Oceanography Committee **ICES CM 2002/C:10**
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Report of the

ICES/IOC Steering Group on GOOS

Halifax, Canada
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International Council for the Exploration of the Sea

Conseil International pour l'Exploration de la Mer

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1 EXECUTIVE SUMMARY

Review Of Membership

The SGGOOS should use products from emerging pilot projects to increase interest in and membership of the ICES/IOC SGGOOS, and widen the communities represented.

SGGOOS should target the intermediate scientific working groups within the fishery management community of ICES first, rather than the stock assessment groups themselves.

The SGGOOS should encourage ACME and ACE to increase the communication of the work and output of SGGOOS to OSPAR.

Interim 2001 Meeting

The report from the interim meeting held in Bergen in 2001 was presented.

ICES/EuroGOOS/IOC Information Exchange

Thirteen presentations were made during the first day of the SGGOOS meeting. Talks highlighted; activities in the eastern North Atlantic, including a report on the recent ICES-EuroGOOS planning group meeting for the North Sea Pilot Project, other EuroGOOS activities during the last year and three presentations on ongoing regional observational programmes: the Ferrybox Project (a number of European countries participate), the Bay of Biscay Project (France) and the Gyroscope Project (Spain); an update on GOOS planning at the international level, i.e., the COOP implementation plan, and highlights of GOOS-related activities in the western North Atlantic; planned or ongoing observational programmes in the US and coastal observing programmes in Atlantic Canada. Four additional presentations, described present efforts in Canada: to develop an ecosystem-based framework for integrated ocean management, to integrate environmental information in the stock assessment process (using the Traffic Light Method), to exploit new technologies (remote-sensing) to link foodweb and fisheries dynamics and to develop data integration and assessment techniques for state of the ecosystem reporting.

The ICES GOOS Implementation Plan

ICES and IOC will revise the ICES GOOS Implementation Plan, available on the ICES web site, and a new version disseminated to the SG for discussion.

Enhancing Communication between ICES/IOC/EuroGOOS

The work of the ICES/IOC SGGOOS will be presented at:

1) ACME – 3rd June 2002. Copenhagen
2) ACE – 7–11 June 2002. Copenhagen.
3) The 35th Session of the IOC Executive Council - 4–14 June 2002
4) Oceanography Committee (and other Committees as appropriate) of ICES at the 90th Statutory Meeting, September/October. Copenhagen.
5) The I-GOOS Regional Forum – 2 and 6 December 2002. Athens.
6) The 3rd EuroGOOS Conference – 3–5 December 2002. Athens.

Promotion of the ICES Status Reports

It was noted that ICES now has 5 different status reports. All members of SGGOOS undertook to increase web links to these.

The ICES/EuroGOOS North Sea Ecosystem Pilot Project (NORSEPP)

The recommendations were as follows:

a) A Category 2 resolution should be submitted to the 2002 Council meeting requesting that the PGNSPP continue to exist, under new ICES/EuroGOOS co-Chairs, in 2003.

b) A Category 4 resolution should be submitted to the 2002 Council meeting requesting that ICES adopts the NORSEPP as an internal ICES project.

c) A presentation introducing the concepts behind NORSEPP should be made at the Theme Session W. This will conclude by inviting ICES member countries to nominate members to the re-formed PGNSPP for 2003.

d) Agenda slots to present the NORSEPP concept to key Committees at the ASC should be allocated, and they should be invited to nominate members to the re-formed PGNSPP for 2003.

It is recommended that national institutes from the ICES and EuroGOOS communities, with support from the ICES GLOBEC Office, submit an Expression of Interest to the 2002 June call of the European Union Framework 6 Programme, nominating the NORSEPP concept as a basis for an Integrated Project. Specifically:

a) that IMR Bergen (Hein Rune Skjoldal) and the UK Met Office (Martin Holt) should be approached in order to formulate and submit and EoI by the 2002 June deadline, with the help of the ICES GLOBEC Office (Keith Brander). These people were approached during and after the SGGOOS meeting and have agreed to take this forward.

b) it was recommended that when submitting the EoI, either in the covering letter or the EoI itself, explicit reference is made to an additional EoI, focusing on fisheries management issues, presently being prepared by M St. John (Germany). These two projects could be merged, or run independently.

c) The NORSEPP community must be ready to act in autumn 2002 when the full calls for proposals are published.

Development of the North Sea IBTS Quarterly Survey

A brief report was made on progress. This will be reviewed again in 2003.

Supporting the ICES Secretariat in relation to GOOS – ICES and JCOMM

A detailed document summarising the relationship between ICES and JCOMM was reviewed by the meeting. Summary actions arising from this were:

a) ICES and OOPC should commence a dialogue on mutual areas of co-operation.

b) ICES should invite the JCOMM Management Committee to meet at ICES HQ.

c) One of the Co-chairs of the SGGOOS should attend the JCOMM Management Group meeting.

d) ICES (SGGOOS or WGOH_ should review the national/regional GCOS action plans.

e) The ICES WGMDM should make contact with the JCOMM Data Management Group.

f) A member of SGGOOS should represent its work at the 4th session of COOP (Sept 24–27, Cape Town, South Africa).

g) SGGOOS should establish links with the JCOMM Products Bulletin. Contact should be made initially through Johannes Guddal (Co-President, JCOMM).

h) ICES member nations research vessel cruises should be publicised to facilitate possible ARGO deployment opportunities.

i) ICES Secretariat should establish a dialogue and links with the new JCOMMOPS data centre.

Supporting the ICES Secretariat in relation to GOOS

1) Planning for Theme Session W at the 2002 ASC continued.

2) A review of upcoming related meetings was commenced.

3) A review of relevant Working Groups/Workshops/Reports was commenced.

4) A briefing for the GSC-V was completed.

2 INTRODUCTION

The Co-Chairs (Dr G Harrison, Canada, and Dr W R Turrell, UK) welcomed members of the ICES/IOC SGGOOS to the meeting. The participants were welcomed by Dr Mike Sinclair (Canada), the Regional Director, Science, of the

Bedford Oceanographic Institute. The meeting agenda appears in Appendix 1, and the participants to the meeting are listed in Appendix 2. Membership of the SGGOOS prior to the 2002 meeting is summarised in Appendix 3.

3 REVIEW OF MEMBERSHIP

The present membership of the SGGOOS was discussed, specifically focusing on its appropriateness and coverage. In the past concern has been expressed that membership is primarily drawn from physical disciplines. It was noted that on of the invited keynote speakers at the 2002 ICES ASC (Dr Tom Mallone, USA), would be well placed to introduce to the general ICES audience the role and importance of operational oceanography, GOOS and the SGGOOS in the future development of fishery management methods and processes within ICES. The function of the SGGOOS is one of policy setting and steering, and not as a scientific working group. There are many Working Groups whose work is of relevance to GOOS within ICES, and the Chairs of these Working Groups should be targeted in the future as potential members. The Chair of the WGIBTS (Mr Andrew Newton) is a member of the SGGOOS, and this link is to be maintained. In some ways the SGGOOS is still in its infancy. Once real products begin to be generated by pilot projects, it will become easier to generate interest in a wider portion of the ICES community. Its was noted that intermediate Working Groups under ACFM, working on the scientific issues behind stock assessment, and developing new fishery management methods, should be approached first, rather than stock assessment groups themselves.

In order to expand the spread of information through ICES, Chairs of the Committees which SGGOOS report to should be listed as ex-officio members of the SG and thereby be on the mailing list. Communication of the work and output of SGGOOS to OSPAR should be achieved through ACME and ACE. In addition, members should communicate news of SGGOOS to their national OSPAR representatives. In some countries the GOOS community is drawn from the academic community, leading to fragmentation of effort with respect to GOOS developments. A strong lead by SGGOOS and ICES can avoid such fragmentation, and enhanced communication is needed to achieve this. In many ways ICES' work represents a non-real time operation system which is 100 years old. Unfortunately new developments in GOOS such as COOP have not been aware of this existing system, although the work of SGGOOS and ICES is already beginning to improve the linkages.

4 REPORT ON THE BERGEN INTERIM SGGOOS 2001 MEETING

In 2001 the SGGOOS met immediately after the Bergen Strategic Workshop, which discussed planning steps towards the North Sea Ecosystem Pilot project. The key issues addressed by the interim SGGOOS meeting were:

SGGOOS mandate to implement NORSEPP: The mandate of SGGOOS to actually implement NORSEPP was discussed. It was stated that the SGGOOS should be viewed as an interface between the environmental monitoring agencies and the fisheries agencies, forming a link for communication between groups that are not presently integrated well. It was also noted that the SG should play a role in the development of integrated "products".

Workshop Itself: The outcome of the workshop was discussed. It was particularly noted that the fisheries community was underrepresented, at both the workshop and on SGGOOS itself.

SGGOOS membership: It was concluded that SGGOOS should be looking to recruit about 20 active members, including representatives from the fisheries research community.

The full report of this meeting is available as Appendix 4.

5 BACKGROUND AND TERMS OF REFERENCE TO SGGOOS 2002

The background to the ICES/IOC SGGOOS, and the 2002 meeting, is presented in Appendix 5. The Terms of Reference for the meeting were:

a) develop further the Implementation Plan for ICES involvement in GOOS (CM 2001/C:01) including:

   i) arrangement to enhance mutual awareness and collaboration with IOC and EuroGOOS,

   ii) inter-sessionally work to promote the ICES Annual Ocean Climate Status summary within the GOOS/GCOS/JCOMM communities and to investigate how this product might be improved to enhance its use in operational aspects of the work of ICES,

iii) initiate, assist in the development of and provide oversight for the ICES/EuroGOOS North a Ecosystem Pilot Project as formulated in the SGGOOS workshop in Bergen 5–7 September 2001,

iv) develop and oversee the role of the North Sea IBTS quarterly surveys in the North Sea Ecosystem Pilot Project;

b) advise and support the ICES Secretariat in GOOS related matters;

c) define and promote the role of ICES in GOOS and EuroGOOS taking into account input from the ICES Committees;

d) inform the Coastal Ocean Observation Panel (COOP) of GOOS on the development of the North Sea Ecosystem Pilot Project.

[Note that the annotated agenda (Appendix 1), and the section headings in the main text, explain how the report items below relate to the SGGOOS 2002 Terms of Reference.]

6 ICES/IOC/EUROGOOS/GOOS INFORMATION EXCHANGE

The meeting commenced with a day of presentations which supplied relevant background material, and facilitated information exchange between ICES, IOC, EuroGOOS and GOOS related scientists from Canada and the USA. Hence the first day of the SGGOOS 2002 meeting went towards ToR a) of the group.

Summaries of the talks presented during this first day are given in Appendix 6. Discussions which the talks stimulated are reported below.

Thirteen presentations were made during the first day of the SGGOOS meeting (Appendix 6). Morning talks highlighted activities in the eastern North Atlantic, including a report on the recent ICES-EuroGOOS planning group meeting for the North Sea Pilot Project, other EuroGOOS activities during the last year and three presentations on ongoing regional observational programmes: the Ferrybox Project (a number of European countries participate), the Bay of Biscay Project (France) and the Gyroscope Project (Spain). Afternoon presentations included an update on GOOS planning at the international level, i.e., the COOP implementation plan, and highlights of GOOS-related activities in the western North Atlantic; planned or ongoing observational programmes in the US and coastal observing programmes in Atlantic Canada. Four additional presentations described present efforts in Canada: to develop an ecosystem-based framework for integrated ocean management, to integrate environmental information in the stock assessment process (using the Traffic Light Method), to exploit new technologies (remote-sensing) to link foodweb and fisheries dynamics and to develop data integration and assessment techniques for state of the ecosystem reporting.

Key points from the presentations and subsequent discussion were:

Opening remarks noted that 2002 is the centenary of ICES and the 40th anniversary of host institute (BIO) for the SGGOOS meeting and that an historical perspective on the nature of monitoring in ICES is appropriate at this time.

ICES has to some degree been an ocean monitoring organisation since the early 1900s when activity of the original ICES committees included seasonal hydrography of fixed stations and lines and fish landing statistics. Combined with process oriented research studies, early ICES work could be characterised as a “Proto-GOOS”.

From the earliest days, however, ICES ocean monitoring has been sector specific (fish) and been defined in relation to the needs for management decision making. The present challenge for ocean monitoring is well articulated in the ICES Strategic Plan; monitoring, research and advice will be in support of integrated oceans management with broad ecosystem-based conservation objectives.

In practical terms, the challenge is to operationalise the concepts of integrated oceans management, i.e., COOP-GOOS/ICES should be designed to provide the data products for the indicators required for integrated management and the design framework should follow the model successfully developed for the climate component of GOOS.

To move forward, an important function of the SGGOOS is to identify tasks to be undertaken by the various ICES working and study groups to define the indictors for oceans management and develop the required data products.

The Planning Group on the North Sea Pilot Project has stated that the overall objective of the Pilot is to increase the efficiency and effectiveness of current relevant national and international monitoring systems so as to facilitate application of an ecosystem approach to fisheries management in the ICES area.

Eight more specific objectives for the North Sea Pilot were developed by the planning group with corresponding "Work Packages" defined for each. SGGOOS has been asked to develop the terms of reference for these work packages and identify the ICES WGs that will be tasked to action the ToRs.

The scope of the Pilot with regard to living resources and environmental monitoring will be limited. If the project succeeds, the remit can be expanded to include more comprehensive environmental analysis.

EuroGOOS, the NE Atlantic regional arm of GOOS, is a major player in the development of the North Sea Pilot and has as its general goal the development of operational oceanography in the European Seas area and adjacent oceans. This is accomplished by promoting the development of operational services already in existence and investment in pre-operational research to create the science and services of the future.

EuroGOOS development has progressed significantly in the last year. Regional Task Teams have expanded their scope, ambition and commitment from participating agencies; the European Directory of the Initial Ocean-observing-system (EDIOS) project started as EuroGOOSs contribution to the GOOS Initial Observing System; EuroGOOS will host the first of the GPO, GOOS Fora of the Regions. The 3rd EuroGOOS conference (December 2002) will showcase progress in operational oceanography on a European and global scale and identify current gaps in observation and modelling and advise on future steps for efficient marine environmental prediction.

A description and current status of the network of operational environmental monitoring activities carried out aboard commercial ferries in Europe (Ferrybox Project) was presented. Planning for a global network of deep-ocean monitoring fixed stations was also described.

A description of the elements, rationale for and status of the 4-year IFREMER Bay of Biscay project was presented. Other national projects in France (IFREMER participation) involved in the development of operational oceanography were also described.

Spain's participation in the Gyroscope project (European contribution to the international ARGO programme) was presented. Profiling float deployments during 2002 and future deployments were highlighted.

An overview of COOP-GOOS and an update on progress in development of the COOP implementation plan were presented. Emphasis was placed on the role ICES can play in the development of GOOS at the regional and global scale.

The US GOOS programme, sponsored by the National Oceanographic Partnership Program (NOPP), has developed a strategy for implementation of an ocean observing programme driven by seven broad societal needs: climatology/oceanography, marine operations, national security, natural resource management, ecosystem preservation, natural hazards mitigation and public health. The thrust of US efforts to support GOOS at the global scale centre on the ARGO and GODAE projects and the ENSO observing system. A broad range of institutions and monitoring activities have been identified in relation to coastal GOOS in the US The coastal component will likely be implemented through a series of regional "federations". Examples of ongoing coastal observation programmes such as the Long Term Environmental Laboratory – 15 Meters (LEO-15) were highlighted.

Canada's contributions and commitments for coastal ocean observation (climate and non-climate related) were summarised. Two very different observation systems developed in Canada and the U.S were described. One, the Atlantic Zonal Monitoring Program (AZMP), was developed according to needs identified by the science community but influenced by requirements spelled out in Canada's Oceans Act. The other, the Gulf of Maine Ocean Observing System (GoMOOS), a corporate model, was developed entirely based on user needs (driven by a stakeholder surveys). The GOOS model requires input from both scientists and end-users at all stages (development through implementation).

The use of satellite remote-sensing (ocean colour) technology for addressing long-standing questions of foodweb – fisheries links, and its promise in general as a tool in operational biological oceanography, were highlighted. Preliminary analysis suggests that variance in fish larval survival on the Scotian Shelf may have a detectable component that is associated with the interannual variability in the timing of the spring phytoplankton bloom.

Canada's approach to ecosystem-based management (EBM) and national implementation activities were summarised. Canadian fisheries management policy is rapidly evolving to allow incorporation of ecosystem considerations. The ultimate goal is to develop a single ecosystem-based framework that integrates all human activities impinging on the ocean environment and will be applied to specific management or governance areas, designated as Large Ocean Management Areas (LOMAs). The hierarchical ecosystem objectives framework developed in Canada was described and the process by which high-level conceptual objectives are "unpacked" to define practical or operational objectives was explained. The efficacy of the framework is being tested currently through two Objectives Based Fisheries Management (OBFM) pilots in Canadian Atlantic coastal waters.

The Traffic Light Method (TLM), developed in Canada, is intended to be imbedded between the hierarchical objectives structure and set of management decision rules. TLM is one of a number of promising tools that provides a means by which environmental information can be incorporated into the stock assessment process. The TLM utilises a number of indicators related to the system or population characteristics in question to reflect the status with respect to the operational ecosystem objective. Each indictor is scored in colour sets from green (good) to red (bad); the indicators are then integrated into a single representation of the characteristic. A number of examples of the application of TLM to groundfish assessments were given and the continuing challenge of defining appropriate environment indicators and using them in stock assessment was reiterated.

The wide recognition of a need for consolidation, synthesis and evaluation of the growing body of environmental and ecosystem data in Canada was the basis for a presentation on plans to produce a series of State of the Ecosystem Reports for the NW Atlantic. The reports are seen as a means to gauge the success of ecosystem management at the same time providing an assessment of the state or "health" of the ecosystem. The presentation outlined a variety of integrative assessment methods that will be utilised and examples using fish species composition and time series of abiotic data were shown to illustrate the feasibility of the different methods. The reports will be generated by teams of inter-disciplinary specialists and the first in the series will focus on a limited geographic area, the eastern Scotian Shelf.

The day's presentations and discussions were summed up by identifying three planned or potential regional GOOS pilots that the SGGOOS is currently promoting or should consider promoting. The first, the North Sea Pilot, is well in hand; planning is underway and an implementation plan has been drafted with specific tasks for the SGGOOS identified. The Bay of Biscay project is another that is currently monitoring a broad range of ecosystem properties. What is not clear is how these data are being integrated, what monitoring strategy is being used for fisheries data and what custom data products are being produced or planned? The SGGOOS is encouraged to open communication with the project managers and explore the potential of the project as a GOOS pilot. The prospects of developing a NW Atlantic regional GOOS pilot was also discussed and one project, GoMAP in the Gulf of Maine, was identified as a possibility. The SGGOOS was encouraged to identify members inside and outside the steering committee that could pursue this suggestion inter-sessionally and report at the next SGGOOS meeting in 2003.

7 DEVELOPMENT OF THE IMPLEMENTATION PLAN FOR ICES INVOLVEMENT IN GOOS (TOR A)

The ICES GOOS Implementation plan, as presently available on the ICES web site, was reviewed. H. Dooley (ICES) and C. Summerhayes (IOC) undertook to review the ICES Implementation plan, and submit the revised version to the SG inter-sessionally.

7.1 Mutual Awareness and Collaboration with IOC and EuroGOOS (ToR A.i)

Methods to enhance and improve communication between ICES and IOC and EuroGOOS were discussed. The principle action needed under this agenda item is to communicate as rapidly as possible the results of the present SGGOOS meeting to:

1) ACFM – 21 May 2002. Copenhagen.
2) ACME – 3 June 2002. Copenhagen
3) ACE – 7–11 June 2002. Copenhagen.
4) The 35th Session of the IOC Executive Council - 4–14 June 2002
5) The ICES Annual Science Conference (Theme Session W) – 1–5 October 2002. Copenhagen.
6) The I-GOOS Regional Forum – 2 and 6 December 2002. Athens.
7) The 3rd EuroGOOS Conference – 3–5 December 2002. Athens.

7.2 Promotion of the ICES Annual Ocean Climate Status Summary (ToR A.ii)

The present knowledge of the IAOCSS is fairly restricted within ICES. However, some stock assessment groups in the Nordic Seas and Arctic areas do routinely refer to the IAOCSS. Members of the WG undertook to link their institute web sites to the IAOCSS. ICES undertook to increase the visibility of the IAOCSS on the ICES web site. IOC undertook to provide links to the IAOCSS from the JCOMM, I-GOOS and GCOS web sites. EuroGOOS undertook at install links with their relevant sites.

It was also noted that ICES produces a total of 5 "status" reports presently:

1) The ICES Annual Ocean Climate Status Summary
2) Baltic environmental Status Reports
3) Decadal Maps of HAB Events
4) Zooplankton Monitoring Reports
5) Maps of fish and shellfish diseases in ICES member countries

All can be found at http://www.ices.dk/status/, and all form a basic operational reporting system, for various aspects of the marine ecosystem in the ICES area.

7.3 Development of the ICES/EuroGOOS North Sea Ecosystem Pilot Project (ToR A.iii)

Harald Loeng informed the SGGOOS briefly about the ICES-EuroGOOS Planning Group on North Sea Pilot Project (PGNSP), which met at the Institute of Marine Research (IMR) in Bergen, Norway 27 February – 1 March 2002, and whose full report has been presented as ICES CM 2002/C:02.

They had two terms of reference: a) consider the basic concepts for integrating oceanographic and fish stock information; b) develop implementation plans for The North Sea Pilot Project. Based on presentations and the following discussion under a), it was concluded that there were several good reasons for integrating oceanographic and fish stock information. There was therefore a clear need for preparing an implementation plan for a pilot project in the North Sea.

The Planning Group prepared an implementation plan for an ICES – EuroGOOS North Sea Ecosystem Pilot Project (NORSEPP). The overall objective was to increase the efficiency and effectiveness of current relevant national and international monitoring systems, so as to facilitate applications of an ecosystem approach to fisheries management. The Planning Group also prepared eight specific objectives and prepared a work package for each of them in addition to suggestions for different products from the project. The focus on living resources was intended to limit the scope of the project to something achievable within a time frame of 3–5 years. If the project succeeds, its remit could be expanded to determine the usefulness of this approach as a tool for comprehensive environmental analysis in support of improved environmental assessments.

