Oceanography Committee

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Report

ICES-EuroGOOS Planning Group on the North Sea Pilot Project

Bergen, Norway
27 February – 1 March 2002

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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TABLE OF CONTENTS

1 INTRODUCTION

The ICES-EuroGOOS Planning Group on the North Sea Pilot Project (PGNSP) met at the Institute of Marine Research (IMR) in Bergen, Norway. The meeting opened at 27 February 2002 at 10.00 by the Chair, who welcomed the participants to Bergen and to IMR. The Chair then introduced the background to the meeting, and thereafter the agenda was adopted. The agenda is given in Annex 1.

1.1 Participation

The members nominated via ICES and members from EuroGOOS agencies of the Planning Group who participated in the meeting are listed in Annex 2.

1.2 Terms of Reference

An **ICES-EuroGOOS Planning Group on the North Sea Pilot Project** [PGNSP] (Chair: H. Loeng, Norway) will be established and will meet in Bergen, Norway from 27 February – 1 March 2002 to:

a) consider the basic concepts for integrating oceanographic and fish stock information;
b) develop implementation plans for The North Sea Pilot Project.

PGNSP will report by 31 March 2002 for the attention of the Oceanography, Living Resources, Resource Management, Marine Habitat and Advisory Committees. It will also make its report available to SGGOOS.

This initiates an important initiative for ICES to actively engage itself in GOOS activities. Thus priority is high.

The scientific justification for establishing the Planning Group was related to the workshop on *Towards a North Sea ecosystem component of GOOS for assessment and management* organised by ICES/IOC Steering Group for the Global Ocean Observing System (SGGOOS) in Bergen 5–7 September 2001 as a follow-up activity of its Implementation Plan.

2 BACKGROUND INFORMATION

This agenda item was introduced by Roald Sætre. In 1997 an ICES Steering Group on GOOS (SGGOOS) was formed in order to prepare an action plan as to how ICES should take an active and leading role in the further development and implementation of GOOS at a North Atlantic regional level, with special emphasis on operational fisheries oceanography. At a workshop convened in Bergen in 1999 a draft design and implementation plan was conceived. This had three essential components:

- To promote global / regional linkages in a GOOS context.
- To promote the ICES Annual Ocean Climate Status Summary as a contribution to GOOS.
- To design and implement a North Sea ecosystem component of GOOS in collaboration with EuroGOOS.

In order to develop these suggestions further the SGGOOS was re-constituted in 1999 as a joint ICES/IOC Steering Group on GOOS with the terms of reference to further develop an Implementation Plan. The SGGOOS initiated a workshop co-sponsored by IOC, ICES, OSPAR, the North Sea Conferences and EuroGOOS 5–7 September 2001 in Bergen to agree on a strategy for a pilot North Sea Ecosystem GOOS project. The Workshop agreed to meet the challenges identified, and to increase the efficiency and effectiveness of the use of data products from current relevant national and international monitoring, the national agencies responsible for monitoring of the North Sea, should be invited to:

- establish a coordinated mechanism that could add value to existing activities by integrating data from various sources (physical, chemical, biological) to aid development of an ecosystem approach,
- collaborate by means of a pilot project sponsored by ICES and EuroGOOS to demonstrate the usefulness of this approach by integrating data on oceanography and fisheries.

ICES endorsed the recommendations and established PGNSP.

The Group questioned the relationship between the PGNSP and the NSC Ministerial meeting. A preliminary draft of the ministerial declaration has been published. Norway had inserted words relating to the outcome of the Planning Group, but this had been edited as being too specific. H. R. Skjoldal will be participating as a member of the Norwegian delegation, and hence can report the outcome of the PGNSP if required. EuroGOOS representative advised attendees at the PGNSP to inform their national delegations to the NSC of the outcome of the PGNSP. Some wording from the Statement of Conclusions of the Bergen meeting have been incorporated into the draft declaration, therefore some GOOS concepts have been retained. It was questioned how the outcome of the PGNSP will be implemented and it was suggested that this might be done under the EuroGOOS umbrella.

The general lack of input from biologists and the fish stock community within ICES was noted. This was acknowledged, but an objective of the PGNSP is to demonstrate to these communities the potential of operational oceanography in a fisheries context.

3 CONSIDER THE BASIC CONCEPTS FOR INTEGRATING OCEANOGRAPHIC AND FISH STOCK INFORMATION

To introduce this item, two invited talks were presented. The first talk was on "How can fish stock assessment being improved by including environmental data?", which explained the work of ACFM and its Working Groups, and how progress might be made. This was presented by Dankert Skagen. (IMR, Bergen) The second talk was on the main conclusions of the EU funded SAP project "Sustainable fisheries. How can the scientific basis for fish stock assessments and predictions be improved?" which was presented by Øyvind Ulltang (University of Bergen)

3.1 How can fish stock assessment being improved by including environmental data? (Dankert Skagen)

Fish stock assessment consists of several elements, which were outlined briefly. Estimation of historical stock abundance and exploitation is largely an analysis and synthesis of observations from the fishery and surveys. Short-term prediction to advise on quotas projects the estimated stock forwards with a range of fishing mortalities. In most – but not all – cases, the estimate of the current stock has the largest impact on the results of such projections. Projections in the medium term, as well as calculations of equilibrium yield per recruit and spawning biomass per recruit are used mostly for strategic decisions. Predictions beyond 1–2 years are made stochastic, to account for the experienced variability in recruitment, weight at age and maturity at age.

ACFM at present does not make systematic use of information about environmental conditions. This is partly because such information may not be considered relevant for the kind of advice ACFM is requested to give, but also because the nature of the advisory process and the workload on ACFM leads to rather standardised procedures with limited opportunities for using auxiliary information.

