Oceanography Committee

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Report of the

ICES-EuroGOOS Planning Group on the North Sea Pilot Project NORSEPP

Nantes, France
7–8 April 2003

International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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1 INTRODUCTION

The ICES-EuroGOOS Planning Group on the North Sea Pilot Project (PGNSP) met at IFREMER, Nantes. The meeting was opened at 7 April 2003 at 09.15 by the EuroGOOS Chair, who welcomed the participants to the meeting. The Chair then introduced the background to the meeting, and thereafter the agenda was adopted. The terms of reference for the meeting are copied at 1.2 below.

1.1 Participation

Members nominated via ICES and members from EuroGOOS agencies of the Planning Group who participated in the meeting are listed in Annex 1. Apologies were received from Bruce Hackett (MetNo, Norway), Stephan Dick (BSH Germany), Roger Proctor (Proudman Oceanographic Laboratory, UK), Icarus Allen (Plymouth Marine Laboratory, UK), and David Mills (CEFAS, UK).

1.2 Terms of Reference

The **ICES-EuroGOOS Planning Group on the North Sea Pilot Project (NORSEPP) [PGNSP]** (Co-Chairs: A Richardson, UK and Martin Holt (EuroGOOS) will meet in Nantes, France from 7–8 April 2003 to:

a) review the status and future of the project in the light of decisions with regard to funding parts or all of NORSEPP;
b) review progress in the implementation of the various elements of NORSEPP, in particular:

   i) compilation of existing observations and information about relevant datasets
   ii) application of existing coupled physical-ecosystem models in now-cast mode;
   iii) demonstrate how data integration methods to be introduced by NORSEPP can be used in support of stock assessment and prediction;
   iv) ways to streamline the flow and exchange of relevant data and information;
   v) review of innovative technologies suitable for operational fisheries oceanography;
   vi) evaluation of ways to promote the results of the project to the ICES stock assessment community.
c) prepare draft terms of reference for relevant ICES Subsidiary Groups whose input is required to support the Project.

PGNSP will report by 30 April 2002 for the attention of the Oceanography, Living Resources, Resource Management, Marine Habitat and Advisory Committees.

2 BACKGROUND INFORMATION

2.1 Overview of REGNS discussion

Andrew Kenny (Chair, REGNS working group) gave an overview of the discussions of the earlier REGNS meetings (details of these are summarised in the report of the REGNS meeting, CM 2003/ACE:04).

2.2 NORSEPP

A presentation overview of NORSEPP development to date was given by W Turrell.

3 TOR (A) REVIEW STATUS AND FUTURE OF THE PROJECT IN THE LIGHT OF DECISIONS WITH REGARD TO FUNDING PARTS OR ALL OF NORSEPP (DISCUSSED JOINTLY WITH REGNS)

Discussion of the scope and focus of NORSEPP following the overview presentations confirmed that NORSEPP should include consideration of eutrophication as additional environmental inputs to an ecosystem based approach to managing the North Sea.

Noting that there has been no feedback from the European Commission on the Expression of Interest submitted during 2002, it was agreed that EU Framework Program 6 funding was not suitable, since the NORSEPP project was too small and focused to form either an Integrated Project or a Network of Excellence, the two primary tools within the

Framework call. The best way to take NORSEPP forward in a sustainable manner was to co-ordinate existing component parts that are already funded at the national or agency level.

However resources from the European Commission could be sought for supporting activities, in particular Marie-Curie Actions. There are many different types of actions, ranging from supporting teams to individuals, and from students to senior researchers. The Marie-Curie action that may be most relevant for NORSEPP is the Marie Curie Research Training Networks.

The aim of these Networks is to stimulate the training of researchers within an international collaborative research project. Requirements for a Research Training Network include a well-defined collaborative research project of recognised international stature, a minimum of 3 partners in 3 countries, and a multidisciplinary research approach. The Network must have a flexible framework for the training and development of researchers, including transfer of knowledge by experienced researchers. To be eligible for this programme, researchers need to have less than 10 years experience (including their PhD). The Network selects Fellows for stays up to 3 years (incl. short stays) in different countries. Money available for each Fellow is dependent on experience.

NORSEPP fits in well with the concept of Research Training Networks. NORSEPP is multidisciplinary, involving the physical and ecosystem modelling communities as well as those from fisheries, eutrophication and ecosystem assessment. Research Training Networks would support post-doctoral research for NORSEPP at multiple participating Institutes, which would be a massive boost for NORSEPP: it would provide the manpower needed to implement the NORSEPP objectives. The partners in NORSEPP also have a variety of skills that they can pass onto the Fellows. The deadline for the second round of proposals is the **19 November 2003**. More information can be found on Marie Curie Actions at *http://europa.eu.int/mariecurie-Actions*.