The Planning Group strongly recommended that SGGOOS should take the necessary action at its meeting in April 2002 to follow up the initiative from the Planning Group.

A more detailed background and development of the ICES/EuroGOOS North Sea Ecosystem Pilot Project (NORSEPP) is presented in Appendix 7. The Report from the ICES/EuroGOOS Planning Group on the North Sea Pilot Project was then considered in detail (ICES CM2002/C:02). Extensive and wide ranging discussions followed. The SGGOOS in particular noted four actions that had been asked of it:

1) To organise a "constitutional" meeting at the 2002 ASC to further debate NORSEPP
2) To discuss the potential of NORSEPP to move forward as an EU funded project
3) To thoroughly review the NORSEPP Implementation Plan
4) To prepare ToRs for relevant ICES Working Groups in order to internally forward NORSEPP in ICES

In summary, the principal outcomes from the debate were:

1) A meeting at the 2002 ICES ASC

It was not considered that such a meeting was the best way forward for NORSEPP. Such a meeting could have two possible purposes; 1) to carry out further planning for NORSEPP, 2) to advertise NORSEPP. Both can be achieved in better ways, and progress should be maintained within the ICES system by:

a) Submitting a Category 2 resolution to the 2002 Council meeting for another meeting of PGNSPP, under new ICES/EuroGOOS Co-Chairs, in 2003.
b) Submitting a Category 4 resolution to the 2002 Council meeting requesting that ICES adopts the NORSEPP as an internal ICES project.
c) Submitting a presentation introducing the concepts behind NORSEPP to Theme Session W. This will conclude by inviting ICES member countries to nominate members to the 2003 PGNSPP meeting.
d) Requesting agenda slots to present the NORSEPP concept to key Committees at the ASC, and inviting them to nominate members to the re-formed PGNSPP for 2003.
e) Establishing the PGNSPP under new ICES/EuroGOOS co-Chairs, and task them with organising the next steps in NORSEPP.

2) A potential European Union FP6 Integrated Project

A call for Expressions of Interest (EoI) has been made in order to help formulate the scientific priorities of the first call in the EU Framework 6 Programme (FP6). NORSEPP is considered an ideal candidate for a Integrated Project under FP6. EoIs must be submitted by consortia of national institutes. It was decided:

a) That IMR Bergen (Hein Rune Skjoldal) and the UK Met Office (Martin Holt) should be approached in order to formulate and submit and EoI by the 2002 June deadline, with the help of the ICES GLOBEC Office (Keith Brander). These people were approached during and after the SGGOOS meeting and have agreed to take this forward.
b) It was recommended that when submitting the EoI, either in the covering letter or the EoI itself, explicit reference is made to an additional EoI, focusing on fisheries management issues, presently being prepared by M St. John (Germany). These two projects could be merged, or run independently.
c) The NORSEPP community must be ready to act in autumn 2002 when the full calls for proposals are published.

3) Review of the NORSEPP Implementation Plan

The NORSEPP Implementation plan (Annex 3, ICES CM2002/C:02) was reviewed section by section. Comments were:

a) p14, first line: include the possibility of involving dialogue from ICES and EuroGOOS members outside the North Sea area.
b) p14, Overall Objective: Consider whether “initiate” or “initiate and enhance” is the aim of the project.
c) p14, Specific Objectives: While the project title, rationale and Work Packages refer to an ecosystem approach, the specific objectives fail to mention this. After discussion, it was considered that this criticism did not simply revolve around the phraseology, but was possibly an indication of more fundamental problems with the NORSEPP concept as it presently stands. An “ecosystem” critique of NORSEPP was commissioned by SGGOOS, and its results are presented as Appendix 8. While ICES needs to produce precise advice on fish stock exploitation, it also must acknowledge the other forms of fishery management advice being developed, and the tools that these need. NORSEPP can certainly develop the products needed by new fishery management methods, but developing such methods is outside its remit, and may fall within that of other FP6 integrated projects.
d) Workpackage 1: Presently has little focus. Needs to be more specific.
e) Workpackage 2: Here the work of WGFS should be mentioned, and cited as a partner.
f) Workpackage 3 and 4: The ecosystem approach needs to be enhanced.
g) Workpackage 5: Also needs links to WGFS.
h) Workpackage 7: Needs to more clearly define its role. Is it communication of ideas between communities, or dissemination of data products?

i) Workpackage 8: Main task is to manage the project. Not explicitly said in any detail.

j) In general, developments internationally must be taken into account more. New fishery management methods elsewhere (e.g., Canada traffic light approach, SCOR-IOC Working Group 119, 'Quantitative Ecosystem Indicators for Fisheries Management'), and new data technologies such as those being developed for the Census of Marine Life, and within the EDIOS project.

k) Overall, NORSEPP must not promise to deliver too much, but must be focused on delivering a real product in a realistic time frame.

Once the comments above are taken into account, the SGGOOS then formally adopted the NORSEPP Implementation plan.

4) Allocation of jobs to ICES WGs in order increase the momentum of NORSEPP

The ICES Science Co-ordinator (H. Dooley), undertook to draft ToRs inter-sessionally, and circulate these to the SGGOOS for comment before the 2002 ASC.

In the discussion above, presentation of the NORSEPP Concept was thought to be appropriate at the following venues:

1) The COOP IV Meeting – 24–27 September 2002. Cape Town.
2) The ICES Annual Science Conference (Theme Session W) – 1–5 October 2002. Copenhagen.
3) The I-GOOS Regional Forum – 2 and 6 December 2002. Athens.
4) The 3rd EuroGOOS Conference – 3–5 December 2002. Athens.

In order to do this the ICES Co-Chair (Turrell) undertook to prepare a draft PowerPoint presentation for review by the SGGOOS.

7.4 Development of the North Sea IBTS Quarterly Surveys in the North Sea (ToR A.iv)

The Chair of the IBTSWG, which met in Dublin just prior to the SGGOOS (8–11 April 2002), submitted a brief report to the meeting. The IBTS is expanding its geographical coverage, and member institutes have formed a consortium which has gained EU funding in the DATRAS (DAtabase TRAwl Surveys) project. This is due for completion in December 2003. It is suggested that a full report from the IBTS on this project is requested for the next SGGOOS meeting.

8 SUPPORTING THE ICES SECRETARIAT IN GOOS RELATED MATTERS (TOR B)

Two items were discussed with respect to this Term of Reference: 1) The relationship between ICES and the newly formed JCOMM, and 2) the forthcoming Theme Session "W" at the 2002 ASC in October 2002.

8.1 The Relationship Between ICES and JCOMM

A report describing potential links between ICES and the newly formed Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) was presented by Turrell and Dahlin, after they attended the first JCOMM meeting in Akureryi, Iceland 19–29 June 2001 (Appendix 9). Dahlin noted that the failure of ICES to be formally represented at the meeting was to be regretted.

Colin Summerhayes reported that the relationship with ICES had been discussed at the first JCOMM Management meeting, and that JCOMM has requested a fuller report for the next Management meeting (Date, Venue to be announced – possibly ICES Headquarters, Copenhagen).

Summerhayes went on to review the submitted document in some detail. Annotated comments have been included in Appendix 9. Some main action points arising from these comments are:

a) ICES and OOPC should commence a dialogue on mutual areas of co-operation.
b) ICES should invite the JCOMM Management Committee to meet at ICES HQ.
c) One of the Co-chairs of the SGGOOS should attend the JCOMM Management Group meeting.
d) ICES (SGGOOS or WGOH should review the national/regional GCOS action plans.

e) The ICES WGMDM should make contact with the JCOMM Data Management Group.

f) A member of SGGOOS should represent its work at the 4th session of COOP (24–27 September, Cape Town, South Africa).

g) SGGOOS should establish links with the JCOMM Products Bulletin. Contact should be made initially through Johannes Guddal (Co-president, JCOMM).

h) ICES member nations research vessel cruises should be publicised to facilitate possible ARGO deployment opportunities.

i) The ICES Marine data Centre should establish a dialogue and links with the new JCOMMOPS data centre.

8.2 Theme Sesssion W – 2002 ICES ASC

Harrison (Canada) introduced the concept of this Theme session, and a general discussion followed with respect to potential contributions. Many of the presentations at SGGOOS on Day 1 (Section 4 above, and Appendix5) may make suitable contributions. Following the SGGOOS meetings, ideas for contributions were requested to be submitted by SGGOOS members.

9 DEFINE AND PROMOTE THE ROLE OF ICES IN GOOS AND EUROGOOS TAKING INTO ACCOUNT INPUT FROM THE ICES COMMITTEES (TOR C)

9.1 Review of Upcoming Related Meetings

SGGOS was asked to review all relevant upcoming meetings, and members have been asked to notify the co-chairs following the meeting. The list at the meeting was:

GOOS Steering Committee	1–3 May 2002	Paris
International GODAE Symposium	13–15 June 2002	Biarritz
COOP IV	24–27 September 2002	Cape Town
3rd EuroGOOS Conference	3–5 December 2002	Athens
EuroGOOS Annual Meeting	7 December 2002	Athens

9.2 Review Working Groups, Workshops, Reports of Relevance to GOOS within ICES

It is recognised that there is an increasing resource of information regarding the application of operational oceanography, and ocean observing systems, to fishery and environmental management in an ICES context. In order to help the ICES community access this information, the SGGOOS has commenced a cataloguing process in order to allow rapid access to this information. Appendix 10 (reports, workshops) and Appendix 11 (relevant URLS) represent a start to this process. It is hoped that the SGGOOS will increase these list, and add to them by the time of the 2003 SGGOOS.

9.3 Briefing for GSC-V Meeting, Paris, May 2002

W Turrell (UK, Co-chair) requested that the SGGOOS and ICES supply a brief on what should be presented at the GSC-V meeting on behalf of ICES. No specific material was suggested. A general discussion followed on possible subject areas, and would include topics such as data management activities in ICES.

9.4 Initiation of a NW Atlantic Pilot Project for GOOS

During the progress of SGGOOS 2002, it was evident that there were potentially three “flavours” of GOOS pilot projects represented within the ICES community:

Operational oceanography applied to fishery management: As represented by the NORSEPP initiative.

Multi-disciplinary ecosystem monitoring: As represented by the single-nation (France) Bay of Biscay initiative.

High technology “organism orientated” coastal observatory type monitoring: As represented by the bi-national (USA/Canada) GoMAP initiative.

However, all these initiatives reside in coastal or shelf seas. The central Atlantic itself remains devoid of co-ordination in terms of operational monitoring. A discussion on the potential for a co-ordinated regional GOOS initiative in the central Atlantic region was thought to be too complex for the 2002 SGGOOS meeting, and has been recommended as a subject for the 2003 meeting.

SGGOS recommended that increased regional dialogue should occur to enhance existing national initiatives and make them more regional In particular France should be encouraged to widen the scope and participation within the Bay of Biscay work, and USA and Canada should increase their dialogue on ecosystem monitoring in the Atlantic seaboard region.

10 INFORM THE COASTAL OCEAN OBSERVATION PANEL (COOP) OF GOOS ON THE DEVELOPMENT OF THE NORTH SEA ECOSYSTEM PILOT PROJECT (TOR D)

The SGGOOS should lobby COOP at the May GSC to influence the content of the COOP implementation plan. The NORSEPP initiative should be explained at the COOP meeting in Cape Town, September 2002.

11 AOB

W Lenz (Germany) proposed that there was a need for north-east Atlantic GOOS stations.

NE-Atlantic GOOS stations - the need for a European solution: Since the Intergovernmental Oceanographic Commission (IOC/UNESCO) has called for a Global Ocean Observing System (GOOS) in 1991, many countries have arranged a co-operation in sub-areas of the world ocean, for example MedGOOS (Mediterranean), BOOS (Baltic), NEAR-GOOS (NE Asia). As far as these areas cover only the Exclusive Economic Zones (EEZ) of the partner countries, there are basically no principal difficulties in operating permanent observing stations. Problems arise in areas outside the EEZs. For European countries (EuroGOOS) this concerns the Northeast Atlantic. How should the costs of maintaining open ocean observing stations be divided?

In the past, such observations were conducted from ocean weather ships, which were run either by single nations or by international agencies, because they all had a substantial interest in it for the security of navigation (ships and flights). Meanwhile, the operation of weather ships has been replaced by meteorological observations from satellites as well as by drifting buoys at the surface. Observations within the ocean have not been continued at the positions of the weather ships and time-series, which register indispensable information on climate fluctuations, are interrupted.

As deep ocean observing stations outside the EEZs are of no direct practical use, at least at present, it is understandable that national agencies do not take on the responsibility of running such stations at their own cost. This presentation tries to stimulate a discussion within ICES and EuroGOOS to get the European Commission involved. Its research project ANIMATE is already designed to initiate long-term time-series measurements at three selected sites in the Northeast Atlantic. (Walter Lenz, Center of Marine and Climate Research, University of Hamburg)

12 ACTIONS FOR SGGOOS MEMBERS

Appendix 12 summarises all actions needed by SGGOOS members inter-sessionally.

13 NEXT MEETING OF THE SGGOOS

It was agreed that the next meeting in the SGGOOS will be in Nantes, France, 7–8 April 2003. It will plan and initiate further action in accordance with the Terms of Reference of the Group.

Suggested Terms of Reference are;

a) develop further the Implementation Plan for ICES involvement in GOOS (CM 2001/C:01) including:

   i) review the revised ICES GOOS Implementation plan, the ICES GOOS Flyer (its purpose, target readers and content), and the ICES standard sections and stations (their use as a contribution to GOOS),
   ii) review progress made towards enhancing mutual awareness and collaboration between ICES/IOC and EuroGOOS,

iii) review progress in the promotion of the ICES Annual Ocean Climate Status summary within the GOOS/GCOS/JCOMM communities and to investigate how this product might be improved to enhance its use in operational aspects of the work of ICES,

iv) review progress in the development of the ICES/EuroGOOS North a Ecosystem Pilot Project and recommend necessary actions,

v) review progress in enhancing the role of the North Sea IBTS quarterly surveys in the North Sea Ecosystem Pilot Project,

vi) consider the establishment of a central Atlantic Regional Pilot Project,

vii) review progress in other potential pilot projects (Bay of Biscay, GoMOOS, GMES, FP6 EoIs submitted in 2002),

viii) review changes in drivers for GOOS in ICES (e.g., OSPAR requirements, EU Directives, EU Marine Strategy).

b) advise and support the ICES Secretariat in GOOS related matters, including;

i) review progress with SGGOOS web site;

c) review the role of ICES in GOOS and EuroGOOS taking into account input from the ICES Committees, including

i) review of presentations made to GOOS/EuroGOOS;

d) review co-operation with the Coastal Ocean Observation Panel (COOP) of GOOS, including;

i) report on COOP Chair visit to ICES;

ii) report on presentations made to COOP;

APPENDIX 1: AGENDA OF THE 2002 ICES/IOC SGGOOS

Agenda – Day 1

9:00 Welcome and Introductory remarks - Monitoring for Canada's Oceans Act.
Mike Sinclair, Regional Director of Science, Bedford Institute of Oceanography

9:20 Meeting goals and agenda
Bill Turrell, Marine Laboratory Aberdeen/Glen Harrison, Bedford Institute of Oceanography

9:30 Planning Group on the North Sea Pilot Project (PGNSP) Report
Harald Loeng, Institute of Marine Research

10:00 Update on EuroGOOS
Hans Dahlin, Swedish Meteorological and Hydrological Institute

10:30 Health Break

10:50 Ferrybox Project, E. Atlantic fixed stations beyond national EEZs
Walter Lenz, Centre of Marine and Climate Research

11:20 The Bay of Biscay Project
Benjamin Planque, IFREMER

11:50 Gyroscope - an EU-funded Drifter Experiment
Alicia Lavin, Instituto Español de Oceanografía

12:10 Lunch

13:00 Update on the Coastal Ocean Observations Panel of GOOS (COOP)
John Cullen, Dalhousie University

13:30 The US GOOS Picture: a Programmatic Panorama and (selected) Potential Pixels
Wendy Gabriel, Woods Hole.

14:00 Canada's Contribution to Coastal Ocean Observations: Commitments and Collaboration
Peter Smith, Bedford Institute of Oceanography

14:30 Ecosystem Variability and Fisheries
Trevor Platt, Bedford Institute of Oceanography

15:00 Health break

15:30 An Ecosystem - Based Objectives Framework for Canada
Bob O'Boyle, Bedford Institute of Oceanography

16:00 Application of Traffic Light Method Considering Environmental Indicators
Paul Fanning, Bedford Institute of Oceanography

16:30 The NW Atlantic State of the Ecosystem Report
Ken Frank, Bedford Institute of Oceanography

17:00 Outline of Day 2 agenda
Bill Turrell/Glen Harrison

18:00 Reception

Agenda – Day 2

1. Welcome
2. Review of Membership
3. Report on Bergen interim SGGOOS meeting.
4. ToR a) develop further the Implementation Plan for ICES involvement in GOOS (C.M. 2001/C:01) including:

i) arrangement to enhance mutual awareness and collaboration with IOC and EuroGOOS,

ii) inter-sessionally work to promote the ICES Annual Ocean Climate Status summary within the GOOS/GCOS/JCOMM communities and to investigate how this product might be improved to enhance its use in operational aspects of the work of ICES,

1) Discuss/allocate inter-sessional tasks

iii) initiate, assist in the development of and provide oversight for the ICES/EuroGOOS North Sea Ecosystem Pilot Project as formulated in the SGGOOS workshop in Bergen 5–7 September 2001,

1) Issues arising from the February PGNSP meeting.
2) What does SGGOOS need to do to further NSPP implementation?
3) Identify input required from ICES PGs, SGs, WGs.

iv) develop and oversee the role of the North Sea IBTS quarterly surveys in the North Sea Ecosystem Pilot Project;

1) Status of IBTS – Andrew Newton's report.

5. ToR b) advise and support the ICES Secretariat in GOOS related matters;

1) Report on ICES relation to JCOMM
2) Theme Session "W" at the 2002 ASC in October 2002.

6. ToR c) define and promote the role of ICES in GOOS and EuroGOOS taking into account input from the ICES Committees;

1) Other upcoming meetings of interest to SGGOOS – GODAE, EuroGOOS.
2) Review of relevant past and upcoming reports/workshops/working groups (ICES, etc.*).*
3) SGGOOS briefing for GSC meeting in Paris, May 2002 – what does SGGOOS want to say? What material should Bill present?
4) Should SGGOOS initiate discussions/planning for a NW Atlantic Pilot Project for GOOS?

7. ToR d) inform the Coastal Ocean Observation Panel (COOP) of GOOS on the development of the North Sea Ecosystem Pilot Project.

1) SGGOOS responsibilities in COOP and OOPC implementation?

8. Date and venue for next meeting.

APPENDIX 2: LIST OF PARTICIPANTS

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APPENDIX 3: SUMMARY OF ICES/IOC SGGOOS MEMBERSHIP

SGGOOS Members [ATTENDING 2002]

Hans Dahlin (EuroGOOS, Sweden)
Wendy Gabriel (USA)
Bill Turrell (UK)
Glen Harrison (Canada)
Kees Zwaneburg (Canada)
Benjamin Planque (France)
Walter Lenz (Germany)

SGGOOS Members [NOT ATTENDING 2002]

Dieter Kohnke (Germany)
Johanne Fischer (Germany)
Andrew Newton (UK)
Gregorio Parrilla (Spain)
Roald Saetre (Norway)

Ex Officio Members

Colin Summerhayes (IOC)
Harry Dooley (ICES)

SGGOOS "Members" (Not yet nominated by their Delegates) [ATTENDING 2002]

Harald Loeng (Norway)
Alicia Lavin (Spain)

USA and Canadian GOOS Scientists [ATTENDING 2002]

Mike Sinclair (Canada)
John Cullen (USA)
Ken Frank (Canada)
Peter Smith (Canada)
Trevor Platt (Canada)
Bob O'Boyle (Canada)
Paul Fanning (Canada)

GOOS Scientists (Attended Previous Meetings) [NOT ATTENDING 2002]

Willem Behrens (Netherlands)
Savi Narayanan (Canada, JCOMM)
Chris Reid (UK)
Hein Rune Skjoldal (Norway)
Franciscus Colijn (Germany)
Erik Buch (Denmark)

APPENDIX 4: REPORT FROM THE 2001 SGGOOS INTERIM MEETING

Meeting of the IOC/ICES Steering Group on GOOS 8 September, 2001. Bergen, Norway

The meeting of the SGGOOS was convened at 9:00AM by Roald Saetre, ICES chair of the steering group at which time the agenda of the meeting was distributed and discussed. Copies of the Terms of Reference and Implementation Plan from the Southampton Meeting were distributed as well as the latest versions of the North Sea Workshop Statement of Conclusions and the Working Group #1 Report.

In attendance:

R. Saetre (ICES Co-chair)
B. Turrell
H. Dahlin
M. Holt
F. Colijn (observer for ICES Oceanography Committee)
G. Harrison (IOC Co-chair)
N. Fleming
C. Summerhayes

1. Assess the results from the North Sea Workshop and discuss the necessary actions to follow:

The chair moved immediately to the first agenda item, asking each member of the SG to provide his views on the outcome of the North Sea workshop of the previous three days. Bill started by expressing some concern about the mandate/power the SGGOOS has to advance some of its action items, specifically related to getting the North Sea Pilot started and implementing it (this question surfaced again when the Terms of Reference were discussed – see next section). It was reiterated that the SGGOOS, in the same sense as EuroGOOS, is a "tool" to facilitate action. The SGGOOS should be viewed as an interface between the environmental monitoring agencies and the fisheries agencies, a link for communication among groups that haven't communicated before. It was also noted that the SG should have some hand in the development of integrated "products". Frustration was expressed and the question was asked how we will get ICES onboard and more specifically get the fisheries interests engaged in the debate and planning as part of the SG-GOOS and the Pilot project. Roald re-emphasised that the role of the SGGOOS was to give the pilot project a push but not to run it. The importance of the "bottom-up" approach was mentioned with regard to bringing good people together in planning for the pilot and to insure that ICES gets good products. Nick Fleming's "middle side-ways" structure in EuroGOOS for facilitating communication (as opposed to the conventional top-down or bottom-up approach) was mentioned in regard to this discussion. It was also emphasised that the participants assembled to put together the pilot project will, in fact, determine and comprise the project management structure.

