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## Report of the Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR)

15–17 January 2013

Lisbon, Portugal



**ICES**

International Council for  
the Exploration of the Sea

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l'Exploration de la Mer

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## Executive summary

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The Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR) met in Lisbon, Portugal, 15–17 January 2013. Dave Reid chaired the meeting. 16 participants of 12 countries attended the meeting.

The work of WGISUR in 2013 focused on three main areas.

- New research projects developing designs and analysis for ecosystem monitoring on fisheries ecosystem surveys
- The results of the Workshop on Evaluation of current ecosystem surveys (WKECES) held in Bergen Norway in November 2012.
- Development of a list of issues for discussion with ICES WGFAST at the 2013 ICES ASC.

Two new research projects funded by the EC, and by the UK government respectively, were discussed in detail. Both projects have been funded and both draw heavily on the work of WGISUR.

The first, entitled “Towards a Joint Monitoring Programme for the North Sea”; PP/ENV/SEA 2012. “ is funded by the EC, and aims to catalogue monitoring capabilities and needs under the MSFD, and where possible to propose adaptations to surveys to develop this role.

The second entitled “Developing fisheries surveys to incorporate other ecosystem monitoring requirements: saving money and improving advice”, is funded by DEFRA UK, and includes Ireland and France. The main aim of this project is to design an integrated ecosystem monitoring programme for the Celtic Sea. As such it is also an associated part of the first proposal. More details on the projects are presented in Chapter 2.

In Chapters 5 we report on the conclusions and possible future developments suggested by WKECES. Possibly the key conclusion was that all the surveys examined fell in some way short of the ideal ecosystem survey concept developed by WGISUR in 2013. However a SWOT analysis of the four surveys showed that each had its own strengths and weakness. In most case these strengths and weaknesses were determined by the origins of each particular survey, starting as a bottom trawl survey or an acoustic survey etc. This led to the conclusion that no single survey could provide a fully integrated ecosystem monitoring service. The workshop also led to proposals for a future joint workshop on how to set up flexible multifunction surveys and the impact on fish stock data acquisition. In addition, WKECES recognized that surveys are often well designed to monitor ecosystem state, but not ecosystem process. This led to a request for collaboration with WGECO on the correct approach to understanding ecosystem process. This is detailed in Chapter 3.

In Chapter 4, we propose the next workshop be dedicated to producing a CRR on fisheries and ecosystem survey integration.

In Chapter 6 we addressed the possible uses of acoustic methodologies in integrated ecosystem surveys. Acoustic methods have the great advantage of being semi-automated, and able to work on the research vessel in transit. They are in principle able to tell us a lot about what is in the water column, as well as on and in the seabed. This chapter was based on a request from WGFAST as will be used as the basis for discussions at the ICES ASC, and thereafter between WGISUR and WGFAST.

## 1 Opening of the meeting

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The Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR) met in Lisbon, Portugal, 15–17 January 2013. Dave Reid chaired the meeting. 16 participants of 12 countries attended the meeting.

The terms of reference were:

- a) Develop surveys to be applicable to the ecosystem approach;
- b) Identify expert groups and develop terms of reference for them;
- c) Identify issues common to all surveys, set up workshops and manage them as appropriate;
- d) Identify complementary technology to add value to surveys;
- e) Provide guidance on the adaptation of existing surveys to provide an approach to an ideal ecosystem survey;
- f) Report on any implications from TOR e) and the evaluation of the Joint Barents Sea ecosystem survey for the planning of future ecosystem surveys;
- g) Identify potential observing approaches that complement ship-based surveys to support fishery and ecosystem assessments;
- h) Develop a list of specific items for interaction between WGISUR and WGFASST for discussion at the 2013 ICES ASC.

The work of WGISUR in 2013 focused on ToR a, b, c, e, f, and h.

## 2 Adoption of the agenda

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The agenda was adopted without any changes. The agenda is in Annex 2.

### 3 Develop surveys to be applicable to the ecosystem approach

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#### New research projects

Members of WGISUR have been instrumental in running up two new projects on the use of surveys for the ecosystem approach. Both projects have been heavily informed by the work of WGISUR in recent years, and involve many of the personnel from WGISUR, from the UK, Ireland, France, Germany, Belgium, and Denmark.