Until other funding could be secured, it was recognised that in order to provide initial demonstration products, NORSEPP needed to proceed with contributions from individual agencies, funded from existing national or project resources. However the availability of a dedicated NORSEPP co-ordinator would expedite the generation of NORSEPP products and the exchange of data. The ICES Oceanography committee are asked to consider how this could be achieved. Suggested options include:

- ICES secretariat / staff
- Secondment from a national agency
- Subscription from ICES member agencies
- Concerted Action support from DG Fish (as provided to the IBTS)

4 TOR B REVIEW PROGRESS IN THE IMPLEMENTATION OF THE VARIOUS ELEMENTS OF NORSEPP

Section B of the terms of reference addresses each of the various elements of the NORSEPP Implementation Plan identified at the PGNSP planning meeting held in Bergen, March 2002.

4.1 B (i) Compilation of existing observations and information about relevant datasets

The IBTS Fisheries Database

There has been an ICES co-ordinated survey conducted in the first quarter of the year in the North Sea since 1967. Information from these surveys is stored individually at a national level and also as an integrated set at ICES. The latter are held in a SIR database, however access to the international data set has proved difficult in recent years particularly as standard outputs (set in the 1970″s) were not compatible to modern requests. A determined effort has been made by ICES to rectify this problem and in 2001 funding was received from the European Commission for a two-year project (DATRAS) to completely re-vamp the ICES fisheries database. Because the database is being re-written the opportunity was taken to extend the data by incorporating other international co-ordinated surveys in the North Sea. It is envisaged that the DATRAS database will contain data from the following North Sea surveys:

- The International Bottom Trawl Survey (IBTS) - Q1, North Sea, Skagerrak, Kattegat
- The International Bottom Trawl Survey (IBTS) - Q3, North Sea, Skagerrak, Kattegat
- The Beam Trawl Survey (BTS), North Sea, Channel and Irish Sea

The database will be held in Microsoft SQL-server and access will be at task levels. One level, which only will be accessible in ICES (database manager) where import, updates and maintenance are done, and another level for data extractions for all users and can be entered through the Internet.

The database should have the following functionality:

- **Loading data**

  Data will be sent to ICES from the national laboratories in a defined exchange format. At present, there is an exchange format for the IBTS North Sea, Skagerrak and Kattegat but an exchange format still needs to be developed for the Beam Trawl surveys. Before sending the data to ICES they will be screened with a checking program by the national laboratories. In ICES the data will be checked once more before they are loaded into the database. A new checking program has been developed under DATRAS.

- **Correcting/deleting data in the database**

  Currently data in the present IBTS database are not updated in the database but in the exchange text files. When data are needed from the database the latest version is loaded and data are extracted. This is a very time demanding task and not how a database is supposed to work. In the DATRAS database this functionality will be fully developed. All updates and corrections should be logged so the database administrator at any time can see when and where updates have been made. To ensure data can be regenerated the original data must still be kept in the exchange text files.

  The safest and less time consuming approach on data update is that the Institute submitting the data is responsible for the quality of the exchange files and that they therefore would have to resubmit all data when mistakes are found in the data in ICES.

- **Producing standard indices**

  One of the main tasks for the surveys is to provide data for indices used by various assessment working groups to tune the VPA. This will remain as one of the main tasks of the new DATRAS database.

- **Producing other data output**

  In addition the database will produce different levels of data output. As far as NORSEPP is concerned the most valuable initial output would be spatial maps of species abundance. Because there are links between the fisheries database and the ICES environmental database it is envisaged that various data can be combined to examine whether there are relationships between environmental factors (as yet unspecified) and stock recruitment and/or distribution.

For example Figure 1 shows the distribution of anchovy and surface temperature contours off the Scottish coast.