Discussion then moved back to Roald's initial question on impressions about the outcome of the workshop. Franciscus noted that the Products Working Group did not accomplish much. Again, it was viewed that the SG would steer but that participants in the pilot project would be primarily responsible for product generation. Nick expressed optimism that in general, there was parallel thinking going on among the diverse participants and a lot of consensus on major issues was apparent. He was also encouraged that the sole fisheries participant appeared to have a full appreciation for what the workshop wanted to accomplish and was very supportive. The absence of a significant fisheries contingency, however, meant that cross-agency linkages were not made. Nick pointed out that EuroGOOS provides these cross-agency links at the technical level but that to get the full participation of ICES may require action at the ministerial level. Nick also pointed out the examples of NOOS and the NW Shelf Plan for bottom-up (in a disciplinary sense). On a related topic, Nick pointed out some of the important issues that were absent from discussion at the workshop, namely a plan for work on chemistry in the North Sea, e.g., suspended sediment load and transport. Nick also mentioned that the SG is looking broader (in a geographical sense) to including the western North Atlantic research, assessment and management communities.

Colin expressed his encouragement that IOC-ICES-OSPAR interests found much common ground as the workshop progressed; participants appear to have left with a positive message to communicate to their agencies. He went on to emphasise that the success of the Pilot project will hinge on " a good team and strong, committed leader", drawing from the experiences of the other notably successful GOOS pilot/demonstration projects, e.g., ARGO and GODAE. There was a suggestion made that maybe EuroGOOS should take the lead in developing the Pilot but Colin felt that would be a mistake; ICES needs to play a leading role as a major customer of the Pilot products. He provided the example that GOOS is the "owner" of NOOS whereas ICES would be the "owner" of the North Sea Pilot Project. Discussion then moved back to the role of the SGGOOS and Colin reiterated that this steering group would be an important forum to link GOOS and ICES. In fact, it is the only place where ICES and GOOS are being brought together. Some additional

discussion and clarification made on the status of EuroGOOS with regard to the parent organisational structure. Colin indicated that EuroGOOS, although not technically an intergovernmental association per se, has been delegated the responsibility for developing GOOS in European seas by IOC, i.e., it has full intergovernmental approval for that role.

Roald wrapped up the discussion about the workshop by indicating that he was very happy with the final result. The only regret is that fishery people were not better represented. He noted, as before, the absence of the fishery people is a deficiency of the SGGOOS also and this must be rectified. There was some discussion about how members are "recruited" and the importance of "marketing" GOOS to the ICES community. In order to improve participation in the SG, it was suggested that ICES delegates must be pressured to put forward names. The fact that there are formal procedures for appointing members was mentioned. It was stressed that what the SG needs, of course, are members who will work, not just nominees. It was concluded that we can and should influence the selection of new members and that a workable size for the SG would be ~20 members. Hans mentioned that the steering committee of the Pilot Project will be comprised of some members of the SGGOOS. He also noted that ICES is currently looking for a project such as the North Sea Pilot to embrace – the timing for this initiative therefore seems very good.

2. Recommendations for the new Terms of Reference

Initial general discussion centred on the scope of the new ToR (and similarly, the expected life-time of the SG); some elements were identified as continuing while others were actions to be taken inter-sessionally, before the next meeting in spring 2002. It was suggested also that the Implementation Plan should be reviewed and revised further if necessary at the next meeting of the SG. Discussion then turned to the individual elements of the ToR and whether they should stand or be modified. Major modifications (not detailed here) were suggested for element (a) and inclusive paragraphs dealing with development of the Implementation Plan. There was considerable discussion on how the planning for the North Sea Pilot Project would be initiated and who would do it. Colin referred again to the existing Pilots in GOOS (ARGO, GODAE) and indicated the requirement for drafting a ToR for the Project as well as strategic plan, followed by an implementation plan. Roald indicated that his Institute (IMR) would take the responsibility for initiating the planning for the Pilot, to include producing a design outline and organising a "side-event" at the March Ministerial meeting. A draft will be circulated among the SG (and wider group?) members beforehand for comment.

Discussion then turned back to the SGGOOS ToR and Bill and Hans reminded the group that for every ToR element, ICES requires background information (and justification), particularly if the ToR element involves costs (e.g., for further meetings, workshops, etc.).

Roald agreed to prepare the draft ICES resolution for the ICES ASC and this is attached as Annex 1 to this report.

Bill then requested input for the theme session he is helping organise (as chair of the ICES Hydrography WG) for the fall 2002 ICES meeting – the proposed theme is linking operational oceanography and environmental/fisheries assessment/management. A number of titles were suggested by the SG members. Bill will draft a title and description of the session to circulate to the members shortly after this meeting. He also mentioned the Fisheries and Climate Symposium planned for 2003 and felt the SG should contribute in some way.

Colin wrapped up the ToR discussion by asking if the action items from the Southampton meeting had been addressed/resolved? The question was then asked when/where the minutes of this ad hoc meeting of the SG would be reported? It was decided that these issues would be included in the report of the next formal meeting of the SG in Halifax in April 2001. However, the revised ToR for the SG should be reported at this year's ICES meeting at the end of the month.

3. Selection/recommendation of new ICES Co-Chair

The discussion regarding recommendation for the next ICES Co-chair was short. The current chair indicated that he had discussed this with Bill and that Bill Turrell was certainly qualified and willing to take over the leadership of the SG-GOOS for ICES. The recommendation will go forward that Bill should assume the Co-Chairship of the SG-GOOS. Bill noted that he would not officially take the job until January; Roald will continue in that function until then. Discussion among the steering group members then concentrated on the responsibilities of the Co-Chairs in the short term, including (1) assisting in the organisation of the side-session for the Ministerial meeting in March, (2) organising the next SG-GOOS meeting in Canada, (4) convening the Theme Session for the next ICES Science meeting in fall 2002 and (3) providing input for the 2003 Fisheries and Climate Symposium. An immediate task is to make a formal request through the US member of ICES (Mike Sissenwine) to nominate a US member to the SG-GOOS. Glen Harrison agreed to action this item.

4. Time and place for the next meeting of the SGGOOS

Discussion started with the question of whether or not the next SG-GOOS meeting should be associated with one of the various European GOOS meetings, preferably after the March Ministerial meeting but before the next ICES fall meeting. Nick mentioned a number of opportunities associated with EuroGOOS and NOOS planning meetings. Colin suggested that the SG meeting should be independent of other meetings and further suggested Canada as the venue since the steering group is in their process of broadening its mandate to include the North Atlantic as a whole and North America has been under-represented in previous meetings. Glen supported this suggestion and agreed to explore the possibilities of holding the next SG-GOOS meeting in Halifax, Nova Scotia sometime in April, 2002. It was suggested that the meeting be 2–2.5 days (shorter, i.e., one day, might discourage group members from travelling so far) and that progress from the north-west Atlantic side in merging operational oceanography and fisheries could be highlighted at that meeting.

Discussion then shifted to the Theme Session on North Atlantic Processes for the 2002 fall ICES Meeting. Bill proposed a title and debate centred around what wording we should use to attract fisheries and environmental assessment/management types and operational oceanographers. A tentative title was selected, "Fishery and Environmental Management: Is there a role for Operational Oceanography?". Bill agreed to put together a text and circulate for comment so that this theme could be considered at the upcoming ICES meeting at the end of the month on Oslo.

Special thanks:

The meeting ending with Colin recognising the four years of excellent leadership Roald has given the SGGOOS and thanked him for his hard work and dedication. The meeting was adjourned at 12:30 p.m.

Annex 1

Recommendation

The ICES/IOC Steering Group on GOOS (SGGOOS) (ICES Co-Chair: W. R. Turrell, UK and IOC Co-Chair: W. G. Harrison) will meet in Halifax, Canada from 9 – 11 April 2002 to:

a) develop further SGGOOS Implementation Plan for ICES involvement in GOOS described in the report of SGGOOS (C.M. 2001/C:01) including;

   i) arrangement to enhance mutual awareness and collaboration with IOC and EuroGOOS
   ii) inter-sessionally work to promote the ICES Annual Ocean Climate Status summary within the GOOS/GCOS/JCOMM communities and to investigate how this product might be improved to enhance its use in operational aspects of the work of ICES
   iii) initiate, assist in the development of and provide oversight for the ICES/EuroGOOS North Sea Ecosystem Pilot Project as formulated in the SGGOOS workshop in Bergen 5–7 September 2001.
   iv) Develop and oversee the role of the North Sea IBTS quarterly surveys in the North Sea Ecosystem Pilot Project

b) advise and support the ICES secretariat in GOOS related matters;
c) define and promote the role of ICES in GOOS and EuroGOOS taking into account input from the ICES Advisory and Science Committees;
d) disseminate results from the North Sea Ecosystem Pilot Project and organise theme session at the ICES ASC in collaboration with the Working Group on Oceanic Hydrography;
e) to inform the Coastal Ocean Observation Panel (COOP) of GOOS on the development of the North Sea Ecosystem Pilot Project.;
f) will invite EuroGOOS to be permanent member of SGGOOS.

SGGOOS will report to ACME, ACE, and ACFM at their May/June meetings 2002, to ICES ASC, EuroGOOS Annual Meeting and to the Intergovernmental Commission for GOOS (I-GOOS).

APPENDIX 5: BACKGROUND TO ICES/IOC SGGOOS 2002

The ICES SGGOOS was established in 1998, with a remit to:

i) prepare an action plan for how ICES should take an active and leading role in the further development and implementation of GOOS at a North-Atlantic regional level

ii) with special emphasis on operational fisheries oceanography

iii) advise and support the Secretariat on GOOS-related matters assist the ICES Delegates to promote ICES on GOOS-related national activities

ICES SGGOOS 1998, by correspondence

The SG met by correspondence in 1998. Two issues immediately created some focus:

a) North Sea Pilot project: SG noted that the Statement of Conclusion from the Intermediate Ministerial Meeting for the North Sea on the Integration of Fisheries and Environmental Issues in Bergen, March 1997.

b) Incorporation of Environmental Data in Fish Stock Assessment

The SG felt that ICES should take an active and leading role in the development and implementation of a regional component of GOOS by taking the responsibility to establish and run a centre or centres for operational fisheries oceanography on a non-meteorological time-scale.

The SG recommended a workshop be held in Bergen in March 1999 to:

a) Identify existing ocean observing activities within the ICES area that are relevant to GOOS.

b) Investigate how these observations already being made routinely, could be combined and enhanced and incorporated within a common plan.

c) Propose a possible design for an ICES regional GOOS component

d) Develop a draft implementation plan for ICES-GOOS

1998 report: http://www.ices.dk/reports/occ/archives

Bergen Workshop and ICES SGGOOS, March 1999

The Bergen workshop essentially developed the draft ICES GOOS Implementation plan. This was subsequently revised by next SGGOOS meeting. It did recommend that the group should become a joint ICES/IOC Steering Group. Two useful annexes were one describing the North Sea Conferences, their achievements and plans (Annex 5) and one written by the ICES Oceanographer putting forward ideas about ICES role in relation to GOOS (Annex 9).

1999 report: http://www.ices.dk/reports/occ/archives

Southampton ICES/IOC SGGOOS, October 2000

This was the first meeting of the joint SG, and was a fairly large meeting with 16 participants. Its main task was to finalise the ICES GOOS implementation Plan (Presented as Annex 11). Presentations at the meeting (and their summaries as annexes to the report) informed ICES of developments in the LMR and Coastal GOOS Panels, EuroGOOS and some national GOOS programmes. The recommendations of the EuroGOOS "Bio-Ecological Observations in Operational Oceanography" (Hague, April, 2000), were usefully summarised as an annex. The 2001 Workshop entitled "Towards A North Sea Ecosystem Component Of GOOS For Assessment And Management" was proposed, co-sponsored by IOC, ICES, OSPAR, the North Sea Conferences and EuroGOOS.

Report: http://www.ices.dk/reports/occ/2001/C0101.PDF

ICES GOOS Implementation Plan: http://www.ices.dk/committe/occ/ices_goos_implementationplan.htm

(It should be noted that as the 2000 meetings was held after the 2000 ASC, the report appeared as a ICES CM 2001/C:01).

Bergen ICES/IOC SGGOOS Meeting, September 2001

In 2001 the SGGOOS met immediately after the Bergen Strategic Workshop, which resulted in the Statement of Conclusions; a key step towards the creation of the North Sea Ecosystem Pilot project (see Annex xx). However, some key issues were also addressed by the subsequent SGGOOS meeting:

SGGOOS mandate to implement NSPP: The mandate of SGGOOS to actually implement the NSPP was discussed. It was stated that the SGGOOS should be viewed as an interface between the environmental monitoring agencies and the fisheries agencies, a link for communication among groups that haven't communicated before. It was also noted that the SG should have some hand in the development of integrated "products". IMR undertook to hold a planning meeting for NSPP, possible as a side event at the 5NSC.

Workshop Itself: The outcome of the workshop was discussed. It was particularly noted that the fisheries community was underrepresented, at both the workshop and on SGGOOS itself.

SGGOOS membership: It was concluded that SGGOOS should be looking to recruit about 20 active members, including representatives from the fisheries community.

ToR for Halifax 2002 Meeting: These were set, with the additional goal of learning about progress from the North Atlantic side in merging operational oceanography and fisheries could be highlighted at that meeting.

As this meeting also took place after the 2001 ASC, the report appears as Appendix 6.

Additional Documents

The ICES Strategic plan: http://www.ices.dk/news/strategicplan.pdf

The ICES GOOS Flyer:

APPENDIX 6: SUMMARY OF PRESENTATIONS; DAY 1 OF ICES/IOC SGGOOS 2002

Introductory remarks - Monitoring for Canada's Oceans Act
Mike Sinclair, Regional Director of Science, Bedford Institute of Oceanography

On behalf of the Bedford Institute of Oceanography (BIO), Mike Sinclair welcomed the participants to Halifax and Nova Scotia. Having the meeting in Canada provides a stimulus to the definition of a Canada-USA COOP-GOOS pilot project. The year 2002 is respectively the centenary of ICES and the 40th Anniversary of BIO. It is fitting to take an historical perspective on the nature of ocean monitoring in ICES. The short presentation addressed why 2002 is a particularly opportune time for the definition of COOP GOOS pilot projects.

ICES has to some degree been an oceans monitoring organisation since 1902. Otto Petterson's proposal in 1895 at the Geographical Society meeting in London was to establish a monitoring programme for the north-east Atlantic at large space and time scales to address the topical issues of the day (e.g., climate variability, weather prediction and fisheries fluctuations). The spirit of his initial proposal was reflected in the early activities of original ICES Committees (A, B, C and Hydrography) during the first decade or so. The monitoring activities included seasonal coverage of hydrographic measurements at fixed stations and lines, as well as the size composition of fish landings (herring, cod and haddock in particular). These monitoring activities, in combination with targeted research on egg and larval distributions and fish ageing, led to a paradigm shift in the interpretation of fisheries fluctuations. Under the new theory, first elaborated by Johan Hjort in 1913 (published in 1914), these fluctuations were interpreted to be due to year-class variability of age structured populations. The key points to be made here are that ICES from the beginning was a sort of "Proto-GOOS", and that good monitoring in combination with process oriented studies contributed to good science.

From the 1920s to 1970s the monitoring in ICES evolved to support fisheries management. In the earlier period (1920 – 1940) the sampling of fish sizes led to forecasting of trends in abundance of long-lived commercial species such as cod and herring. The monitoring programmes through the two wars also led to a clear proof of the theory of overfishing, which was necessary before member countries were willing to take action on limiting fishing effort. During the 1950s to about 1990 monitoring strategies were relatively narrowly defined in relation to the specific needs of fisheries management, and later environmental management. The monitoring activities were defined in relation to the indicators for fisheries decision making [indicators of fishing mortality (F) and stock biomass (E)], based on the conceptual framework of developed by Beverton and Hold (yield per recount) and Pope (virtual population analysis). Following the Oslo/Paris and Helsinki conventions monitoring strategies were developed for contaminants. The key point here is that ocean monitoring has been sector specific and defined in relation to the needs for management decision making.

The present challenge for ocean monitoring is well articulated in the ICES Strategic Plan. Research, monitoring and advice will be in support of integrated oceans management, with broad conservation objectives for the protection of the diverse marine ecosystems in the North Atlantic. There have been several drivers for this change in perspective from sectoral management, with narrow conservation objectives, to integrated management with ecosystem objectives. These include:

- Recognition that fisheries activities are having significant impacts on biodiversity and ecosystem structure and function (as summarised in the ICES/SCOR Symposium on the Ecosystem Effects of Fishing in Montpellier in March 2000)
- Fisheries management requires a broader set of conservation constraints that address ecosystem features as well as sustainability of the target species of exploitation.
- Legal institutional arrangements (international and national) include the protection of biodiversity and ecosystems (e.g., Convention on Biological Diversity, FAO Code of Conduct, United Nations Fisheries Agreement, Australian Oceans Policy, Canadian Oceans Act).
- Climate change concerns have generated multidisciplinary global programmes including WOCE, CLIVAR, JGOFS and GLOBEC, which in turn generate the need for oceans monitoring of a broader nature than sector management of ocean industries.
- Developments in technology allow cost effective monitoring at the ecosystem level.

The challenge is to operationalise the lofty concepts of integrated oceans management with ecosystem objectives. An emerging framework has the following features:

- Definition of ocean management areas based on administrative convenience.

- Definition of a common set of overarching ecosystem objectives to constrain the objectives of all ocean industries. The objectives address maintenance of biodiversity at three levels (ecosystem type or seascape, species, and genetic), ecosystem productivity and marine environmental quality.
- The general ecosystem objectives are translated into operational objectives/strategies with specific indicators that are monitored in the oceans. The indicators are the basis of decision making around reference points.

It is proposed that COOP GOOS in the ICES area should be designed to provide the data products for the indictors required for integrated management and/or coastal zone management. The design framework would parallel the approach that climate-GOOS has taken.

There are other considerations for a COOP-GOOS monitoring programme. The interpretation of causality between a change observed in an indicator and an ocean activity such as fishing or oil/gas production will be an ongoing challenge for integrated management. Thus there is a need for the monitoring of oceanographic conditions (physical and biological) that will help characterize natural climate variability.

The final remarks addressed the somewhat unique role of the "Steering Group". Steering is the key work here. There is a requirement for the group to identify tasks to be undertaken by diverse ICES working and study groups with respect to monitoring in the North Atlantic. The group could also address the desirability of ICES producing state-of-the-ecosystem reports that are tailored to the needs of integrated management. The vision of ICES, to be "relevant, responsive, sound and credible, concerning marine ecosystems and their relation to humanity" is pertinent to the work of the group in addressing the ocean monitoring requirement for the North Atlantic.

Discussion***:*** Introductory comments well-received. SGGOOS members reaffirmed their role in steering, Immediate task is to move the North Sea Pilot Project forward.

Planning Group on the North Sea Pilot Project (PGNSP) Report
Harald Loeng, Institute of Marine Research

Harald Loeng informed briefly about the ICES-EuroGOOS Planning Group on North Sea Pilot Project (PGNSP), which met at the Institute of Marine Research (IMR) in Bergen, Norway 27 February – 1 March 2002.

They had two terms of reference:

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

Based on presentations and the following discussion under a), 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.

The Planning Group prepared an implementation plan for an ICES – EuroGOOS North Sea Ecosystem Pilot Project (NORSEPP). The overall objective is to increase the efficiency and effectiveness of current relevant national and international monitoring systems, so as to facilitate applications of an ecosystem approach to fisheries management

The Planning Group also prepared eight specific objectives and prepared a work package for each of them, in addition to suggestion for different products from the project. The focus on living resources is intended to limit the scope of the project to something achievable within a time frame to be agreed. If the project succeeds its remit could be expanded to determine the usefulness of this approach as a tool for comprehensive environmental analysis in support of improved environmental assessments.

The Planning Group strongly recommended that SGGOOS should take the necessary action at its meeting in April 2002 to follow up the initiative from the Planning Group.

Discussion: The scope of North Sea Pilot was discussed, i.e., whether is should be limited to physical oceanography and fish or broadened to include other ecosystem components, contaminants, etc. It was argued that the scope should be limited initially to insure success and that the fisheries component is, after all, ICES' niche. It was also reiterated that the pilot will pull together existing monitoring activities, not create new ones. Funding for the pilot was also discussed with the point being made that there should be assurances for contributing parties that the pilot would be funded even if

the proposed 6th Framework submission was not successful. The importance of developing custom data products was stressed and close consultation with the ICES GLOBEC WG was advised in this regard.

Update on EuroGOOS
Hans Dahlin, Swedish Meteorological and Hydrological Institute

EuroGOOS is an association of 31 agencies and institutes from 16 European countries, founded in 1994, to further the goals of GOOS, and in particular the development of Operational Oceanography in the European Sea areas and adjacent oceans.

EuroGOOS, the European Regional GOOS body, has the following main objectives:

i) to foster European co-operation on and contribute to international planning and implementation of the Global Ocean Observing System ("GOOS");

ii) to identify European priorities for operational oceanography and to promote the development of science, technology and computer systems for operation oceanography and assess the economic and social benefits from operational oceanography;

iii) to develop policies for the furtherance of GOOS and to co-ordinate the best European participation in GOOS, identifying where greatest value is added by collaboration;

iv) to promote collaboration between existing European multi-national agencies, programmes, organisations, and initiatives having expertise in oceanography, operational systems, and remote sensing of the ocean;

v) to provide, as appropriate, expertise, working groups, workshops, consultants, etc., to the GOOS Steering Committee and I-GOOS and the international sponsor agencies of GOOS and to collaborate with other regional GOOS organisations;

vi) to promote studies and the evaluation of the economic and social benefits produced by operational oceanography;

vii) to co-operate as appropriate with organisations concerned with climate change, global environmental research, and the impacts of climate variability and climate change;

viii) to publish findings of meetings, workshops, studies, and other documents commissioned by the EuroGOOS Members, joint representation at and submission of documents to international meetings related to GOOS, and collective representation of GOOS to European and national Agencies, when requested by Members;

ix) to co-ordinate GOOS data acquisition with existing European and national data gathering under agreements and conventions relating to pollution monitoring, marine meteorology, navigation and safety at sea;

x) to promote the development of European regional and local operational oceanography, taking into account the Modules of GOOS for the Coastal Zone, Health of the Ocean, Living Marine Resources, Climate, and Ocean Services;

xi) to promote the development of common European operational data procedures and services, including data quality control and data management for operational oceanography;

xii) to promote the research and pre-operational research which will solve problems relating to operational oceanography;

xiii) to promote the development of common infrastructure and to promote major systems or capital installations required to support European operational oceanography;

xiv) to promote pilot studies in GOOS operations, local, regional, or global;

xv) to promote the development of common European operational oceanographic services and products of maximum value to European governments and agencies, the furtherance of European industries and service companies, and the protection of the environment and health in the European coastal and shelf seas;

xvi) to promote the development of low cost efficient operational instrumentation, observing systems, and data acquisition systems;

xvii) to support operational oceanography and services in collaboration with public and private sector organisations and programmes in Europe concerned with ocean technology;

xviii) to promote collaboration with space agencies and remote sensing scientists and engineers so as to ensure optimum integration of both *in situ* and remote sensed data in operational oceanography;

xix) to promote aid, technology transfer, and collaboration with developing countries within the framework of GOOS;

xx) to promote collaboration between European institutes and agencies in providing aid and assistance to developing countries for operational oceanography, and the necessary capacity building.