#### 3.1 EU Lot Call

Under an EU funding scheme headed “Pilot Project - New Knowledge for an integrated management of human activities in the sea”, a new research project has been funded by the European Commission entitled “Towards a Joint Monitoring Programme for the North Sea”; PP/ENV/SEA 2012. The following is extracted from the proposal:

*The main goal of the project is to develop – in a shared effort which includes the institutions responsible for national marine monitoring – a joint, integrated marine monitoring programme in the North Sea region. In parallel, and taking advantage of shared partnerships and approaches, a monitoring programme for the Celtic Sea will be developed. These joint programmes have to meet monitoring requirements of the Marine Strategy Framework Directive (MSFD) and other environmental legislation and to support the management of human activities in these subregions. Through inclusion of both Greater North Sea and the Celtic Sea, with distinctive geographical characteristics and data coverage, and by including cross-references to adjacent regions, notably Bay of Biscay and Iberian Coast<sup>1</sup>, the project will develop strategic approaches and generic decision-making tools which can be applied in other integrated marine monitoring schemes in other regions.*

*Considering two subregions within the project will bring a wide range of partners together, with a broad range of expertise. And it will enable the partners to trial different ways of combining monitoring programmes and share lessons learned. The aim of this pilot project is to find ways to integrate marine monitoring efforts of the partner organizations. This will be done by finding synergies in existing marine monitoring programmes and finding cost-effective ways of maximizing efficiency of existing resources (e.g. multi-use of existing monitoring platforms). This will enhance efficiency and effectiveness of marine monitoring efforts. The partners wish to work towards reducing the overall monitoring costs of the implementation of the MSFD.*

*Core question is to what extent the North Sea and Celtic Sea countries can work together, sharing their MSFD monitoring efforts and simultaneously also meeting their other monitoring commitments, e.g. under the Common Fisheries Policy and the Data Collection Framework.*

*Developing integrated monitoring tools at regional seas scale will enable the Southern Consortium under the same call. Partners to meet the objectives outlined under the MSFD requirements, contributing to Member States’ requirements to develop monitoring programmes by 2014. As a priority, these tools will target the monitoring requirements of the MSFD, building on the ongoing monitoring under the Regional Sea Conventions, the Common Fisheries Policy, the Data Collection Framework and, where relevant, the Habitats and Birds Directives, the Water Framework Directive (WFD) and other relevant directives.*

*The outcomes of the pilot project (e.g. decision-making tools, integrated monitoring strategies and methods, proposals for joint monitoring programmes) will be transferable to other sea regions. Specific objectives of this project are:*

- 1. To develop integrated marine monitoring – across disciplines, programmes and Member States – in the North Sea and Celtic Sea subregions of pressures from human activities and their effects on the marine environment;*
- 2. In doing so, enhancing monitoring efficiency and effectiveness;*
- 3. To develop integrated monitoring strategies and decision-making tools at regional seas scale, which help design an effective and efficient joint monitoring programme for the North Sea region, that meets monitoring requirements of the MSFD;*
- 4. To ensure transferability of developed outputs and tools to other EU regions.*

*The indicators for these objectives are:*

- Delivery of the outputs/results of Activities A-I;*
- Digital availability of developed strategies and tools;*
- Delivery of the proposals for joint monitoring programmes in the Greater North Sea and the Celtic Sea.*

The proposal includes designing a fully integrated monitoring programme for the Celtic Sea. The complexity of the North Sea monitoring requirements was considered to preclude the full evaluation of a custom designed fully integrated monitoring program. In contrast to this, the Celtic Sea has fewer constraints with respect to existing monitoring programmes; and the spatial and temporal sampling constraints are based specifically on the spatial and temporal scales of the occurrence of the fundamental ecosystem processes. These two situations can thus be compared, a North Sea case study evaluating the costs and benefits of altering existing surveys and a Celtic Sea case study trialling a custom designed ecosystem survey; based on approaches described by WGISUR (2012).