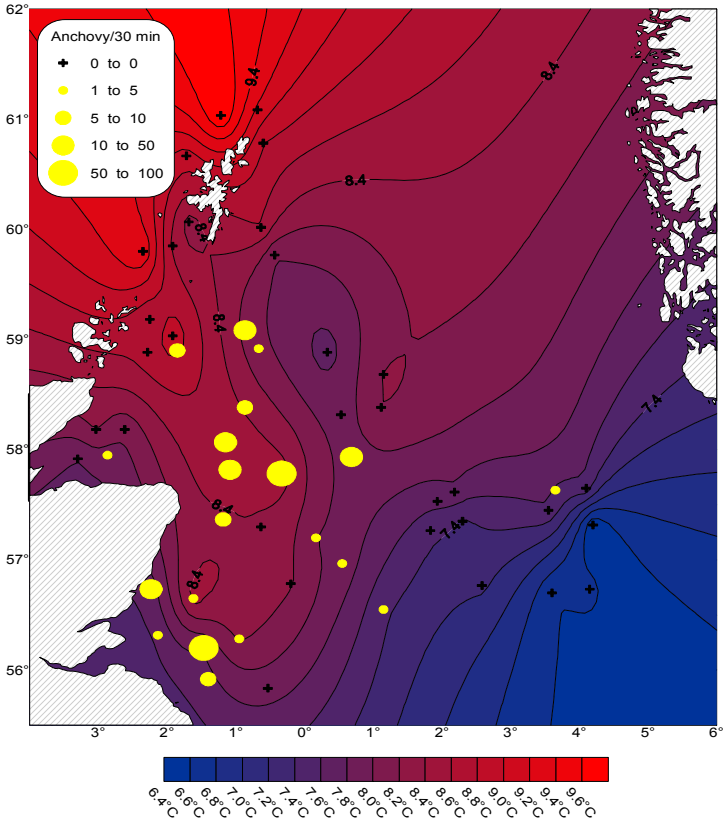

Figure 1 Sea Surface temperature (^{o}C) and distribution of anchovy

4.2 B (i) 2 Products of Ferry Box

FerryBox delivers data on hydrographic, chemical and biological parameters on nine Ferry routes in the Baltic Sea (Helsinki-Rostock, Helsinki-Tallinn), Skagerrak (Oslo-Hirtshals), North Sea (Cuxhaven-Harwich), Wadden Sea (Den Helder-Texel), the Channel (Southampton-Isle of Wight), Gulf of Biscay (Portsmouth-Bilbao), Irish Sea (Liverpool-Belfast/Dublin) and the eastern Mediterranean Sea (Athens-Crete). Sampling frequency along the transect ranges from many times per day to a few times a week.

1) The data are contained in an open data structure and are available after QC for modellers as validation and calibration data. (MODELDATA) Data sets contain: position, temperature, salinity, chlorophyll-fluorescence, turbidity, (most ferries), dissolved inorganic nutrient concentrations (ammonium, nitrate/nitrite, silicate, phosphate), pH, oxygen, algal composition (selected ferries). (data are available on a weekly basis)
2) The same data will be used as ground truth for Remote Sensing applications (MERIS; ENVISAT).
3) Specific data sets are used to develop indices to assess eutrophication in European waters (winter concentrations, length of bloom duration, algal bloom composition, maximum bloom levels, etc.): are these indices better than current ones (this will be tested by looking at the seasonal distribution of nutrient concentrations, of chlorophyll-a concentrations and partly species composition). From the primary data, aggregated indices (e.g. TRIX) will be calculated to further improve the assessment of the eutrophication status of European waters. (EUTRO-1;-2) (EU funded EUROCAT project, FP5)
4) Specific data sets will be used to test the possibility to use the FerryBox approach to estimate transport of SPM through tidal inlets (hydrodynamic questions regarding erosion/sedimentation problems) by e.g. using an ADCP. SPM concentration is also relevant for the distribution of many associated contaminants and further has links to models for the calculation of primary production.
5) The project will deliver an analysis of technological developments at present and in the near future (sensor technology, primary production, data treatment, ..)

6) The project should show that FerryBox data can be used as operational data and therefore improve the capability of operational models. (May be after data assimilation)

7) FerryBox data will contribute to the ecosystem approach by making relevant ecological data (chlorophyll-a concentrations, species composition, aggregated nutrient concentrations) available for a regional assessment.

8) The project will deliver a cost benefit analysis of the FerryBox approach as an alternative for current monitoring strategies and give recommendations for future use of FerryBox systems.

4.3 B(i) 3 The observing network at BSH, Hamburg

BSH maintain the MARNET Marine Environmental Monitoring network for the North Sea and Baltic Sea. Eight of the stations shown in Figure 2 measures physical parameters plus oxygen. In the German Bight, nutrient data are also monitored. Further details are available from **http://www.bsh.de/Marine_Environment/MARNET/index.html**

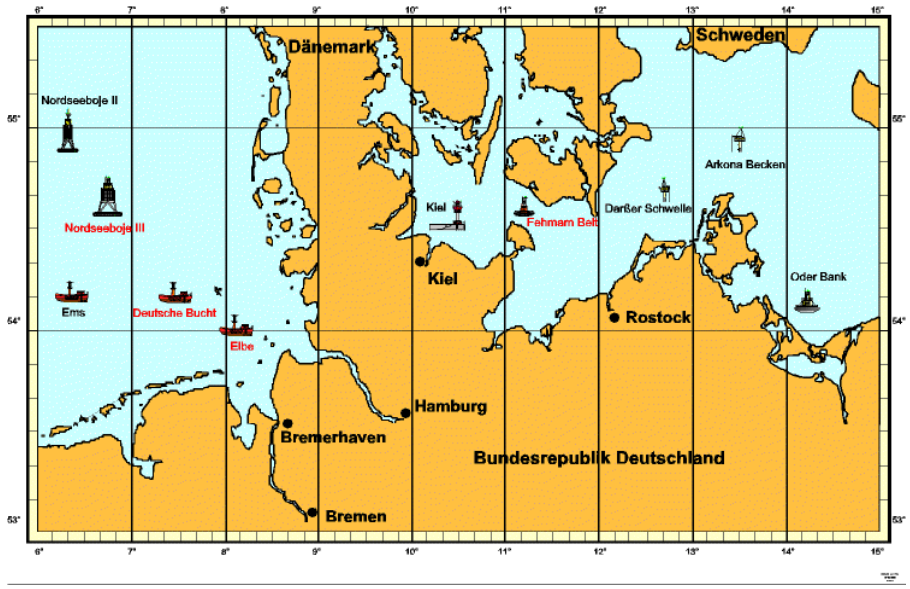

Figure 2 Monitoring stations of the BSH MARNET network.

Observations from MUMM

Products from observations:

The availability and delay of delivery of products must be checked with the team responsible of the database. More information will be given during the next year meeting.

