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**REPORT OF THE WORKING GROUP ON SHELF SEAS HYDROGRAPHY**

Aberdeen, 12 - 14 May 1986

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## REPORT OF THE WORKING GROUP ON SHELF SEAS HYDROGRAPHY

Aberdeen, 12 - 14 May, 1986

### 1 Organisational matters

#### 1.1 Opening of the Meeting

The meeting was opened at 1400 on 12 May 1986 by Dr A.D. Hawkins, deputy director of the Marine Laboratory, Aberdeen. He welcomed participants and spoke of the important function of the working group in promoting collaborative research. He thought that this was particularly necessary in relation to hydrographic research which needed a lot of money to maintain it as well as active interest by active scientists.

In thanking him for his remarks, the Chairman, K.P. Koltermann said that the working group was happy to be back in Aberdeen, having not met there since before the time of JONSDAP '76.

#### 1.2 Local Information

Mr. JHA Martin, local host, provided information of general interest to the members.

#### 1.3 Appointment of Rapporteur

The Chairman asked the Hydrographer to act as Rapporteur for this meeting.

#### 1.4 Review of membership

The Chairman informed the group that H. Dahlin had been made a Swedish member of the working group, but was not present at this meeting. Members present, were K.P. Koltermann (F.R. Germany), S. Fonselius (Sweden), D. Ellett, J.H.A. Martin, R.R. Dickson (UK), Y. Camus (France), and R. Sætre, M. Mork (Norway). Also present were G. Hecq (Belgium - representing B. Jamart), J. Howarth (representing Dr. N.S. Heaps), M. Heath, C. Hudson (UK) and the ICES Hydrographer. Dr G. Topping, Chairman of the Marine Chemistry working group, attended parts of the meeting,

#### 1.5 Approval of Agenda

The provisional agenda, circulated prior to the meeting by the Chairman was agreed. It is as per contents list of this report (excluding Appendix).

### 2 Review of National and International Research efforts

#### 2.1 Institute plans, proposals, results

The Chairman asked each participant to outline national activities relevant to the working group. The main points to emerge were:

Sweden	An increased activity in the Skagerrak is being planned. Recently much effort has been put into preparations for the PEX experiment. This experiment
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was conducted in April this year, and some of the first results of it were presented to the meeting. Sweden continued to monitor conditions in the Baltic basins. Stagnation of some of the basins has persisted for some 10 years, and salinity has continued to decrease.

**Scotland** A number of organisations were studying the flow of the Coastal current off the Scottish west coast, and a project was underway to compare relative productivities of some coastal embayments. Other work underway included studies of the retention time of water in the Firth of Clyde, and the drift of patches of herring larvae, treating larvae as a point source. Attempts were underway to utilise an Argos buoy to determine feeding rates of larvae.

**England** There were many ad hoc coastal studies underway, most related to water quality impact studies. Most activities were confined to the Irish Sea, in particular the North Channel. An acoustic doppler current meter was being developed at IOS to provide a capability of measuring current profiles.

**France** A multi-institute project (ONDINE 85) was successfully carried out in fall 1985, off Brest between the 100m isoline and the abyssal plain. A large data set consisting of currents, thermistor chains, meteorology, CTD, Nansen casts and tidal measurements is now being worked up. Plans are now being made for a tomographic experiment in the Bay of Biscay, probably in the summer of 1988.

**Norway** There are intensive activities in the North Sea in relation to oil exploration. A new programme is one related to a study of the early life history of fish. This is taking place primarily in the coastal current north of 62°N. Effort is concentrating now on spawning herring, and in the Barents Sea, cod. Drifting buoys are being used to map stationary features of the coastal current, most of which appear to be topographically controlled. Historical data is being utilised to investigate the persistence of the westward extension of Skagerrak water that dominated the North Sea hydrographic picture in the summer of 1984.

At the University of Bergen, interest is mainly directed towards studies of the dynamics of the coastal current. An acoustic doppler profiler is being utilised to obtain data on  $t$ ,  $s$  and currents whilst underway.

**FR Germany** The German frontal project, on a multidisciplinary basis, will continue sea-going activities in 1987. Close cooperation with the Dutch 'Frisian Frontal Programme' is maintained. Interest in North Sea models is still at a high level. Work is proceeding on eg water quality models, and models of storm surge reproduction and of the German Bight salinity front.

There is also much activity related to short-term funding to the Universities, eg the "Circulation and Pollution Transfer" programme, details of which were announced at last year's ICES statutory meeting. The Atlas of North Sea surface temperature has now been produced and is available as report Dt. hydrogr. Z. Erg -H.B. Nr 17, 1986. In this atlas data acquired to produce the well known DHI weekly charts, are displayed on weekly, monthly, and annual bases, and include additional statistical information.

