The last meeting had been chaired by the Chairman of the ICNAF Environment Sub-Committee, so he proposed that the Chairman of the Hydrography Committee of ICES, Dr A Svansson, should chair the present meeting. The meeting agreed, and Dr Svansson took the chair. A list of those attending is given in Annex I.

As before, each participant presented the Project he represented and there were brief discussions after each presentation. The meeting was concluded with a general debate.

1. Dr O Mamaye presented CICAR and IOCARIBE as follows:

The activities of the Cooperative Investigations of the Caribbean and Adjacent Regions (CICAR) which successfully lasted for seven years, have terminated with the eighth (and last) session of its International Coordination Group (formally) and the CICAR-II Symposium, both held in Caracas, Venezuela, in July 1976.

Prior to that, an ad hoc meeting of the experts in marine science of the Caribbean was convened in Mayaguez, Puerto Rico, to determine further programmes and ways of cooperation in marine sciences in the Caribbean and adjacent regions. The Group of Experts came up with eighteen selected programmes for future international cooperation (including their description, justification, feasibility and implementation).

The report of the ad hoc Group of Experts, according to Resolution IX-13 of the 9th Assembly of IOC, was submitted to the first session of the newly formed (on an experimental basis for the period of six years) IOC Association for the Caribbean and Adjacent Regions, IOCARIBE.

The IOCARIBE reviewed the proposals of the ad hoc Group of Experts, together with other scientific proposals, and came up with three principal projects for future international research, i.e.:

- 1) Scientific programmes in support of fisheries projects and marine pollution monitoring;
- 2) The biology and culture of commercially important marine invertebrates;
- 3) Environmental geology of the Caribbean coastal area.

It was agreed that three interdisciplinary scientific workshops should be convened in early 1977, and that only after that the scientific programme of international cooperation will be formulated, based on the results of findings of these workshops.

The IOC/FAO(WECAFC)/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions will be held in Trinidad and Tobago in December 1976.

2. Dr O Mamayev, supplemented by Mr J Smed and Mr A Preston, presented IGOSS activities as follows:

The operational programme of IGOSS was started in January 1972 when the Pilot Project for the Collection and Exchange of Bathythermograph Data was launched. In 1975 this Pilot Project was converted into an operational programme.

A second operational programme, the Pilot Project on Marine Pollution Monitoring, was launched in 1975, aimed at monitoring of petroleum-derived oils.

The IGOSS General Plan and Implementation Programme for 1977-82 has now been prepared, providing guidelines for the development of the major elements of IGOSS, i.e. the IGOSS Observing System, the IGOSS Data Processing and Services System, the IGOSS Telecommunication Arrangements and the IGOSS Data Archiving and Exchange System.

A very considerable amount of bathythermograph data are now being communicated regularly over the Global Telecommunication System (GTS). Nevertheless, the amount is still on an unacceptable level for real-time product preparation, except in very limited ocean areas. There is some hope, however, that this situation may improve somewhat fairly soon. In any case, the observations go into the oceanographic data banks and are thus most useful. It would seem that whereas the real-time aspect of the IGOSS data was originally considered the more important one, the non-real-time aspect has become progressively more important.

An IGOSS sub-group of experts will prepare a draft plan for the provision of IGOSS products and services in support of the fisheries, and FAO has been requested to submit for consideration by the group a summary of fishery needs for IGOSS products and services. Activities leading to the development of IGOSS products and services in support of GARP are also under consideration.

In general, the priority activities for IGOSS in the next few years have been established as follows:

- (a) Increase of the IGOSS data base by incorporating data taken by all research vessels and ocean weather ships; equipping ships of opportunity and WMO voluntary observing ships to take and contribute XBT data; incorporating data from buoys and satellite systems; and enforcing strict quality control procedures.
- (b) Progressive implementation of the IGOSS Basic Observational Network.
- (c) Provision of IGOSS products and services in support for GARP, and the First GARP Global Experiment (FGGE) in particular.
- (d) Development of projects on the application of IGOSS products of interest to fisheries in certain oceanic areas.
- (e) Implementation of the IGOSS Data Processing and Services System (IDPSS) by coordinating product formulation programmes of existing centres and defining participation of national processing centres in the IDPSS.