Two examples were given, where information on environmental conditions have been used directly or indirectly. Firstly, Eastern Baltic cod is far outside safe biological limits and heavily exploited, and the advice is to close the fishery. The recruitment is very sensitive to the inflow of salt-water form the North Sea, and the conditions at present are not good. Although this is clearly recognised as an important cause of the problems, the advice is mainly based on the state of the stock as it is actually assessed.

Secondly, anchovy in the Bay of Biscay is one of the few stocks where oceanographic data (an upwelling index as predictor of recruitment) has been used directly in the advice. In the advice for 2000, a very poor recruitment was predicted, and ACFM advised to close the fishery. Later on, it turned out that the recruitment was about average and the stock continued to be in a good shape after an ordinary fishery. Even though the association between the upwelling index and the recruitment is statistically significant, the predictive power of the index is insufficient for the purpose of setting quotas. This experience has led managers to consider other ways of controlling this fishery, and the upwelling index is not used for the time being.

It was concluded that information about environmental conditions and their variation may be more important for strategic considerations by managers than for the year-to-year advisory process. There is a growing understanding of the shortcomings of the current year to year quota advice as basis for fisheries management, and long term strategies are becoming increasingly important.

In the discussion that followed it was suggested that oceanographers should attend stock assessment Working Groups in ICES. Environmental data would form a useful background, even if not used directly in an assessment. It was suggested that many good developments within ICES are not followed through to implementation. An example was the work of the SG on integrating Environmental Information into Assessments, which had not been followed up. A discussion

followed on the application of statistical relationships using integrated environmental indices. It was noted that when relationships collapse after a period of time, the usefulness of the index is then questioned. Statistical relationships should always be used to direct research into causative mechanisms. Presently many of the complex processes controlling recruitment are not well understood. Some regions, such as the Barents Sea and Baltic Sea, do present simpler relationships between fish stocks and ocean climate. In other areas environmental data is of less direct use at present, and such data, combined with fisheries statistics, should be used to enhance research rather than directly in the assessment process. Such studies should have a spatial dimension as, particularly within the North Sea, spatially integrated parameters often hide complex spatio-temporal patterns of both fish behaviour and biology and environmental processes. Finally, it was noted that the incorporation of environmental data needs an adjustment of present assessment mechanisms so that the assessment system is able to respond to such inputs.

3.2 Sustainable fisheries. How can the scientific basis for fish stock assessments and predictions be improved? (Øyvind Ulltang)

The objective of the project was to examine whether existing scientific knowledge can be better utilised for reducing the uncertainties and increasing the time horizon of fish stock predictions, and evaluate implications for fishery management. The project focused to a large extent on possible gains by making more and better use of environmental data, and knowledge of environmental effects on fish stocks. It was concluded that failure to take account of environmental effects, including both biotic and abiotic factors in the term *environment*, is a serious source of error in fish stock assessments and limits the time horizon of reliable predictions.

Temperature is a key parameter with a profound influence through all trophic levels in the regions of the North Atlantic ecosystem. The most obvious influence of temperature is the direct effect on vital rates in marine organisms, but in the various regions the temperature is linked to other ocean climate parameters, which also have influence on the organisms. Therefore, temperature has a complex linkage to recruitment and growth in fish stocks. The strongest response of fish stocks to temperature changes has been documented in the northernmost parts of the sector, i.e., in the Barents Sea. Case studies for several stocks demonstrated that environmental conditions (in particular sea temperature) have clear effects on stock-recruitment relationships. To facilitate the use of environmental data in stock assessments, it is recommended that environmental life history indices relating to each age group (stage) of fish should be established yearly for each particular stock in accordance with the scheme used for biological stock variables and parameters. Environmental data given on such a format would greatly enhance comparisons of environmental and biological stock variables/parameters and the establishment of quantitative relationships.

3.3 Discussion

It was noted that in the Barents Sea, nowcasting of 0-group recruitment provides a forecast of the size of the 3-year-old year class, thereby introducing a 3-year predictability. In such cases, we already know what is possible, and it is a case of implementing action. The phrase “alternative approaches to predicting ocean climate” was questioned. Ø. Ulltang explained that this meant such developments as using statistical relationships derived form climate indices, time lags assuming advective processes influence climate anomalies, and new modelling techniques using coupled atmosphere/ocean models. It was noted that too often “environmental” data meant simply temperature. There are many other parameters that describe relevant processes in the marine environment. For example, contaminant loads have so far not been considered in respect to recruitment success or mortality. ICES Working Groups produce data on many aspects of the marine environment, and so far these have not been utilised.

There followed a general discussion on how to consider the basic concepts for integrating oceanographic and fish stock information. In some respects, it was thought that if the fish assessment process could not incorporate environmental data, then it was not necessary to proceed with the PGNSP. However, the demonstration planned in the PGNSP is not solely for the benefit of ICES. The ICES experience in stock assessment procedures, and the incorporation of environmental data, has much to give to the GOOS community at large, which presently lacks such linkages. There has been a planned step-wise approach to the implementation of GOOS within ICES, and the PGNSP is an important step in this process. It was also noted that the majority of institutes running research vessels within the North Sea are ICES members, and these institutes include the whole range of marine science disciplines. Fishery surveys provide an ideal platform for enhanced environmental monitoring.