Belgium A "National Concerted Programme in Oceanography" is currently underway and is financed by the Ministry of Science Policy. Its main objective is to understand the dynamics of, and to model, marine systems. Specific activities in relation to this include plankton ecology, phaeocystis effect, heavy metals and stable organic pollutants, benthos monitoring, sand transport monitoring, geomorphology of shelf, and dynamics of frontal systems. Recent results have been published in "Progress in Belgian Oceanography Research" - Proceedings of a symposium held in the Academy of Belgian Sciences.

Impending activities include coastal monitoring (t, s, chlorophylls, nutrients, pollutants), ECOFRONT, between Belgian coast and Shetland (t, s, O, nutrients, chlorophylls, zooplankton, pH, alkalinity, CO<sub>2</sub> cycle and birds)

## 2.2 IYFS Hydrographic Data

The Hydrographer reported that the collection of hydrographic data during the IYFS was running reasonably smoothly. He was routinely rejecting some data acquired from those participants using uncalibrated CTDs. In response to C. Res 1978/4:2 which asked for this working group to comment on the progress being made in collecting nutrient data during the survey, the Hydrographer presented some summary diagrams describing the data coverage, and which give some impression of the data quality.

The 1984 data set had been worked up in detail, the data from all four countries who collected these data having been submitted to the Service Hydrographique some time ago (ie England, Scotland, Federal Republic of Germany and France). The main analyses has been restricted to the 1984 data set because for subsequent years (ie 1985 and 1986) data from only England and Scotland has been submitted.

The analyses of the 1984 data set suggest that there may be some problem with regard to consistency between countries. The F.R. German data had a much lower variance than the other data sets but it was possible that the reasons for this may be oceanographic rather than analytical. However it was clear that the FR German phosphate data was of higher quality, the remaining data showing frequent "drop-outs" to lower values. This is a fairly well known problem in relation to phosphate determinations, and its solution may lie in better preservation of the samples. Indeed it seems that techniques have improved to the extent that

the 1986 phosphate data so far received appears to be of similar quality to the 1984 FR German data.

It was considered that, in general, the available data was of sufficient intensity in turns of coverage. The resulting charts are perhaps the most comprehensive available, and will in due course produce information of value to monitoring exercises. The working group regretted that only 3 countries were now taking part in this nutrient exercise, (data for 1985 and 1986 from F.R. Germany has yet to be submitted) which meant that certain coastal areas, especially in the southern and eastern North Sea were being poorly mapped. It was clear that all countries participating in the survey could benefit, if only to ensure an annual opportunity to intercalibrate, which would produce higher standards in future International data sets. Within this context, the Hydrographer remarked that the recent intercalibration of nutrients in the PEX experiment demonstrated that marine chemists had no reason at all to feel complacent about their capability of measuring nutrients.

Dr Topping reported that the recent meeting of the Marine Chemistry working group had considered the question of the availability of nutrient data, and the possibility of using these data for temporal trend monitoring. In order to identify those areas where trends may be monitored it is planned to compile an inventory.

### 3 Review of laboratory practise on standard physical oceanographic procedures to collect and analyse T and S data

In introducing this item, the Chairman recalled the very successful Hydrography Committee special topic session on data collection procedures, which had provoked considerable discussion, as well as a recognition of the need to maintain high standards in all aspects of oceanographic measurement. Two initiatives had been made interessionally, as a direct result of the special session, one concerned with an intercalibration of salinometers, the other concerned with a comparison of salinity bottle types.

#### 3.1 Results from the salinometer quick check

The Hydrographer gave a brief overview of the exercise, which had been initiated and conducted by DHI Hamburg. Bottles containing water of known salinity had been distributed to some 30 institutes and results sent to the Hydrographer and Dr Schmidt of the DHI for analysis. The intercalibration had consisted of salinity measurement at 4 points (salinity of approximately 8, 23, 34.7, and 35.5) and was performed on approximately 40 different salinometers, the majority of which were of the Auto-Sal type.

It was clear from the preliminary results of this exercise that there had been some contamination of samples which had invalidated some results. However a first impression is that the Institutes known for their high precision produced very consistent results to within .003, but others showed very poor capability, especially amongst those using the Tsurimi Seiki salinometer. Further analyses, in cooperation with Dr Schmidt, was pending and it was hoped to have a final report prepared for the Statutory meeting.