The IGOSS Marine Pollution Monitoring Pilot Project (Petroleum) began in January 1975 and was reviewed at a Workshop in Monaco in June 1976. Very little data of a strict given quantitative nature have been obtained except observational data on occurrence of slicks. The more sophisticated measurements called for have produced a very low level of response. Most of the activity has been in the North Atlantic.

Developing countries have stated their interest in the continuation of at least the simpler elements of the programme. It is agreed to continue the project for two more years, but subject to review after a further year. GIPME will be responsible for the critical

evaluation of the project. It is still in pilot phase and no decision has been taken on its future status or extension to other pollutants. The future role of IGOSS in monitoring will be subject to advice from GIPME.

In expressing their interest in continuation of the pilot project, developing countries requested that a higher priority be given to the training and technical assistance aspects so that they could develop a more active participation in the project, especially in relation to the more sophisticated aspects. A training course is to be arranged within the framework of the pilot project in October/November 1976. Following commentary by the GIPME Ad Hoc Task Team on Monitoring, greater emphasis is to be given within the pilot project to intercalibration work, and an intercomparison programme would start as soon as possible.

Proposals for an Open Background Monitoring Project came from UNEP/EC calling upon IGOSS to examine the feasibility of and plan for open ocean baseline monitoring studies* Three UNEP/WMO/IOC consultants drew up a provisional plan in September 1975. This plan was reviewed by an invited group of experts in Geneva in March 1976. They expressed the view that the plan was overly ambitious and made proposals for amendments. These proposals were endorsed by the Joint UNEP/IOC/WMO IPLAN meeting of governmental experts, who proposed that the plan be rewritten in the light of the experts' commentary. It will shortly be distributed in its final form. It will provide initially a pilot scale project at 2 or 3 positions in the North Atlantic and measurements of a few selected pollutants. Details of sampling, analytical procedures and intercalibration should be finalised at a Workshop in 1977/78 to be followed by a trial of at least one year's duration.

3. Mr J Crease presented JASIN as follows:

The objectives of the programme remain as reported to the last meeting. We will study the physical processes in the atmospheric and oceanic boundary layers and in particular the momentum and heat fluxes and budgets.

The next main international field experiment will now be from 15 July to 15 September 1978 and not 1977 as previously reported. The preferred area is now the northern Rockall Trough, it having logistic advantages for the participating ships and aircraft, better navigational coverage and possibly less strong horizontal gradients than the area of the previous experiment.

Since 1974 two scientific planning meetings have been held and a JASIN planning document was published by the Royal Society of England. International subject coordinators have been appointed covering fields such as surface and radiative fluxes, micro-scale mapping, stress measurement, mooring strategy, satellite data, surface winds, bottom topography, internal waves, salinity and temperature fields and energy dissipation. Overall coordination is now provided for logistics and oceanography (at IOC, England) and for meteorology (at the Meteorological Office, England).

Four ships are rather firmly committed with, at this early stage, at least four more as good possibilities for participation. Four ships will be required exclusively for the meteorological programme on a horizontal scale of 150-200 km. The oceanographic programme will probably be on scales of up to 40 km. Two and possibly more research aircraft will also participate. Scientists are participating from the Federal Republic of Germany, U.S.A., United Kingdom, Denmark, Australia, Canada, Netherlands and U.S.S.R.

* EARTHWATCH, a part of UNEP, has a programme element GEMS (Global Environmental Monitoring Systems) a component of which concerns the oceans and calls for establishment of a few open ocean baseline stations where present concentrations of contaminants should be determined and their trends followed.

Work is underway to obtain background data for the area by the use of drifting buoys, moored arrays and undulating profilers for temperature and salinity. A one month programme using United Kingdom and Netherlands ships in August 1977 will provide an opportunity for field tests of instruments and logistics.

4. CINECA was presented by M R Letaconnoux as follows:

CINECA is devoted to the general study of the Canary Current, the upwelling system and the study of productivity along the coast of West Africa (Gibraltar to Cape Verde Islands).

The main events since 1972 were:

- the multi-ship cruises in February and August 1973;
- the Joint I Expedition from February to May 1974;
- the national cruises undertaken occasionally or regularly by some countries like Spain or the GDR.

The group of National Coordinators met in February 1974 to consider the situation and make proposals for the future of CINECA. The report of that meeting was published in CINECA Newsletter No.7 in July 1974 with Recommendations 8 to 13.