It was noted that the main problem at present is how to incorporate environmental data into the assessment process. There is a basic lack of knowledge on how this can be achieved, yet at the same time the basis is known; there is a limited set of primary environmental variables (e.g., The key physical parameters, and parameters describing primary and secondary production). Progress can be made by conducting research using such data, and linked physical/ecosystem models. The question is, how progress can be achieved in the short term. Model output has not yet been utilised in such studies, or in correlative studies using fishery parameters. Additional funding is required in order to commence these.

Some of the participants indicated that the main problem is the combination of environmental and fishery science. It has taken significant efforts to combine these two disciplines. The Implementation Plan for the North Sea Pilot Project noted that from an international GOOS perspective, in the past the approach to environmental and fishery science has been a single discipline/single sector one. A multi-sector approach gives a better chance to understanding the system and to predict it. There is some conflict though, as the European Commission wants better products to underpin policy, while at the same time not wising to fund primary science or monitoring without demonstrated end users.

From the ICES perspective, it was noted that the sole objective of the Pilot Project is not simply to incorporate environmental data into the fishery assessment process. The draft implementation plan also highlights the need to generate better monitoring data, and to harmonise existing monitoring and create more structured information For example, the IBTS and the use of its combined data sets is a good example of how to achieve co-ordinated sampling. Another example is the Canadian groundfish survey. A recent report (SYNOPS) published in Germany was mentioned. This report noted that presently the availability of *inter alia* zooplankton data from the North Sea is limited. Therefore two roles for the Pilot Project may be seen; to make existing data more available, and to identify gaps, which may then be filled. It was also mentioned the role of models in order to synthesise data. This also has not yet been done in a systematic way.

It was noted that while the IBTS was a good example of multi-disciplinary surveys, it too needed GOOS support, as it had already been cut from four times per year to two. While GOOS has no mechanism for funding, it may be used to support long term monitoring surveys. Other organisations, such as OSPAR, are also relevant to support long term monitoring. There are still no mechanisms to synthesise the outputs from surveys such as the IBTS, and that it will expand in the future by incorporating new areas outside the North Sea.

It was underlined that while there is a large initiative needed to initiate operational systems in the North Sea, there is considerable monitoring efforts already in place, with new developments occurring such as the FerryBox programme and the use of ships of opportunity. Such surveys incorporate a European-wide dimension. The large task PGNSP faces is to link such observations with models, to provide tools for now casting/forecasting.

The representative from EuroGOOS reminded the group that ICES, HELCOM, OSPAR etc. do not themselves have resources, rather they co-ordinate national programmes. However, individual member countries can not afford separate systems to underpin advice to each of the separate customer groups. Hence a single multi-purpose system must be developed with the widest possible justification. Examples of such systems are provided by the Baltic Operational Observing System (BOOS) and the proposed North West Shelf Operational Oceanographic System (NOOS). Both rely on existing national operational programmes. PGNSP should provide a novel component which will enhance NOOS developments, with particular focus on advising fisheries management. The outcome should include firmer commitments from nations for monitoring.

There is a need for new technologies, especially for expanding biological measurements. It was also noted that participants at the Ecosystem Approach workshop stressed the need of the results of long-term and continuous monitoring, especially in order to underpin research, needed to solve specific scientific problems, and not just to underpin operational modelling.

Based on the discussion, it was concluded that there are several good reasons for integrating oceanographic and fish stock information. It is a clear need for preparing an implementation plan for a pilot project in the North Sea.

4 BACKGROUND INFORMATION FOR A NORTH SEA ECOSYSTEM PILOT PROJECT (NORSEPP)

4.1 Highlights of Framework Programme 6 within EU

Luis Fariña Busto from the European Commission - DG RTD Directorate I: Environment - Preserving the Ecosystem Unit I.4 (Marine Ecosystems. Infrastructures) presented some highlights of Framework Programme 6. The statements

included in the *Scientific Justification* under the Terms of Reference presented at the beginning of the meeting fit well to the strategy and content of FP6[1)]. The intended contribution to an ecosystem approach to "further integration of fisheries and environmental protection, conservation and management measures"[1] seems in line with the thematic priority 1.1.6.3, *Global Change and Ecosystems*, of the First Activity in FP6. More specifically, the subsections on "Biodiversity and ecosystems" and "Operational forecasting and modelling" within that priority, as described in the specific programmes[2], have aims which the activities proposed in this meeting would help achieving. In so far as the intended project may reach realistic contributions to fisheries management it could also be relevant to the priority 1.2.1, *Supporting policies and anticipating scientific and technological needs*, where research that will "provide, in particular, support for … the common fisheries policy (CFP)" is foreseen.[3]

Furthermore, the recognition of a "need for improved, integrated monitoring through co-ordination and harmonisation of existing national and international monitoring activities"[4] is practically a call for the application in this particular domain of the principles of the European Research Area[5].

The Commission will decidedly favour the use of the new instruments, in particular integrated projects (IP) and networks of excellence (NoE)[6], when implementing the sixth framework programme for RTD. If this project is to seek FP6 funding the participating institutions should decide which of these two instruments is more appropriate to the activities intended, and perhaps whether it could be more adequate to define the project from the beginning as a module that would contribute within an overarching structure (a larger IP or NoE) to the research priorities of the framework programme.

4.2 Baltic Operational Oceanographic System (BOOS)

This item was introduced by Hans Dahlin. The operational oceanographic service in the Baltic region contributes to and improves the efficiency of marine operations, reduces the risk of accidents, optimises the monitoring of the marine environment and climate, improves the assessment of fish stocks and improves the public marine management.

The Baltic Operational Oceanographic System – BOOS – constitutes a close co-operation between national governmental agencies in the nine countries surrounding the Baltic Sea responsible for collection of observations, model operations and production of forecasts, services and information for the marine industry, the public and other end users.