Dr Dickson referred to a letter he had received from one of the editor's of Deep Sea Research, indicating a desire to have an article on the intercalibration exercise published in this journal. The working group felt that this was very appropriate particularly as it would help to promote the image of ICES as an organisation intent on ensuring the maintenance of high quality standards in marine data.

### 3.2 Results from the salinity sample bottle check

Dr Dickson explained that this intercomparison had been set up in order to obtain information on the effects on salinity values due to storage of salinity samples in the wide variety of bottles presently in use in different marine institutes.

Twenty seven marine institutes had supplied bottles for the experiment, and some have sent more than one type of bottle, giving a total of 35 determinations. Bottles were filled with samples of known salinity, and will be analysed for salinity after periods of 1, 2, 4, 8 and 16 weeks. It is hoped that a report can be prepared in time to be presented at the Statutory meeting.

### 3.3 'Who uses thermometers'

The Chairman explained that he had put this item on the agenda because he felt that many institutes were relaxing their thermometer calibration standards as a direct result of the increasing use of CTDs. The result of a survey amongst members yielded the following points:

- SMHI calibrate thermometers every 5 years, but unprotected thermometers are not used.
- IOS Bidston do not use unprotected thermometers. Their protected Kurt Gohla thermometers are calibrated every 2-3 years. CTDs are calibrated every one or two dips (at one point).
- SMBA deploy 2 bottles at each CTD station. Thermometers (mainly Kurt Gohla) are calibrated every 5 years.
- Aberdeen uses protected and unprotected Kurt Gohla thermometers, recalibrated every 3 years.
- In Belgium, thermometers are not used at all. CTD calibration is undertaken in a tank.
- Menai Bridge calibrate their thermometers (protected and unprotected) every 5 years.
- Lowestoft use Kurt Gohla unprotected and protected thermometers. They are used on every second bottle of a rosette for CTD calibration. Thermometers are calibrated frequently because of high loss rate resulting in frequent new purchases.
- EPSHOM calibrate their CTD at sea. Thermometers are calibrated at 3 year intervals, many times at 0°.



- IMR Bergen do not use unprotected thermometers. Their protected thermometers were calibrated every year, but frequency is gradually declining. They use mainly Japanese and Kurt Gohla (expanded scale) thermometers.
- DHI used to calibrate thermometers at the Bureau of Standards, but now at Kurt Gohla because they are considered to be more accurate. They maintain a thorough history of each thermometer which are used now primarily for CTD calibration. To ensure the highest accuracy, low temperature, expanded scale thermometers are not read until 6 hours after the measurement.

In the ensuing discussion it was noted that no two institutes were alike in their use of thermometers, probably because requirements had been tuned to particular needs. It was hoped however that this overview will encourage scientists to critically review their procedures, and make changes if they think they are falling short.

Dr Dickson remarked that he felt that recently the biggest advance we had made in alerting ourselves to the necessity for high standards was last year's special session. It was important now to maintain the momentum by arranging appropriate special topic sessions at forthcoming Hydrography Committee sessions. It was therefore agreed that the following suggestions should be made to the Hydrography Committee:

- Shelf Seas use of CTDs, convened by the Hydrographer. (Santander 1987)
- Quality of current measurements, convened by J. Howarth (Bergen 1988).

#### 4 Joint programmes

##### 4.1 SCAPINS

The Chairman briefly described the outcome of the ad hoc Study Group, which met in Copenhagen in December 1985 to further develop plans for the SCAPINS exercise. The report of this group is Appendix A of this report. The meeting had failed to establish a firm framework for SCAPINS, in spite of the fact that it was clear many regionalised activities were being considered, or were underway. The group had felt that unless some important gaps specifically related to the coverage of current meters in the North Sea could be filled, then the exercise should be downgraded to one which merely attempted to link a common theme.

The Chairman of the ad hoc group, Dr Becker, had requested that members investigate ways of filling these gaps and send specific proposals to him by the end of March. However none were received, following which Dr Heath, on behalf of the Marine Laboratory, Aberdeen, announced withdrawal from the project. This was because Dr Heath felt that his proposed programme of work within SCAPINS was only justified if SCAPINS was going to be a joint programme. Since it was now clear that that was not going to be the case he had decided to modify his work programme. Furthermore he felt that his plans for participation in SCAPINS had been

continually frustrated because of the ever-changing plans of some of the potential participants. As a result SCAPINS now seem disjointed in relation to the scenario presented at one time. In addition to Dr Heath's planned withdrawal, Dr Backhaus had also indicated that he would now be unable to contribute modelling effort to the programme but offered his models to those who wanted it.