A synthesis of national activities was requested and answers received from some countries which were then published in CINECA Newsletter No.8 in February 1976.

A group of oceanographers was established under the chairmanship of Dr Mittelstaedt to collect data from the multi-ship cruises of 1973 and prepare charts and sections.

ROSCOP forms and data of all cruises were to be sent to the ICES Service Hydrographique which would be acting as a regional center for CINECA.

A Workshop on Zooplankton and Micronecton was scheduled for 1974, but was finally held in August 1975 in Kiel in conjunction with the Third International Symposium on Upwelling Ecosystems.

It was decided to hold a CINECA Symposium* in 1977 and a Preparatory Group was established, chaired by Professor Hempel. No final decision has been taken about it and the question will be discussed during the actual ICES Meeting.

5. JONSWAP was presented by Dr K Richter as follows:

The JONSWAP-75 (Joint North Sea Wave Project 1975) Experiment was carried out successfully. Probably it is the final multi-national experiment in a series of extensive studies of the following main objectives:

- (i) Field measurements of wave growth and swell decay as basis of testing and improving wave prediction models.
- (ii) Investigation of the fluxes near the sea surface, especially the influence of surface waves on the structure of the turbulent boundary layer.
- (iii) Investigation of the interactions between short (cm-dm) and long waves simultaneously with micro-wave backscatter measurements which form the basis for interpreting remote sensing data by micro-wave radar instruments presently flown or planned for use in satellites.

The basic data analysis (computation of spectra) was completed early this year. In the meantime three different Workshops took place in Hamburg and Miami in which the first results were worked out.

* It has later been decided to postpone the Symposium to early 1978, and a First Announcement has been circulated.

Some of the results were presented at the Joint Oceanographic Assembly, Edinburgh, and at the Colloquium on Radio Oceanography just now in Hamburg. The interpretation of the extensive data is by far not finished now. It is planned to organise a "Surface-Waves-and Air/Sea Interaction Symposium" at Marseille in September 1977, during which the final JONSWAP results will be presented. Some of the preliminary results are:

(a) Wave prediction model

A Technical Group NORSWAM (North Sea Wave Model Group) has been formed, which worked out an operational wave prediction model for the North Sea. Members are scientists from the Federal Republic of Germany, United Kingdom, Norway, Belgium, Netherlands and several oil companies.

The model is a so-called "hybrid model", because swell and wind-sea are treated by different numerical methods. The swell is predicted with a traditional characteristic method while the wind-sea development is described by a five-parameter model.

At present the hybrid model is tested against JONSWAP measurements under complicated wind conditions, such as in passing fronts with rapidly turning freshening or slackening winds.

For less complicated wind situations and neglecting relaxation processes it can be shown that the wind-sea model can be reduced to a simple prediction equation for one variable, the peak frequency of the spectrum.

(b) Swell decay

Measurements of the bottom topography indicate that variation of bottom irregularities is not sufficient to explain the observed rates of swell decay by scattering of swell due to these irregularities. Calculations of decay rates due to percolation in the porous sand bottom seem to give better agreement with experimental results.

(c) Air/sea interaction

Analysis of data is not completed.

(d) Remote sensing and short-long wave interactions

Simultaneous measurements of long and short waves and radar backscatter signals exhibit a strong modulation of the waves in the cm-dm range by the longer waves. The same modulation can be found in the backscattered radar energy.

Several active and passive micro-wave radar instruments were successfully tested against the JONSWAP ground truth data.

(e) Future experiments

A post-JONSWAP Experiment is planned for June to September 1977 at the JONSWAP site near the island of Sylt. The detailed mechanism of momentum transfer across the air-sea interface and the crucial turbulent processes very near to the surface are still an open question. We hope to clarify these questions by use of a wave follower system (Shemdin, now JPL, USA).

It should be mentioned that extensive wave data, gained during GATE 1974 and FLEX (Fladengrund Experiment) 1976 were incorporated in the JONSWAP data set. Similar wave measurements will be made during JASIN 1978.

6. JONSDAP-76 was presented by Dr A Svansson as follows:

This project which was reported on at the last meeting started to be planned in 1972 and was carried out in March-June 1976. The field

phase went very smoothly and all the early indications point to the data set being not only large but also of very great interest. The exercise consisted of two parts:

- (1) Project INOUT, mainly 15 March - 25 April, to monitor storm surge and tidal and residual movements over the whole of the North Sea, but especially at its boundaries.
- (2) FLEX, a multi-disciplinary experiment concerned with phytoplankton spring bloom in a 100 x 100 km area of the northern North Sea.