Update on EuroGOOS. The last year has been an important phase of development for EuroGOOS. EuroGOOS is now fully independent of any financial support other than the Members' subscriptions. The twin objectives of provision of regional operational services and the conduct of pre-operational research have attained equal importance. EuroGOOS continues to be firmly committed both to promoting the development of operational services which already exist, and the maximum investment in pre-operational research to create the science and services of the future

The Regional Task Teams of EuroGOOS are continuously growing in scope, ambition, and the commitment from participating agencies. This is exemplified in particular by the signing of Memoranda of Understanding to commit resources to BOOS, and to NOOS. The Mediterranean Forecasting System Pilot Project, MFSPP, has been an astounding success, and its successor, MFSTEP, has achieved EC funding. Developments in the Atlantic continue at a high level of activity, centred around CORIOLIS, MERCATOR, FOAM, GYROSCOPE, and DIADEM-TOPAZ. The EuroGOOS Arctic Task Team formulated a policy focusing on the Nordic Seas between Norway and Greenland. Data products available from many of the major agencies demonstrate the increased range of variables and forecasts in routine use in all sub-regions.

The Black Sea GOOS MoU was signed by 5 of the 6 Members in June 2001, and the 6th Member in September 2001. A Joint MoU with EuroGOOS was signed 20 December 2001. The EC funded project ARENA will provide the necessary research infrastructure for the pre-operational ocean observing and forecasting system in the Black Sea according to the needs of the end users. EuroGOOS, through the EuroGOOS Office, is an active partner in the ARENA project.

The new GOOS Fora of the Regions are organised by the GOOS Project Office, GPO, on behalf of I-GOOS. EuroGOOS has offered to host the first GOOS Regional Forum in connection with the third EuroGOOS Conference. The Forum is now being organised as an integrated part of the Conference 2–6 December 2002 in Athens, Greece, and gives a good opportunity for the participants of the Forum to also follow the scientific-technical programme.

One basic objective of EuroGOOS is to co-ordinate the European contribution to GOOS and in particular the contribution to the Initial Ocean Observing System. With substantial support from the European Commission EuroGOOS has started the project European Directory of the Initial Ocean-observing System, EDIOS. This project aims to produce an extensive and detailed metadata base on ocean observations made by European countries. The metadata base will be a web based inventory serving different users, but it will also serve specific EuroGOOS requirements as supporting the design of a European network and the contribution to GOOS, and to define the availability of observed data in relation to the EuroGOOS Data Policy.

JCOMM links IOC and WMO in a Joint Commission. Most EuroGOOS members are active in either or both IOC and WMO. At present the oceanographic community is not well organised to develop key issues at the global scale for presentation to JCOMM. The GOOS Regions need to work with I-GOOS and GPO to prepare material for JCOMM and for co-ordinated commitments. In Europe several countries are to small to be able to be active in JCOMM or to give the global scale enough priority. Early 2002 EuroGOOS begun a dialogue with JCOMM to find a strategy for co-operation and how to benefit mutually from European initiatives as GMES, Global Monitoring for Environment and Security, and the 6th Framework Programme, FP6.

Funding from the European Commission under the successive Framework Programmes has for many years supported the development of operational oceanography in Europe. The programmes for Marine Science and Technology, MAST, and the Forecasting Cluster under the 5th Framework Programme, FP5, have been directly dedicated to marine science and operational oceanography. Many EuroGOOS related projects funded under the last phase of MAST are now completed, and some of the projects funded under the early calls of FP5 are also completed.

EuroGOOS related project proposals have been very successful in the last call of FP5. These projects include MAMA and PAPA, which give valuable support for the co-ordination of operational activities from all coastal states and continued development of operational oceanography in the Mediterranean and the Baltic Sea respectively.

The 6th Framework Programme will use a new approach to plan the calls and to select projects. Europe's research community is invited to help prepare the first calls of FP6 by submitting Expressions of Interest, EoI. Two new "Instruments" will be used: Integrated Projects and Networks of Excellence. The projects under FP6 will be much larger than under earlier programmes, and also more autonomous in relation to the Commission in how to achieve the expected results and deliveries. FP6 gives operational oceanography en outstanding opportunity to fund continued integration, implementation of new technologies and, research for future needs. EuroGOOS members are involved in the preparations of EoI for both Integrated Projects and Networks of Excellence. The EuroGOOS Office and Officers are at present putting a lot of effort into the co-ordination of activities in order to focus strength on fewer and more competitive marine projects.

The third EuroGOOS Conference will be held in Athens, Greece, 3–6 December 2002. The mission of the conference is to show the progress of operational oceanography during the past three years on a European and a Global scale, to identify gaps in the current observing, nowcasting and forecasting capacity, and to advice on the next steps towards efficient marine environmental predictions. Following the successful example of the first and second conference, the meeting will bring together scientists, policy makers and representatives of private companies and agencies that work in the fast evolving sector of Operational Oceanography. Representatives from the Users' Community are invited to present their views and define their future needs for operational marine services.

The Conference will integrate the Operational Forecasting Cluster Meeting of the European Commission DG – Research and the GOOS Regional Forum. In this way the results of the major multi-national research efforts in Europe and the experience from other regions of the World Ocean will be presented to a wide audience. Strategies and methods will be compared and scientific challenges will be identified.

In November 2002 the European Commission will launch the 6th Framework Programme of European Community Research that will encourage and support large integrated efforts towards creating a European Research Area. The marine part of the programme will be presented at the Conference.

Discussion:

A number of questions were raised with regard to the operational oceanography projects funded under the 5th Framework, i.e., kinds of models, where the models reside, e.g., regional centres, etc. The need for operational ecosystem models was stressed but it was recognised at the same time that lots of research is needed before ecosystem models can be operationalised. It was also noted that there will be a need for appropriate observations on appropriate time-space scales to support ecological models.

Ferrybox Project, E. Atlantic fixed stations beyond national EEZs
Walter Lenz, Centre of Marine and Climate Research

Operational monitoring of coastal areas and shelf seas is mainly carried out by manual sampling and analysis during (research) ship cruises. In addition, automatic operating measuring systems on buoys allow routine measurements of standard oceanographic parameters, e.g., temperature, salinity, currents and in some cases other parameters, e.g., turbidity, oxygen and chlorophyll fluorescence. These systems are much affected by biofouling and the maintenance/operation costs are quite high mainly due to ship costs. Moreover information is limited to single positions, but with high frequency.

On the other hand, there are many routes for ferryboats and "ships-of-opportunity" which run quite frequently. Standardised measuring systems on such carriers have several advantages: 1) the measuring system is protected against waves etc., 2) biofouling can be more easily prevented (inline sensors) and 3) most important, the running costs are much smaller since the operation costs of the ship have not to be calculated.

Within the GOOS (Global Ocean Observing System) and EuroGOOS Framework we have started initiatives to develop automatic measuring systems for bio-oceanographic parameters. As a measuring platform ferries on regular routes offer a cheap and reliable possibility to obtain regular observations on near surface water parameters. Present activities are both nationally and internationally EU funded.

German FerryBox project:

The "German FerryBox" consists of a fully automated flow-through system with different sensors and automatic analysers. For a reliable unmanned operation the system is supervised by an industrial programmable logic control which can shut-off the system in case of very severe errors and operates automatic cleaning cycles, e.g., in harbour. At the time being, the FerryBox has sensors/analysers for the following parameters: water temperature, salinity (precision), turbidity, oxygen, pH, chlorophyll fluorescence, nutrients (ammonium, nitrate/nitrite, phosphate, silicate), main algal classes (special analyser to discriminate between different algal classes based on different fluorescence patterns). Data acquisition, -storage and telemetry is co-ordinated by an industrial PC. Data can be transferred to shore and the system can be remotely operated by GSM (mobile phone). Biofouling is prevented by pressure cleaning of the sensors with acidified tap water or under severe conditions (tropics) by chlorination. Sometimes clogging of the water inlet in the ship, interface by debris or fish causes problems. Since all flow rates are supervised by the system in such cases a pressure back-flushing cycle is initiated which clears the inlet.

The system had been installed on the ferry Hamburg(Cuxhaven)-Harwich and is under test since November 2001.

EU-Project FerryBox:

Within a few months we will start a so-called FerryBox project, where observations will be made along European coasts in waters of different character. Currently Ferries with automatic equipment are operated in the Baltic by the FIMR, in the North Sea by the GKSS, in the Dutch Wadden Sea by the NIOZ at Texel, between Southampton and the Isle of Wight in the Channel, between Oslo and Kiel by the Kiel University and between Oslo and Hirtshals by the NIVA in Oslo.

In the EU funded project we aim for ferries in the Mediterranean between Athens and Crete by the NCMR in Athens, in the Irish Sea by the Proudman Oceanographic Laboratory in joint co-operation with the Environmental Agency and in the Gulf of Biscay by Southampton Oceanographic Centre and the Spanish Institute of Oceanography. Our concept will offer us the possibility to compare different systems and different types of seas (enclosed, coastal, shelf, oceanic, oligotrophic, eutrophic,). Temporal and spatial resolution on a scale normally not available will enable us to use the data in operational models both as a means of calibration and validation. Cost effective monitoring is the main application, thus the project will deliver background data for the European Water framework directive.

Discussion:

Questions focused on the initial capital cost, maintenance, calibration, and whether any of the various Ferrybox projects were actually running in an operational mode; some are, e.g., in Finland. The development of data products was also discussed; impetus for the programme and the kinds of data products produced is driven largely by water quality conventions.

The Bay of Biscay project and GOOS related activities at IFREMER (France)
Benjamin Planque, IFREMER

In 2001 IFREMER has initiated the programme called 'Défi Gascogne' in the Bay of Biscay. The rational for the project is the necessity to possess adequate observations and forecasting tools for sustainable preservation of environment, species and human activities in the Bay of Biscay.

The three main goals of the project are (i) to understand the interactions between fishing resources, environment and human activities at the scale of the region, (ii) to determine the role of social and economical factors in controlling the above components of the system, and (iii) to analyse, understand and forecast the evolution of the Bay of Biscay system according to climatic and economical scenarios.

To address these questions, the project is subdivided in 5 main components: (i) habitat dynamics (physical processes and sedimentary structures), (ii) population ecology (mostly HABs, and commercial fish species such as anchovy, sole, bass, hake), (iii) communities (invertebrates and vertebrates, pelagic and benthic communities), (iv) fishing activities and management (monitoring of fishing activities, technical interactions, public policies, etc.), and (v) Technological development: multi-parameter (i.e., physical, chemical and biological) moored station. This last item, although in its early development phase, will be of direct interest to GOOS. Component i-iv all include observational and modelling activities which can also be of interest to GOOS.

The project is currently running with an initial duration of 4 years, with 80 man year/year and a budget of 2.5M€/year. The current phase of the project will end in 2005.

In addition to the Bay of Biscay project, IFREMER is involved in national programmes for the development of operational oceanography. The three main interacting programmes are CORIOLIS, MERCATOR and JASON-1. CORIOLIS is a programme for *in situ* measurements (including drifting profilers, XBT, CTD, surface buoys). MERCATOR is part of GODAE and is the modelling component. MERCATOR already published a bulletin of oceanic forecast. Satellite JASON-1 mission provide the remote observation for altimetry.

Discussion:

Questions were asked about data management and the nature of operational modelling in the Bay of Biscay project, considering the breadth of the project elements and amount of data being generated. This project was identified as a good example of a potential GOOS pilot, however, it faces the same challenges of integration as the North Sea pilot. Moreover, the Bay of Biscay project is more closely linked with OOPC activities than with COOP. Representation in ICES on the fisheries side is weak; data is provided but there are no French representatives on the various ICES stock assessment WGs.

Gyroscope - an EU funded drifter experiment. Gyroscope 0302 cruise
Alicia Lavin, Instituto Español de Oceanografía

The EU Project Gyroscope is the European contribution to the international experiment ARGO that plans to deploy 3000 autonomous profilers in the World ocean. Gyroscope objective is the development of a real time '*in situ*' observing system in the North Atlantic Ocean, by an array of Lagrangian profiling floats. It is funded with around 3 million € and extends from Jan 2001 to Dec 2003. There is a group of nine institutions French (IFREMER, SHOM,CLS), British (NERC, UKMO), German (IFM Kiel) and Spanish (IEO, ICM, ULPGC) leading by Ives Desaubies from IFREMER. During 2001, 13 profilers were deployed in the eastern North Atlantic.

This cruise Gyroscope 0302 was carried out from 2–23 of March 2002. During this cruise 20 of the planned 80 Gyroscope profilers have been deployed. It has also been carried out 39 CTD stations to provide *in situ* checking of the profiler sensors and the background information to refer the profiler data and performance. The cruise took place between the Canaries and the Mid-Atlantic Ridge, and the latitudes 24.5ºN and 30ºN on board of the Spanish ship B/O "Vizconde de Eza" that belongs to Secretaría General de Pesca Marítima (Ministerio de Agricultura, Pesca y Alimentación). Station positions are shown in Figure 1. The cruise was organised and lead by the Instituto Español de Oceanografía (Chief Scientist: G. Parrilla) in collaboration with the Universidad de Las Palmas de Gran Canaria.

The main objective of this cruise was to deploy 20 autonomous profilers: 15 Provor CT-F2, developed by IFREMER through an industrial partnership with MARTEC, and 5 APEX from Webb Res. Co. Both are designed to provide CTD profiles. They are programmed to achieve about 100 profiles from 2000 m depth to surface. Featuring active depth control and, prior to their profiling phase, they will stabilise at 1500 m. When they surface, after a 10 days cycle, data and location will be transmitted via ARGOS satellite before diving again.

PROVOR profilers are equipped with FSI CTD sensors. APEX ones use Sea Bird sensors that provide salinity instead of conductivity. Apex also use a hydraulic bladder, inflated by an air pump, in addition to the oil ballast, to speed up the emergence phase. Except for the profiler PV 14 due to a programming failure did not work, the rest was deployed successfully. Profilers records can already be seen and download in www.coriolis.eu.org.

The SeaBird 911 CTD was combined with a 24 10 l bottles Carousel which was substituted by a 12 bottles one after station 9, due to problems with the load tension on the CTD winch. More winch problems prevent CTD sampling on the second part of the northern section. Water samples were used for the determination of salinity, dissolved oxygen and nutrients. The acquisition and processing software used were the ones provided by the SeaBird makers. For most of the CTD casts a redundant C and T sensors were used. Salinity sensors were calibrated vs. the salinity of the samples measured with a Guildline Autosal mod. 8400B.

Discussion:

The comment was made that Argo floats can now be instrumented with low-energy demand bio-optical sensors, providing the potential for autonomous measurement of biological as well as physical properties of the upper ocean. There was some discussion on the mechanisms for integration of the various eastern North Atlantic Ocean observation programmes (EuroGOOS NE Atlantic task team) and the need for a more formal group to integrate entire N Atlantic.

Update on the Coastal Ocean Observations Panel of GOOS (COOP)
John Cullen, Dalhousie University

The vision of GOOS was described in a brief introduction. The Global Ocean Observing System will be a sustained, co-ordinated, international system for: gathering and processing data about the oceans ands seas; generating useful products and services including accurate descriptions of present conditions and forecasts of future conditions; creating long term data sets; and pre-operational research and development for new and improved products and services. Two modules are being developed. The OOPC is responsible for the ocean climate system and COOP is developing the coastal module. COOP is in the process of developing the Design Plan for the coastal module.

The observing system will be sustained and integrated, including elements that apply to marine services, ecosystem health and living marine resources. Generally, capabilities to provide data products for marine services are fairly well developed; R & D and integration of capabilities to detect and predict changes in biotic properties and processes will be more difficult and will take more time. A major objective is to detect and predict phenomena of interest to the broad range of user groups. Examples of phenomena include coastal flooding, chemical contamination of seafood, and oxygen depletion. The phenomena are typically local in scale, but occur globally. Often they are forced by larger-scale influences from land, sea and air.

The coastal module is being designed as a global system for the measurement of common variables (essentially a backbone), enhanced by a federation of regional elements. The coastal component of GOOS will be developed as a locally relevant, globally co-ordinated system providing timely access to data of known quality.

The five phases of implementation are: designing & planning; operational demonstrations and pilot projects; incorporating of existing observing systems; gradual operational implementation to full-scale; and periodic review, assessment, and improvement of the system. The coastal module is in the first phase, but several operational and pre-operational regional programmes have been identified as candidates for inclusion as the system develops.

The Design Plan is being drafted. It includes a description of guiding principles, the elements of the observing system, variable, models, data management, and integration. The ranking and selection of common variables for the global system is nearly complete. The goal is to identify a minimum number of variables that must be measured to detect and predict changes that are important to the maximum number of user groups. The procedure is objective and transparent: variables are ranked according to the number of phenomena they can help to detect and predict, with each phenomenon weighted by the number of user groups interested in it. It is clearly recognized that measurement of these variables alone will not be sufficient to detect and predict many changes; national and regional elements will make the needed observations and the global backbone will provide the large-scale and long-term context.

Several ICES activities are relevant to Coastal GOOS. Regional bodies such as ICES will definitely be important in the co-ordination of regional elements. The North Sea Ecosystem component of could be a model for regional development. Ecosystem based management an important theme in both ICES and GOOS. Also, the ICES Working Group on Harmful Algal Bloom Dynamics has encouraged (though not yet considered for official endorsement) a workshop on real-time observation systems for ecosystem dynamics and HABs (France, June 2003). This workshop has been endorsed by COOP.

Discussion:

Presentation well received by SGGOOS members. Much of the discussion centred on the process for selection of and regional utility of the common suite of variables under development by the COOP implementation team. Emphasis was placed on the importance of the development of region-customised variables. Discussion shifted to Tom Malone's invited lecture on COOP at the fall ASC and the importance of him articulating the need for strong linkages between the operational oceanography and the fisheries sectors in developing a comprehensive, relevant and responsive coastal ocean observing programme.

The US GOOS Picture: a Programmatic Panorama and (selected) Potential Pixels
Wendy Gabriel, Woods Hole

History. The US GOOS programme is sponsored by the National Oceanographic Partnership Program (NOPP), a Congressionally authorised organisation of Federal, academic, and industrial elements of the oceanography community. NOPP's mandate is to use partnerships among its members to co-ordinate and strengthen existing and planned oceanographic efforts. NOPP's National Ocean Research Leadership Council was requested by Congress to develop a plan for an ocean observing system, and an initial report, "Toward a US Plan for an Integrated Sustained Ocean Observing System" was prepared by a working group chaired by T. Malone and W. Nowlin. The report was reviewed by the US GOOS Steering Committee, and listed seven societal needs which would be met by a GOOS, reflecting domains of climatology/oceanography, marine operations, national security, natural resource management, ecosystem preservation, natural hazard mitigation and public health. A follow-up report, " An Integrated Ocean Observing System: A Strategy for Implementing the First Steps of a US Plan," was produced by the Ocean Observations Task Team, chaired by R. Frosch, under the aegis of NOPP's Ocean Research Advisory Panel. That report lead the Leadership Council to establish the Ocean US office, charged with the integration of existing and planned elements. In March, 2002, Ocean US and the US GOOS Steering Committee hosted an Initial Implementation Plan Workshop of participants representing Federal, state, and local government; industry, academic and non-governmental organisations. The objective of the workshop was to identify the set of core ocean measurements which addressed the maximum number of goals over the range of societal needs previously identified.. The workshop also characterised observing technologies as either immediately implementable, capable of being converted from research to operational, or benefiting from additional research. Finally, the workshop compared the operational feasibility of various observing technologies and systems with their ability to provide measurements to support the maximum number of observing goals. The workshop continued to follow the national and global model of dividing GOOS into a global and a coastal component. A final report is scheduled to be completed in June.

Global GOOS. Global GOOS projects primarily address societal needs in the areas of climate variability, national security, and marine operations such as shipping; and typically involve the Department of Navy, National Oceanic and

Atmospheric Administration, National Science Foundation and academic institutions. The thrust of the US efforts continues to be support of the Argo project and Global Ocean Data Assimilation Experiment (GODAE), and support of the ENSO observing system. The Argo and GODAE elements are implemented through the National Oceanic and Atmospheric Agency's Pacific Environmental Laboratory and the Atlantic Oceanographic and Meteorological Laboratory; and universities including Woods Hole Oceanographic Institute, Scripps Institution of Oceanography, and University of Washington. The latter programme is supported primarily through the Pacific Marine Laboratory's Tropical Atmosphere Ocean (TAO) project.

Coastal GOOS. Coastal GOOS projects address societal needs in the areas of resource management, ecosystem management, public health, recreation and energy. A much broader range of institutions are involved, including multiple state and federal agencies, universities, non-governmental organisations, and a variety of industries. Coastal GOOS will likely be implemented through a series of regional "federations". On-going efforts range from coastal ocean observatories to local, regional, and coastwide monitoring systems. Ocean observatories such as the Long Term Environmental Laboratory – 15 Meters (LEO-15) or GoMOOS (Gulf of Maine Ocean Observing System) have been operational for several years and have focused primarily on observing meteorological and physical oceanographic variables at a range of scales from less than centimetres to 20 km (CODAR) to coastwide (in the case of linked satellite data). At the other end of the spectrum, coastwide monitoring systems such as the Northeast Fisheries Science Centre's marine resource surveys have been routinely conducted from Cape Hatteras to Nova Scotia for over 40 years, collecting data on physical and biological variables ranging from surface and bottom water temperature and salinity to relative abundance indices for zooplankton, fish, invertebrate, and vertebrate taxa; life history characteristics of those taxa; fishery behaviour; and providing ecosystem metrics based on those data.