The Chairman expressed regret at this turn of events, but fully understood Dr Heath's position. Dr Satre, however, indicated that, following the Copenhagen meeting, there had been much discussion within Norway on developing research on certain aspects of the SCAPINS programme. This specifically related to the manner in which the Dooley Current entered the Norwegian Channel, and merged with the Atlantic water there. Dr Heath agreed that such work would go some way to curing his grievances. The Norwegians, in collaboration with the Danes, were also planning a detailed programme in the Skagerrak, but as yet no details were available.

Dr Hecq described (in Any Other Business) definite proposals being made in Belgium with regard to a contribution to SCAPINS, but remarked that these may be modified in the light of what has been said. They were planning a cruise on the research ship "Belgica" from 15 August to 30 September 1987, with the theme "Influence of summer circulation and hydrology on water column properties, plankton productivity and biochemical characteristics". The ship would take measurements in the Straits of Dover, Southern Bight, South German Bight and Dogger Bank and would include subsurface tracking of T, S, chlorophylls a b c, carotenoids, fluorescence, zooplankton composition and biochemistry, lipid content, nutrients etc). They planned vertical profiles in stratified areas and mooring stations in the German Bight.

In considering the present position with regard to SCAPINS, the Chairman indicated that there are clear grounds for North Sea research to be developed in a way to meet the needs of all the ICES community. SCAPINS can provide a means to guide future progress, and it was clear that many scientists/institutes would either individually or in groups, respond to the ideas implicit within SCAPINS. It was up to the group to be alert to these developments, and ensure that adequate communication channels are created. The Hydrographer indicated that he thought a useful way ahead would be to link the present initiatives with the IYFS in order to help provide detailed understanding of environmental and biological processes that influence the first year of life. An appropriate coordinating body for this type of work would be the IREP steering group.

#### 4.2 The possible role of SH within WCRP

The possibility of Service Hydrographique being utilised as a data centre for certain WCRP projects was, according to Dr Dickson, dependent very much on the current and projected capability of the SH. As this task would be demanding on both expertise and resources, the controlling bodies of these projects would be examining the possibilities rather critically. The working group considered however that the SH was well placed to take on certain of these tasks, especially because of its existing capabili-

ties in maintaining long-time series data sets. The experience gained from eg the use of SH as a project data centre for PEX was highly relevant in this context.

## 5 ICES matters

### 5.1 National review of papers submitted to ICES Stat. Meeting 1986

The Hydrographer briefly outlined papers submitted for this years Statutory meeting. There were very few of direct relevance to the working group, reflecting the current dominance of interest in deep water oceanography.

### 5.2 Main theme session and mini-symposium

The Chairman referred to the theme session "Data products and information services on an operational basis". No contributions had been submitted for this session, and the session would be cancelled for this year. The working group, however, strongly supported this topic and considered that it should be pursued in good time for the 1987 meeting.

### 5.3 Matters related to the Service Hydrographique

The group briefly discussed the 'SH priority list' as given in C.Res 1985/4:5 in the light of information notes provided by the Hydrographer. The objective and future of the ROSCOP form, in particular, produced some sort of reaction. Some members of this group see this commodity as something only of use to data centres, and is a chore for the marine scientist who gain little from its existence. The Hydrographer indicated that he could see the value of this type of inventory, and was certainly an invaluable tool for the SH. Most enquiries received by him are quickly processed with the help of ROSCOP, but this would only remain a useful tool so long as the inventory covered the majority of cruises.

### 5.4 Matters referred to the WG by other WG

The Hydrographer provided a brief outline of the discussions at the Marine Data Management meeting. He described the 'blueprint' which had been agreed as a useful basis for further development. The working group had no comment to make on this development, which had stemmed from the need to bring together multi-disciplinary data acquired during shelf seas projects and surveys.

The Chairman referred to the request from ACMP for the working group to help prepare an assessment of the Irish Sea. He had asked Dr Dickson to initiate work on this, and Dr Dickson provided the meeting with an executive summary of a document which had been prepared for a UK government department. Dr Dickson explained that it was a very long document, and had found it impossible to follow the guidelines as laid down by ACMP. He suggested that anyone who wished the opportunity to comment on the document, especially with regard to providing ideas on how to "internationalise" it, should request a copy of it from the Chairman. It was agreed that reactions should be transmitted to the Chairman who would then send a coordinated response to the ACMP Chairman.

Dr Dickson's overall conclusions were that the Irish Sea was in a good state of health, the only problem area being Liverpool Bay. He regretted that the report was not allowed to cover the issue of radioactivity, which he had considered unsatisfactory.