Over 100 moored current meter or offshore tide gauge stations were deployed in total. The loss rate varied from region to region with, as might be expected, the northern and southern boundaries bearing the brunt: as of 16 June some 30 of the 280 or so instruments deployed were still missing, all but four of these being from northern boundary stations.

The central position in the FLEX box was kept occupied almost continuously (March 25 - June 13) by a German research vessel (mostly R.V. "Meteor"). The high nutrient concentrations of the winter months vanished in the course of a few days at the end of April as a primary production bloom got underway. It is hoped that the data set will provide a detailed picture of this process and that in particular the links between the physical and environmental regimes will be highlighted.

Data processing in earnest has now begun - in some institutes it is finished - exchange between participants will be executed according to agreed procedures using a development of the GF2 format which has been termed the JONSDAP format to avoid any possible confusion.

7. The ICES Projects "OVERFLOW-73" and MONA were presented by Dr J Meincke as follows:

The main objective of the OVERFLOW-73 expedition was to study the water mass exchange across the Greenland-Iceland-Faroe-Scotland ridge, in particular the overflow of Norwegian Sea deep water into the Northeast Atlantic basins. An international multi-ship survey was carried out in August/September 1973 under the auspices of ICES, making extensive use of moored current meters and thermographs. The Working Group "OVERFLOW-73" of the ICES Hydrography Committee is coordinating the working-up of the observations. A data inventory is published (ICES Oceanographic Data Lists and Inventories, No.29) which also contains a guide to the various data reports published by the participating laboratories.

The analysis of the observations has shown the water mass exchange to occur on time-scales of 2 to 20 days, which are compatible to the most energetic fluctuations of the weather pattern over the area. However, the OVERFLOW-73 time series are too short to prove the correlation between atmospheric and oceanic fluctuations. Therefore, the field programme MONA (Monitoring the Overflow into the North Atlantic) was launched in summer 1975 by setting 6 current meter moorings along the Greenland-Scotland ridge. Four out of six arrays were successfully recovered in summer 1976; a preliminary analysis confirmed the expected correlation.

The success of MONA led to the decision to continue the long-term current monitoring with a varying number of instrumented moorings in the overflow area between Iceland and Scotland until 1978.

Time Table on Field Work

<u>Aug-Sep 1973</u>	<u>June 75-June 76</u>	<u>Oct 76-June 77</u>
ICES OVERFLOW-73 Expedition	ICES MONA Phase 1 (6 current meter moorings)	ICES MONA Phase 2 (2 current meter moorings)

June 77-June 78

ICES MONA Phase 3
(8-10 current meter moorings)

8. COST-43 was presented by Mr T Kvinge (no report received).
9. POLYMODE was referred to by Mr J Crease as follows:
Joint work by the United Kingdom, France and Federal Republic of Germany under the auspices of SCOR WG 34 is contributing to the POLYMODE programme by setting up and maintenance of a series of six long-term moorings in the deep basins of the NE Atlantic. It is expected that these moorings will be in place for at least two years from early next year.
10. FGGE of GARP was referred to by Dr J Meincke as follows:
The First GARP Global Experiment (FGGE) is the main observational effort within the Global Atmospheric Research Programme (GARP) and is concerned with the large-scale dynamics of the atmosphere. Its goals are to determine the possible limits to deterministic forecasting, to provide a basis for studies related to climate dynamics and to provide a world-wide test of how well existing models can simulate the existing climate.
The Observational Phase of FGGE consists of a build-up year from September 1977 to August 1978, an Operational Year from September 1978 to August 1979 and two Special Observing Periods during January/February 1979 and May/June 1979. The Observing System is planned to consist of:
 - (1) WWW observing system (surface based and satellites)
 - (2) Special tropical observation systems (50 meteorological-oceanographic vessels and airplanes)
 - (3) Special observations systems for the southern hemisphere (200 drifting surface buoys)
 - (4) Other observation systems.
For the planning of an oceanographic programme SCOR (particularly its WG 47) and IOC have accepted the leading role. It is expected that SCOR will provide the documentation for an FGGE oceanographic plan by April 1977. SCOR WG 47 (Chairman: Henry Stommel) has set up panels for the Pacific, the Atlantic and the Indian Oceans. So far, they differ widely in their progress of planning specific experiments, especially in relation to the tropical observing system. The close cooperation between meteorologists and oceanographers, however, is critical for the programme. One practical reason is that 50 research vessels can only be made available if they are effectively used by combined programmes.
11. The ICES/SCOR Studies of Pollution of the Baltic were presented by Dr G Kullenberg, as follows:
Studies of the pollution of the Baltic were initiated in 1968. A Working Group concentrated much of its work on collecting information about the input of pollutants to the Baltic Sea area from land-based sources, and presented a report in 1969 (Cooperative Research Report, Ser. A, No.15 (1970)).
Contacts were established with SCOR, and in 1971 a Joint Working Group for the Study of the Pollution of the Baltic and its Effects on Living Resources was established. From the beginning, the Group organised its work along three different lines:
 - (a) an extended study of the input of pollutants to the Baltic;