Discussion:

The need for (and difficulty of) the selection of "reference sites", i.e., where human influence is minimum, in developing coastal monitoring programmes was stressed. The question arose as to how in the US system is legislation at the congressional level to provide funds for coastal ocean observation generated? Answer – leading scientists get direct access to congressman!

Canada's Contribution to Coastal Ocean Observations: Commitments and Collaboration
Peter Smith, Bedford Institute of Oceanography

To put this presentation in context, I will first summarise Canada's proposed contributions to GOOS and GCOS under the climate module, OOPC. These consist of three priority levels of commitment:

Priority #1

- Sea Level: 5 gauges
- Hydrographic: Line P, AR-7W, OWS Papa, OWS Bravo
- Upper Layer T,S: ARGO floats, 25/yr (1999–2002). long-term maintenance of 75

Priority #2

- Upper Layer T,S: additional ARGO floats. 25/yr. long-term maintenance of 150

Priority #3

- Heat, Freshwater, Carbon Budgets and Transports: trans-ocean sections (Atl. + Pac.) every 8 years

The status of this initiative, according to the 2001 Annual Report of National GOOS Activities, is that the Arctic Tide Gauge programme has been funded at the level of $1.4M over four years, starting in 2001/02, and a total of 52 ARGO floats were delivered in 2001. Six of these floats have been successfully deployed in 2001; another 8 deployments are planned for 2002.

The primary goal of my presentation is to describe and compare two very different coastal ocean observing systems that have been developed in Canada and the US The Canadian system, the Atlantic Zonal Monitoring Program (AZMP), defined in official documentation as an "ocean augmentation (to GOOS) to meet national requirements", represents the initial efforts of DFO Science to perform ecosystem monitoring of the coastal zone in support of integrated management, as required by Canada's Ocean's Act (1997). The environmental monitoring under AZMP consists of the sustained collection of physical, biological, and chemical data in order to define and understand the causes of ocean variability on seasonal to decadal time scales, and to provide multidisciplinary data sets for marine ecosystem research. Key monitoring variables include:

Biological

a) Primary Production
   i) Chl a concentration,
   ii) phytoplankton dominant species composition,
   iii) Secchi disk and water transparency.

b) Secondary Production
   i) zooplankton biomass
   ii) zooplankton species composition, abundance, size structure.

c) Fish and Invertebrates
   ii) species composition,
   iii) distribution and abundance.

Chemical

a) Nutrient Concentrations (nitrate, phosphate, silicate)
b) Dissolved Oxygen

Physical

a) Temperature and Salinity
b) Sea Level

Ancillary Data (runoff, meteorological forcing, sea ice).

The fundamental elements of AZMP consist of:

- Regular multidisciplinary monitoring of biological, chemical and physical variables at fixed stations and along key transects of the continental margin,
- Collection and time series analysis of remote sensing of SST and ocean colour (SeaWiFs) in selected subareas of the region,
- Regional groundfish surveys, including hydrographic, biological and chemical sampling,
- Coastal sea level measurements, and
- Collection and analysis of continuous plankton recorder (CPR) data on the Scotian Shelf and Newfoundland Shelf lines

The measurements represent modest enhancements over previous monitoring activities, but utilise new standardised protocols and newly-developed instrumentation. Data archaeology and retrospective analysis played a large role in the development of the AZMP sampling strategy and analysis schemes.

Existing monitoring schemes at the inception of the AZMP consisted primarily of networks of sea level gauges, wind and wave buoys, nearshore temperature moorings, and satellite remote sensing. As a result of AZMP, these measurements were complemented by biweekly sampling of physical, chemical and biological variables at a series of fixed stations, and frequent occupations of a set of standard cross-shelf transects (Figure 1). Primary sections are occupied 2–4 times per year, with a special emphasis on the Halifax line and the 47oN section across the northern Grand Bank.

Early results have clearly demonstrated the utility of AZMP monitoring data. For instance, biweekly sampling at fixed Station 2 off Halifax has revealed temporal variations in the abundance and community structure of Calanus finmarchicus, indicating the timing of reproduction and its relationship to the growth cycle of phytoplankton. Similarly, analyses of 2-week average ocean colour properties in selected sub-areas of SeaWiFS data have revealed important temporal and spatial variability in the timing of the spring boom of phytoplankton. Station 2 has also been the test site for a unique new monitoring instrument, known as the Seahorse wave-powered profiler. Its low power requirements allow unattended long-term monitoring, producing high-resolution profiles of physical and biological properties over a

substantial part of the water column. These results have led to substantial new insights into the nature of the Atlantic coastal ecosystem at the relatively minimal cost of a modest extension to existing sampling networks.

Figure 1 Locations of fixed stations and cross-shelf transects for AZMP monitoring. Fixed stations are occupied biweekly, primary transects 2–4 times per year, and secondary transects as opportunity arises.

The model for the Gulf of Maine Ocean Observing System (GoMOOS) is radically different from that of the AZMP. GoMOOS is a non-profit organisation, recently incorporated in the State of Maine that is dedicated to building a coastal ocean observing system for the Gulf of Maine. GoMOOS began as a research project at the University of Maine, sponsored by the US Office of Naval Research, but is presently undergoing a transition to an operational utility. This transition has sometimes been painful, because the research goals are not totally aligned with those of other stakeholders, yet the scientific input is essential for design and implementation of the system. The mission of GoMOOS is user-based. Initial planning included an extensive survey to determine what data were of most interest to users of the system and how those data should be transmitted to them. This work continues, as the programme matures, with efforts to define the data and information products most needed by the users. This corporate model is run by a Board of Directors composed of representatives for various stakeholders, including municipal, state, and federal government agencies (US and Canada), research and educational institutions, private industry and the general public.

The primary elements of the GoMOOS technical programme consist of:

- Long-term telemetering moorings: basin, shelf, near-shore
- Long-range CODAR: 4 sites along New England coast, 3 km res.
- Satellite remote sensing: AVHRR, SeaWifs, MODIS, QuickSCAT
- Hydrographic surveys
- Numerical modelling: circulation (POM), waves
- Data management system: GoMIMS, client-server architecture

Strong partnerships with the US Navy and NOAA promote interoperability with regard to circulation and surface wave forecast modelling. The field programme commenced in July, 2001 with the deployment of ten telemetering moorings (Figure 2). In spite of technical difficulties, most of these are still reporting regularly. Furthermore, two of the CODAR installations are operating, but only one is fully functional at the moment. Ultimately, the CODAR system is expected to monitor surface currents at 3 km resolution over the inner 100–150 km of the Gulf, but will not extend to the outer banks and channels. The Canadian (DFO) contribution to GoMOOS is the development and validation of a state-of-the-art shallow water wave forecast model to replace the Navy's baseline system.

Figure 2. Locations of NOAA data buoys, C-MAN stations, and GoMOOS facilities proposed for the Gulf of Maine region.

In the near future, GoMOOS is expected to complete its transformation to an operational system, while enhancing its products and services to stakeholders. In Washington, US legislation has gone forward to enable the development of a national federation of regional coastal observing systems that will ultimately blanket the entire coastal zone of the US: east, south, and west. A common thread of protocols, data types and products will link these systems, so that boundaries remain as transparent as possible. GoMOOS may be considered as the pilot project for the NorthEast Observing System (NEOS).

Time will tell whether the US vision for coastal ocean observing materialises as planned. Obviously, its conception is very different from that in Canada. Personally, I would like very much to see certain of the GoMOOS infrastructure elements (e.g., CODAR, forecast models) extended into Canadian waters in support of integrated management of the coastal zone.

Discussion:

Information was requested on outreach programmes for GoMOOS and the AZMP monitoring programmes; public information/education is an important component of the former but has not yet been implemented for the latter. The SGGOOS was alerted about a new autonomous, moored-instrument coastal observing programme start-up in a Lunenburg Bay, Nova Scotia, developed by The Center for Environmental Observation Technology and Research (CEOTR) at Dalhousie University.

Ecosystem Variability and Fisheries
Trevor Platt, Bedford Institute of Oceanography

Using remotely-sensed data on ocean colour, we have established a time-series of the distribution of chlorophyll concentration in the Atlantic Zone with resolution one week in time and roughly one kilometre in space. From the time series, we can extract the following properties of the spring phytoplankton bloom for each year covered (1997 to present): timing of initiation, timing of maximum, amplitude and duration for each of the 1.5 million pixels in the Zone. These data form the raw material for an operational test of the match/mismatch hypothesis of Cushing. The test was made on the Eastern Scotian Shelf haddock fishery, for which annual survey data are available. We find that some 90% of the variance in abundance of 0-group larvae can be explained in a linear regression with timing of bloom initiation and timing of maximum as independent variables. The results cannot be regarded as definitive, given that the time series is, as yet, quite short. Nevertheless, they are strongly suggestive that variance in larval survival may indeed have a detectable component that is associated with interannual variability in the spring bloom.

We extended the analysis further back in time using the CZCS data for the period 1979 to 1981. With the combined data, we find that some 60% of the variance in larval survival can be accounted for by variations between years in the timing of the spring bloom. The data series on survival of larval haddock (1970 to present) contains two instances of very strong year classes: both of these occurred in years with abnormally early spring blooms. The null hypothesis that interannual variation in larval survival is independent of fluctuations in timing of the spring bloom will probably have to be rejected.

Discussion:

The comment was made that cause-effect may be more fruitfully pursued by looking at the more direct links of fish larval survival/variability to hydrodynamics and zooplankton as a food source rather than trying to link through phytoplankton abundance. At present, however, only phytoplankton abundance/distribution (from ocean colour) are available at synoptic scales to address these questions. The question was also raised about the limitations of remote-sensing data due to clouds. Despite frequent heavy cloud cover in coastal waters in the NW Atlantic at times, sufficient clear-sky conditions permit the characterisation of phytoplankton abundance on the appropriate temporal and spatial scales to begin to address questions of fish recruitment - foodweb linkages.

An Ecosystem - Based Objectives Framework for Canada
Bob O'Boyle, Bedford Institute of Oceanography

The presentation reviewed Canada's approach to ecosystem-based management (EBM) and recent efforts on its national implementation. It was pointed out that the current management of human activities using Canada's oceans is sector-based. For instance, fisheries are generally managed separately from oil and gas development, transport, and so on. There is no common approach to all sectors. Growing anthropogenic pressure on coastal and ocean ecosystems in Canada and elsewhere, highlighted by the collapse of many fisheries worldwide, has emphasised to need for ecosystem – based management. Over the past decade, Canadian fisheries management policy has been evolving to allow incorporation of ecosystem considerations into fisheries management. The most significant piece of legislation in Canada has been the Canada Oceans Act (1997), which is unique internationally. Under it, DFO is named the lead agency for oceans management and is obliged to develop management approaches that integrate all human activities under one ecosystem-based framework. Since the passage of the Ocean's Act, a number of workshops and conferences (Murphy and O'Boyle, 1999; O'Boyle, 2000; Jamieson *et al,* 2001; Vancouver Ocean Stewardship Conference, June 2001) have been convened to encourage the operationalization of EBM in Canada.

Large Ocean Management Areas. The first issue to resolve is the management or governance area (analogous to a stock area for fish). This outlines a common area within which all users 'play' by the same rules or same general ecosystem objectives. In Canada, these are called Large Ocean Management Areas (LOMAs), the boundaries of which will be based on biology, stakeholder requirements and current administrative boundaries. LOMAs provide the geographic framework for governance. So far, LOMAs have been identified on the Eastern Scotian Shelf, in the Gulf of St. Lawrence and Beaufort Sea, and the Central Coast of BC. It is planned to finalize LOMA boundaries in 2003.

Ecosystem Objectives. A workshop (Jamieson and O'Boyle, 2001) of national and international experts was convened in Sidney, BC during February 2001 to identify the ecosystem-level objectives that would guide ocean management and to consider illustrative indicators and reference points for these. These are in the process of being officially adopted as the basis for Canada's ocean management.

A hierarchy of objectives was developed, with the top most, overarching objectives defined by the two dimensions of sustainable development – the sustainability of human usage of the environmental resource (the socio-economic

dimensions) and the conservation of species and habitats (the environmental dimension. The workshop focused on developing the elements of the latter, recommending that a similar national workshop is required to define the socio-economic objectives.

The high level, conceptual, objectives of the environmental dimension were further considered in three sub-objectives:

- Conserve components (communities, species, populations, etc.) so as to maintain natural resilience of ecosystem
- Conserve each component so that it can play its historic role in foodweb
- Conserve physical & chemical properties of ecosystem

These address the biodiversity, productivity and habitat of an ecosystem.

The biodiversity conceptual sub-objective is composed of three sub-objectives:

Maintain within bounds of natural variability:

- Communities
- Species
- Populations

The productivity conceptual sub-objective has three sub-objectives:

- Maintain primary production within historic bounds of natural variability
- Maintain trophic structure so that individual species/stage can play their historical role in foodweb
- Maintain mean generation times of populations within bounds of natural variability

Finally, the habitat conceptual sub-objective consisted of:

- Conserve physical features e.g., critical landscape & bottomscape features and water column properties
- Conserve chemical features e.g., water quality and biota quality

The next step is to define Strategies or operational objectives that can be included in management plans. These consist of a verb (e.g., maintain), specific measured indicator (e.g., biomass), and reference point (e.g., 50,000 t) and are derived through the 'unpacking' of the conceptual objectives in workshops involving experts, managers and stakeholders. This will likely have to be done separately by ocean sector, which would produce operational objectives specific to that sector. The advantage of the objectives hierarchy is that it explicitly links the higher level, policy, statements, that are the same for all ocean sectors, with operational objectives specific to that sector. As well, the hierarchy allows one to determine which 'branches' of the hierarchy are meeting their objectives and to establish priorities across these branches.

Ecosystem Assessment. The many potential operational objectives infer many indicators and associated reference points, some qualitative and some quantitative, often with limited understanding and models that link cause and effect. For decision-making and communication, a different approach from traditional assessment methods is thus required. The Sidney workshop considered two potential methods (Index of Biotic Integrity and Traffic Light Approach), which are related to Rapfish, MCDS, and other like techniques. The Traffic Light Approach, for instance, combines diverse indices into one framework, which could include indicators and reference points for all parts of management system, addressing the resource (diversity, productivity, habitat), socio-economics, and enforcement. While many technical issues remain to be resolved, these techniques show promise for Ecosystem-based Management.

Implementation of EBM in Canada. Since the 1997 Oceans Act, Canada has made progress towards implementing EBM. As stated above, the boundaries of LOMAs are in the process of being established. Integrated Management pilots are underway in a number of regions, with dialogue underway with the various ocean sectors on the concepts and objectives of EBM. Fisheries is one of the most complex sectors and here, a nationally led Objectives Based Fisheries Management (OBFM) initiative has been initiated. In the Maritimes, two OBFM pilots – one for groundfish and one for the Bay of Fundy scallop – have been initiated. In the development of the draft OBFM groundfish plan, the current strategies and measures used in the fishery were linked to the Sidney ecosystem objectives. Over the next five years, these will be further developed through unpacking exercises to provide operational objectives for all ecosystem components.

In the coming years, it will be important to establish effective governance structures to steer the implementation of EBM is Canada. Already progress has been made in the Maritimes in this area, with the creation of the ESSIM Forum for integrated management and the Fishery Roundtable for OBFM. These organisations can facilitate unpacking workshops in all ocean sectors to create tables of operational objectives. It is important that the experiences of these workshops are shared to learn how best to proceed on EBM. Also, research is required on the assessment frameworks and how these can be used in decision-making.

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Discussion:

The problem of first defining ecosystem boundaries and then reconciling them with resource management/administrative boundaries was raised. It was proposed that this could be dealt with using a "nested" approach. The question was raised why ecosystem objectives should strive to "preserve" or "conserve"; maybe change is acceptable/better in the long run? More appropriately, the objectives should be formulated in order to maintain system/community diversity and resilience.

Application of Traffic Light Method Considering Environmental Indicators
Paul Fanning, Bedford Institute of Oceanography

The progress being made towards a wide range of environmental or ecosystem objectives is being monitored through a variety of systems of indicators. Examples include the UK system called the Quality of Life Counts to monitor progress towards the objectives of sustainable development in the UK. Another example is the Dashboard of Sustainability being developed under the auspices of the European Commission. In both cases they are attempting to both determine the degree of progress being made towards the relevant objectives and to present it in a format that is both information-intensive and readily grasped. In both these examples, various others, and our traffic light method, a system of colour scoring with red, yellow and green is used. The UNFAO has also been active in promoting the development of Sustainable Development Reference Systems and the variety of indicators required by such systems.

The Traffic Light Method (TLM), as developed in the Maritimes Region of DFO, is intended to be embedded between a hierarchical structure of objectives and a corresponding set of management decision rules. Objectives set at a strategic level are repeatedly 'unpacked' into more specific objectives until a point is reached at which the objective is recognised as something that we can actually monitor in the real world. At this point the objective will consist of a characteristic of the population or system, a verb defining what we wish to achieve and reference point(s) defining either the point at which we wish to be (a target), a point we do not wish to cross (a limit) or both. The TLM utilises a number of indicators related to the characteristic in question to reflect the status with respect to the objective. Each indicator is scored in colour sets from green for good to red for bad and the individual indicators are integrated into a single representation of the characteristic. The integration preserves the relative contributions of each colour and so is able to both reflect intermediate states and conflicting signals from different indicators.

In the fish stock assessment context the characteristics of interest are related to the productive capacity of a fish stock to sustain a harvest. The biological characteristics include abundance, production, fishing mortality and ecosystem or environmental factors. Fisheries factors include economic, social and management characteristics. The characteristic of abundance can be estimated by a number of indicators such as research vessel surveys, population dynamic modelling, commercial catch per unit of effort as well as other, less direct, means. The acceptable indicators of given characteristic require a careful review to ensure the properties of the indicator are understood and the colour boundaries are supportable.

The original TLM was developed with abrupt transitions from one colour to another a set values. This caused an avoidable loss of information, particularly in the transition areas where the greatest need for information existed. The loss of information was greatly reduced by implementing gradual transitions over a range of values as fuzzy sets or other means. The fuzzy set approach leads into fuzzy logic and fuzzy control theory as a means of implementing the decision rules required to achieve the objectives.

Application of fuzzy TLM to recent stock assessments has shown that the transition zone determinations are actually more easily accepted by clients and participants in the review process. The TLM has also reduced the disparity in assessment products between data-rich and data-poor stocks. Even if population dynamic models are not possible the TLM can be used to compile the available information to estimate the status of the important characteristics.

Regarding the question of environmental indicators in stock assessment, there are more questions than answers. Fisheries oceanographers and fish stock assessment scientists need to collaborate closely to construct environmental indicators which are actually related to the dynamics of the stock in question. The ability to describe the environment actually experienced by a fish stock requires understanding how a given species or stock uses or responds to particular aspects of it's environment. When such an indicator has been described, the TLM will allow its inclusion in the fisheries management decision making process.

Discussion:

A comment was made that TLM is also now being applied in studies of contaminants and site-selection in aquaculture. There was some concern expressed that the underpinning of TLM is very subjective. On the other hand, it does maximise the use of limited information and is independent of specific formulations/calculations.

The NW Atlantic State of the Ecosystem Report
Ken Frank, Bedford Institute of Oceanography

Ecosystem considerations in the context of marine resource management are now a major issue. There is wide recognition of the need for consolidation, synthesis and evaluation of the growing body of environmental and ecosystem data. The outcome of such an exercise – an Ecosystem Report, can be seen as a means to gauge the success of ecosystem based management schemes while providing an assessment of the status or health of the ecosystem. The Canadian Department of Fisheries and Oceans, Maritimes Region, has recently established a project with a goal to develop an ecosystem report for various areas of the north-west Atlantic, with an initial focus on the eastern Scotian Shelf. Several research objectives have been established to achieve this goal including integration of time series of biotic, abiotic and human metrics, testing the degree to which top down control by predators or bottom up production by plankton is responsible for changes in trophic structure and productivity, and evaluation of alternative management strategies associated with the conservation of marine resources such as the use of MPAs. How to combine and quantify the different data series is an important question and a variety of integrative methods of assessment will be explored, ranging from statistical approaches to community analyses to community size-spectra to traffic lights. Worked examples based on fish species composition data from research vessel surveys and time series of abiotic data were used to illustrate the feasibility of the different methods. Overall, the fish community composition on the Scotian Shelf has changed very little during the past thirty years although the dominance structure has changed dramatically, shifting from large bodied groundfish to small bodied groundfish and pelagic species. Interestingly, recent increases in stratification tend to coincide with the shift from demersal to pelagic dominance. The project will rely on a team of inter-disciplinary specialists within and outside of DFO to carry out this work. The expectation is to product a report within one year that will focus on the biotic and abiotic diversity of the eastern Scotian Shelf.

Discussion:

The question was raised if, in addition to a description of the status and trends in environmental conditions of the NW Atlantic, the report would make explicit assessments of the state of the ecosystem; a sensitive issue. This was answered with a conditional "yes"; if we don't do, who will? A "report card" will be one of the outputs of the State of the Ecosystem Report of the NW Atlantic. Other programmes, e.g., OSPAR, do this as a routine in their reporting (Quality Status Reports).

Closing Remarks
Mike Sinclair, Regional Director of Science, Bedford Institute of Oceanography

Mike summed up the day's presentations and discussion by identifying three planned or potential regional GOOS pilots that the SGGOOS is currently promoting or should consider promoting. The first, the North Sea Pilot, is well in hand; planning is underway and an implementation plan has been drafted with specific tasks for the SGGOOS identified. The

Bay of Biscay project is another that is currently monitoring a broad range of ecosystem properties. What is not clear is how these data are being integrated, what monitoring strategy is being used for fisheries data and what custom data products are being produced or planned? The SGGOOS is encouraged to open communication with the project managers and explore the potential of the project as a GOOS pilot. The prospects of developing a NW Atlantic regional GOOS pilot was also discussed and one project, GoMAP in the Gulf of Maine, was identified as a possibility. The SGGOOS was encouraged to identify members inside and outside the steering committee that could pursue this suggestion inter-sessionally and report at the next SGGOOS meeting in 2003.