The proposal team also said that:

*“Valuable work has been undertaken by the ICES Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR, 2012) and the workshop on Evaluation of current ecosystem surveys (WKECES, 2012). They looked at combining monitoring activities on current vessel based fish and ichthyoplankton surveys to monitor the ecosystem rather than a single objective. This resulted in a catalogue of data needs based on which suggestions were made for adding monitoring activities on current surveys. The catalogue also includes detailed information on resources (time, staff, equipment, on board facilities (e.g. storage and lab space), data storage) needed for executing the added work. As a North Sea example, the International Bottom Trawl Survey (IBTS), which is a long running joint fish survey monitoring the Greater North Sea, was used.”*

The agreed project will start in September 2013, and last for 18 months. Survey related research will be reported to WGISUR as it develops.

### **3.2 DEFRA UK funded Celtic Sea Project**

As a complement to the first project, Cefas, the Marine Institute and Ifremer are also collaborating on a UK DEFRA funded project entitled “Developing fisheries surveys to incorporate other ecosystem monitoring requirements: saving money and improving advice”. This project started in July 2013, and is proposed to last for 22 months.



The purpose of this project is to design a single integrated monitoring program for the Celtic Sea region that addresses the statutory reporting requirements of the CFP and the MSFD in an efficient, integrated and internationally coordinated way. It will:

- Establish an expert advisory panel/steering group that will include membership from strategic partnership organizations as well as Defra to oversee the process and to provide strategic support to implement the project.
- Review the theory and principles of integrated ecosystem monitoring and provide the scientific justification for developing integrated surveys in UK seas.
- Identify the spatial and temporal scales at which the important ecosystem processes occur in the Celtic sea and use this information to evaluate different survey designs.
- Undertake three internationally coordinated monitoring surveys in the Celtic Sea with additional ecosystem monitoring designed into the survey.
- Test the utility of the integrated monitoring program approach by using all available ecosystem monitoring information to examine the precision of estimates of ecosystem status indicators (where available), the ability elucidate ecosystem processes in the Celtic Sea, and the significance of gaps left behind.
- Inform on the costs and benefits of various approaches to CFP and MSFD monitoring when considering implementation in other regional seas dependent upon successful completion of objective 5 and collaboration within EU funded project: "Towards a Joint Monitoring Programme for the North Sea" (PP/ENV/SEA 2012).

## **4 Identify expert groups and develop terms of reference for them**

### **4.1 How to design a survey approach to provide ecosystem “process” data**

Much of the work of WGISUR has focused on the synoptic element of fisheries surveys and their ability to provide similar synoptic data for other components of the ecosystem beyond fish communities. In terms of fish stock estimation, we are able to understand many of the processes underpinning our estimates. So, we understand, to some extent processes like; recruitment, growth, fecundity, natural and fishing mortality. In most cases we do not have a similarly elaborated understanding of many of the wider ecosystem and particularly so in terms of some of the key MSFD descriptors e.g. biodiversity, seabed interactions and foodweb interactions. This is important, as any synoptic survey, if designed for purpose, needs to be designed in the context of the processes that govern the system we are monitoring. If this is not the case, then we are largely, simply taking snap shots of the “State” of the system without being able to say how that state might have arisen and where that state might progress to, under prevailing conditions. This is not to overstate the issue. It is clear that we do understand some of the elements of the processes involved in biodiversity, seabed impacts, and the foodweb. However, this information should be used in the design of the type of EAFM survey we are aiming for.

Current, or modified, surveys could clearly provide extensive ecosystem data as described in previous WGISUR reports. However, we have little understanding of what survey approach would need to be taken to understand the “process” as well as the state of those ecosystem components we are surveying. In a simple appraisal, WGISUR suggested that this might entail including taking more, and more detailed, observations at a small number of targeted locations. How this was carried out and with what instrumentation and protocols is not immediately clear. It may well be that actually, fisheries or EAFM surveys would not be the appropriate platform for conducting this type of research or monitoring. A possible better approach would be the use of moored or shore based stations that could monitor elements such as water movement, productivity, daily or seasonal changes, vertical structures, nutrients etc.