#### 6 Any Other Business

Dr Hecq gave a presentation on Belgian proposals for SCAPINS (see above), and Dr Sætre described his recent work on matters related to the eastward spreading of Skagerrak water.

Dr Dickson referred to the decision by the ICES Bureau, that ICES should support the 1988 Joint Oceanographic Assembly. One way to do this was to make proposals for Sessions. The group concluded that, in view of major forthcoming activities concerned with water quality in the Shelf Seas, a session entitled "Assessment Studies of Marginal Seas" should be proposed.

Within this context, and in preparation of evaluations pending with regard to the water quality status of the North Status, the group wishes to propose to the Hydrography Committee a theme session on "Intercomparison of North Sea water quality models".

#### 6.1 Date and venue for the next WG meeting

The group were pleased to accept the offer of Dr Sætre and Prof Mork to hold its next meeting Bergen, some time in May 1987. Topics to be discussed include SCAPINS and water quality issues.

#### 6.2 Closure

In closing, the Chairman observed that, obviously, activities and interests in the work of this Working Group had shifted away from cooperative efforts to individual activities. Compared to the high level of work in the 1970s he now noted a strong increase towards the oceanic domain, with a considerable number of new faces and institutes pursuing shelf seas research. He traced this back, in part, to the restrictions and administrative overhead generated in implementing the national Law of the Sea legislation. This trend was further increased, he remarked, by a wide-spread reservation to spread information, establish bi- or multilateral links and long-term cooperation in the wake of the North Sea Conference. The Chairman expressed his regret that the difficult part of ICES hydrography, but nevertheless the one with the most obvious impact on pollution problems, was impinged by action from outside ICES. He also noted that one way to a more combined activity and action was the design, intercomparison and use of water-quality models, which will be in a much greater demand in the future.

The Chairman thanked Tony Martin for the support and help he had given the working group during its stay in Aberdeen, and for organising a pleasant outing into the Dee Valley. The meeting closed at 1600 on 13 May 1986.

**APPENDIX A**

REPORT OF AD HOC GROUP ON SCAPINS  
TO THE SHELF SEAS WORKING GROUP

Report of ad hoc Group on Scapins  
to the Shelf Seas Working Group  
ICES Headquarters 12/13 December 1985

## 7 INTRODUCTION

This meeting was convened following deliberations at the 1985 Statutory Meeting. C.Res 1985/2:17 gave formal approval for this meeting, under the Chairmanship of G. Becker, which was charged with seeking the coordination of existing plans and to develop further cooperation for an international exercise on Summer Circulation and Production in the North Sea (SCAPINS). This group is to report to the Shelf Seas Working Group in time for it to be considered at its next meeting in Aberdeen.

### 7.1 Opening

The meeting was opened by its Chairman, G. Becker, who circulated the draft agenda. This was approved. The ICES Hydrographer, who was appointed Rapporteur, briefly explained the routine adopted at meetings in the Secretariat.

### 7.2 Participants

Resolution 2:17 contained a list of names of scientists who were thought to have interests in participating in SCAPINS. All these had been formally invited to take part in this meeting by the Chairman of the Shelf Seas Working Group, Peter Koltermann, in a letter distributed previously. In addition, the General Secretary had also written to all Delegates, inviting participation in this meeting. The following attended:- Becker, Koltermann, Backhaus, Doerffer (Federal Republic of Germany), Dickson, Howarth, Heath (UK), Richardson, Nygard and Olsen (Denmark), Mork, Sætre (Norway). The ICES Hydrographer, Harry Dooley, also attended. Of the North Sea countries not represented at this meeting, Belgium and France had expressed no interest. The Netherlands had expressed interest and regretted that it was not convenient for either of their two representatives (Veth, Gieskes) to attend. Information from the Netherlands had however been received, and would be taken into account.

The Chairman expressed gratification at the good mixture of disciplines at this meeting, and thanked, in particular, the none physical oceanographers for their interest in discussing a multi-disciplinary project for the North Sea.

## 8 SCAPINS plans

### 8.1 Background to SCAPINS

SCAPINS had its origins in JONSDAP'76, which was the last large scale oceanographic exercise in the North Sea. JONSDAP had addressed circulation (including storm surges) and plankton questions, specifically in the period of the year spanning the spring bloom. A number of numerical modelling studies had made good utility of the enormous data set acquired during JONSDAP, but there was a considerable body of information that suggested that studies at this time of year were not typical of conditions in the North Sea. As a result, models of the North Sea are of very limited applicability, and needed to contain improved

physics in order to enable a more realistic hindcast of inter and intra-annual variability to be acquired.