The first day of the steering group meeting was closed with thanks extended to all the presenters for a stimulating and informative day.

APPENDIX 7: BACKGROUND TO THE ICES/EUROGOOS NORTH SEA ECOSYSTEM PILOT PROJECT

1 Stages Leading to NORSEPP

1997

The Intermediate Ministerial Meeting for the North Sea on the Integration of Fisheries and Environmental Issues in Bergen, March 1997, stated that "*further integration of fisheries and environmental protection, conservation and management measures, shall draw upon the development and application of an ecosystem approach*". This was subsequently used by SGGOOS as one of the main rationales for the debate leading to NORSEPP.

Report: http://odin.dep.no/md/html/conf/consso/bergen_1997.html

ICES news item: http://www.ices.dk/newslet/30/imm97.htm

Also in 1997, the North Sea Conference published the "Assessment Report on Fisheries and Fisheries related Species and Habitat Issues" which more fully explained concepts and requirements of integrated ecosystem and fisheries management.

Report: http://odin.dep.no/md/nsc/Intermediate_meeting/022001–990240/index-dok000-b-n-a.html

1998

When the SGGOOS first met by correspondence in 1998, one of two issues which immediately created some focus was the establishment of a North Sea Pilot project, stimulated by the statement of the 1997 Intermediate Ministerial Meeting.

A workshop which may be of some relevance to NORSEPP was held, entitled "the Ecosystem Approach to the Management and Protection of the North Sea", in Oslo (Norway) 15–17 June 1998. The report of this workshop provides useful background concepts for the rationale and ultimate application of NORSEPP in an "ecosystem approach" context.

Report: http://odin.dep.no/md/html/conf/workshop/

Summary: [Doc 1: NORSEPP Doc 1 Oslo 1998 Summary.doc]

1999

Little progress was made in this year. Following a workshop held in Bergen in March 1999 to discuss GOOS, the SGGOOS simply reaffirmed that SGGOOS should "*establish a co-ordinated and harmonised observation network and design a system for operational oceanography on appropriate time scale for the North Sea*".

2000

Again little progress was made. The October meeting of SGOOS in Southampton, UK, prepared the draft announcement for the 2001 Strategic Workshop in Bergen. The ICES GOOS Implementation Plan, prepared in 2000, called for:

A regional ICES GOOS Programme component for the North Sea

a) *ICES, in co-operation with EuroGOOS and other relevant partners, and under the auspices of the Steering Group on GOOS establish a co-ordinated and harmonised observation network and design a system for operational oceanography on appropriate time scale for the North Sea. Such system may consist of a network of participating institutions with one institution acting as co-ordinator or "Lead institution".*

It also suggests, rather optimistically, that "*The ICES GOOS Programme component focused on the North Sea has the potential of offering the most comprehensive prototype integrated Coastal, LMR and HOTO system for the world community to consider.*"

A relevant external event occurred, when OSPAR published its Quality Status Report 2000, Region II: Greater North Sea (www.ospar.org) which forms a useful background introduction to relevant issues in the North Sea.

2001

The Strategic Workshop "Towards a North Sea ecosystem component of GOOS for assessment and management" was held in Bergen, in September 2001. It was co-sponsored by IOC, ICES, OSPAR, the North Sea Conferences and EuroGOOS. This workshop produced a report published by IMR, Bergen, along with a Statement of Conclusions. This Statement contained many detailed recommendations, not only for the establishment of a regional pilot project, but also concerning associated changes needed to the institutional and organisational framework, data sources and data management and data products and assessment products. The final recommendations and goals are reproduced below:

Statement of Conclusions from the September 2001 Bergen Strategic Workshop

Overall goals

To meet the challenges spelled out above, 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 co-ordinated 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 the 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 co-ordinated mechanism. The strategy should aim among other things to:

- *facilitate stronger national and international co-ordination and co-operation needed to promote and support the development of the ecosystem approach*
- *promote development of an overall framework that helps to set priorities and promotes synergy, cost-efficiency and ecosystem sustainability*
- *engage the fisheries science and assessment community as enthusiastic participants in the process*
- *facilitate development of the proposed North Sea ecosystem pilot project as a demonstration of the usefulness of this approach*
- *stimulate co-ordination and co-operation between North Sea monitoring activities and research programmes studying relevant ecological processes and mechanisms, so as to obtain synergistic effects between them*

ACTIONS

INSTITUTIONAL AND ORGANISATIONAL FRAMEWORK

- *The co-sponsoring organisations should be invited to consider their roles in a co-ordinating mechanism to promote the further integration of data from various sources.*
- *An inventory of current national and international monitoring of the North Sea should be prepared based on existing inventories and information held by ICES, OSPAR, EuroGOOS, and EEA, and supplemented by any new information from national sources. This inventory should be GIS based and linked to inventories of data sources and data and assessment products. The Institute of Marine Research (IMR) in Norway will take the initial lead on this item with the aim to report the status of North Sea monitoring at the time of the 5 th North Sea Conference.*
- *Based on the inventory of North Sea monitoring and guidance from the international organisations, the establishment or consolidation of a North Sea monitoring network as a concerted action between national and international agencies and organisations should be considered.*
- *An ICES-EuroGOOS North Sea pilot project for the integration of data on oceanography and fish stocks should be established under the guidance of the ICES-IOC Steering Group for GOOS. IMR will take the responsibility for a planning meeting in Bergen in March 2002 in connection with the 5 th NSC.*

DATA SOURCES AND DATA MANAGEMENT

- *Actively stimulate the use of a meta data standard, giving insight in the quality assurance procedure used, data sampling, long term data availability and other necessary elements to enable inter-disciplinary use of data among the data providers. The co-operation between different agencies and institutes will benefit strongly from a widely accepted industrial standard for meta-data (e.g., marine-XML, IODE initiatives).*
- *Reach agreement between groups working on the North Sea ecosystem component on a data policy that enables open access for data. There should be clear conditions for use and appropriate recognition for the data collecting agencies and/or funding organisations (example: EuroGOOS data policy).*
- *Evaluate monitoring programmes for opportunities to provide increased efficiency and cost effectiveness. Possible outcomes would be a need for harmonisation, inter-calibration, and introduction of innovative methods of data gathering (e.g., new sensors, modelled data, remote sensing and automated buoy systems or an integrated approach).*

Identify and disseminate best practice in management of the rapid increase in data volumes being 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 developments in, existing infrastructure to fulfil user need for quick access to data.

DATA PRODUCTS AND ASSESSMENT PRODUCTS

Promote annual web-based reporting system with a standardised format that could be updated as new national information becomes available.

- *Stimulate more extensive use of physical models to provide information on state variables, which are not easily measured e.g., time series of fluxes of water by ocean currents.*
- *Physical models also provide a means of spatially and temporally integrating between available observations and can be used to identify gaps in the data.*
- *Stimulate the development of a common North Sea modelling tool, which can assist in the assessment of eutrophication status.*
- *Improve the flow of data to support the ongoing development of scientifically sound Ecological Quality Objectives (EcoQO's) and environmental indicators.*

Full Workshop Report: [Available on paper from IMR Bergen]

Statement of Conclusions:

http://www.eurogoos.org/Activities/Meetings/Copenhagen/EG01_36%20Bergen%20Statement.pdf

It is clear that SGGOOS has been charged with considering the conclusions of this workshop, and taking forward those which are needed for the success of NORSEPP.

The Statement of Conclusions was subsequently presented to the 5th North Sea Conference that took place in Bergen, Norway on 20–21 March 2002. However, it was not fully adopted by the Ministers, as some of the recommendations of the workshop were thought to be too specific. Some of the concepts did, however, appear in the eventual Ministerial declaration (see below).

In 2001 the SGGOOS met immediately after the Bergen Strategic. The mandate of SGGOOS to actually implement NORSEPP was discussed. It was stated that the SGGOOS should be viewed as an interface between the environmental monitoring agencies and the fisheries agencies, a link for communication among groups that haven't communicated before. It was also noted that the SG should have some hand in the development of integrated "products". IMR undertook to hold a planning meeting for NORSEPP, possible as a side event at the 5NSC.

Also in 2001, the EuroGOOS North West Shelf Task Team published the "NOOS – Strategic Plan; North West Shelf Operational System 2002 – 2006". This is clearly relevant to NORSEPP, and developments within NOOS must be fully integrated with the development of NORSEPP.

EuroGOOS NOOS Strategic Plan:

http://www.soc.soton.ac.uk/OTHERS/EUROGOOS/Activities/Publications/NOOS%20Strategic%20Plan%20Final.pdf

2002

A meeting entitled "Scientific issues for North Sea ecosystem management Expert conference related to the 5th North Sea Conference" was held between 20–22 February 2002 in Bergen, Norway. The scientific expert conference recommended that a North Sea Ecosystem Science Programme should be established as a framework for further focused ecosystem research. This meeting led to many recommendations that NORSEPP should integrate in their planning.

Summary of conclusions from this meeting: http://www.iMrno/Dokumenter/QXUDYFIPOXQAAX.pdf

Full report: [NOT YET AVAILABLE]

NORSEPP PLANNING MEETING

A subsequent Strategic Workshop entitled "Towards a North Sea Ecosystem Component of GOOS for Assessment and Management" was held in Bergen 5 – 7 September 2001. This produced the Implementation plan for NORSEPP, which SGGOOS is charged with following up.

Full Report: http://www.ices.dk/reports/occ/2002/pgnsp02.pdf

The 5th North Sea Conference took place in Bergen, Norway on 20–21 March 2002. The Bergen Declaration provides a formal framework within which NORSEPP should work. SGGOOS should consider the outcome of this meeting, as well as the ICES Strategic Plan, to place NORSEPP into a relevant and timely framework.

Home Page: http://www.dep.no/md/nsc/

Main Outcomes: http://www.dep.no/archive/mdvedlegg/01/09/Berge043.doc

Bergen Declaration: http://www.dep.no/archive/mdvedlegg/01/09/Berge041.doc

APPENDIX 8: AN ECOSYSTEM CRITIQUE OF THE NORSEPP CONCEPT

Benjamin Planque, IFREMER, Laboratoire d'Ecologie Halieutique

The background to the project partly comes from the conclusions of the Intermediate Ministerial Meeting on Fisheries held in Bergen (1997). Those conclusions put a clear emphasis on ecosystem issues and in particular are concerned with the integration of fisheries management into the wider concept of ecosystem-based management. The concept has been largely discussed at the expert scientific conference held in Bergen (20–22 February 2002) which preceded the 5th International Conference on the protection of the North Sea. One important element of discussion was the recognition that fisheries management is the main tool for the management of the North Sea, but that at the same time management objectives may be defined in relation to the ecosystem rather than to fish population only.

It is remarkable that the implementation plan of the North Sea pilot project omit to mention the North Sea ecosystem and instead, mainly concentrates on fisheries management related issues. This separation between the background to the project and the implementation of the project makes it difficult to read the goals of the project.

To summarise, there is confusion between 'ecosystem effects of fishing' (background material) and 'effects of ecosystems on fishing' (implementation plan).

As currently stated, the project is more of an integrated fisheries oceanography project than an ecosystem project per se. This is also clear from the report of the Bergen meeting (20–220 February) in which the project is renamed 'North Sea Pilot Project on Fisheries and Oceanography'. If it is the final intention to maintain the current implementation of the programme, then I believe the background and justification for it should be redrafted. Other wise it seems essential to include ecosystem components into the implementation plan. This could be done as follows:

Overall Objective

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

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

Streamline the flow and exchange of data and information

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

Establish efficient communication in order to disseminate operational products to users

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

In addition, it seems that IOC/SCOR WG199 on ecosystem indicators could take part in the North Sea pilot project. In that context the North Sea would serve as a test region for the indicators proposed, selected, or recommended by this WG.

APPENDIX 9: A DISCUSSION PAPER ON THE RELATIONSHIP BETWEEN ICES AND JCOMM

ICES and JCOMM: Potential Areas of Overlap And Collaboration

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[Note = annotations arise from comments of C Summerhayes, IOC, made during the 2002 SGGOOS meeting]

1 Introduction

This document is split into three sections:

- A brief introduction to the International Council for the Exploration of the Sea (ICES)
- A brief introduction to the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM).
- Detailed specific areas of overlap between the activities of ICES and JCOMM arising from the First Session of JCOMM (June 2001)

It has two purposes; to communicate to the ICES community news of the creation of JCOMM, and details of the existing and new developments which will be of relevance to the work of ICES; and to communicate to JCOMM specific areas of their work programme where liaison with ICES would be beneficial to both organisations.

2 A Brief Introduction to ICES

Within the North Atlantic, and within Europe in particular, there are several existing inter-governmental Conventions covering subjects which coincide with the objectives of GOOS and JCOMM; the International Council for the Exploration of the Seas (ICES), the Helsinki Commission (HELCOM), the Oslo and Paris Commission (OSPAR) and the Barcelona Convention.

ICES, which now has a corresponding organisation in the Pacific (The North Pacific Marine Science Organisation - PICES), is a convention covering the North Atlantic area. Twenty countries bordering the Atlantic, and the North and Baltic Seas, are members of ICES. ICES passed through a similar planning phase to JCOMM, but during the years 1899 to 1902. A significant part of the monitoring network established then is still existing and active.

ICES is today focused on fishery and environmental problems, but their basic work covers the whole ecosystem, including ocean climate. Its primary function is to give advice to member state Governments and to the European Commission, and the OSPAR and HELCOM Commissions. It has extensive experience in marine data management and analysis of ocean data, in both physical and non-physical (chemical and biological) parameters. The ICES Annual Science Conference attracts 600 to 1000 scientists each year. ICES also works inter-sessionally through approximately 80 Working Groups, some of which are co-sponsored by UN organisations such as IOC and FAO. One example is the IOC/ICES Steering Group on GOOS, which is presently considering developments in the regional application of GOOS in the ICES area. ICES sponsors a continuous programme of theme based Symposia, which includes a series of decadal symposia which specifically analyse decadal change in both physical and biological aspects of the North Atlantic, and determines their cause.

ICES is organised around a professional Secretariat consisting of approximately 30 people. Their role is to co-ordinate the output of inter-sessional WGs, to manage ICES databases in the disciplines of physical, chemical and biological oceanography and, perhaps most importantly, fishery statistics. Member states submit data to ICES regularly, and most operate at least two ocean going research vessels. The organisation itself is governed by a council consisting of 2 Delegates from each member nation. There is a President elected for a period of four years, a Bureau consisting of the President and 5 vice-Presidents. Work is co-ordinated by the Consultative Committee, and is divided between advisory work (4 Committees issuing advice on the marine ecosystem, marine environment and marine fisheries) and scientific work (6 Committees covering oceanography, fish resource management, marine habitats, living marine resources, mariculture and fishing gear technology). In addition there is a Publications Committee overseeing the dissemination of ICES information to relevant stakeholders. ICES is about to restate its mission, aims and objectives in a Strategic Plan to be launched in 2002.

ICES Home Page: http://www.ices.dk/

3 A Brief Introduction to JCOMM

The World Meteorological Organisation (WMO) has co-ordinated meteorological measurements around the globe for several decades. This is a major intergovernmental organisation, co-ordinating the community of meteorological agencies world-wide. In terms of marine meteorology (weather measurements and forecasts at sea), they organise Voluntary Observer Ship (VOS) and moored and drifting buoy programmes to gain meteorological measurements at sea, and ensure that everyone measures the same things, the same way and reports them in the same words and formats. They also maintain a system called the Global Telecommunications System (GTS) whereby meteorological data is sent in coded form around the world as soon as it is entered into the system. Anyone attached to the GTS can access this data stream globally. For most meteorological measuring systems this means almost instantaneously, as automatic measuring systems are directly attached to the GTS. The measurements are used to improve weather forecasts, by allowing meteorological agencies to make sure that computer model predictions resemble the observations where and when they are available.

As oceanography matures, it is moving towards weather forecasting, but for the oceans and seas, and beneath the surface. The key term is "operational". This means that the results from measurements are rapidly disseminated as soon as they are available, either globally or at least regionally. These measurements in themselves are useful. An example would be a measurement of sea level in the North Sea which is sent quickly throughout Europe. Agencies along a coastline could see the approach of a storm surge towards their waters and act to warn the public. However, it is also in the field of improving models that operational oceanographic measurements are needed. The temperature of the sea surface directly influences the air above it, so the meteorologists themselves need wide coverage, rapidly broadcast SST measurements in order to improve weather forecasts globally and for specific regions. An obvious example is measuring tropical Pacific SSTs and using these to help forecast weather in Australia - because of the El Nino Southern Oscillation (ENSO) effect. So now SST measurements are appearing on the GTS.

However, it is not just weather forecasters who want better measurements of the oceans. Oceanographers also have computer models of the ocean which can make predictions of currents (analogous to winds in meteorology), sea level, temperature and salinity. Increasingly models are also predicting chemical and biological parameters such as nutrients and productivity. These models have moved, really only in the last few years, from research projects to engineering tools. Their application so far has been limited to improving meteorological models and predictions, improving climate predictions, storm surge warnings, oil spill tracking and predictions of drift in search and rescue operations. Increasingly they will now be used also for water quality prediction/assessment and ecosystem assessment as they can extrapolate between wide spread measurements.

The Intergovernmental Oceanographic Commission (IOC – a UN organisation) and the WMO recognized that the needs of the two communities, marine meteorology and operational oceanography, are growing closer together. Both use measurements from space, both need rapid transmission of measurements around the world, both measure environmental parameters at sea, either from buoys, fixed platforms or ships. It therefore made sense to have one Commission over viewing developments, and ensuring that people used the same data formats, used measuring opportunities to their full, and swapped data in the most practical way. Hence the formation of JCOMM.

JCOMM Home Page: http://ioc.unesco.org/goos/jcomm.htm and http://www.wmo.ch/web/aom/marprog/index.html.

4 Detailed Specific Areas of Overlap Between ICES and JCOMM

Before starting this section, we first make the point that many ICES member nations, and agencies within those nations, will be intimately involved in some of the activities of JCOMM already. Examples are agencies involved in sea ice work, drifting buoy deployments, marine data exchange, marine climatology, the use of satellites etc. etc. This document is meant more to make those within ICES and JCOMM who do not regularly work together, aware of joint interests.

Secondly, we must congratulate Dr Savi Narayanan on becoming one of the first co-Presidents of JCOMM. Dr Narayanan has a long history of work within ICES, and has served on the ICES WG Marine Data Management (WGMDM), WG on Oceanic Hydrography (WGOH), SG on GOOS (SGGOOS), and was Chair of the WGOH. Hence JCOMM starts off with an excellent ambassador for the work of ICES.

JCOMM requested that the Management Committee ensure that the experience and monitoring work undertaken by non-UN organisations, with ICES specifically identified, should be taken into account and used during the

implementation of JCOMM programme activities [13.4.1]. Based on the draft report from JCOMM-1, specific areas of such potential overlap, which both ICES and JCOMM should note, are:

1. *ICES Long Term Monitoring:* The first International Conference on Ocean Observations for Climate (OceanObs) was held in St Raphael, France 1999). One of the recommendations arising from this workshop was that deep sea *in situ* measurements were a key factor in understanding the climate system. The ICES Standard Sections and Stations contribute to a network of *in situ* measurements, and this work by ICES members, coordinated by the ICES WGOH and promoted by the ICES SGGOOS, should be brought to the attention of JCOMM. [5.1.2]

2. *A Future Meeting: ICES should note that a second OceanObs conference is planned, probably for 2002. Full participation should be considered by ICES, particularly through its WGOH and SGGOOS.*

3. *ICES and the OOPC:* JCOMM noted that the GCOS/GOOS/WCRP Ocean Observing Panel for Climate (OOPC) had identified that one of its goals was to establish an observation system which could help understand decadal variations. The decadal scale oceanic ICES Standard Sections and Stations, the ICES Annual Ocean Climate Status Summary (IAOCSS - http://www.ices.dk/status/), the decadal symposia and the work of the ICES WGOH all contribute to such an objective, and JCOMM should be made aware of this work. [OOPC Chair - Neville Smith, Australia. 4(5)].

   [Comment Summerhayes: In order to ensure these linkages occur a dialogue must be started between ICES and the OOPC. This might be started at the GSC-IV meeting]

4. *ICES and the IGOS:* OceanObs [5.1.3] resulted in a map of desirable *in situ* observations (See Figure 1) to compliment space-borne observations. This network of necessary *in situ* measurements was also endorsed by the GCOS/GOOS Integrated Global Observing System (IGOS) Ocean Theme Report [12.1.2]. ICES members already maintain the transport sections across the Greenland Scotland Ridge, and long term Atlantic hydrographic sections [5.1.3]. These contributions should be brought to the attention of JCOMM, as well as to the GOOS and GCOS Secretariats, who have been charged by the GCOS Steering Group, in consultation with the OOPC, with the task of defining precisely which components of GOOS constituted the ocean elements of the AGCOS Networks [12.1.5].

5. *ICES and the UNFCC:* With respect to documenting national systematic observational networks [12.1.6], JCOMM recognised the important work that the GCOS Secretariat had done with the UNFCC Conference of Parties (COP) and its Subsidiary Body for Scientific and Technological Advice (SBSTA). JCOMM urged delegations to actively report national activities of systematic observational networks to the UNFCC, and to make known the needs and deficiencies in global ocean observations for climate. ICES, through the ICES Oceanographic Data Centre, the ICES WGMDM, and the ICES WGOH should help compile such national lists and encourage the inclusion of ICES coordinated monitoring.

6. *List of User Requirements:* JCOMM noted that there was a wide range of operational users for oceanographic products [5.2.1]. The Management Committee of JCOMM was asked to maintain a list of user requirements of operational oceanography. ICES, and in particular the ICES SGGOOS is in an excellent position to assess the need for operational oceanography in a fisheries context, and the ICES/IOC Workshop to be held in Bergen in September 2001 should be brought to JCOMM=s attention by the ICES Secretariat. In addition, the JCOMM Data Management Coordination Group, through its Expert Team on Data Management Practices, has been tasked to inter-sessionally seek solutions to end-to-end data management systems to provide multi-parameter products and services to meet the needs of the user community [7.2.6]. ICES WGMDM and ICES Oceanographic Data Centre are well placed to contribute to this work, and communications with the JCOMM Expert Group should be established.