To help determine what surveys could and should do, and what other methodologies should be deployed (e.g. moored monitoring stations), WGISUR have suggested a ToR for WGECO to assist with this. Suggested wording might be:

*“Advise on the relevant ecological, biological and physical processes that could usefully be monitored using surveys and/or fixed platforms. If possible to elaborate this to a list of priority monitoring targets and details of the spatial and temporal resolution of monitoring that would best serve the needs of the MSFD and a wider understanding of the marine ecosystem in the ICES area.”*

However, we propose that WGECO and WGISUR work together to develop an appropriate wording and approach

### **4.2 Multifunction surveys and their impact on fish stock data acquisition**

The main thrust of the work of WGISUR to date has been to describe how our existing surveys could be adapted to a wider ecosystem monitoring role, particularly in the context of the MSFD. It has been recognized by WGISUR from the start of this process that there is an implicit risk that such adaptation could also compromise the value of the current core purpose in fish stock estimation. This is obviously the case if

the additional ecosystem monitoring is carried out within the current survey design and timetable. In the context of bottom-trawl surveys, for instance, most additional sampling will mean a longer time spent at stations, or more stops between stations. It may also involve fewer stations in total. For acoustic surveys it may involve more stopping in transects to collect samples, and possible deterioration in the quality of the data collected on transect.

WGISUR would, therefore, suggest that it is important to quantify the potential impact of any changes in survey practice on the core purpose of that survey. This is in recognition of the fact that national and EU funding of the surveys is often predicated on delivery of that core data and at a set level of accuracy and precision. The other side of this question is a consideration of what scope for change does currently exist in the surveys. For instance, would it be possible to reduce the number of stations in a bottom-trawl survey, or change the stratification of those stations, without significant impact on their accuracy and precision.

A similar issue arises in the context of the ecosystem data that we are already collecting or that we could start collecting on these surveys. What level of sampling, accuracy and precision would be appropriate to a given set of key ecosystem indicators?

WGISUR suggest that this would a suitable subject for a joint meeting with the Working Group on Improving use of Survey Data for Assessment and Advice (WGIS-DAA), or possibly a joint workshop, possibly held alongside a routine meeting of one of the EG. We would also suggest that participation from the IEA EG under SSGRSP should be invited.

## **5 Identify issues common to all surveys, set up workshops and manage them as appropriate**

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Based on the discussions at WGISUR in 2012 and 2013, and also WKECES, the group felt that it would be important to bring together all the various different pieces of work carried out on integrated ecosystem surveys and produce a CRR. The CRR would be constructed as a “user manual” giving guidance and examples on the development of integrated ecosystem surveys from pre-existing fishery surveys, or de novo. It was proposed that this be the subject of the next WGISUR workshop, to be held in tandem with the next meeting of WGISUR in 2014.

## **6 Provide guidance on the adaptation of existing surveys to provide an approach to an ideal ecosystem survey and Report on any implications WKECES**

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One element of the role of WGISUR is the setting up and reporting on a series of workshops surrounding the core terms of reference of the group. The latest of these, The Workshop on Evaluation of current ecosystem surveys (WKECES) was held in Bergen Norway in November 2012.

The Workshop aim was to evaluate four surveys with distinct ecosystem survey characteristics and to synthesize the results of this evaluation into advice to WGISUR as to the important considerations when developing ‘ideal ecosystem survey’ for the implementation of the ecosystem approach to management.

The four surveys were:

- The Joint NOR-RUS Barents Sea ecosystem survey (BESS)
- The French and Spanish Pelagic Ecosystem Survey – PELGAS / PELACUS
- The German Small-scale Bottom Trawl Survey (GSBTS)
- The UK Western Channel Beam Trawl Survey (Q1SWBeam)

The approach taken was to evaluate the four candidate surveys separately through a presentation and plenary discussion performing a SWOT (strengths, weaknesses, opportunities and threats) analysis. Two top level themes emerged as the causes of the strengths and weaknesses for all the surveys:

- The setting and prioritizing objectives, and
- The survey design and the need to be able to elucidate process by explicitly linking dynamics in different ecosystem components.