- (b) a baseline survey of the level of contaminating substances in living resources of the Baltic, combined with inter-calibrations of the analytical techniques;
- (c) a coordinated scientific programme, aiming at an understanding of the processes governing the distribution and fate of pollutants in the Baltic.

The information on inputs, collected in 1974 by means of a questionnaire, showed a significant improvement compared with what was known in 1969, but it also showed that there are still large gaps to be filled by national investigations before one will have a reasonably clear picture of all relevant input sources.

The baseline study on the level of pollutants in living resources was planned along the same lines as the corresponding study carried out in the North Sea, and the intercalibration was linked with that undertaken among North Sea and Atlantic laboratories. Laboratories in all countries bordering the Baltic contributed to the study.

It proved very difficult to organise the sampling in accordance with the agreed guidelines, and this makes it difficult to draw more than very general conclusions from the results. Nevertheless, the survey represents a significant contribution to the knowledge of the pollution of the area, and is a first important step towards an international monitoring.

It became clear at an early stage in the discussions within the ICES/SCOR Working Group that it would be necessary to intensify the research activities in the Baltic in the hope of understanding the processes that govern the pollution of the area and that this research would have to be considerably more process-oriented than had been the case before. It was agreed that this should take the form of a large, multi-disciplinary, but integrated study. The study is now in the middle of implementation.

A Special Meeting on Modelling of the Baltic (ICES Headquarters) was held in 1974.

The Belt Sea Project aiming at an understanding of the exchange processes through the Danish Sounds is carried out by Denmark in cooperation with Sweden and the Federal Republic of Germany.

"BALTIC-75" (an intensive study of an area in the Bornholm Basin) was carried out by the Federal Republic of Germany in 1975.

Joint USSR/GDR studies of, i.a. the rapid changes of the vertical temperature structure and fluctuations in current velocities were made the same year.

Joint studies, mainly of physical oceanography, were undertaken intensively in a limited area in the time 12-27 August 1976 by ships from USSR, Poland, Sweden and the German Democratic Republic.

A Workshop is planned for the evaluation of the results from the joint experiments in 1975 and 1976 and to complete the plans for a large-scale experiment in September 1977.

A large-scale multi-disciplinary open sea experiment with participation by scientists from all Baltic countries is planned for September 1977. At least three research ships have been committed and there are good chances that up to five more will take part.

12. The ICES Pollution Studies in the Oslo Convention and ICNAF Areas were presented by Mr A Preston as follows:

The Oslo Commission and ICNAF Area Baseline Survey was undertaken on behalf of the Oslo Commission, though subsequently extended to cover parts of the ICNAF Area and was based on a statement of requirements made on behalf of the Commission by a Working Group on Monitoring Requirements to meet the relevant articles of the Convention. The plan which was elaborated by the ICES Working Group on "Pollution Baseline and Monitoring Studies in the Oslo Commission and ICNAF Areas" was based in part on an experience gained in the ICES Baseline Study of the North Sea (Cooperative Research Report, No.39) and in-

cludes a study of pollutant inputs via various pathways and a study of the distribution of metals (Pb, Hg, Cd, Zn and Cu) and organochlorine compounds (DDT, DDE and PCB) in commercial fish species, principally cod, hake and herring, but including other species where appropriate geographical coverage dictated. This part of the exercise is supported by carefully conducted intercalibration exercises in order to ensure comparability of data from different regions and different laboratories.