The goals of BOOS are to:

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[1] Taken from the *Statement* issued by the Intermediate Ministerial Meeting on the North See (IMM-97), as quoted in the Report of the meeting *Towards a North Sea Ecosystem Component of GOOS for Assessment and Management*, Bergen 5-7 September 2001.

[2] *Amended proposals for COUNCIL DECISIONS concerning the specific programmes implementing the Sixth Framework Programme 2002-2006 of the European Community for research, technological development and demonstration activities (2002-2006) concerning the specific programmes implementing the Sixth Framework Programme 2002-2006 of the European Atomic Energy Community for research and training activities (2002-2006)– 30.01.02.*
http://www.cordis.lu/rtd2002/background.htm#spamended
The two sections read:
– Biodiversity and ecosystems: the objectives are to develop a better understanding of marine and terrestrial biodiversity and of ecosystem functioning, understand and minimise the impacts of human activities on them and ensure sustainable management of natural resources and terrestrial and marine ecosystems and the protection of genetic resources.

Research will focus on: assessing and forecasting changes in biodiversity, structure, function and dynamics of ecosystems and their services; with emphasis on marine ecosystems' functioning; relationships between society, economy, biodiversity and habitats; integrated assessment of drivers affecting ecosystems' functioning and biodiversity, and mitigation options; risk assessment, management, conservation and rehabilitation options in relation to terrestrial and marine ecosystems.

– Operational forecasting and modelling, including global climate change observation systems: the objective is to make systematic observations of atmospheric, terrestrial and oceanic parameters including those of climate so as to improve forecasting of the marine, terrestrial and atmospheric environment, consolidate long-term observations for the modelling and in particular prediction, establish common European data bases and contribute to international programmes.

Research will focus on: observations of basic marine, terrestrial and atmospheric parameters necessary for global change research and management strategies, and of extreme events; large observing/monitoring/ surveying/operational forecasting/modelling networks (taking into account the developments of GMES and providing the European dimension to G3OS).

[3] See web address in footnote 2.

[4] *Draft implementation plan*, page 2.

[5] See http://europa.eu.int/comm/research/area.html.

[6] See updated detailed information in http://europa.eu.int/comm/research/nfp/networks-ip.html.

- Improve and further establish services to meet the requirements of environmental and maritime user groups.
- Co-ordinate, improve and harmonise observation and information systems, where necessary.
- Increase the quality of and harmonise user-oriented operational products.
- Decrease the production costs of public products and services by sharing the workload.
- Co-operate with HELCOM and other relevant bodies with the aim to avoid duplication of work and to maximise mutual assistance.
- Identify new customers for operational oceanographic products.
- Further develop the market for operational oceanographic products.
- Develop BOOS pursuant to the GOOS Principles.
- Provide high quality data and long time series required to advance the scientific understanding of the Baltic Sea.
- Provide data and forecasts to protect the marine environment, conserve biodiversity, and monitor climate change and variability.

The co-operation focussed mainly on basic pan-Baltic products, which can be value-added and turned into national services. Data from observations and operational forecasting models are timely exchanged by using a system of FTP-boxes. Some joint products and links to the agency services can be found on Internet, www.boos.org.

To strengthen the work and to increase possible further involvement of all Baltic countries, the European Commission is supporting BOOS through the recently approved PAPA-project. The co-ordinated services and the co-production are continuously developed according to the BOOS-plan, EuroGOOS Publication No. 14.

4.3 North West Shelf Operational Oceanographic System (NOOS)

Martin Holt presented the Northwest Shelf Operational Oceanographic System (NOOS). NOOS is being established by the member agencies of the EuroGOOS NW Shelf Task Team, closely following the experience of the Baltic BOOS. A strategic plan for NOOS 2002–2006 has been drafted and is available from the EuroGOOS office (publication No 18, November 2001). A Memorandum of Understanding (MOU) has been drawn up and is now close to finalising before signature by the agencies.

Once the MoU is in place, an Implementation Plan will be drawn up, based on commitments from the participating Agencies in agreed projects. NOOS has recognised the importance of working with ICES to develop products of maximum value to ecosystem and fisheries management.

Seventeen agencies are ready to sign the NOOS Memorandum of Understanding. These are:

"Fisheries":	IMR
"Met":	DNMI DMI KNMI Met Office, SMHI, MeteoFrance
"Ocean Forecast and data"(non Met):	BSH, MUMM, RIKZ, Irish Marine Institute, IFREMER
"Research":	NWO/ALW Earth and Life Sciences Council (Netherlands), Southampton Oceanography Centre, Proudman Oceanographic Laboratory
"Environment":	Environment Agency, UK
"Hydrographic"	RDANH

4.4 Global Monitoring for Environment and Security (GMES)

Hans Dahlin (Director, EuroGOOS) informed the meeting about GMES. A wealth of data on the monitoring of the European oceans has been collected by marine research institutions and operational agencies associated to EuroGOOS, MedGOOS and Black Sea GOOS and by industries. This joint effort has produced added value for structuring data into useful information products for users. European scientists and industrialists are involved in the International GOOS effort to address the institutional, infrastructural and legislation problems preventing the full use of available data. GMES-Oceans is pulling together existing European capabilities and efforts to: (i) structure existing data into an information product; (ii) report on the bottlenecks limiting the use of data and the flow of information between data-producers, policy-makers and users; (iii) improve the knowledge, methods and technology required for monitoring, information production and delivery; (iv) provide an infrastructure in support of the process of establishing a European capacity for global ocean monitoring. The aim of GMES-Oceans is to expand the European autonomous capacity to producing global ocean information building upon existing monitoring capabilities, data available, the well established

institutional co-operation infrastructures of EuroGOOS, MedGOOS and Black Sea GOOS and capitalising on national and community investments on pre-operational ocean monitoring.