One of the broad conclusions was that the strengths in the different surveys were mutually exclusive, either operation-ally or conceptually, and therefore an ‘ideal ecosystem survey’ on a single vessel, is unlikely to exist. This was based in part on some of the surveys being based on trawl surveys, while others were based on acoustic surveys. An ecosystem monitoring program that has at the heart of it one or more ecosystem surveys is required and these must go beyond strict status observations and link different ecosystem components with each other or the physical environment. WKECES concluded the prioritization in these surveys should be based on three factors:

- the characteristics of the ecosystem particularly with respect to the spatial and temporal scales of variability.

- the available resources in ships time, but also expertise and financial considerations. International pooling of resources will aid to increase efficiency and improve regional ecosystem assessments across national boundaries.
- the management and legal requirements and prioritizations for reporting. This is not a scientific criterion, but an ability to address the former will almost certainly have an impact on the availability of resources.

A key issue raised was that in all four cases the survey had been developed out of what had basically been a fisheries survey. In addition, they were initially designed in the context of the type of survey, a series of transects for acoustics, and a grid of stations for trawl surveys. The surveys had been designed for boundaries of fish species distribution and not “ecosystems” A number of key conclusions rise from this as follows:

- In designing an integrated fishery ecosystem survey we should identify those ecosystem components which can be successfully monitored within the constraints of a pre-existing fishery survey.
- As an ancillary question, it would also be relevant to ask if the initial fishery survey was fit for the original purpose, or is it merely adequate.
- The important question of using fixed or random stratified designs for an integrated survey will depend on what components are included in the monitoring, and on the characteristics of the area to be studied. So an area where there is lot of local scale habitat variability may be better surveyed with a random stratified design, while a larger, more uniform area might be better for a fixed station design.
- When adding new ecosystem components to those monitored on a survey, it is important to know the scale of the process involved, and link this to that of the other components examined. As an example, is there any value in collecting benthos material with a GOV on the scale of the standard IBTS survey?
- To develop a fisheries survey into an integrated ecosystem survey, the surveys themselves will need to be more adaptable. This raises the issue of changes to a survey leading to problems with the use of the species abundance estimates produced, be that CPUE on a trawl survey, or echo-integrated biomass on an acoustic survey. Can the number of stations or transects be reduced without compromising the original survey target data?
- Prioritization is a major issue. Which components to focus on. One suggestion from WKECES was to focus ecosystem data collection on those areas where impacts are major. Alternatively different survey strata could be weighted according to the energy flows by stratum, or vulnerable components, ecosystem component variability, survey resource contribution (usually from fisheries departments), scale of anthropogenic pressures (MSFD) or by common aims with others (collaboration). Again this raises the need to understand the “process” that we wish to monitor.
- One first approach identified was to define a small set of ecosystem variables that could constitute the standard-operating-practice for all surveys, or at least all surveys in each métier (trawl, acoustic and ichthyoplankton). This would be best defined by a combination of groups including the IEA EGs, and the various ecology EGs, and especially WGECO.

## 6.1 In conclusion

The workshop concluded that the definition of an ecosystem survey could be one that considers ecosystem processes as an integral part of the survey design and planning. An ideal ecosystem survey would encompass all ecosystem processes as well as monitoring of ecosystem status, but it would appear that there are insurmountable operational and temporal barriers to the ideal ecosystem survey so that one should think of 'less than complete' ecosystem surveys as a vital part of an 'ideal ecosystem monitoring program'.

The WKECES case studies demonstrate that surveys that formally primarily served fisheries management purposes can be adapted to form the backbone of an effective ecosystem monitoring program. The most important initial consideration when adapting surveys is not which ecosystem components to add, but how to add them as to maximize the improvement in ecosystem process understanding.

Ecosystem surveys should be based on robust (statistically) and preferably adaptable sampling designs, the development of which must include the evaluation of existing data / knowledge to assess temporal and spatial scales of variability of order to assure efficiency and effectiveness. There are a number of different effective options to achieve such monitoring aims all of which have their respective strengths and weaknesses. The best design in a given situation is a function of the characteristics of the ecosystem, especially the spatial and temporal gradients in variability, the management requirements / priorities and scientific objectives.