Attached to these questions of variability were some relating to biological processes in the North Sea. When SCAPINS was first proposed in 1981, algal concentrations at water mass boundaries was a topical issue. The location of these concentrations, and their variability, appeared intimately connected with physical processes, and an integrated study of these appeared appropriate. In particular an understanding of their role in the North Sea food chain appeared desirable as fluctuations of marked amplitude were, theoretically at least, possible. This was the P in SCAPINS. This has loosely referred to several biological processes, eg Production, plankton, even pollution, during the several years of discussion, but nothing specific was identified. More recently there has been renewed interest amongst biologists of the physical/biological processes important to the well-being or otherwise of herring larvae, which are spawned in the North Sea in late summer. The questions being asked required a detailed understanding of circulation variability on both within year and between year time scales. Furthermore herring larvae are locked to areas where circulation variability is strongest. As a result last year's Shelf Seas working group meeting had concluded that SCAPINS objectives should be modified to incorporate this work. The Statutory meeting agreed therefore that the following objectives should be developed.

- To measure the dynamics of the summer circulation of the North Sea and its response to the autumn breakdown of stratification.
- To compare stratified and unstratified hydrodynamic models of the North Sea with the observed circulation pattern.
- To measure temporal and spatial distributions of the autumnal plankton bloom.
- To assess the impact of physical conditions on the availability of food for fish (herring) larvae and on larval drift.

The Hydrographer explained that it had been clear from the very early stages of the discussions on SCAPINS that an experiment on the scale of JONSDAP 76 was not feasible, because institutes were no longer willing to commit resources on such a scale. A compromise experiment in which institutes would be encouraged to work in certain areas, preferably where circulation features are known to be pronounced, was therefore proposed. This meant that very large gaps in the "network" of data would be likely, which would frustrate the interpretation and potential gains from SCAPINS. These gaps would have to be identified, and attempts should be made as soon as possible to remove them.

## 8.2 Specific national proposals

At its 1985 meeting, the Shelf Seas Working Group considered in some detail the various national plans for research in the North Sea. These plans provided the basis for the decision by ICES to support SCAPINS, on the assumption that these plans were likely

to be realized. Participants were therefore asked to prepare for this meeting somewhat more detailed statements of their intention, in particular pointing out the extent to which the description of their projects, contained within the Shelf Seas Working Group report, was still relevant. Information on the status of the planning was also sought. All this information was compiled at the meeting and is summarised in Table 1. This Table lists by country/institute, the area of intended operations in the North Sea, the problems to be solved, manner of execution, and the status of plans as relevant to the possibility of undertaking projects during the previously agreed time span for SCAPINS. Since this meeting wished to specifically identify gaps in the exercise, it paid close attention to this type of breakdown, mainly because of the now very short lead in period to the exercise, which dictates the urgent need for firm, stable plans.

The Table reveals groups of plans in categories firm, tentative and very tentative and these are discussed below in that order. By "firm" is meant that there is currently a definite intent to procede.

#### 8.2.1 Firm Plans

Plans in this group are entirely confined to programmes which have materialised to seek an answer to biological questions (plus one concerned with modelling). In other words Table 1 demonstrates that, contrary to the previous impression, there is currently no firm statement from the physical oceanographic community concerning a contribution to SCAPINS. These plans, further details of which are contained in the Shelf Seas Working group report (CM 1985/C41) are:-

- a) Studies of herring larval distribution (drift), growth, survival and food production on the herring spawning grounds east of Scotland (Aberdeen Bank southwards). This study has already commenced with detail plans for field work (including 3 to 4 current meter moorings) in Sep and Nov 1986. A 2 week period during SCAPINS in 1987 is also planned, utilising similar resources. This work is being undertaken primarily by the Charlottenlund laboratory.
- b) Similar studies are underway in the Orkney-Shetland area by the Aberdeen laboratory, with a basic objective to determine the magnitude of transport of herring larvae from the west coast of Scotland into the North Sea. This is an extensive IREP-type study involving many biological and physical measuring techniques (including current meters and drifters). In 1986 six research vessel cruises are committed to this work, and detailed plans are being proposed for 1987.
- c) The Dutch "Frontal Zone Program" is seen as a very relevant contribution to SCAPINS. No more information was available to the meeting than was available at the Shelf Sea WG meeting, and summarised in its report. In the absence of a representative from this programme the Ad hoc group merely noted the existence of this programme, which has plans for fieldwork in both 1986 and 1987.