4.5 European Directory of the Initial Ocean-observing System (EDIOS)

Johanne Fisher, coordinator of EDIOS, introduced the project. EDIOS will be a searchable marine Directory of the ocean observing, measuring, and monitoring systems operating in Europe and is an initiative of EuroGOOS (European Global Ocean Observing System). The project will constitute a prerequisite for the full implementation of EuroGOOS by allowing for the first time an analysis of the continuously available data for operational models in Europe, and hence the ability to optimise the deployment of instruments, and the design of sampling strategy. Classification of the ocean-observing sites/devices included in EDIOS will set European standards for ocean observations and help define the initial European ocean-observing system.

Those ocean-observing sites/devices that meet minimum standards with regard to their geographic distribution and their reliability, frequency, and processing of the data sampled will be classified for inclusion in EuroGOOS regional models. The importance of considering the requirements and priorities of all kinds of users will be met by strong user involvement in all significant steps of the Directory's design (e.g., meta-data entries, user interface). A user-friendly visual interface will ensure multipurpose use of the Directory allowing a large variety of users from different sectors to perform individual searches through the Directory without being experts on data base use. Regular update of EDIOS in the future will ensure that the directory will bring to light most European ocean-observing systems operating on a continuous level.

EDIOS will represent a much needed management and design tool that will permit the scientific and logistic design of a long-term marine observing system, combining operational agencies and research projects as sources. Scientists and forecasters testing, developing, and designing ocean data assimilation for numerical models will use EDIOS for identifying the geographic sources of data and examining different designs of the systems. EDIOS will enable rapid combination and co-ordination of national ocean-observing stations to improve monitoring and modelling around European seas, and to plan investments to develop and refine observations. It will also allow the present performance of the ocean observing and forecasting system to be assessed in terms of instruments and platforms, and it will set European standards for ocean-observing technology by developing a classification system for the performance of ocean-observing devices. This will eventually lead to a much needed compatibility and high standard of ocean-observations throughout Europe and help reducing the overall costs of the national operational oceanographic programmes. Furthermore, EDIOS will provide market data to instrument and equipment manufacturers, who can see where there are sales potentials. Finally, EDIOS will encourage trans-national wide-ranging scientific use of the data generated by the ocean-observing systems included in the directory, which will benefit efforts to predict, assess the impact, and formulate response options to global change.

5 DEVELOP IMPLEMENTATION PLANS FOR THE NORTH SEA PILOT PROJECT. (TOR 2)

The plenary session split into three sub-groups, each focusing on a different aspect of the implementation plan. These reported back to the plenary session, and on the last day a first draft was presented for the participants and consensus was obtained on all main points of the Plan. The resulting Implementation Plan is presented in Annex 3. It is recommended that SGGOOS take the necessary action at its meeting in April 2002 and organise a constitutional meeting of NORSEPP during the coming ICES ASC where GOOS is a central theme on the agenda. All the institutions responsible for the long-term monitoring activities of the North Sea should be invited to the meeting where a declaration of intention of cooperation and network building should be agreed.

6 ANY OTHER BUSINESS

There was no other business.

7 CLOSING

The Chair thanked all the participants for their hard work and enthusiasm for the Pilot Project. He closed the meeting at 14:30 on 1 March 2002.

ANNEX 1 – ICES-EUROGOOS PLANNING GROUP ON THE NORTH SEA PILOT PROJECT

Venue: **Institute of Marine Research, Nordnesgt. 33, Bergen**
Time: **27 February at 10^{00} – 1 March 2002 at 14^{00}**

Agenda:

1) Opening
2) Background and introduction to the meeting
   Roald Sætre: The process leading up to PGNSP
3) Integration of oceanographic and fish stock information
   Introductory talks :
   Dankert Skagen (Norwegian ACFM member): How can fish stock assessment being improved by including environmental data?
   Øyvind Ulltang (Coordinator of SAP[7]): Some main results from the SAP-project
4) "Highlights of FP6". Luis FARIÑA BUSTO (Commission Européenne: Unit I.4 - Marine Ecosystem) will give information about: Infrastructure overall structure and budget of FP6; a closer view at the themes in priority 6 (sustainable development, global change and ecosystems); the instruments, with particular attention to integrated projects and networks of excellence.
5) Background information about NOOS (North West Shelf Operational Oceanography System) by Martin Holt
   BOOS (Baltic Operational Oceanographic System) by Hans Dahlin
   Global Monitoring for Environment and Security (GMES) by Hans Dahlin
6) Development of implementation plan
7) Any other business
8) Closing

[7] Sustainable fisheries. How can the scientific basis for fish stock assessments and predictions be improved? (EU-project 1998–2000).

ANNEX 2 – PGNSP PARTICIPANTS

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ANNEX 3 - ICES - EUROGOOS

NORTH SEA ECOSYSTEM PILOT PROJECT

(NORSEPP)

IMPLEMENTATION PLAN

1 March 2002

Background

At the Intermediate Ministerial Meeting (IMM) on fisheries in Bergen in 1997, the Ministers of the North Sea countries agreed to:

> *Further integration of fisheries and environmental protection, conservation and management measures, drawing upon the development and application of an ecosystem approach which, as far as the best available scientific understanding and information permit, is based on in particular:*
>
> - *the identification of processes in, and influences on, the ecosystems which are critical for maintaining their characteristic structure and functioning, productivity and biological diversity;*
> - *taking into account the interaction among the different components in the food-webs of the ecosystems (multi-species approach) and other important ecosystem interactions; and*
> - *providing for a chemical, physical and biological environment in these ecosystems consistent with a high level of protection of those critical ecosystem processes.*

As a follow-up activity, a Workshop on the Ecosystem Approach to the Management and Protection of the North Sea was held in Oslo in June 1998. This workshop identified monitoring as a key component of an ecosystem approach in relation to ecological objectives, to assessments, and to scientific advice to management.