7 *The Coastal Ocean Observations Panel:* JCOMM noted that the three design plans of the Coastal GOOS Panel, the Living Marine Resources Panel and the Health of the Oceans Panel had been drawn together in an information document prepared by the GOOS Project Office (web address http://ioc.unesco.org/goos/). They called for coordinated physical and non-physical (chemical and biological) measurements in coastal seas [5.3.1, 12.1.14]. JCOMM in particular agreed that it would assess the requirements for implementing non-physical measurements in support of the coastal component of GOOS [5.3.1]. The Three Panels themselves have been replace by the single Coastal Ocean Observations Panel (COOP) [12.1.11]. COOP=s goals are to monitor, assess, and predict effects of natural variations and human activities on the marine environment and ecosystems of the coastal ocean, focusing in particular on ecosystem health, living marine resources, natural hazards and safe and efficient marine operations [12.1.11]. Although the emphasis is on coastal waters, COOP is also concerned with semi-enclosed systems, the continental shelf and out towards the deep ocean. ICES members and WG=s have long experience in

working in these areas, and with precisely the same set of concerns as COOP. Therefore ICES and COOP should establish links, perhaps through the ICES Oceanography Committee, and may hence help JCOMM in the task of working inter-sessionally to prepare a position paper on how JCOMM could best implement the coastal component of GOOS [12.1.16]. JCOMM will appoint a Rapporteur to prepare this position document, which will consider such things as interfaces between multi-disciplinary regional Programmes and regional pilot activities, which the forthcoming ICES North Sea ecosystem component for GOOS will certainly form. ICES should inform the Rapporteur of its activities, and the ICES Secretariat establish links with this post.

8. *JCOMM Products Bulletin:* The JCOMM Products Bulletin (http://iri.ldeo.columbia.edu/climate/monitoring/ipb/) was described [6.5], and will be harmonized and coordinated with the GOOS Products Bulletin (http://ioc.unesco.org/gpsbulletin/). In addition, JCOMM noted the work of IGOSS in preparing status reports [10.4], and that there are now many web sites with products of relevance to the work of JCOMM but which would benefit from better integration and interaction [10.15]. The work of ICES in preparing web based status reports should be brought to the attention of JCOMM, and links made between the ICES web site and the JCOMM Products Bulletin web site. This could be achieved via the ICES Secretariat. The JCOMM Products Bulletin editor (Y Tourres) noted that a users workshop would be useful to determine operational products users need. ICES should be aware of this workshop, and collaborate in relation to defining operational products of use in fishery management.

9. *MPERSS (Marine Pollution Emergency Response Support System):* The WMO Committee on Marine Meteorology (Recommendation 2 CMM-IX) agreed with the outcome of MARPOLSER98 Workshop, and the oceans outside national EEZ=s should be split up into areas, and Area Meteorological and Oceanographic Coordinators (AMOCs) be established for each area. The AMOC would provide expert advice but not necessarily operational products. The MPI areas should be considered and adjusted to better suit geographical realities (e.g., to include coastal areas), that meteorological and oceanographic information should be delivered in time and space scales relevant to the operational users (e.g., clean up operations), the AMOCs should receive real-time feedback from agencies on the ground, and oil spill models should be run with information from the user. JCOMM-1 urged member countries to include MPERSS as part of the intergovernmental protocols and contingency plans relating to emergency response operations. In a survey to gauge the implementation of MPERSS, the UK did not come out well. Several interventions during JCOMM-1 urged MPERSS to be extended to within national EEZs, and the wording of the relevant recommendation covering MPERSS [6.4.2] was altered to cover pollution incidents originating outside EEZs. ICES member nations have a large range of concerns regarding pollution at sea, and its impact on living marine resources and the coastal marine environment. ICES, through its SGGOOS, should monitor progress with MPERSS, and consider how this may be integrated with the development of operational oceanography in the ICES area.

   [Summerhayes: ICES may wish a presentation on MPERRS at the 2002 ASC]

10. *The Global Temperature Salinity Profile Programme:* ICES should monitor progress of the Global Temperature Salinity Profile Programme (GTSPP), and where possible contribute to it [7.2.1]. This may include closer to real-time delivery of data from research cruises [7.2.4c], and the WGMDM and the WGOH might consider this. The ICES Oceanographic Data Centre might also consider new ways of interacting with this programme.

11. *Surface Salinity Data:* ICES was listed as a participant in an international project to manage surface salinity data [7.2.5]. Again the WGMDM, the WGOH and the ICES Oceanographic Data should monitor progress with this programme.

12. *Real-time Data from ICES Research Vessels:* The transmission of near-real time data from ships came up again in 7.4. The ICES WGMDM, SGGOOS and WGOH should note developments being progressed by JCOMM in this area, namely the use of new, lower cost satellite communication systems (E.g. Orbcom), the use of Code 41 dialling procedure to reduce costs of relaying meteorological and oceanographic data from ship to shore, the automation of message preparation and broadcast (e.g., TurboWIN), and Internet based data exchange. Canada already submits CTD data from its research vessels in near-real time onto the GTS. Norway experimented with this in the early 1990s. It is recommended that the ICES WGMDM and WGOH consider recommendations to make more research vessel data available to the operational oceanographic community in near-real time mode, and develop simple systems, such as used by the Canadian Department of Fisheries and Oceans, for doing this. In addition, JCOMM noted that under the SOLAS Convention member states (of which the UK is one) were required to encourage ships to make and transmit meteorological and oceanographic observations while at sea. The JCOMM Ship Observations Team were charged with encouraging Voluntary Observing Ships [8.1.2]. ICES member countries should note this, and consider whether research vessels should become VOS. The WGMDM and WGOH might consider this issue.

[Summerhayes: research vessel cruises are not along routine tracks. Fish surveys may be more relevant however.]

13. *A New Way of Managing Marine Data:* Increasingly it is apparent that marine data will be managed using the Marine Extensible Markup Language (XML). This is Internet based technology that allows large data sets to be managed most effectively, with modern search and sharing capabilities [7.4.32]. It is recommended that the ICES WGMDM, WGOH and the ICES Oceanographic Data Centre continues to monitor progress in this area, and where appropriate, participate in its development. ICES has particular expertise to offer with respect to non-physical parameters that other communities are less familiar with.

14. *Underway Data Collection:* SOOP [8.1.13] and COOP [Rec. 8.1/2] is investigating new instrumentation for vessels underway to collect data, especially non-physical data. These include moving vessel profilers, thermosalinographs, pCO2 analysers, fluorometers, pigment analysers, nutrient analysers and the self-contained ASeaKeepers@ module. Some VOS were broadcasting this data on the GTS. The Ferrybox project should note these developments, and the ICES WGOH who report on underway measurements from research vessels.

15. *Vandalism of Oceanographic Buoys:* Increasingly the vandalism of properly marked and publicised scientific buoys is being recognised as unacceptable by the international marine community [8.2.10]. The IHO has developed a AHydrogram@ on the presence of scientific buoys in the sea, and their importance, to be published once each year by national Hydrographic services in their ANotices to Mariners. A web site about this issue is to be found at http://dbcp.nos.noaa.gov/dbcp/. JCOMM-1 recommended that members should contact their national Hydrographic Services to ensure that AHydrograms@ are published at least once per year, but also as often as possible, that tamper-proof mooring designs are developed, that intentional damage is publicised as widely as possible, and that legal steps be taken by member nations within territorial seas and EEZs to limit acts of vandalism [Rec 8.2/1]. The ICES WGOH should note this development, and members publicise it within their home countries.

16. *Argo:* The Argo project of drifting buoys is clearly seen by JCOMM as a major contribution to global and regional operational oceanography and marine meteorology [8.2.13]. Where possible ICES WGOH should maintain a watching brief of this project. The ICES Standard Sections and Stations form a complimentary data set to the drifting buoy programme. ICES vessels may help populate specific sea areas, e.g., the Nordic Seas, with floats, and the WGOH would be one way to publicise available cruises, and a contact point for the Argo programme.

17. *Two-way Argos Transmission:* Many ICES members, particularly in the WGOH use the Argos satellite system for mooring monitoring and data retrieval. Members should note that a two-way communication facility will be available in 2002.

18. *Transition to Operational Systems:* JCOMM recognised that operational systems must pass through distinct phases from an idea to a mature, robust technique [8.5.10]. It was rare for this process to take less than a decade. Four broad phases were identified: a) Development of techniques within the oceanographic community; b) community acceptance of the methodology gained through experience within pilot projects whose principle objectives were evaluation and demonstration; c) the sustained pre-operational use of the methods and data by researchers, application groups and other end-users; d) incorporation of the method and data into a continuing framework with sustained support and for sustained use. JCOMM went on to define a pilot project, and charged the JCOMM Management Committee to review potential new components of an overall operational system. This should be noted by ICES members, and particularly she SGGOOS and the WGOH whose members run potential new operational systems including the ICES Standard Sections and Stations, the ICES NOOS, MAIA, the Nordic WOCE network of ADCPS, OWS Mike, and the Nuka Arctica and New York/Hawaii programme of VOS ADCP measurements.

19. *Establishment of a New International Marine Data Centre:* JCOMM will be establishing the JCOMM In-Situ Observing Platform Support Centre (JCOMMOPS) [8.5.2 and Rec. 8.5/1]. JCOMMOPS is charged with bringing together the existing largely unconnected oceanographic and marine meteorological monitoring, data management and services programmes into a fully integrated system. JCOMMOPS will deal with programmes covering sub-surface, drifting and moored buoys (DBCP, Argo), and Ship-Of-Opportunity (SOOP, VOS) programmes. JCOMMOPS will initially be based in Toulouse, France. It will be a contact point to provide information on many aspects of marine monitoring and data exchange. It is recommended that ICES, through the ICES Oceanographic Data Centre, the ICES WGMDM and the ICES WGOH, establishes links with JCOMMOPS and member countries informed of its creation and function.

20. *Training and Capacity Building:* When considering the stated objectives of training and capacity building in the new ICES Strategic Plan, several related aspects of the proposed work of JCOMM should be noted: a) Fellowships

[11.1.4]: Approximately 12 fellowships are awarded each year by the WMO to support training in physical oceanography. ICES member countries might host such fellowships and provide training; b) The International Ocean Institute Virtual University (IOIUV) [11.1.9]: The goal of this project is to make high quality post-graduate education available in marine affairs. It will be based at 17 operational centres around the world. ICES members might help produce relevant modules on fishery oceanography. The ICES WGOH might consider participating; c) OceanTeacher [11.2.6]: A modular web/CD based education resource kit is available from the International Oceanographic Data and Information Exchange (IODE) (http://oceanteacher.org) covering many aspects of marine science, policy and management. Again ICES might help formulate modules in fishery management, and fishery-related aspects of oceanographic and marine science.

21. *International Data Exchange Policy:* Sections 12.3.6–12.3.11 deal with the development of an internationally agreed policy on oceanographic data exchange. The ICES WGMDM should monitor these developments and provide input where appropriate.

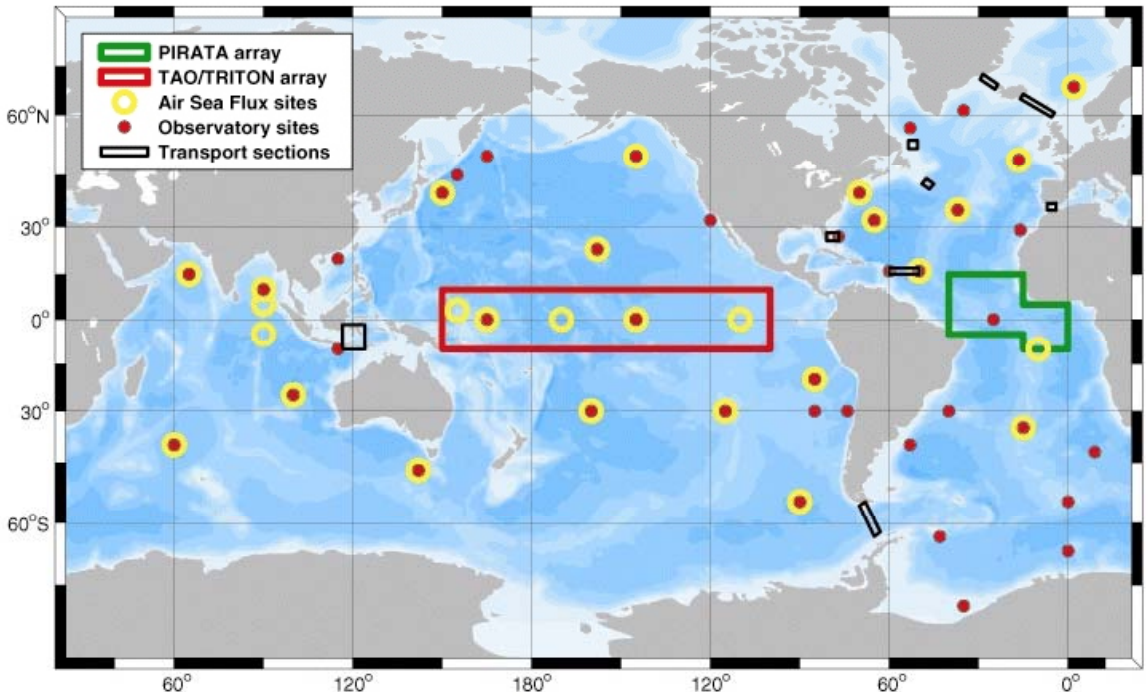

Figure 1. Desired network of *in situ* observations to compliment space-based observations. Members of the ICES WGOH maintain OWS Mike, hydrographic stations and sections in the Atlantic and Nordic Seas, and the transport sections along the Greenland-Scotland Ridge.

APPENDIX 10: WORKSHOPS, WORKSHOP PROCEEDINGS AND RESEARCH DOCUMENTS RELEVANT TO ICES/IOC SGGOOS

CANADA

CSAS (Canadian Science Advisory Secretariat, Science Sector)
http://www.dfo-mpo.gc.ca/csas/csas/English/Publications/Index_Pub_e.htm

W.G. Harrison and D.D. Sameoto. 1996. Incorporating ecosystem information into the Fisheries Assessment Process: Can we develop a quantitative "Plankton Index"? DFO Can. Science Advis. Sec. Res. Doc. 1996/007. 16p.

The incorporation of environmental data into the fisheries assessment process is now a priority within DFO. During the 1995 FOC meeting, plankton (both phytoplankton and zooplankton) data was added to the list of environmental properties for consideration. At that meeting, we identified both archived (e.g., CPR) and future (e.g., satellite ocean colour data) data sources that would be useful. The next step (and the subject of this paper) is to begin to explore more specifically if and how we can incorporate this information into the assessment process. Our approach is to identify and exploit properties of the plankton which, based on established ecosystem principles, are most likely to reveal cause-effect relationships between prey (plankton) and predator (fish larvae). Our first cut at this is based on Cushing's "Match-mismatch Hypothesis" in which the timing, magnitude and duration of the phytoplankton seasonal cycle influences the survival of fish larvae and, in turn, recruitment and stock variability. We have "parameterised the phytoplankton growth cycles using two gaussian distributions (one for the spring and one for the fall bloom) which yield the relevant ecosystem properties of phase, magnitude and duration. Our test datasets are the CPR data from the NW Atlantic (1961–1994) and the 1979 CZCS ocean colour satellite data on primary production. The mathematical representation of the growth cycle and the resulting parameters are promising and, with regard to the CPR data, show some interesting changes in the relative magnitude and duration of the spring blooms between the early 60's and the present. A similar analysis is planned for the CPR zooplankton data. It is anticipated that these plankton "parameters" alone may not be adequate in the assessment process. Therefore, we have speculated on a procedure in which we might "scale" or "rank" the parameters based on their observed environment range in order to come up with a quantitative "Plankton Index", analogous to the "Fire Hazard Index". This is presented more as a starting point for discussion than for implementation at this point.

R. Ian Perry. 1999. Scientific concepts for ecosystem-based management of marine invertebrates on Canada's Pacific coast. DFO Can. Science Advis. Sec. Res. Doc. 1999/123. 24p.

Management to achieve sustainable marine fisheries requires consideration of habitat and multi-species interactions in addition to the present single-species population dynamics approaches. Such "ecosystem" approaches to fisheries management are now common recommendations from advisory bodies, and are becoming part of formal legislation. From a scientific basis, however, it is not clear how to implement or advise upon such ecosystem-based approaches. This paper discusses the scientific concepts and issues necessary to include ecosystem considerations into the management of Canada's Pacific marine invertebrate fisheries resources. The critical concepts are to define the goals for "ecosystem management"; to define the ecosystem (time and space scales); to recognise large uncertainties; to identify appropriate "control levers"; and to go slow (incrementally) but start now. Approaches to applying these concepts are to explicitly include ecosystem thinking in present assessments; to develop indices of ecosystem status; to reduce destructive fishing practices; to provide an "allocation" for predators; to establish reserve or experimental areas; and to develop models to help focus research. A central point is that "ecosystem management" can not mean the management of ecosystems; rather it means the management of human activities with marine ecosystems.

Proceedings of the Fisheries Management Studies Working Group, 12 January 2000. DFO Can. Science Advis. Sec. Proceed. Ser. 2000/002. 72p.

The Working Group met on 12 January 2000 to review the draft Discussion Paper on Implementation of the Precautionary Approach for Harvest Fisheries prepared by an ad hoc drafting group and decided on final changes. The Working Group also reviewed the recent applications of the Traffic Light method for advising on stock status of groundfish and shrimp stocks. Recommendations were made for further research on the value of particular indicators, on methods for combining and interpreting indicators to describe stock status, and on ways of formulating decision rules based on them.

Proceedings of a workshop on the ecosystem considerations for the Eastern Scotian Shelf Integrated Management (ESSIM) area. DFO Can. Science Advis. Sec. Proceed. Ser. 2000/014. 93p.

The Canada Oceans Act (1997) extends Canada's jurisdiction over the ocean to the full extent permitted under international law. With this claim of sovereign rights comes responsibilities, including the establishment of a governance structure, based upon the principles of integrated management, sustainable development, the precautionary approach, the collaborative approach and the ecosystem approach. In December 1998, the Minister of Fisheries and Oceans announced the ESSIM initiative to pilot this new comprehensive approach to Oceans management. In support of ESSIM, a workshop of scientific experts was held to 1) provide the initiative with a precautionary framework for ecosystem based management, 2) consider the current management approaches and consider where changes are required to meet ecosystem objectives, 3) describe the Eastern Scotian Shelf ecosystem, 4) consider potential indicators to guide management, 5) outline the monitoring requirements, and 6) consider to what degree the proposed Sable/Gully Marine Protected Area (MPA) meets the potential ecosystem-based objectives of ESSIM. This report presents the results of this workshop.

Proceedings of the Fisheries Management Studies Working Group, 8–11 January 2001. DFO Can. Science Advis. Sec. Proceed. Ser. 2001/008. 48p.

The Working Group met on 8–11 January 2001 to discuss the use of the Traffic Light method for application of the Precautionary Approach to fishery management planning. Specifically, the intentions were:

- to learn from the experience of a pilot application of the Traffic Light method at the November 2000 groundfish RAP and assess client reactions,
- evaluate possible solutions to outstanding issues and assess Traffic Light performance through examination of test cases,
- establish a plan of action for production of a citable version of the Methods Workbook produced by an ad hoc study group on the Traffic Light method in July 2000, and
- make recommendations for further research and on future applications of the method.

Proceedings of the national workshop on objectives and indicators for ecosystem-based management. DFO Can. Science Advis. Sec. Proceed. Ser. 2001/009. 140p.

During 27 February —2 March 2001, a workshop was sponsored by Fisheries and Oceans Canada (DFO) in Sidney, B.C. to identify ecosystem-level objectives, with associated indicators and reference points, that could be used in managing ocean activities. Participants included DFO scientists, fisheries managers, ocean managers, and habitat managers, as well as experts from other federal government departments, academia and other nations. Under the overarching objective of conservation of species and habitat, the workshop defined objectives related to biodiversity, productivity and the physical and chemical properties of the ecosystem. Under each of these, further nested components were defined, along with an 'unpacking' process to link these conceptual objectives to those suitable for operational management. For each nested component, a suite of biological properties or characteristics was developed that further described the objective. Example indicators and reference points were also developed by operational objective, although further work on these at both a national and regional level is required. Assessment frameworks that evaluated progress against all objectives simultaneously were discussed and their potential uses investigated. A major achievement of the workshop was development at a national level of the concepts and terms related to ecosystem-based management. Finally, the workshop developed a list of issues and proposed next steps, including recommendations for further research, that DFO would need to address to further the implementation of ecosystem-based management in Canada.

Proceedings of the Fisheries Management Studies Working Group, 15–16 and 31 May 2001. DFO Can. Science Advis. Sec. Proceed. Ser. 2001/021. 83p.

The Working Group met on 15–16 and 31 May 2001 to review proposals for indicators to be used in Traffic Light based management decision frameworks. Agreement was reached on nine indicators that were considered suitable for use in Traffic Light analyses. Descriptions of these are appended to this report. The template used for descriptions was again reviewed and minor improvements made to it. Arrangements were made for further work on several aspects of the Traffic Light method, including for preparation of several more indicator descriptions.

Proceedings of the Fisheries Management Studies Working Group, 25–29 June 2001. DFO Can. Science Advis. Sec. Proceed. Ser. 2001/022. 71p.

The Working Group met on 25–29 June 2001 to discuss the use of the Traffic Light method for application of the Precautionary Approach to fishery management planning and the concept of Intensive Fishery Evaluations (IFEs). Specifically, the intentions were to:

- Thoroughly air and provide a sound basis for solutions to the technical problems raised during pilot applications of the Traffic Light method in groundfish stock assessments in November 2000.
- Further elaborate the conceptual basis for using the method as a precautionary framework for fishery management by exploring the interface between stock assessment and the rest of the management system and making proposals for decision rule formulations.
- Review the format of IFEs, as proposed by the National Stock Assessment Review.
- Discuss IFE — like approaches used elsewhere and locally to better describe what an IFE consists of and what issues need to be considered.
- Consider the current assessment review process and discuss what changes would be required to move to an IFE framework in the Maritimes and Gulf Regions.

