REPORT OF THEME SESSION ON
"ENVIRONMENTAL WORKING GROUP REPORT TOPICS"

Chairman: Professor A D McIntyre
Rapporteurs: H Dooley
                J Pawlak

In opening the meeting, the Chairman explained that the object of the Session was to provide time for consideration of scientific aspects of the Working Groups reports, in particular those aspects which were common to several reports and which would benefit from discussion in a multidisciplinary form.

Fourteen documents were relevant to the Session, and they are listed in the end of this report. Before the chairman of each Working Group was given an opportunity to highlight matters of interest in individual reports, there was a general discussion focussed on topics of relevance to several of the Working Groups. The discussion was introduced by a number of selected speakers who made brief contributions.

The first topic was Problems of Environmental Surveys and this covered in particular aspects of reports C.M.1984/C:2, C:30, C:31, E:4, E:18, E:21, and L:37. Environmental Surveys of one kind or another were required by many of the Working Groups, and they raised many questions, such as how to locate stations for chemical monitoring and how to design sampling for fish larval studies. In the introductory remarks, the general problem of variability was discussed, and the need to define space-time scales and to recognize the problems they created in sampling. For phytoplankton, the relevant scale might be 1 km and 24 hours, while for fish it could be 1 000 km and 1 000 days. Other considerations were obviously relevant; for example, weather (1 000's km and a few days) and fronts (a few km and several years). Since it is not possible to cover the whole spectrum of scales, decisions must involve a compromise. Sampling strategies were then discussed, and the use of satellites was touched on, but a warning note was sounded in terms of the difficulty of handling large scales in space and time because of the variability. Finally on the biological side, there was a need to understand the nature of the variability. It may be that in dealing with high levels of biological organisation, it would be better to look at changes in variability rather than at mean values.

Following the introduction, a number of Working Group Chairmen entered the discussion in relation to their own reports. From the Marine Chemistry Working Group, the need was emphasized to define clearly the purpose of monitoring and to have adequate quality assurance of the data. The need for a good understanding of the physics was noted before trends could be discerned, and that called for interaction between chemical and physical oceanographers. In chemical monitoring, the signal to noise ratio was always a problem. On the biological side, it was suggested that some of the difficulties in fish larval studies arose from not recognizing fully the scale problem already referred to. Also, while the physics was important, biological factors such as predation were also relevant.

In introducing the interests of the Shelf Seas Hydrography Working Group,
the importance was noted of linking shelf seas with the oceans, of looking
particularly at processes and of obtaining good basic chemical data so that
physical problems can be properly addressed. Separate approaches were now
being undertaken in individual laboratories, looking at different areas and
different processes and these can usefully be tied together. Topics included
larval dispersal off the English east coast, river fronts and pollution
problems, the circulation in the Skagerrak area, the Fair Isle current and
related biological processes, and the Norwegian coastal current. From the
Working Group on Oceanic Hydrography, a warning was given of the difficulties
of finding a site with constant hydrographic characteristics. Even when
there appears to be a stable mean, detailed investigation uncovers
variability at intra- and inter-annual stages. Some areas, such as the
Eastern Mediterranean and the South Norwegian Sea, are reasonably constant
but good sampling is required to measure the variability. The possible value
of using opportunistic sites such as oil platforms was noted.

During the discussion, attention was drawn to the range of satellites that
would be available in the 1990s. Other speakers took up the time and space
scale subject and in particular the problem of "reference" stations was high-
lighted.

Turning to the question of Marine Data Management, the report of the Marine
Data Management Working Group (C.M.1984/C:29) was presented. This Working
Group has provided advice on the archival of data on contaminants in the
marine environment, which is in the first year of realization by the ICES
Secretariat. In addition, the Working Group has been asked to develop a data
system for the reporting of results of benthic investigations in the North
Sea. In terms of the use of codes in archiving data, the Working Group feels
that it is now possible to move from codes to the full names of data items,
including the full latin names for species. This Group was concerned about
the flow of data to the ICES Service Hydrographique because a fewer data
have been submitted to ICES in recent years. It also considers that ICES
has an important role to play in the provision of information on where data
on marine environmental products may be obtained, using for example the ROSCOP
forms.

In the discussion of this report, the comment was made that ICES has data
bases for hydrgraphical and hydrochemical data and recently also for data
on chemical contaminants. However, no data archival systems have been deve-
loped for biological data, for example, on phytoplankton and zooplankton,
and possibilities should be explored for the inclusion of these types of
biological data in the ICES system.

The next major topic considered was Biological Effects Monitoring. In in-
troducing this topic, it was noted that effects of contaminants can be
measured on individual organisms and also on communities of organisms. The
measurement of effects on the individual organism tells about the evolutionary
fitness of that type of organism with regard to reproduction, growth, possi-
bilities of survival, etc. The techniques chosen to measure effects on the
individual must not only be sensitive, but it must also be possible to relate
the effect observed to the ability of the organism to survive.   In the
use of these techniques, it is necessary to know the variability and also
whether the biological response is general to many contaminants or specific to
certain types. Most responses are general and a great deal of additional work
is needed to increase the specificity of the response. Among the techniques
useful to indicate general responses, promising methods are available for the

measurement of physiological changes, cytochemical effects, and histo-pathological changes. In terms of more specific responses, several bio-chemical techniques are available.