- d) The University of Hamburg is planning detailed modelling studies, primarily to support its "Circulation and Pollutant Transfer Project" details of which were presented to the Hydrography Committee at its recent meeting. This field project, planned to take place in late 86 and early 87, and therefore not timed to coincide with SCAPINS, involves an extensive array of stations in the North Sea, and measuring a full suite of nutrient parameters. An offer was made to utilise the model, which is driven by meteorology and water density to hindcast recent summer circulations in the North Sea.
- e) A desk exercise is being planned by MAFF Lowestoft to reanalyse the historical data from a section worked through the Flamborough Front from the 1930s to 1960s. This will utilise data stored in the ICES data bank, and will yield information on the magnitude of inter-annual variability in the distribution of temperature and salinity.

#### 8.2.2 Tentative plans

Plans in this category stem from discussions primarily within and between Norway and Denmark and are deemed to have a reasonable chance of fruition because of firm activities with regard to bilateral meetings and discussions developing in the ICES Skagerrak/Kattegat Working Group. Details are:-

- a) The Geophysical Institute, Bergen is embarking on a program, starting 1986, to investigate the development of the Norwegian Coastal current front through the year, for better understanding of seasonal variations, and to monitor currents on a long time scale. This program, which is likely to be expanded to cover the SCAPINS period, will involve the deployment of 3 current meter moorings for one year, and hydrographic sections in January, June, August and October.
- b) At the annual meeting of the Association of Norwegian Oceanographers a joint Scandinavian programme for investigations in the Skagerrak was approved. Preparatory meetings are to be organised with a view to starting the investigations in 1987-1988. The programme plan for 1987 will be finalized in June 1986.

#### 8.2.3 Very Tentative Plans

The meeting noted with regret that many of the "tentative" plans outlined in the Shelf seas Working Group report had now been downgraded to "very tentative", and in some cases, objectives had also been modified or altered drastically. This was because the institutes concerned had to commit their major resources to areas other than the North Sea. It was deemed particularly unfortunate for the health of SCAPINS that the major resources available in these institutes, and which had ensured the success of JONSDAP'76, would not be available for SCAPINS. Plans in this category include:-

- a) A joint program by the English institutes at Bidston and Lowestoft. Studies, both field and theoretical, could focus on the dynamics of the Flamborough front. Several cruises to the area may be mounted in the SCAPINS period, involving the deployment of various types of instrumentation, including thermistor chains and current meters (up to 5 moorings). A 3-D numerical model for water quality studies may be developed, and it is hoped to make use of SCAPINS observations to validate it.
- b) Danish studies in the Jutland Current are being phased out, and it is unlikely that any studies in this area will be undertaken in 1987.
- c) The Institute for Marine Research, Bergen has ongoing observations at fixed positions (light vessels, Ekofisk) and on commercial routes. These observations may be intensified for SCAPINS, and it may be possible to contribute with other resources. However participation during the SCAPINS period is not possible because of commitments elsewhere.
- d) DHI Hamburg may put together 3-4 short cruises to measure stratification, chlorophyll, phytoplankton and zooplankton.

#### 8.2.4 Activities of non-ICES groups

The group was informed about two joint projects relevant to SCAPINS, being planned by other organisations. These were the:

- Cooperative Oceanography Project on Ergoclines (COPE), under SCOR, and
- NATO Advanced Workshop on influence of freshwater inflow. This group had expressed an interest in mounting projects under the SCAPINS umbrella.

#### 8.2.5 Conclusion

Even after taking together plans of every status, it is clear that, at best, SCAPINS must fall far short of its primary physical oceanographic objectives. Clearly, others must be encouraged to contribute, and the Chairman asked participants to attempt to find additional resources and support. As a result it was not possible at this stage to formulate a proposal for SCAPINS to be considered by the Shelf Seas Working Group. This would have to await the furnishing of additional proposals to the Chairman during spring 1986.

#### 8.3 Ways of filling gaps

In order to facilitate the task of identifying additional resource for SCAPINS the meeting proceeded to discuss ways of maximising the effort based on the known commitments and resources. The discussion centred on the identification of gaps, which are many.

### 8.3.1 Mooring Availability

The total amount of current meters/moorings that could be available if all the plans are materialised is approximately 25 moorings and 100 current meters. Of these only 15 % are committed in the projects that are "certain" to go ahead, and many of the others are confined to near coastal regions and are in any case only short period deployments. The group considered at length the most effective way of filling the gaps in information and concluded that this could be done as follows:-

- Deployment of a large number of drifting (ARGOS) buoys during the period.
- Contributing equipment to participants who are definitely taking part. It was eg suggested that each of the English Laboratories represented at this meeting could contribute one mooring to the Charlottenlund programme. These could be used to fill a gap in the Central northern North Sea, and thus help to identify and measure the major circulation feature that may be responsible for the transport of larva across the North sea.