4.4 B(ii) Application of existing coupled physical, ecosystem models in nowcast mode

Coupled physical-ecosystem modelling of the North West European shelf seas is under development in many NW European countries, and representatives of these agencies attended PGNSP. There are a range of levels of complexity of ecosystem model, from the full complexity of the European Regional Seas Ecosystem Model (ERSEM), which includes both pelagic and benthic components, and a range of size groups for zooplankton, to the simpler phytoplankton-only models such as NORWECOM running daily at MetNo.

In common with physical ocean forecast models, the coupled physical-ecosystem models in nowcast mode will take surface forcing as available from numerical weather prediction models. Thus the ocean models are driven by “today’s” weather. However usually climatological values are used for river inputs.

Because of the complexity of coupled physical-ecosystem models and the required computing resource, there is usually a trade-off between the model domain and the model resolution. For research understanding, it has been shown by the Proudman Oceanographic Laboratory that for the Irish Sea or North Sea, a target resolution of around 1 nautical mile is needed, in order to resolve the baroclinic processes in the physical model, since these impact on the marine ecosystem.

The coupled models can be run for long-term hindcasts, where the necessary met-ocean forcing and boundary data are available, or can be run daily in nowcast mode. Usually the output files from the daily nowcast runs are kept, thus building up over time an archive database of model results.

Typical indicators produced by a model based marine monitoring system include:

- plankton concentration
- total, new or primary production
- peak production of different algal groups
- bottom oxygen concentrations
- zoobenthos
- oxygen consumption
- nutrient concentration and ratios
- nutrient transports to target areas

Model output can be presented in either a spatial view (GIS compatible format) or as a time series representation at a selected location. Development of the best means of presenting modelled data to users is only just beginning, though some work is starting at a national level. This is a key step in the transition from research to operational modelling, and is part of the pre-operational development of the modelling systems.

4.4.1 Modelling of the NW European continental shelf at the Met Office (UK)

A key development for NORSEPP here is the planned hindcast and nowcast modelling to be carried out between the Met Office (UK), Proudman Oceanographic Laboratory (POL) and Plymouth Marine Laboratory (PML) during 2003 as part of the European Commission framework program 5 GMES project MERSEA. In this work, the POLCOMS ERSEM coupled model will be set up to cover the full NW European continental shelf on a grid of ~6km. This model will take physical boundary forcing data from the POLCOMS ~12km Atlantic Margin model, which is in turn nested into the Met Office deep ocean model FOAM, which includes data assimilation. Within the shelf wide 6km model, two nested regional models will be set up at 1 nautical mile resolution. One will cover the Irish Sea, the other the southern North Sea. These domains are shown schematically in Figure 3. The nested models will be run in research mode, for evaluation and development of process understanding and development of the next generation of coupled model.

The model suite will be run for the annual cycle of 2002, for validation against available data such as the CEFAS smart buoys, and will be brought up to near real time by summer 2003. Thereafter the suite will be run in near-real time, with a weekly update and possibly also a five day forecast with surface forcing from the available numerical weather prediction model data. The Met Office will liaise with the Government Ministry DEFRA, as well as CEFAS scientists, to synthesis and present the coupled model output for use by policy managers. This will be a major modelling contribution to the NORSEPP.

Through the NOOS partnership, experience with running the model system will be shared, and the suitability of using model data for other regional nested submodels will be explored.

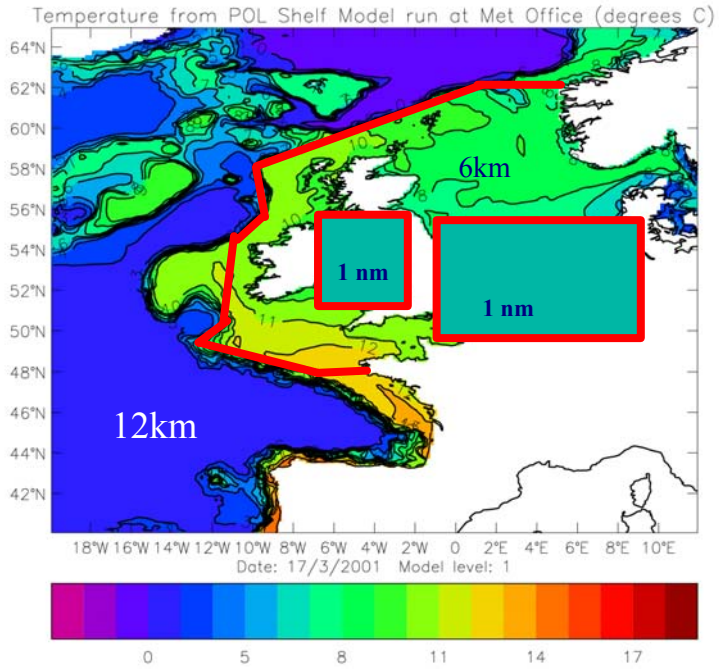

Figure 3 Schematic of the POLCOMS-ERSEM model domains to be used by the Met Office in the MERSEA Strand1 project.