The 5th North Sea Ministerial Conference will meet in Bergen, Norway, 20–21 March 2002. The conference aims at agreeing to implement an ecosystem approach, based on a conceptual framework developed at the 1998 workshop.

In 1997 an ICES Steering Group on GOOS (SGGOOS) was formed to prepare an action plan as to how ICES should take an active and leading role in the further development and implementation of GOOS at a North Atlantic regional level, with special emphasis on operational fisheries oceanography. At a workshop convened in Bergen in 1999 a draft design and implementation plan was conceived. This had three essential components:

- To promote global / regional linkages in a GOOS context.
- To promote the ICES Annual Ocean Climate Status Summary as a contribution to GOOS.
- To design and implement a North Sea ecosystem component of GOOS in collaboration with EuroGOOS.

To develop these suggestions further the SGGOOS was re-constituted in 1999 as a joint ICES/IOC Steering Group on GOOS with the terms of reference to further develop an Implementation Plan. The SGGOOS initiated a workshop co-sponsored by IOC, ICES, OSPAR, the North Sea Conferences and EuroGOOS in September 2001 to agree on a strategy for a pilot North Sea Ecosystem GOOS project.

To meet the challenges identified at the meeting, the workshop agreed to increase the efficiency and effectiveness of the use of data products from current relevant national and international monitoring, and therefore invited the national agencies responsible for monitoring of the North Sea to:

- establish a coordinated mechanism that could add value to existing activities by integrating data from various sources (physical, chemical, biological) to aid development of an ecosystem approach,
- collaborate by means of a pilot project sponsored by ICES and EuroGOOS to demonstrate the usefulness of this approach by integrating data on oceanography and fisheries.

Further efforts will be required in consultation with appropriate bodies to develop a strategy for establishing and implementing the coordinated mechanism.

Although considerable progress has been made recently by a variety of national agencies and through EuroGOOS on monitoring, modelling, and forecasting physical parameters, until now no attempt has been made to establish an integrated information system including ecosystem parameters for the North Sea. Such an approach would have the synergistic effect of integrating many current national activities.

The present monitoring of the North Sea is insufficient to discriminate between human impacts and natural variation on the ecosystem. There is a need for improved, integrated monitoring through co-ordination and harmonisation of

existing national and international monitoring activities, as well as through implementation of new methods and technology.

For marine ecosystems, meteorological and climatic variability are primary driving forces for ecosystem variability. Improved knowledge of the relationship between climate and changes in ecosystems would greatly benefit the difficult task of distinguishing between anthropogenic impacts and natural variability in environmental assessments. A challenge will be the use of environmental data within the annual assessment cycle for fish stocks by the fisheries research and management community. Such an approach will involve the bringing together of diverse data sets and the application of new approaches to fishery assessment modelling.

The North Sea, because of the intensive work that has already been carried out in this area, is an obvious candidate for a pilot project. Developing an ecosystem approach for the management of the North Sea will need an integrated monitoring and information system and continuous updating of information, which could be seen as a North Sea ecosystem component of GOOS. The implementation plan for the period 2003 – 2007 of a North Sea Ecosystem Pilot Project for Operational Oceanographic System (NORSEPP) is outlined in the following pages.

North Sea Ecosystem Pilot Project (NORSEPP)

This project will seek to involve fishery scientists and oceanographers from all North Sea countries. A challenge will be the use of environmental data within the annual assessment cycle for fish stocks by the fisheries research and management community. Such an approach will require the compilation of very large data sets and the application of new approaches to fishery assessment modelling. Consequently, NORSEPP will involve the development of a harmonised system to monitor, assess, and forecast the environment and ocean climate of North Sea, taking into account existing operational collaborative mechanisms within meteorology, oceanography, fisheries, modelling and remote sensing.

In the international discussion on GOOS a central term is "operational oceanography". According to the EuroGOOS definition "operational oceanography is the activity of routinely making, disseminating, and interpreting measurements of the seas and oceans and atmosphere so as to:

- Provide continuous forecasts of the future condition of the sea for as far ahead as possible *(Forecast)*
- Provide the most usefully accurate description of the present state of the sea including living resources *(Nowcast)*
- Assemble climatic long term data sets which will provide data for description of past states, and time series showing trends and changes *(Hindcast)"*

Overall Objective

To initiate operational fisheries oceanography by integrating existing physical, geochemical, and biological monitoring programmes and models to improve advice to fisheries managers.

Specific Objectives

There are seven specific objectives, each of them related to a specific work package:

Co-ordinate and harmonise relevant physical, geochemical and biological monitoring programmes and networks.

Combine models and data to generate operational products relevant to fish stock assessment

Further develop and demonstrate applications of operational products to fish stock assessment using test cases

Streamline the flow and exchange of data and information

Evaluate the outputs of the operational systems to assess their usefulness and accuracy, and suggest improvements where necessary

Establish efficient communication to disseminate operational products to users

Evaluate existing North Sea monitoring technologies and strategies regarding their usefulness for operational fisheries oceanography and initiate improvement

The focus on living resources is intended to limit the scope of the project to something achievable within the time frame. The successful completion of this Pilot Project will provide the knowledge and expertise to develop additional operational oceanographic systems to support a broad range of improved environmental assessments.