### 8.3.2 Ships of Opportunity & platforms

The group had noted with interest the establishment of the use of an Ekofisk standby vessel for monitoring hydrographic parameters. The group felt that this was an important way to proceed as it was a cost effective means of acquiring time series data. This initiative by IMR Bergen should be encouraged and other institutes should be encouraged to participate in such a scheme, preferably with a wider suite of parameters. Other activities discussed which do not rely on the availability of research vessels include the deployment of XBT's by ships of opportunity. Such a resulting data set would make a valuable contribution to the need to specify in near real time, the density field for input to the Hamburg circulation model.

### 8.3.3 Remote Sensing

An important element of SCAPINS has been a demonstration of the role of remote sensing in monitoring and depicting circulation and biological features in the North Sea. Remote Sensing could also be used as a means of acquiring data on scales not possible by conventional means. Its applicability in SCAPINS had been put to the Aerospace Remote Sensing Group, but they had so far not commented.

In discussing the current availability of Remote Sensing data it was noted that the CZCS is unlikely to survive to SCAPINS. Other optical sensors are available on LANDSAT, but the purchase costs are high (ca 6000\$ per image). The group however considered that it was still a high priority to demonstrate the utility of remote sensing, and invited Dr Doerffer to follow up the request to the Aerospace Remote Sensing Group to perform an analysis on selected North Sea scenes. In support of this, SCAPINS could seek to acquire a broad suite of optical data. The Institute of physical Oceanography, Copenhagen, offered to supply appropriate

instrumentation, if required.

#### 9 Recommendations

In consideration of the fact that there was still a great deal to be done before a SCAPINS project as proposed is viable, the group, taking into account all aspects of its discussion recommends to the Shelf Seas Working Group that:-

- i) The Aerospace Remote Sensing Study Group make a detailed analysis of imagery of the North sea during the summer, in order to demonstrate the utility of this tool in explaining and monitoring features of the North seas physics and biology.
- ii) This group should meet informally during the 1986 Statutory meeting, to review the resources available to SCAPINS, and to consider progress in the light of the opinions expressed by the Shelf Seas Working Group.
- iii) The Chairman of the Hydrography Committee is requested to inform other relevant committees on gaps in the present proposals, and asking for more support.

#### 9.1 Closure

In his closing remarks the Chairman commented on the rather poor progress made by the meeting, even though it was now possibly easier to assess the chances of staging a worthwhile project. He noted that many discussions at a national level were pending, and looked forward to receiving details of their outcome so that a detailed logistical plan could be prepared prior to the Aberdeen meeting. The meeting closed at 1300 on 13 December 1985.

Country/ Institute	Area	Problem	Execution/Equipment to be deployed	Status of plans
Denmark (IPO)	Jutland Current	Jutland Current transport	-	No plans after 1986
Denmark (DFH)	East Scotland	Herring Larval drift & food	Plankton/hydrography Current meters	Autumn 1986/87
Denmark & Norway	Skagerrak	Physics/biology	-	Plan to be finalised in June 86 for 87/88
Norway (GI)	Coastal Current	Seasonal var., coastal front	Repeated sections, 3 CM sonde, sea soar etc	Definite for 86, plans for 87
Norway (IMR)	northern N. Sea	Fisheries oceanography	Coastal stations (light ships, Ekofisk), Commer. routes, Argos, Ekofisk	Tentative, but cannot contribute directly to SCAPINS
Scotland	Orkney/ Shetland	Larval drift into N Sea	Process surveys, CM's tide gauges, drifters	Existing programme spanning SCAPINS
England (MAFF/IOS)	E. England	Dynamics of Flamborough Fr	Surveys, CM's, thermistor chains, drifters, tides	Very tentative. Dep on other commitments
England (IOS)	northern N. Sea	Circulation dynamics	Shore-based tide gauges CM's	Iffy
Netherlands	S Dight	Frontal processes	Plankton, sediment, meteo Cms	Proceeding for 86/87
FRG, University (Hamburg)	Whole	Chemical budget	hydro/chem surveys	Proceeding for 86/87 but not SCAPINS period
FRG, University (Hamburg)	Whole	Modelling hindcast.	CM's - tide gauges (German Bight)	Underway, plans for 87
FRG DHI + Bremerhaven	Frisian fr	Frontal proc.	hydro/chem surveys; CM's	Exist. prog SCAPINS per
FRG, DHI	North Sea	Stratification	towed CTD, CM	tentative

TABLE 1 Summary of SCAPINS projects