More efficient and particularly automated sampling methodologies should be developed, investigated and tested to ensure effective use of resources, but these developments must also consider time-series and data quality aspects.

## 7 Interaction potential with ICES WGFAST

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The WG on Fisheries Acoustic Science and Technology requested WGISUR to provide a list of possible areas where the work of the two groups could synergise. It should be noted that some members of WGISUR were also current or previous members of WGFAST, and might be expected to have a strong working understanding of the general field of acoustics. As much as possible, the WG set out to ask questions, and not try to provide their own answers. In some cases this results in what may appear as naive questions. However, it was felt that it was better to ask the question and be told it was not useful, possible, or sensible, rather than not ask the question at all. The following topics are presented as they arose in the WG, and not in any order of interest or preference. We perceive these as the starting point for discussion.

### 7.1 General Considerations

WGISUR are aware of considerable amounts of acoustic data collection carried out on routine surveys other than acoustic surveys. Most RVs are equipped with state-of-the-art echosounder systems, or Multibeam systems and recording procedures. Would it be appropriate to develop a standardized procedure for this type of data collection? E.g. speed and between trawl stations on an IBTS? In principle, acoustic data are simple to collect, but complex to reliably analyse. Could WGFAST provide guidance or a manual for minimum standards for this type of data collection? Should ancillary data collection be included for ground-truthing, and if so what? Equally, would the basic design of the core survey compromise the data collection? For instance, on a DEPM survey, the vessel would have to stop for a plankton sample every

20 minutes. Many surveys e.g. ichthyoplankton surveys, work overnight. Could these data be used in any useful way? More detailed possibilities for acoustic data collection and analysis are listed below, but one of the key considerations is that, at least in principle, acoustic systems are relatively easy to run on non-acoustic surveys and may have a high value return.

## 7.2 Acoustic Systems

### 7.2.1 Passive Acoustics

Passive acoustic systems, allowing the detection of sound produced by biota, or indeed non-living processes, may be very useful. The most obvious candidate for this would be the cetaceans (André *et al.*, 2011; Pavana and Borsani, 1997). Evaluation of cetacean numbers and populations can be expensive and difficult, requiring substantial human resources, and good weather. Towed hydrophone arrays may be able to complement or improve these estimates. Would it be possible to deploy these systems on surveys without expert personnel?

Are there appropriate survey applications of passive acoustic to quantify fish e.g. through noise production during spawning (Finstad and Nordeide, 2004).

Are there any other uses passive acoustics on standard surveys that could be used to improve our data collection for the EAFM, and MSFD – e.g. background v. anthropogenic noise?

### 7.2.2 Moored or bottom mounted systems

WGISUR are aware of considerable amounts of work on moored or seabed mounted acoustic systems, e.g. Handegaard *et al.* (2013). A major emerging issue in the use of survey vessels for the EAFM is that they are excellent for understanding the “state” of the ecosystem, or parts of it (e.g. fish abundance), but are less appropriate to a more process based understanding of the system, e.g. what happens before and after the survey, and what are the systems that drive productivity etc. Fixed station systems would be much more appropriate. A closer integration of the survey design and the placement and operation of these fixed station systems might be appropriate.

### 7.2.3 Passive Acoustics

Passive acoustic systems, allowing the detection of sound produced by biota, or indeed non-living processes, may be very useful. The most obvious candidate for this would be the cetaceans (André *et al.*, 2011; Pavana and Borsani, 1997). Evaluation of cetacean numbers and populations can be expensive and difficult, requiring substantial human resources, and good weather. Towed hydrophone arrays may be able to complement or improve these estimates. Would it be possible to deploy these systems on surveys without expert personnel?

Are there appropriate survey applications of passive acoustic to quantify fish e.g. through noise production during spawning (Finstad and Nordeide, 2004).

### 7.2.4 Multibeam acoustic systems

Multibeam acoustic data collection is obviously useful for seabed classification, when carried out in a systematic fashion, and with associated ground-truthing. However, is there value in collecting such data during more routine surveys including acoustic (SBES) surveys? Can these data be used for wider purposes than seabed classification,

e.g. water column biota? Is it appropriate or useful to run a MBES on other surveys, given the operational constraints imposed by bottom trawl, ichthyoplankton or even standard acoustic surveys? If it is, would it be possible to define protocols and standards for this type of data collection?