Proceedings of the workshop on the Canadian contribution to the Living Marine Resources (LMR) module of the Global Ocean Observing System (GOOS). DFO Can. Science Advis. Sec. Proceed. Ser. 2001/033. 117p.

The goal of LMR-GOOS is to provide operationally useful information on changes in the state of living marine resources and ecosystems, i.e., observational services and forecast to those concerned with the harvest, conservation and scientific investigation of living marine resources of the deep ocean and shelf seas. In order to fulfil this goal, a comprehensive ecosystem and environmental observational programme is required which identifies variables and parameters of importance for detection of changes in structure, behaviour and bio-diversity, including the status of fishery resources. Within Canada, discussions on LMR-GOOS were initiated by DFO in January, 1999 at the workshop to develop the Canadian contribution to the Climate Module of GOOS. Among the recommendations coming out of that workshop was the suggestion of a follow-up workshop focusing specifically on LMR The purpose for LMR-GOOS workshop held at the Bedford Institute of Oceanography (29–30 March, 2000) was to begin the process of developing a framework for Canada's contribution to LMR based on (1) identification of ecosystem objectives for integrated oceans management and conservation and (2) definition of the indicators by which the observational tools we will employ to monitor the ocean ecosystem can be assessed. Approximately 35 scientists and managers, including members of the Ad Hoc DFO committee on GOOS, other DFO (including Oceans Sector) representatives and national and international university experts, participated in the two day workshop. The workshop was structured around presentations by DFO scientists on six proposed ecosystem objectives and associated indicators and extensive follow-up discussion lead by outside experts. The goal of the workshop was to determine if this is the appropriate conceptual framework for Canada to follow in developing a national LMR monitoring programme and to gain a broader perspective on the list of indicators that will be required to determine and prioritise the ecosystem features to be monitored and monitoring products required.

Ocean activities and ecosystem issues on the Eastern Scotian Shelf: an assessment of current capabilities to address ecosystem objectives. DFO Can. Science Advis. Sec. Proceed. Ser. 2001/095. 44p.

Conservation and environmental protection objectives and regulatory measures for key ocean use sectors (fisheries, oil and gas, marine transportation, maritime defence operations, and potential ocean mining) on the eastern Scotian Shelf area are examined. These ocean sectors are analysed to determine the extent to which proposed new ecosystem objectives are considered in current management planning. Existing management plans and measures were not expected to have explicit references to all of the proposed ecosystem objectives. The capabilities and effectiveness of current governance/institutional structures are assessed, and changes required for addressing defined ecosystem objectives are identified, for each ocean use sector. In addition to sector-specific considerations, the paper addresses the issues of cumulative ecosystem effects and makes recommendations for changes and additions to governance structures to ensure that ecosystem objectives are met in the eastern Scotian Shelf area.

Halliday, R.G., L.P. Fanning and R.K. Mohn. 2001. Use of the Traffic Light Method in fishery management planning. DFO Can. Science Advis. Sec. Res. Doc. 2001/108. 42p.

The Traffic Light method has been investigated as a framework for stock assessment and fishery management planning in a precautionary approach. The method has been applied in the science advisory process for Northwest Atlantic shrimp stocks and, on a trial basis, for some DFO Scotia-Fundy Region groundfish stocks. It has yet to be applied as a

framework for Integrated Fishery Management Planning. This document describes the elements of the method and discusses some of the issues to be considered in its application. It is a progress report and is prepared in support of wider trial applications of the methodology.

USA

National Oceanographic Partnership Program (NOPP)

http://www.coreocean.org/NOPPpg1.html

The Oceans Observation Task Team Report:

"An Integrated Ocean Observing System: A Strategy for Implementing the First Steps of a US Plan". To provide a sustained national system for observations of the ocean with outputs that are easily accessible for creating forecasts and products essential to the nation's economy, the management of marine resources, public health and safety, and national security.

http://www.coreocean.org/oceanobs.html

The ORAP (Ocean Research Advisory Panel) report:

"Strategic Vision for Achieving Sustainable Marine Resources Within the US EEZ". To develop a strategic plan (primary topics and their initial priorities) for a US research programme to study marine biological resources within the 200-nautical mile US exclusive economic zone. The OSTP requested that the plan also address the means to make these resources economically and ecologically sustainable by 2010. The ORAP was asked to build on and synthesise the many available studies, stakeholder inputs and ongoing programmes to reach a broad framework for a US research agenda over the next decade, to be revisited periodically. The plan was to address two areas: 1) ecological sustainability, including the marine food web, impact of pollution on living marine resources, and tools for management and conservation of living and non-living marine resources and 2) economic sustainability, including marine biotechnology and health of marine fisheries and research on marine organisms.

http://www.coreocean.org/orap013001.html

US. Oceans

Ocean US was created by the National Oceanographic Partnership Program (NOPP) in late 2000. In the coming decade an integrated ocean observing system will become operational. Information from this system will serve national needs for the following:

- Detecting and forecasting oceanic components of climate variability
- Facilitating safe and efficient marine operations
- Ensuring national security
- Managing resources for sustainable use
- Preserving and restoring healthy marine ecosystems
- Mitigating natural hazards
- Ensuring public health

http://www.ocean.us.net/

GoMOOS (Gulf of Maine Ocean Observing System)

GoMOOS is a national pilot programme designed to bring hourly oceanographic data from the Gulf of Maine to all those who need it, including:

- Commercial Mariners making everyday decisions that impact their safety and livelihood
- Coastal Resource Managers seeking to maintain economically and environmentally vital resources
- Scientists trying to understand complex ecosystems and predict climate change

- Educators conveying the complexity and urgency of ocean science
- Search and Rescue Teams trying to find and save lives
- Emergency Response Teams mitigating damage from environmental disasters
- Public Health Officials concerned about outbreaks of harmful algal blooms (such as red tide)

http://www.gomoos.org/

US Coastal Observing Systems

The NOAA Coastal Services Center has compiled this Web page to identify and provide links to some of the major observing systems in US coastal waters. Many observing systems collect and process data, make their data available on the Web, and maintain archives for future use. There is, however, no centralized source to find out who is measuring what, where these observations are being made, and what data is available on the Web. Since these data can be valuable to coastal resource managers, scientists, and others, this page should begin to remedy the situation by providing information about coastal observing systems. Data collection is accomplished using various instruments, sensors, probes, and other advanced equipment. The observing systems consist of data collection platforms with data storage or transfer capabilities. The platforms include moored and drifting buoys, meteorological towers and stations, bottom-moored instruments, stand-alone instruments, ship survey cruises, satellite imagery, and remotely and autonomously operated vehicles among others.

http://www.csc.noaa.gov/coos/

ICES (International Council for the Exploration of the Sea)
http://www.ices.dk/)

SGGOOS reports:

Report of the Steering Group on Global Ocean Observing System (by correspondence). ICES CM 1998/C:12.

Report of the Workshop on the Global Ocean Observing System –GOOS and Steering Group on the Global Ocean Observing System (by correspondence). ICES CM 1999/ C:11 and ICES CM 1999/C:14.

Report of the ICES/IOC Steering Group on GOOS. ICES CM 2001/C:01.

Report ICES-EuroGOOS Planning Group on the North Sea Pilot Project. ICES CM 2002/C:02.

Other ICES reports:

Report of the Working Group on Ecosystem Effects of Fishing Activities. ICES CM 2000/ACME:02.

Report of the Working Group on Ecosystem Effects of Fishing Activities. ICES CM 2001/ACME:09.

Report of the Working Group on Zooplankton Ecology and Joint Meeting with Working Group on Phytoplankton Ecology. OCES CM 2001/C:07.

Report of the Study Group on Incorporation of Process Information into Stock Recruitment Models. ICES CM 2002/C:01.

SCOR (Scientific Committee on Oceanic Research)

http://www.jhu.edu/~scor/index.htm)

SCOR-IOC Working Group 119 "Quantitative Ecosystem Indicators for Fisheries Management"

Terms of Reference

- To review the current state of knowledge in different marine and terrestrial disciplines relevant to the development of indicators for marine ecosystems (environmental, ecological and fisheries)
- To review theories (hierarchy, cascade…) and indicators that have been developed in terrestrial ecology and to assess their utility for marine ecosystems.
- To develop new indicators to study the functional role of species in ecosystems, exploitation and environment using output of multi-species models or available time series (e.g., fish catch statistics….), and using satellites, GIS (Geographic Information System).
- To apply these indicators in a comparative way to characterize ecosystem states, changes and functioning.
- To assess the utility of these indicators for management purposes and for the sustainable utilization of renewable resources.

http://www.ecosystemindicators.org/

POGO (The Partnership for Observation of the Global Oceans)

http://www.oceanpartners.org/jmain.htm)

Dartington Workshop Report:

Biological Observations of the Global Ocean: Requirements and how to meet them. The ocean carbon cycle cannot be understood without information on the biologically-mediated transformations and transport of carbon within the ocean. In addition to carbon dioxide, biological processes also affect the cycles of other green-house gases such as methane. We have much to learn of the role of the ocean biota in climate change. We also have very little understanding of how marine life will be affected by, and respond to, global change. The signatories to the UN convention on biodiversity have an obligation to monitor the biodiversity of various environments. However, the commitment to record marine diversity lags far behind the required level. Collapsing fisheries and disappearing stocks of living resources from the ocean have highlighted the need for sustained, scientific management of fisheries and other living resources. Reports of coral reefs under threat have highlighted the fragility of marine ecosystems, and the need to understand them better, to serve the needs of conservation. All these concerns argue for improved monitoring of marine life and their interactions with their physical and chemical environment. Yet, no system for sustained, long-term, monitoring of marine biota and biological processes is in place at the global scale. POGO therefore convened a Biology Meeting to explore the requirements of such an observing system, and to recommend step-wise and organised implementation of elements of such a system, through the POGO institutions.

PICES (North Pacific Marine Science Organization)

http://www.pices.int/index.asp

PICES Scientific Report No. 18:

Proceedings of the PICES/CoML/IPRC Workshop on “Impact of Climate Variability on Observation and Prediction of Ecosystem and Biodiversity Changes in the North Pacific”. The main focus of the workshop was to review the goals and strategies for observing North Pacific marine ecosystems and their biodiversity, and to improve our ability to predict ecosystem changes. This was accomplished by: (i) defining existing observation and prediction system (regional and basin-scales); (ii) identifying needed improvements to the existing system for increasing our understanding of biodiversity and climate linked changes in biodiversity; and (iii) nominating existing time-series and predictions for inclusion into a PICES Ecosystem Status Report.

http://www.pices.int/Library/ScientificReports/Report18/report18.asp

APPENDIX 11: A SUMMARY OF URLS RELEVANT TO THE APPLICATION OF GOOS CONCEPTS WITHIN ICES

URLs:

Argo - http://www.argo.ucsd.edu
Census of Marine Life (CoML) - http://core.cast.msstate.edu/censhome.html
Centre for Marine Biodiversity (CMB) - http://www.marinebiodiversity.ca/home.html
CLImate VARiability and Predictability (CLIVAR) - http://www.clivar.org/
Coastal Ocean Observations Panel (COOP) - http://ioc.unesco.orglgoos/COOP.htm
Continuous Plankton Recorder Survey (Sir Alister Hardy Foundation) - http://www.npm.ac.uk/sahfos/sahfos2/html
Convention on Biological Diversity - http://www.biodiv.org/
Department of Fisheries & Oceans, Atlantic Zonal Monitoring Program (AZMP) - http://www.meds-sdmm.dfo-mpo.gc.ca/zmp/main_zmp_e.html
Department of Fisheries & Oceans, Canadian Science Advisory Secretariat (CSAS) - http://www.dfo-mpo.gc.ca/csas/Csas/English/Index_e.htm
Global Ocean Data Assimilation Experiment (GODAE) - http://www.bom.gov.au/bmrc/ocean/GODAE/
GLOBal ocean ECosystem dynamics (GLOBEC) - http://www.pml.ac.uk.globec/
Global Ocean Observing System (GOOS) - http://ioc.unesco.org/goos/
Integrated Global Observation Strategy (IGOS) - http://www.igospartners.org/
Intergovernmental Oceanographic Commission (IOC) - http://ioc.unesco.org/iocweb/
International Council for the Exploration of the Sea (ICES) - http://www.ices.dk/
International Ocean Colour Co-ordinating Group (IOCCG) - http://www.ioccg.org/
Joint Global Ocean Flux Study (JGOFS) - http://ads.sMruib.no/jgofs/jgofs.htm
National Oceanographic Partnership Program (NOPP) - http://www.coreocean.org/Dev2Go.web?Anchor=nopp_home_page&rnd=25128
North Pacific Marine Science Organization (PICES) - http://www.pices.int/index.asp
Ocean.US – Integrated and Sustained Ocean Observations - http://www.ocean.us.net/
Partnership for Observation of the Global Oceans (POGO) - http://www.oceanpartners.org/jmain.htm
Scientific Committee on Oceanic Research (SCOR) - http://www.jhu.edu/~scor
Surface Ocean — Lower Atmosphere Studies (SOLAS) - http://www.ifm.uni-kiel.de/ch/solas/main.html
World Ocean Circulation Experiment (WOCE) - http://www.soc.soton.ac.uk/others/woceipo/ipo.html

URLs of Programmes and Projects relevant to C-GOOS

Biodiversity/BIOMAR - www.biomareweb.org
CalCOFI - http://www-mlrg.ucsd.edu/calcofi.html
CLIVAR - http://www.clivar.ucar.edu/hp.html
C-GOOS Strategic Design Plan - http://ioc.unesco.org/goos/CGOOSPLANver7.doc
Chesapeake Bay Monitoring Program - http://www.chesapeakebay.net/Program.htm
COOP - http://ioc.unesco.org/goos/coop_co.htm
Ecosystem Models - www.ecopath.org
EuroGOOS - http://www.soc.soton.ac.uk/OTHERS/EUROGOOS/eurogoosindex.html
GCOS - http://193.135.216.2/web/gcos/gcoshome.html
GEOHAB - http://www.phys.ocean.dal.ca/~jhurst/SCOR/GEOHAB/GEOHAB.html
Global observing systems information center: http://www.gos.udel.edu
GLOBEC - http://www1.npm.ac.uk/globec/
GODAE - http://www.bom.gov.au/bmrc/mrlr/nrs/oopc/godae/homepage.html
GOOS - http://ioc.unesco.org/goos/
GOOS Capacity Building Strategy - http://ioc.unesco.org/goos/Cap_Build_principles.pdf
GOOS 1998 Prospectus, - http://ioc.unesco.org/goos/Prospe98/Contents.html
GOOS Products and Services Bulletin - http://ioc.unesco.org/gpsbulletin/
GTOS - http://www.fao.org/gtos
HOTO - http://ioc.unesco.org/goos/hoto.htm
IBOY - http://www.im.ac.cn/DIVERSITAS/Iboy/index.html
ICES - http://www.ices.dk/
IGBP - http://www.igbp.kva.se
IOCCG - http://www.ioccg.org
IOC-IODE Ocean Portal - http://oceanportal.org
IODE - http://ioc.unesco.org/iode/

LMR - http://ioc.unesco.org/goos/lmr.htm
LOICZ - http://www.nioz.nl/loicz/welcome.html; http://www.nioz.nl/loicz/modelnod.htm
MFS - http://www.cineca.it/~mfspp000
NEARGOOS - http://ioc.unesco.org/goos/neargoos.htm
OBIS Databases
http://habanero.nhm.ukans.edu/FISHNET/
http://netviewer.usc.edu/web/output.html
http://www.kgs.ukans.edu/Hexacoral/index.html
http://www.cephbase.utmb.edu/
http://www.zoogene.org/
OOPC - http://ioc.unesco.org/goos/oopc.pdf
OOSDP - http://www-ocean.tamu.edu/OOSDP/FinalRept/t_of_c.html
QUIJOTE - http://www.cem.ufpr.br/fisica/quijote.htm
SIMBIOS - http://simbios.gsfc.nasa.gov
State of the Environment Reports -
GEO 2000 - http://www.unep.org/unep/eia/geo2000/
Millennium Ecosystem Assessment - www.millenniumassessment.org
Pilot Analysis of Global Ecosystems - www.wri.org/wr2000/coast_page.html
World Resources - http://www.wri.org/wr-96-97/96tocful.html
- http://www.wri.org/wt-98-99/wr98-toc.htm
State of the Coast - http://state-of-coast.noaa.gov/
State of the Nation's Ecosystems - http://www.us-ecosystems.org/
Chesapeake Bay - http://www.chesapeakebay.net/pubs/sob/index.html
Gulf of Finland - http://www.baltic-region.net/baltfact/gof96.htm
Puget Sound - http://www.wa.gov./puget_sound
Wadden Sea - http://cwss.www.de/TMAP/QSR.html
US GOOS, Toward a US Plan for a Sustained, Integrated Observing System -
http://core.ssc.erc.msstate.edu/NOPPobsplan.html
US C-GOOS Workshop - http://www.hpl.umces.edu/projects/wrkrpt.pdf

APPENDIX 12: ACTION POINTS FOR SGGOOS MEMBERS

Member	Action	Date
???	Present SGGOOS/NORSEPP at ACE	7 June 2002
???	Present SGGOOS/NORSEPP at ACFM	21 May 2002
???	Present SGGOOS/NORSEPP at COOP-IV, Cape Town	24 September 2002
???	Publicise ICES research cruises as ARGO deployment opportunities	7 April 2003
ALL	Add Reports/Workshops/Working Groups to Appendix 10	7 April 2003
ALL	Add URLs to Appendix 11	7 April 2003
ALL	Create links at their home institutes to ICES status reports page	7 April 2003
ALL	review info on ICES SSS	7 April 2003
ALL	Review list of upcoming meetings in 2002 report	7 April 2003
ALL	Review relevant GCOS regional Action Plans on their web site	7 April 2003
BRANDER	Submit NORSEPP EoI to FP6	1 June 2002
DAHLIN	Create links from EuroGOOS web site to ICES status reports page	7 April 2003
DAHLIN	Prepare a draft resolution for a Theme Session for the 2003 ICES ASC	1 October 2002
DAHLIN	Present SGGOOS/NORSEPP at I-GOOS Regional Forum	2 December 2002
DAHLIN	Present SGGOOS/NORSEPP at I-GOOS Regional Forum	2 December 2002
DOOLEY	Create time slots in Committee Agenda's for the promotion of NORSEPP at the ASC	1 October 2002
DOOLEY	Draft Category 2 resolution proposing re-formation of PGNSPP (circulate draft)	1 October 2002
DOOLEY	Draft Category 4 resolution proposing NORSEPP as an ICES project (circulate draft)	1 October 2002
DOOLEY	Draft terms of reference for relevant ICES WGs to forward NORSEPP in ICES	1 October 2002
DOOLEY	Incorporate all relevant ICES Chairs as ex-officio members of SGGOOS	1 October 2002
DOOLEY	Move web link to ICES Status reports to front of ICES web site	1 October 2002
DOOLEY	Review the ICES GOOS Implementation Plan. Send to SGGOOS members.	1 October 2002
DOOLEY	Update the SGGOOS web site (Incorporate Appendixes as separate pages)	1 October 2002
DOOLEY	Distribute to SGGOOS members all info on ICES Standard sections and stations	1 October 2002
DOOLEY	Send Bureau WG report Del 12/12 International Programmes to SGGOOS members	1 October 2002
DOOLEY	Invite the JCOMM Management Group to meet at ICES HQ	1 October 2002
DOOLEY	Establish links with JCOMMOPS	7 April 2003
GABRIEL	Progress discussions on regional GOOS Pilot projects (US/Canada)	7 April 2003
HARRISON	Present SGGOOS/NORSEPP at JCOMM Management Group	???
HARRISON	Brief Tom Malone for ASC keynote talk	1 October 2002
HARRISON	Present SGGOOS/NORSEPP at ICES ASC Committee meetings	1 October 2002
HARRISON	Update the SGGOOS web site (Incorporate Appendixes as separate pages)	1 October 2002
HARRISON	Recruit speakers for Theme Session W	1 May 2002
HOLT	Submit NORSEPP EoI to FP6	1 June 2002
LOENG	Present SGGOOS/NORSEPP at ACME	3 June 2002
LOENG	Present SGGOOS/NORSEPP at ICES ASC Committee meetings	1 October 2002
PLANQUE	Draft “Ecosystem critique” of NORSEPP	1 June 2002
SKJOLDAL	Submit NORSEPP EoI to FP6	1 June 2002
SUMMERHAYES	Create links from JCOMM/GCOS/GOOS sites to ICES status reports page	7 April 2003
SUMMERHAYES	Present SGGOOS/NORSEPP at 35th Session of IOC Executive Council	4 June 2002
SUMMERHAYES	Print and distribute copies of NORSEPP plan at GSC-V	1 May 2002
SUMMERHAYES	Review the ICES GOOS Implementation Plan. Send to SGGOOS members.	1 October 2002
TURRELL	Present SGGOOS/NORSEPP at JCOMM Management Group	???
TURRELL	Incorporate all relevant ICES Chairs as ex-officio members of SGGOOS	1 October 2002
TURRELL	Present SGGOOS/NORSEPP at 3rd EuroGOOS Conference	2 December 2002
TURRELL	Present SGGOOS/NORSEPP at 3rd EuroGOOS Conference	2 December 2002
TURRELL	Present SGGOOS/NORSEPP at ICES ASC Committee meetings	1 October 2002
TURRELL	Present SGGOOS/NORSEPP at Theme Session W	1 October 2002
TURRELL	Update the SGGOOS web site (Incorporate Appendixes as separate pages)	1 October 2002
TURRELL	Prepare Draft SGGOOS/NORSEPP PowerPoint presentation	1 July 2003

TURRELL	Submit abstract for Theme Session W	1 May 2002
TURRELL	Send JCOMM Report to ICES Chairs	1 October 2002
TURRELL	Progress a dialogue with the OOPC Chair	1 October 2002
TURRELL	Inform WGMDM Chair Contact JCOMM Data Management Group	1 October 2002
TURRELL	Establish links with JCOMM Products Bulletin (Johannes Gudal)	1 October 2002
ZWANEBURG	Progress discussions on regional GOOS Pilot projects (US/Canada)	7 April 2003