4.4.2 Modelling of the NW shelf Seas at BSH, Hamburg

In addition to the MARNET observation network described in section B(i), BSH run circulation and dispersion models of the North sea and Baltic, including suspended matter transport, and plan to host a PhD student in ecological modelling, to develop coupled physical-ecosystem modelling.

4.4.3 Modelling of the southern North Sea at MUMM, Belgium.

MUMM are developing a coupled physical-ecosystem model of the North Sea, based on the COHERENS model. A storm surge model is also run, with nesting giving high resolution along the Belgian coast, and 3D circulation modelling is under development.

1. Description of the model OPTOS (Operational - forecast)

Regions: CSM (2D): 12°W-13°E 48°N-62°N
NOS (3D): 4°W-9°E 48.5°N-57°N
BCZ (3D): 2°E-4.14°E 51°N-51.9°N
Spatial resolution: CSM (2D): 2.5’ (lat) x 5’ (long)
NOS (3D): 2.5’ (lat) x 5’ (long); 20 layer
BCZ (3D): 2.5’/6 (lat) x 5’/7 (long); 20 layer
Meteorological data: from Met Office. Spatial resolution: 0.833° (lat) x 0.556° (long) Time step: 6h
Time resolution: CSM: Δt_{2D} = 20 sec; NOS: Δt_{3D} = 5 min; BCZ : Δt_{3D} = 5 min
Variables : u, v; elevation [T, S (in development)]

2. Products deliverable in the future by MUMM

Products from models:

Hydrodynamic model (OPTOS - operational):
Parameters: elevation, current, transport (transect to define), residual circulation, temperature, salinity.
Regions: see detailed description above
Spatial resolution: CSM 1 point over 16, NOS 1 point over 16, BCZ 1 point over 64
Time resolution: 1h (map), 5' (time series BCZ.), 10' (time series CSM, NOS).
By when: Real time, forecast at 4 day, 6 hours.
Ecosystem model (COHERENS, a new ecosystem model is currently in development):
Parameters:
Currently: nitrogen, phytoplankton, timing of the phytoplankton maximum (year 1989).
Soon: nutrients (& ratios), oxygen, phytoplankton (diatoms – flagellates), primary production, abundance ratio between two types of phytoplankton, timing of the bloom of the different phytoplankton.
Region: 4°W-9°E 48.5°N-57°N
Spatial resolution: 2.5' (lat) x 5' (long); 10 layer
Time resolution: 1h (time series), monthly and annual mean (maps)
Period: hindcast since 1992

MUMM Products from remote sensing:

Region : 4°W-9°E 48.5°N-57°N
Spatial resolution: 1.13 km x 1.13 km
Period: since 2002 (MERIS)
Time resolution: annual value and/or seasonal value
By when: 2 months
Parameters:
Euphotic depth (seasonal or annual mean)
Timing of the bloom (annual value)
TSM (seasonal or annual mean)
Chlorophyll a concentration (seasonal or annual mean)

3. Deliverable products in March 2004 (demonstration products)

MUMM will deliver 3 products for the test case (March 2004). One is coming from the ecosystem model, the second comes from the hydrodynamic model and the last one, from remote sensing.

Product 1: Timing of the phytoplankton maximum (annual value)
Year: 1989
Region: 4°W-9°E 48.5°N-57°N
Spatial resolution: 1/15° (lat) x 1/10° (long); surface
Source: COHERENS model

Product 2: Time series of the transport across the Channel (and other transects to be defined)
Monthly mean for the period 1993-2003
Region: 12°W-13°E 48°N-62°N
Source: OPTOS- CSM 2D model
Product 3: Euphotic depth (annual mean)
Year: 2003
Region: 4°W-9°E 48.5°N-57°N
Spatial resolution 1.13 km x 1.13 km

4.4.4 Modelling at MetNo and IMR, Norway

The Norwegian Met Office, MetNo, run a coupled physical ecosystem model covering the North Sea. The ecosystem model was developed at IMR, and includes nutrients and two classes of phytoplankton. The model system is run daily, with a seven day forecast. As part of the project MONCOZE, the physical-ecosystem modelling is further developed, including a presentation and analysis tool for monitoring the marine ecosystem. Both IMR, MetNo and NERSC are involved in the European Commission project MERSEA, and the MERSEA integrated project proposal.

4.5 B(iii) Demonstrate how data integration methods to be introduced by NORSEPP can be used in support of stock assessment and prediction

Summary of First NORSEPP Data Products

Time – For the Year 2003. Spatial Resolution – ICES Quarter Stats square

Theme - Status

Model			Observations				Product	Time
IMR	Met O	MUMM	RV (2)	IBTS	CPR	Sat		
●	●	●		●			Bottom T, S and NO3 in Feb (IBTS)	February
●	●	●	●			●	T, S surface	Monthly
●	●	●	●				T, S bottom	Monthly
●	●	●					Transport / residual current anamoly	Monthly

Theme – Primary / Secondary Productivity

Model			Observations				Product	Time
IMR	Met O	MUMM	RV (2)	IBTS	CPR	Sat		
●	●	●					Timing of the onset of stratification	Annual
●	●	●	●		●	●	Timing Spring bloom	Annual
●	●	●	●		●	●	Timing of Peak Diatom Abundance	Annual
●	●	●	●		●	●	Timing of Max Dinoflagellate abundance	Annual