#### **7.2.5 Acoustic Doppler Current Profiler Systems**

Like MBES, these systems are routinely fitted on RVs, but are rarely deployed on routine fishery surveys. While their main role is in water body movement quantification, it is also understood that they may be used in a wider context, e.g. to quantify plankton abundance. As with MBES, is it appropriate to run an ADCP in a more routine fishery survey context? If it is, would it be possible to define protocols and standards for this type of data collection?

#### **7.2.6 Net mounted acoustic systems**

Would there be any value in mounting upward looking acoustic systems on trawlnets to identify or quantify what is missed above the fishing net?

### **7.3 Potential Novel Information Products from Acoustic Systems**

#### **7.3.1 Plankton**

One of the long standing fascinations for marine ecologists has been the acoustic recordings of many and complex scattering layers in echograms. WGISUR also appreciate that a great deal of work has gone into studies of plankton acoustics, and that are many issues associated with target strength modelling, air bubbles, etc. However, it is possible that quite simple and integrative acoustic derived indicators may be useful. This might involve the use of higher frequency systems. There may be value in, for instance, size spectrum information in layers through the water column. Some indication of high and low productivity would be useful. This could also be in a small number of categories. Another approach may be to simply cluster similar plankton species into higher taxonomic categories e.g. copepods, mysids etc. and provide an indicator of biomass by EDSU. WGISUR is fully aware that this has been something of a holy grail for some years, but would welcome any feedback.

#### **7.3.2 Feeding state**

It is known that fish target strength may be modulated by its stomach contents. Is there any potential in a reverse convolution of this analysis to provide data on the feeding state of the fish seen in an acoustic survey? Anecdotal observations also indicate that on occasion echograms show fish schools associated with “holes” in the plankton layers. Is this anything other than intriguing but essentially anecdotal, or is it of potential for determining feeding state?

#### **7.3.3 All the other biota!**

Most acoustic surveys will be used to develop stock abundance estimates of a small number of key commercial species, usually small pelagics. What if any other information could we glean from acoustic survey data beyond these few species. We have touched on plankton above, but information on non-target species, demersal species, aggregation patterns and behaviour, could all prove potentially useful.



### 7.3.4 In Conclusion

One of the key attractions of acoustic technologies and methodologies is that they appear to be able to be operated successfully on board an RV while it is able to carry on other work without interruption. While this is obviously the case at the simplest level, it may not be very useful. You can switch on the sounder, set up the recording system, and get on with the rest of your survey. However, are the data collected of any use at all? Issues like calibration, target strengths, ground-truthing, the vessels cruise track, and stopping and starting are all likely to be major issues. The need for expertise to analyse any data collected after the survey is also clearly vitally important. Hence WGISUR suggest that it would be useful for WGFASST and WGISUR together to develop protocols and guidance on how to carry out ancillary acoustic data collection. It would also be useful to consider how much additional ecosystem information we could extract from dedicated acoustic surveys, and at what additional cost in terms of ground-truth data, and analysis overheads.

## 8 References

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## Annex 1: List of participants

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## **Annex 2: Agenda**

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### **Tuesday 15th Jan**

- 10:00 Presentation of the report from the Workshop on Evaluating Current Ecosystem Surveys and discussion of the outcomes
- recommendations from WKECES – Sven Kupschus and Dave Reid

### **Wednesday 16th a.m.**

- 09:00. WGISUR/WGFAST interactions (ToR h). Dave Reid

### **Wednesday 16th p.m.**

- WGISUR and the EU LOT proposals submitted in December 2012 – implications.

### **Thursday 17<sup>th</sup>**

- Recommendations for future workshops, and work programme

Drafting the report and assignment of writing tasks.