The exercise also includes provision for a study of metal distribution in sea water (Hg, Cd, Zn and Cu) which is still in the planning phase with intercalibration of analytical and sampling methods as a first objective. The measurement of petroleum residues in commercial fish and the use of sediments as baseline and monitoring exercises are the subject of further research activity under the coordination of ICES.

The first results have been reported to the Oslo Commission and are available as an ICES Report (Doc. C.M.1976/E:4). The distribution of the measured pollutants in commercial fish species indicates very low levels of contamination in the majority of the area surveyed, with significantly higher levels close to the coast, especially the Canadian coast and Irish Sea, but even here average levels are well below those regarded by international health authorities as having public health significance. Those areas where contamination was highest will be subject of continued monitoring, but it is not considered necessary to conduct a large-scale survey of the whole area again for at least five years. However, steps are being taken to improve coverage of one or two areas where the initial survey was incomplete.

13. The ICNAF environmental work was presented by Mr V Hodder and Mr E Sandeman as follows:

- (a) A special Environment Working Group was established at the 1974 Annual Meeting to develop proposals for research on the causes of variation in the production of year classes for the major commercial fish species in the Northwest Atlantic. To date three meetings of the Working Group have been held and two specific areas have been chosen for close examination. The Gulf of Maine-Georges Bank area was selected because it contains the largest herring populations in the Northwest Atlantic and because intensive, coordinated studies on the distribution and abundance of larval and juvenile herring have been in progress since 1971. An evaluation of the data base was carried out and a comprehensive proposal for continued investigation formulated. The Flemish Cap area was chosen for a study of a demersal stock complex (cod and redfish) for many reasons not the least of which was the relative isolation of the stocks there from those on adjacent banks. Progress has been much slower for this area and a decision on its feasibility as a study area must await the results of a Symposium to be held at Murmansk, USSR in May 1977. These coordinated investigations involve not only the biology of the fish species concerned, but also the effects of the environment which may affect the life history and recruitment population dynamics.
- (b) In order to systematically monitor the environmental conditions on the continental shelves from West Greenland to the southern part of the ICNAF Area, ICNAF has adopted a series of standard sections and stations for international use in conducting environmental surveys. Most of these sections are the same as, or modifications to, existing national sections, for which time series of data are available, but some are new sections designed to provide more adequate coverage than in the past. The positioning of these standard sections is such that environmental conditions may be monitored in so far as they affect the major demersal and pelagic fish stocks of the ICNAF Area. Also, work is in progress on the development of suitable base periods for the analysis of data from these sections and stations.
- (c) The Canadian Marine Environmental Data Service (MEDS) has been officially adopted as the regional data centre for the ICNAF Area, and a concerted effort is being made to accumulate all available oceanographic

graphic data in national archives, particularly the vast amount of data taken by fisheries research vessels during the course of their fisheries survey programmes, but not reported to World Data Centres. Considerable progress has already been made by MEDS in developing the types of data products required by ICNAF, with emphasis being first placed on the production of atlases utilising temperature data for specific areas, especially for the areas being intensively studied by the Environmental Sub-Committee.

- (d) ICNAF has adopted a programme of encouraging the reporting of weather and ice conditions by fishing vessels of various countries, since these vessels often operate in areas of the Northwest Atlantic from which weather and ice reports are minimal or non-existent at certain times of the year.
- (e) A plankton sorting and identification centre has been established at Szczecin, Poland, developed jointly by the United States of America and Poland. ICNAF is very appreciative of the work being done on material from the Northwest Atlantic, noting that the Centre is now directly involved in a comprehensive study of samples collected during 1971-75 in conjunction with the ICNAF Coordinated Larval and Juvenile Herring Survey Programmes.

14. Plans for an International Anguilla-Expedition were presented by Dr F W Tesch as follows:

An International Expedition to explore the spawning places for eel in the Sargasso Sea is under planning for 1978 or 1979.

It is the intention to explore the spawning places of the North Atlantic eel species Anguilla anguilla and A. rostrata. Proposed methods include: cross sections of leptocephalus catches through the North Atlantic in the spring of 1978 or 1979 by research vessels of several countries; searching courses by these vessels through the Sargasso Sea between March and May using larvae- and egg-nets; pelagic trawling to catch spawning eels; scanning sonar, tracking of adult eels and other means of assistance to locate the exact spawning places of both species; hydrographical and other investigations to characterise the environment of the spawning places.