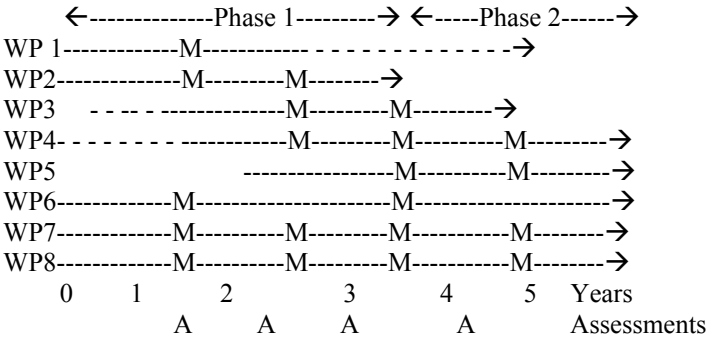
To achieve these objectives, the following project structure is suggested.

NORSEPP – Project Structure:

Work Package	Content	Potential Partners
1. Data compilation	Compile existing observations and information about relevant datasets. Identification of gaps	NOOS agencies, ICES agencies (CEFAS, RIVO, MARLAB, IMR, BFA, DIFRES), IBTS, WGOH, SAHFOS
2. Product Development	Combine data with models to produce basic products. Apply existing coupled physical-ecosystem models in now-cast mode. Testing and validation.	METO, BSH, IMR, SGPBI, POL, MUMM, RIKZ, SAHFOS, NERSC, Met.no, etc.
3. Retrospective Analysis and Research	Relating hindcast models and time series to historical population dynamics, in order to identify suitable test cases. See how environmental models can be used in support of stock assessment and prediction. Identify gaps and needs.	WP1 partners plus GKSS, NIOZ, POL, SOC, IfM (Hamburg), Universities, SGPRISM/WGRP, ICES-GLOBEC, IBTS, SAHFOS
4. Data Management and Exchange	Streamline the flow and exchange of relevant data and information. Actively stimulate the use of data standards, quality assurance procedures, inter-laboratory comparison and data exchange among the data providers in close co-operation with relevant ICES Working Groups.	WP1 partners plus relevant data management centres e.g., BODC, ICES, DOD etc
5. Evaluation	Assess the performance of stock forecasts, using methods developed by the Pilot Project, including demonstration projects as appropriate. This will include an expert assessment of environmental conditions.	WP1 partners plus WGRP, WGOH, IBTS, ICES-GLOBEC
6. Innovative Technologies	Review existing technology and initiate innovative technologies suitable for operational fisheries oceanography	EuroGOOS, SMEs, SeaNet, EDIOS
7. Communi-cation	Encourage further interaction between fishery and environmental scientists by demonstrating the value of the products developed by the Pilot Project. Develop interface between environment and fish communities via web products etc.	SGGOOS, EuroGOOS, ICES-GLOBEC
8. Project Management	Report to ICES, IOC and EuroGOOS via SGGOOS.	Leaders of WPs, project managers

WP 8 reports to SGGOOS that will report to ICES relevant science and advisory Committees, EuroGOOS and IOC.

NORSEPP Project Management Timeline and Milestones



Relation to assessment process

Project outputs will be reported after each milestone to WGIBTS and the key ICES North Sea Assessment Groups for discussion and feedback. These groups include:

- Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)
- Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine, and Anchovy (WGMHSA)
- Herring Assessment Working Group for the area south of 62ºN

Terms of reference

1) SGGOOS April 2002 meeting will define terms of reference for each work package
2) SGGOOS will draft terms of reference to define the involvement of relevant ICES Working/Study Groups in the Pilot Project

NORSEPP products

Products for improved environmental input to fisheries management need to be based on a combined approach using both observations and model output. Observations are also required for testing and validation of models. Physical models of the North Sea may be further developed by nesting to provide higher resolution where needed, and may be coupled to an ecosystem model to provide a full 3D description of ecologically relevant variables, providing suitable inputs for new data products.

Development of these products could take place in two phases. In the first instance, available data could be assembled into a readily useable format and provided to the users, perhaps through a web based browser interface. In a second phase, additional new diagnostics can be prepared, for example based on output from a coupled physical-ecosystem model.

Throughout the development and application of the products, clear mechanisms for feedback from users to developers will be established.

There is value in providing environmental data at different levels in the chain of fisheries management. First as input to research, second in preparation for the assessment working groups, third as input to the ACFM, and last in a suitably refined form, to the policy managers, the public, the fishing industry, and other interested parties.

Through setting up the new diagnostics, gaps in existing knowledge may be identified. This will lead to new requirements for monitoring, such as monitoring of zooplankton, or of secondary production, or of nutrients as needed for model boundary forcing. As models increase in complexity and resolution, improved data on river flow rates and loading will be required. Identification of these additional requirements may be considered a deliverable of the project.

Models and observation systems produce huge amounts of output, which require advanced visualisation and presentation tools to provide an interface to user groups.

Oceanographic Products

Several products are expected from the project. Maps or time series at specific locations of daily to seasonal averages of physical parameters as sea surface temperature, near-bed temperature, thermocline depth, currents at different depth levels, transport through specific sections, temperature or current profiles, outflow from the Baltic, oceanic inflow to the North Sea and forecasts of the position of fronts. Nutrient at different depth and areas will be presented in the same way. Relevant biological information on primary and secondary production and some fish population parameters will also to be used.

The diagnostics and environmental products will turn the complex datasets into readily useable information and be based on "smart" volume or time integrated parameters (e.g., transports), presented as maps, as well as data. The products should be timely for input to ICES Assessment Working Groups.