Theme – Eutrophication

Model			Observations				Product	Time
IMR	Met O	MUMM	RV (2)	IBTS	CPR	Sat		
●	●	●			●	●	Annual primary production – integral of year	Annual
●	●	●					Annual min bottom oxygen	Annual
●	●	●	●				Chla in August	August
●	●	●	●				September oxygen minimum	September

The SCOR/IOC WG 119 has placed ecosystem indicators of health and function into three broad categories:

1) *The Environment:* This includes the spatial and temporal dynamics of the environment, heterogeneity and complexity of the different habitats at different scales, the quantification of retention, concentration and production processes related to recruitment, and primary production.
2) *Ecology:* This includes functional indicators and aggregated indicators of ecosystem status (diversity, keystone species and cascade effects), functional impact, dominance, interaction strength indicators, size-based indicators such as size spectra, emergent property indicators, derived indicators from mass balanced models, and transfer efficiency.
3) *Exploitation:* This includes fisheries indicators such as fleet activity and dynamics, reference points for fisheries (*MSY*, *F*) spatial dimensions in fisheries management, indicators for MPAs, GIS indicators, fisheries impacts on ecosystems (trophic level FIB), primary production to sustain fisheries, indicators derived from observed patterns such as resilience, persistence and school dynamics.

A list of references describing ecosystem indicators is also available from the SCOR/IOC WG 119 website at http://www.ecosystemindicators.org/wg/readings.htm.

4.5.1 Canadian Experience

Proceedings from the Canadian Ocean Monitoring-Stock Assessment Workshop are online at the URL given below. The particular report referred to during discussion at PGNSP is CSAS 2002/034. http://www.dfo-mpo.gc.ca/csas/Csas/English/Publications/Proceedings_e.htm

4.6 B (iv) Ways to streamline the flow and exchange of relevant data and information

This is essential for the smooth and efficient running of NORSEPP. It will require co-ordination and will benefit from having a dedicated project co-ordinator. See the discussion at TOR(A) above.

The meeting noted that existing ICES databases are suitable for archiving, but are unlikely to be useful for operational products.

4.7 B (v) Review of innovative technologies suitable for fisheries oceanography

4.7.1 FerryBox

Ships-of-opportunity such as ferries offer cheap and reliable measuring platforms to make automatic observations in coastal waters. In November 2002 an EU-Funded (FP5) project 'FerryBox' started, in which different FerryBox systems and different types of seas (enclosed, coastal, shelf, oceanic, oligotrophic, eutrophic) are being compared.

Ferries with automatic equipment are used by the project partners (Germany, Finland, Estonia, Norway, UK, Spain, Greece, the Netherlands) in e.g. the North Sea, Baltic Sea, Skagerrak, the English Channel, and Irish Sea, the Bay of Biscay, the Mediterranean (Athens-Crete) and the Dutch Wadden Sea.

Temporal and spatial resolution on a scale normally not available will enable the data to be used in operational models both as a means of calibration and validation. As cost effective monitoring is the main application, the project will deliver background data for the European Water Framework Directive.

One of the systems used in this EU funded project is the German 'FerryBox' operating on a ferry between Cuxhaven (Germany) to Harwich (UK), a distance of about 600 km. The innovative system consists of a fully automated flow-through system with different sensors and automatic analysers. It provides the possibility of automatic cleaning and wash-cycles and position-controlled sampling (GPS). Data can be transferred to shore and the system can be remotely operated by GSM (mobile phone), if the ferry is near shore. Data acquisition, storage and telemetry are coordinated by a PC. Online presentation of data on board is planned as one mechanism for data dissemination.

To avoid bio-fouling automatic cleaning and rinsing of critical sensors is used. Other key features are automatic and remote controlled operation from the shore, safety precautions to remove water blockage by automatic back-flushing and automatic shut-down in case of leakage or malfunction.

The German FerryBox automatically measures the following parameters: temperature, salinity, turbidity, oxygen, pH, chlorophyll fluorescence, ammonium, nitrate/nitrite, phosphate, silicate and main algal groups (by wave length dependent fluorescence). Further options within the EU funded project are to test other, new sensors like a flowcytometer (algal 'species') and equipment to measure primary production (PAM Fluorescence, FRR fluorescence).

The system has been operating since November 2001. Results so far show that the system works well with almost no discontinuities and that the data have a high quality, if calibration takes place regularly.

More information is available from the FerryBox website (www.ferrybox.com or from the GKSS website: www.gkss.de).

4.7.2 Acoustic methods

This was not covered at PGNSP due to lack of expertise, though this topic was the subject of the ICES Montpellier Acoustic symposium.

4.7.3 Remote sensing: MERIS/ENVISAT

Since spring 2002 the European Environmental Satellite ENVISAT has been in orbit. It carries (amongst others) the MERIS spectrometer which resolves ocean colour in 10 µm wavelength intervals. Thus the resolution for specific applications such as phytoplankton identification has strongly increased. Since the 1st April 2003 pictures from ENVISAT are available on a routine basis.