The data which are available at present show that the spawning area of A. anguilla is near 27°N and 58°W. The spawning places of A. rostrata are further to the west or southwest, possibly not far from the Bahamas or Leeward Islands.

One of the main purposes of the expedition, beside the exact location of the spawning places, will be the determination of environmental factors correlated with the separation of the two spawning areas. There are also other problems related to the environment in this area which would be worth investigating closely.

Since the investigations of J. Schmidt 60 years ago, the technical potential of research vessels and of equipment has increased with the higher speed of the modern vessels; a large network of sampling stations can be covered. This should make possible a much more precise definition of the spawning areas, as well as the migration routes and the growth of the larvae. With modern equipment it should also be possible to catch migrating or spawning eels.

15. The ICES Coordination of Oceanographic Work at the North Atlantic Ocean Weather Stations was presented by Mr J Smed as follows:

The project of oceanographic observations from the North Atlantic Ocean Stations, the NAOS system, dates back to the first years after the Second World War. As a matter of fact ICES was active in establishing an oceanographic observation programme for the weather ships as early as in the late 1940s. Observations by these ships on station or en route, are obviously of very great interest as they give unique long-term series of data, mainly from areas where not too much information is available from other sources. The data are invaluable, both for studies of climatic fluctuations and for studies of air-sea interaction.

During a long period of years ICES, at the request of IOC, has coordinated oceanographic work at Stations ALFA, INDIA, JULIETT, KILO and MIKE, all of them situated in the ICES area. A coordination has been so much more needed as each of these stations was operated by several countries, according to a certain rotation schedule. ICES has published annual inventories of the observations, with some financial support from IOC; up to now, the period 1963-74 has been covered, and an inventory volume for the pre-1963 period is in preparation. A volume containing the observations at INDIA 1964-66 has also been published, with an analysis by D J Ellett, and other analysis volumes are in preparation. Furthermore, a bibliography of papers which are based upon observations at the North Atlantic Weather Ships is in preparation. It may be added that the main part of the oceanographic data from the NAOS positions in the ICES area are available at the ICES Data Centre.

There has recently been a reorganisation of the NAOS Scheme. The meteorological observations from these stations are no longer of the same importance to the aviation as earlier. The International Civil Aviation Organisation (ICAO) backed out, and a new scheme was established under the World Meteorological Organisation (WMO). There are now only four Ocean Weather Stations in the North Atlantic, in addition to the U.S. HOTEL near the U.S. coast which is outside the Scheme. The new arrangement became effective from 1 July 1975. At that occasion both the IOC, WMO and ICES tried to get the oceanographic work at the stations upgraded from the category "Other Services" to "Primary Services", but did not succeed. It is evident, however, that the oceanographic work will continue along much the same lines as hitherto, and in the NAOS Vessel Manual the operating parties are invited to collaborate with ICES in the coordination of oceanographic work and the publication of data.

The decrease in number of stations is a serious drawback, and so is the change of position of two of the remaining stations. It was in order to remedy this that ICES in 1975 recommended not only that members operating NAOS stations should continue to make oceanographic observations at the positions of the remaining stations, but also that all members should make observations on an opportunity basis at former NAOS positions and submit these observations to the oceanographic data centres.

In this way a sort of phantom weather ships are established at the former positions. In this connection an approach made by the Ocean Climate Panel of SCOR Working Group 48 may also be mentioned. This Panel is studying the feasibility of using a carefully selected small percentage of the world's commercial shipping fleet to provide time series of XBT data at a few, about 30, fixed geographical points, mainly in data-poor areas of the world ocean. This is the so-called Phantom Weather Ships Project. The XBT observations at those fixed positions should, if possible, be supplemented with radiosonde data, solar radiation observations and other measurements. A provisional scheme of such Phantom Weather Ships has been prepared.

16. CIM was presented by Dr O Mamayev as follows:

The third meeting of the ad hoc Group of Experts on the International Bathymetric Chart of the Mediterranean was held in Monaco in April 1976. Experts from France, Federal Republic of Germany, Greece, Italy, United Kingdom and USSR were present. The work on the Chart is progressing as scheduled.

The Operational Unit of CIM is working on the preparation of Ichthyoplankton Sheets in cooperation with ICES.