Some concrete products/analysis in NORSEPP:

- Visualisation and analysis of historic and current fish distribution (spawning, feeding and fishing areas) in relation to water mass distribution and characteristics (including oxygen conditions). The degree to which the fish distribution is explained by environmental conditions will be addressed using advanced analysis techniques such as EOF and, pattern recognition.
- Visualisation and analysis of historic and present larval drift and distribution in relation to water mass distribution and characteristics. The degree to which fish recruitment variability can be explained by the drift of larvae through a highly variable environment will be investigated.
- Produce new historic environmental time series from data and models that will be tested against fisheries state variables such as abundance, recruitment and growth, and for possible input to multi species models of population dynamics. Such new time series include: transports through selected sections, area or volume of water masses, turbulence relevant to larval feeding, oxygen conditions, the presence or loss of larvae in critical areas, algae abundance and the timing of blooming, primary production on abundance of key zooplankton groups and, extreme events.
- Identify optimal combination of observations, and the possible operational services from models and remote sensing to ship surveys.

To initialise and validate biological models embedded within the physical models, seasonal phyto- and zooplankton fields for relevant North Sea taxonomic groups will be derived from the Continuous Plankton Recorder dataset. The Pilot Project will provide a unique opportunity to incorporate broad-scale plankton data into models to aid fish stock assessment. Observation will in addition also include data from surveys such as the herring survey, IBTS and other ICES and national surveys. Information on catch statistics and fish distribution will be essential. Data from remote sensing such as SST and ocean colour will also give valuable information.

Products will benefit everyone contributing. They will be attractive and relevant to both the public and policy makers. Products will be timely, understandable, of relevance to a wide audience as well as addressing policy issues. Latest technologies will be used in the distribution of information e.g., the Internet, XML and GIS. The project will disseminate and publicise new developments to policy makers, environmental managers and the public.

Data management

The Pilot Project will use data standards that facilitate co-operation among different agencies and institutes. Operational fisheries oceanography will benefit from a widely accepted data standard (e.g., marine-XML, IODE initiatives).

Groups within the North Sea Pilot Project must reach agreement on a data policy that enables open access to data, to the extent possible. There should be clear conditions for use and appropriate recognition for the data collecting agencies and/or funding organisations (example: EuroGOOS data policy).

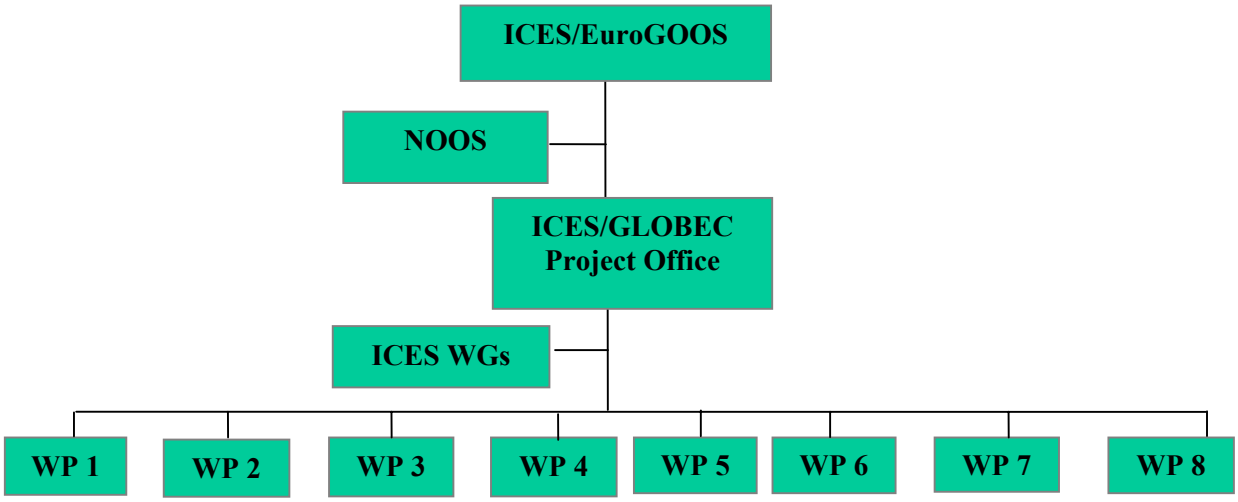
It is necessary to identify and disseminate best practice in management of the rapid increase in data volumes generated by multi-disciplinary automated instrumentation (*in-situ*, models and remote sensing). Quality control and near real-time distribution of large data volumes has impact on the use of -and development of existing infrastructure to fulfil user needs for quick data access.

The Pilot Project will use an annual web-based reporting system with a standardised format that can be updated as new national information becomes available.

Organisation

It is a recommendation from this meeting that there should be two co-leaders (one from GOOS and one from ICES) for the Pilot Project.

NORSEPP Organisation



The ICES/IOC SGGOOS should make it a priority to promote this project to the next ICES meeting in October 2002.

NORSEPP Financing

Three possible funding sources are envisaged:

1) The use of core resources – by institutes and ICES Working Groups. We should try where possible to bring core funding into action, with immediate effect.
2) Possible external funding via FP6 initiatives:
    a) probably via the network process.
    b) As part of a big integrated project, e.g., a possible North Sea ecosystem science programme, of which this Pilot Project may be a component.

FP6 financing is likely to be available from mid-2003. The first call for proposals is expected to be February 2003. Any project proposal must be consistent with FP6 guidelines. It is noted that the Project as currently envisaged does seem to follow both the ecosystem and observing system themes emerging within FP6.