There were no remote sensing experts attending PGNSP, however information was received on a Framework Program 5 project that is likely to provide useful inputs to NORSEPP. The REVAMP project aims to develop and apply improved algorithms for processing MERIS data from ENVISAT, providing improved estimates of surface chlorophyll-a. The project will prepare an Atlas from spring 2002 to spring 2003 of validated CHL concentration maps for the North Sea, with indices to underlying processes. Further details are available at the project website: http://ivm5.ivm.vu.nl/revamp

Ecosystem modelling Further development to pre-operational and operational status of coupled physical ecosystem modelling will follow on from the work described in B(ii) above. In particular planned developments to the ERSEM model will include dino-flagellates in the model system. For the physical modelling, in strongly tidal or shallow waters, the 3D ocean circulation model needs to be coupled with a wave model, for improved representation of bed stress, sediment and nutrient resuspension, and surface stress. As computing resources increase, the spatial resolution of the shelf wide coupled models can be increased, and also the complexity of the coupled model systems can be further increased.

The need for NW shelf wide hydrological modelling for improved representation of riverine inputs was noted, and some early developments are taking place here at a national level.

As coupled physical-ecosystem models become developed with the ability to nowcast phytoplankton and zooplankton, it will become possible in future to include Individual Based Models in the system.

The use of web-based "live access server" technology to access large gridded datasets of model output is already under development for datasets of physical ocean model output, and this could be extended to include output from coupled physical-ecosystem modelling. This software allows web based access to the data, where the user can configure the presentation of the data, including selection of a subdomain of the model. See for example the website http://www.nerc-essc.ac.uk/las

4.7.4 Moored Buoys

No expert on moored buoy instrumentation attended PGNSP.

4.7.5 CPR

Although the CPR survey has a 70-year history, recently innovative ways of analysing the data are being applied. Advanced multivariate techniques and time series have helped identify community changes related to climate and fisheries. Recently a new Instrumentation Policy has been implemented at SAHFOS, and it is likely that all CPRs will be fitted with temperature loggers in the next year. This information can be used to supplement data from other monitoring programmes such as FerryBox.

4.8 B (vi) Evaluation of ways to promote the results of the project to the ICES stock assessment community

An Ocean Environmental Status Report should be prepared and presented to the appropriate stock assessment meetings (see the proposals in TOR C below).

Incorporation of environmental information into stock assessment/forecasting procedures is not a new concept. There are well documented physical-biological linkages within the Baltic and Arctic seas and the North Sea has been the subject of EU funded studies (e.g. STEREO) and ICES groups (e.g. SGPRISM). Whilst these exercises have successfully identified and modelled environmental-biological linkages, there still remains a widespread lack of information exchange and usage between the stock assessment and environmental ICES groups.

There needs to be increased dialogue between environmental modellers and fisheries assessment scientists in order for the two groups to understand the operation, and function of their models and the products that are required. In particular

operational oceanographic models are often regarded as incompatible with fisheries assessment models due to their complex spatio-temporal resolution as compared to the basin-wide, annual datasets used for fisheries assessment. Another source of reluctance to embrace environmental information in stock assessment processes is the requirement of assessments to produce forecasts well beyond the range of current oceanic forecasting ability. The current stock-assessment structure in terms of assessment procedures/software and the time pressure on assessment working groups effectively precludes instantaneous uptake of Project output and a more gradual approach will be required.

This Group acknowledges these concerns and proposes the following strategy for moving the ecosystem approach agenda forwards. The group has identified a range of products which may be suitable for incorporation into fisheries assessment procedures. These can initially be included in a scene setting manner and may help stock assessors identify and/or clarify trends in their data in relation to factors such as changes in weights at age and recruitment patterns. Full inclusion into stock assessments in a more formal manner will require further development of the assessment software and methods.

There are therefore two main groups of scientists who need to be targeted for successful uptake of Project results, the model developers and the assessment scientists. It is proposed that during *2004/5*, Group members present working papers detailing products and their potential use to the assessment working groups (WGNSSK, SGMNNS, HAWG, WG*NEPH)* and methodology working groups (SGGROMAT). This should enable dialogue leading to the refinement of Project products, promote exchange of information between the disciplines and encourage interdisciplinary participation in the various groups.

5 TOR C PREPARE DRAFT TERMS OF REFERENCE FOR RELEVANT ICES SUBSIDIARY GROUPS WHOSE INPUT IS REQUIRED TO SUPPORT THE PROJECT

It is suggested that the Terms of Reference for the following WGs are amended to include:

- Review and prioritise the list of potential NORSEPP products, providing feedback to the PGNSP and suggest any additional variables that may be useful. We would envisage send the following groups a one page document.