The Regional Data Centre for CIM continues the work on dissemination and exchange of oceanographic data collected in the Mediterranean. The following documentation was published by the Centre: Catalogues of CIM Data (Vol.1, parts 1 and 2); Data Reports of CIM (11 issues). The Centre also continues important work on the preparation and publication of the "Atlas of Oceanographic Data Coverage of the Mediterranean".

The presentations were followed by a general discussion. The question was raised if at least some of the Projects which were presented ought to be more closely coordinated, or whether they would benefit from such closer coordination. Most of the participants agreed that this was not yet practical or even desirable. Most of the purely scientific Projects were directed towards solutions of specific problems, and most of them need to develop specialised methodologies. Perhaps in ten years' time, one would arrive at a state when more of a synthesis could be feasible or desirable. On the other hand, it was pointed out that for instance the ICES/SCOR Studies of the Pollution of the Baltic represented a case where a series of different studies were successfully integrated into one plan. It was recognised, however, that this may be easier to achieve in a relatively limited area like the Baltic, than in the open ocean. It was also pointed out that a study which started with a rather special purpose like the "OVERFLOW-73" had developed through MONA into a Project that had thrown light on very general problems, like large-scale atmosphere-sea interactions. There may perhaps be other cases where one would find that problems which may seem remote, are in fact coupled. The ICES North Sea Symposium 1975 was in this context mentioned as a successful attempt to synthesise results from a wider area of different studies.

Another question which was brought up was the need for long-term coordination of plans. Large-scale projects bind a considerable amount both of man-power, ships' time and instrumentation, and it is important to ensure, both that they do not collide, thereby splitting available resources, and that they - at least in some instances - take place in a logical sequence, so that maximum benefit can be drawn from each of them in planning and execution of others that will follow them in time.

In this context, the meeting noted that the Projects that had been presented could be listed as follows in a chronological order:

- 1976 (Dec.) IOC/FAO/UNEP Workshop on Caribbean Pollution
- 1977 (Early) IOC/ARIBE Workshop
- (Later) UNEP/WMO/IOC Workshop on Pilot Base-Line Study of Pollutants, 2-3 positions in the N. Atlantic
- (Jun-Sep) Post-JONSWAP Experiment, Sylt
- (April) JONSDAP-76 Meeting
- ICES/SCOR BOSEX-77 (Jan) Workshop; (Sep.) Experiment
- 1978 CINECA Symposium
- (Jul-Sep) JASIN Field Experiment, Rockall Region
- Eel Investigations Sargasso Sea (or 1979)
- 1979 Eel Investigations (or 1978)

- Oct. 76 - Jun. 77, 2 moorings MONA
- June 77 - June 78, 8 - 10 moorings MONA
- Early 77 - early 79, 6 moorings POLYMODE
- Sept. 77 - Aug. 78, Build-up FGGE
- Sept. 78 - Aug. 79, Operational FGGE
- Jan. 79 - May/June 79, Special periods FGGE

Furthermore, it was referred to the Projects presented at the meeting falling roughly into two groups. One was represented by the specialised scientific studies, the other by large-scale projects with a character of surveys. It was noted that many of the scientific projects which in recent years had been undertaken with new and sophisticated instrumentation, had shown that the previous general assumptions concerning the processes in the marine environment need to be revised, sometimes thoroughly. Under these circumstances it was felt that one should be careful in launching large-scale ambitious, sometimes global, survey-type projects prematurely. Much

of the work might turn out to be a waste of time and resources, if the methodological aspects were not given sufficient consideration.

The question was also raised if this type of consultation meetings (this was the third one) are useful, and if they should be continued. It was agreed that the exchange of information had been fruitful and the participants felt that the meetings ought to be continued. It was in this connection noted that there seems to be no parallel to them arranged by others.

It was also agreed, however, that when another meeting is arranged, participants should be asked to send in written statements in advance. These should be circulated before the meeting and could then only briefly be referred to. This would leave more time for exchange of views and for general discussions.

The meeting was closed at 17.30 hrs.

ANNEX 1

List of Participants

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J Smed	International Council for the Exploration of the Sea (Service Hydrographique), Charlottenlund Slot, 2920 Charlottenlund, Denmark.
A Svansson (Chairman)	Fishery Board of Sweden, Hydrographic Dept., Box 4031, 400 40 Gästeborg, Sweden.
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