14:00 Close

### Annex 3: WGISUR terms of reference for the next meeting

2012/2/SSGESST19 The Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR), chaired by Ingeborg de Boois\*, Netherlands, will meet in Nantes, France, 21–23 January 2014 to work on ToRs and generate deliverables as listed in the Table below:

WGISUR will report on the activities of 2014 (the first year) by 1 April 2014 to SSGESST.

#### ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN		EXPECTED DELIVERABLES
			TOPICS ADDRESSED	DURATION	
a	Provide guidance on the adaptation of existing surveys to provide ecosystem data	a) Science Requirements b) Advisory Requirements c) Requirements from other EGs	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	3 years	CRR
b	Provide guidance on the development of an ICES ecosystem survey approach	a) Science Requirements b) Advisory Requirements	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	Year 2	CRR
c	Identify issues common to all surveys, set up workshops and manage them as appropriate	a) Science Requirements c) Requirements from other EGs	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	yearly	Workshop Report
d	Liaise with IEA groups, and others as appropriate (e.g. CWGMSFD), over data product needs and specification	a) Science Requirements b) Advisory Requirements c) Requirements from other EGs	1.2, 1.4, 1.5, 1.7, 2.1, 2.4, 2.5	yearly	List of data product needs

#### Summary of the Work Plan

Year 1	Workshop report, identify next workshop
Year 2	Workshop report, Provide data product needs
Year 3	Completion of CRR

#### Supporting information

Priority	High. Integration of surveys is needed in support to the ecosystem approach. The working group will meet that objective by steering all survey groups and providing a home in which integration can be planned.
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Resource requirements	<p>Surveys are coordinated on a regional basis but there are issues common to all, requiring the steering of all groups. Also the integration of surveys is needed in support to the ecosystem approach.</p> <p>International survey programs involve many vessels and teams. Calibration of methods, protocols and exchange in expertise requires global steering. Methodological issues include topics on: species identification, echogram interpretation, Phase I analysis of data such as combination of indices of different nature (acoustic and trawl) or of multiple surveys (different gears), precision of estimates.</p> <p>International survey programs deliver data and products. Regional database are being developed for all surveys (not only for bottom-trawl surveys but also for acoustic, egg and larvae surveys). Standard data format and portals to access data require global steering of all survey groups. Also, steering the format of survey products (e.g. atlas) for all surveys would contribute to constructing the overall picture needed for the ecosystem approach.</p> <p>International survey programs are evolving towards ecosystem monitoring platforms. Such evolution should be steered for all surveys. In particular, can ecosystem monitoring be performed by fisheries surveys as they are currently just adding new data collection protocols? Adaptation of surveys for the ecosystem approach include topics on:</p> <p>Planning of surveys to fit for a purpose and evaluation of the compliance of surveys to fit for the purpose;</p> <p>Spatio-temporal scales and designs to sample different components of the ecosystem;</p> <p>Coordination and combination of surveys of different nature and scales (sampling processes and surveying patterns, annual and intra-season surveys).</p> <p>WGISUR will examine and report on how to combine fishery survey information and procedures with that from other platforms (e.g. moorings, satellites, coastal stations etc. to realize broad ecosystem monitoring. This will broaden WGISURs scope in terms of planning for Integrated Observations for the Ecosystem Approach.</p>
Participants	15–20 Chairs of identified Expert Groups and additional experts invited by the Steering Group chair as appropriate
Secretariat facilities	None
Financial	None.
Linkages to ACOM and groups under ACOM	Yes.
Linkages to other committees or groups	SCICOM , Survey based WGs under SCICOM, WGEKO and other ecology based WGs, IEA WG under SSGRSP, and DIG
Linkages to other organizations	There are no direct linkages to other organizations

## Annex 4: Recommendations

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<b>Recommendation</b>	<b>Adressed to</b>
1. It is recommended that WGISUR is embedded in the workstream of the ACOM/SCICOM strategic initiative on MSFD	ACOM/SCICOM strategic initiative
2. It is recommended that advice be provided on how to design a survey approach to provide ecosystem “process” data, and on what “process” data would be most appropriate	WGECO
3. It is recommended that WGISUR, and WGISDAA hold a joint meeting on developing multifunction surveys and their impact on fish stock data acquisition.	SCICOM, WGISDAA