Assessment Working Groups

1) Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)
2) Herring Assessment Working Group for the Area South of 62°N (HAWG)
3) Working Group on *Nephrops* Stocks (WGNEPH)
4) International Bottom Trawl Working Group (IBTSWG)
5) Working Group on North Atlantic Salmon (WGNAS)
6) Study Group on Evaluation of Current Assessment Procedures for North Sea Herring (SGEHAP)
7) Study Group on Multispecies Assessments in the North Sea (SGMSNS)
8) ICES - IOC Working Group on Harmful Algal Bloom Dynamics (WGHABD)

Survey Working Groups (probably of less relevance to them)

9) Planning Group for Herring Surveys (PGHERS)
10) Planning Group on North Sea Cod and Plaice Egg Survey in the North Sea (PGEGGS)
11) Working Group on Beam Trawl Surveys (WGBEAM)

Additional Working Groups that would be interested

12) ICES/GLOBEC Working Group on Cod and Climate Change (WGCCC)
13) Working Group on Methods of Fish Stock Assessments (WGMG)
14) Working Group on Ecosystem Effects of Fishing Activities (WGECO)
15) Working Group on Recruitment Processes (WGRP)

The WG on Zooplankton Ecology (WGZE) will be asked if they could provide indices specific to the North Sea. Currently they produce a Status Report for the North Atlantic. Dr Richardson will make this request.

6 RECOMMENDATIONS

Proposed TOR for next meeting

PGNSP will meet to:

- Produce a summary product from operational NORSEPP deliverables identified at the April 2003 meeting.
- Plan how to disseminate the NORSEPP Status Report and information to the ICES community and to receive and act on feedback.
- Continue planning components of NORSEPP, including integrated products for 2005 with input from REGNS
- Review lessons learned from preparation of the first NORSEPP Status Report and recommend on transition to fuller operational status.
- Review present operational North Sea observing programs, with input from the EDIOS project, in relation to the requirements of NORSEPP

The PGNSP will meet next year in Southampton, UK from the Wed 24 March - Fri 26 March.

PGNSP further recommends that:

- IBTS are invited to send a delegate to attend the next meeting of PGNSP
- A dedicated project co-ordinator be appointed to collate NORSEPP products and prepare and disseminate the Status Report. Suggested funding / resourcing options for this position include

    1) ICES secretariat
    2) Subscriptions from ICES member agencies
    3) Secondment from a national agency
    4) Supported by IOC
    5) Funded through DG Fish concerted action to follow present IBTS work (Action Turrell/ Dahlin to contact? Hans Larsen to discuss)

- PGNSP members investigate possible financial support from EU supporting activities (Dahlin to contact DG Research; Dahlin / Turrell to contact DG Fish, Richardson/Fox to explore possible use of Marie Curie Research Training Networks)
- Consideration is given to adding NORSEPP data products to the existing German MURSYS status report. See www.bsh.de/Marine_Environment/mursys/index.html

Various other actions were noted:

- Turrell to collate contributions and prepare first draft of NORSEPP Status Report
- Members of PGNSPP to make presentations (at the beginning of the WG meeting) at relevant assessment Working Groups
    - *Nephrops* (March)
    - Demersal (September)
    - Recruitment processes
    - Oceanography (Bill Turrell)
    - Herring Assessment (Einar Svendsen)

- Anthony Richardson could present NORSEPP at a WG as required, but may require funding for travel.

7 ANY OTHER BUSINESS

ICES Annual Science Conference 2003

ICES Co-chair Anthony Richardson will report on NORSEPP to the ACE and Oceanography committees at the Annual Science Conference. There is no suitable theme session for a dedicated NORSEPP presentation.

8 CLOSING

The Co-chairs thanked all the participants for their hard work, and thanked Benjamin Planque of IFREMER for his hospitality in hosting the meeting, and closed the meeting 8 April 2003 at 1500.

Summary of Actions from PGNSP April 2003

1	Anthony Richardson to contact Sheldon Bacon SOC to discuss date and venue for next meeting of PGNSP	
2	Bill Turrell / Hans Dahlin to contact Larsen to discuss possible DG Fish funds for NORSEPP report coordinator	
3	Bill Turrell to collate contributions and prepare first draft NORSEPP report	
4	Hans Dahlin to contact DG Research to discuss possible EU funding for NORSEPP	
5	Anthony Richardson / Clive Fox to follow up Marie Curie Research Training Network proposal	
6	Einar Svendsen to present NORSEPP status report to herring Assessment group	
7	Bill Turrell to present NORSEPP status report to Oceanography WG	
8	Anthony Richardson to report on NORSEPP to ACE and Oceanography Committees at Annual Science Conference.	

ANNEX 1: ATTENDANCE AT PGNSP NANTES

Anthony Richardson	SAHFOS / ICES	Co-Chair ICES
Martin Holt	Met Office / EuroGOOS	Co-Chair EuroGOOS
Hans Dahlin	EuroGOOS	
Franciscus Colijn	EuroGOOS and ICES	
Einar Svendsen	EuroGOOS and ICES	
Genevieve Lacroix	MUMM / EuroGOOS	
Glen Harrison	IOC / SG-GOOS	
Ewen Bell	CEFAS / ICES	
Bill Turrell	FRS, ICES	
Clive Fox	CEFAS / ICES	

Day 2 only

Andrew Newton	FRS / IBTS, ICES

Day 1 of the meeting was held jointly with REGNS.

PGNSP participants NANTES April 2003

The following attended all or part of the PGNSP meetings. In addition, members of the REGNS group attended the joint session on Monday 7th

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