The measurement of biological effects of contaminants in the community level is much more difficult. Community population and biomass are not useful as a technique to measure biological effects owing to the consider-able noise in both structure and function of these communities. Nor is community stability a meaningful measurement in this context. It was also pointed out that control sites are not really possible in biological studies.

It was pointed out that it is now possible to recommend techniques for the measurement of biological effects on individual organisms, but it is not possible to recommend techniques for use on a community basis. The latter must involve the work of ecologists looking at community response of popula-tions in the field. The importance was also pointed out of the need to link biological effects studies with studies of chemical contaminants and to look at questions regarding the specificity of effects. Chemists must be involved in this work not only with regard to body burdens of contaminants but also with regard to the effects of chemical speciation and other chemical factors.

The value of workshops designed to study and evaluate techniques in the field was stressed.

The results of several evaluations carried out in the United States on the usefulness of a number of techniques related to biological effects monitoring were reported. Techniques rated highly in these evaluations included studies of dissolved oxygen concentrations, the measurement of body burdens of conta-minants in fish, observations of lesions and deformities in fish, studies of water chemistry and nutrients, benthic community structure studies, and the measurement of inorganic and organic contaminants in sediments. Techniques which were deemed not very useful in this context included behaviour studies in the field, fish immunology, and the measurement of adenylate energy charge.

In terms of the use of certain fish diseases to indicate poor environmental conditions, especially the presence of contaminants, it was noted that obser-vations of fin erosion, certain tumours and certain ulcerations have proved useful. In the future, it could be useful to explore observations on fish liver neoplasms, genetic-chromosomal anomalies, and certain immunresponses in fish. This led into a presentation of the results of the Workshop on Fish Methodology of Fish Disease Surveys (C.M.1984/F:17). This Workshop identified a number of problems encountered in fish disease surveys, from the actual iden-tification of certain fish diseases to the sampling protocols and fishing gear used. The Workshop made a number of recommendations to improve the comparability of results of different surveys for fish diseases.

The report of the Working Group on the Pathology and Diseases of Marine Organisms (C.M.1984/F:34) was presented and the importance was stressed of obtaining good background knowledge on natural disease prevalence according to the disease, fish population, area and season. The importance was also stressed on the conduct of experimental work on disease to follow the course of the disease and also to attempt to induce the disease in fish.

In the discussion of biological effects studies, the value of including a biological effects component into the 1985 Baseline Studies of Contaminants in Fish and Shellfish was discussed. While some participants felt that the addition of a biological effects component would provide a very useful test of techniques presently in use, other participants felt that this would not be useful owing to the large amount of variability in the results and a lack of understanding of the significance of the effects in terms of for example survivability or impact on fisheries.

The value was noted of the use of a suite of biological effects techniques in intensive surveys in known areas of contamination. Techniques that measure cytotoxicity should be used in contaminated areas along with chemical studies of the environmental quality of this area and of the body burden of contaminants in the organisms used. The value was noted of measurements not only of dissolved face trace metals in the water column, but also of trace metal concentrations in the particulate phase and trace metals in bottom sediments.

Having discussed these general themes, the meeting then turned to the individual Working Group reports and Chairmen present were invited to comment. Some of the reports had already been dealt with well enough in the earlier discussion, and some others (Doc. E:2, L:36) did not have appropriate representatives and were referred back to MEQC; comments arising from some of the remaining reports are given below.

The Chairman of the ICES/SCOR Working Group on the Study of the Pollution in the Baltic noted that the Group is much concerned with inputs from land, rivers and other sources, and with the need for accurate quantification of, in particular, nutrient inputs from all sources. Sections will be operated in the Baltic Sea from estuaries to the open sea, ending at the Baltic Monitoring Programme Section. Also the strategy of monitoring will be examined (e.g., the parameters and the frequences). It would be useful to compare results obtained from a low level monitoring programme, with those from a programme with a fuller data set to find if costs could be saved.

With regard to the Study Group on Patchiness Investigations in the Baltic Sea, the Chairman of the Study Group said that 6-8 ships were now available for the Joint Baltic Experiment on Patchiness. This was a large number, and it was important that they should be adequately staffed and equipped, and that the problems of sampling strategy should be solved. The next meeting of the Group would be in Rostock.

The Chairman of the Genetic Working Group drew attention to the importance of Genetic Studies in Mariculture but also to the need for better knowledge of natural genetic variability and to the possible effects of mariculture activities on the natural genetic pool.

The Chairman of the Shelf Seas Working Group stressed the desirability of forwarding data to the established data centres, and of the value of accumulated data for long-term time series in the context of climatology.

Finally, in connection with the Working Group on Marine Data Management, questions were raised as to why less and less data are coming to ICES; about the desirability of using full Latin names for species; and about the need for on-line access to data.

Communications

The complete list of papers will appear in the Procés-Verbal 1984.