ICES WGMARS REPORT 2014

SCICOM STEERING GROUP ON SUSTAINABLE USE OF ECOSYSTEMS

ICES CM 2014/SSGSUE:08

REF. SCICOM & ACOM

Second Interim Report of the Working Group on Maritime Systems (WGMARS)

2–5 December 2014

ICES HQ, Copenhagen, Denmark

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

Recommended format for purposes of citation:

ICES. 2015. Second Interim Report of the Working Group on Maritime Systems (WGMARS),2-5 December 2014, ICES HQ, Copenhagen, Denmark. ICES CM 2014/SSGSUE:08. 35 pp.
https://doi.org/10.17895/ices.pub.5430

For permission to reproduce material from this publication, please apply to the General Secretary.

The document is a report of an Expert Group under the auspices of the International Council for the Exploration of the Sea and does not necessarily represent the views of the Council.

© 2015 International Council for the Exploration of the Sea

Contents

Executive summary

This was the second interim year for the multi-annual Terms of References (ToRs) for the Working Group on Maritime Systems (WGMARS). ToR A is the social network analysis of ICES networks. ToR B is an analysis of the management plan landscape in Europe, focusing on the plurality of individual and institutional roles involved in management plan processes. ToR C addresses how to best integrate stakeholders in ICES work.

WGMARS addressed ToR A this year with significant quantitative analyses of the ICES Expert Group network. These analyses were completed before the meeting by the PhD. student who received funding from the first ever ICES Science Fund. During the meeting, 15 interviews were conducted with members of the ICES Secretariat and the ICES Advisory Committee (ACOM) to provide qualitative information to corroborate the quantitative results. Finally, WGMARS members formally presented results of ToR A work of social network analyses at the ACOM December meeting at the ICES Secretariat, followed by an ACOM-wide discussion of the results. WGMARS plans to pursue additional funding for social network analysis of ICES work since it has proven to be a fulfilling academic exercise and strategic tool useful for ICES.

Discussions related to ToR B led to an expansion of the current "What hat are you wearing?" manuscript WGMARS which was started at last year's meeting. This manuscript addresses the different individual and institutional roles with which fisheries scientists in the ICES community are faced. The discussions during this year's meeting on ToR A and ToR C were fruitful to develop several of the themes of this manuscript. WGMARS has identified three case studies to illustrate different roles, and also was able to interview a fisheries scientist for more information for the manuscript. It is expected that this manuscript will be submitted in the first quarter of 2015 as an ICES JMS "Food for Thought" paper that raises issues of legitimacy, transparency and credibility of fisheries science and advice.

WGMARS received a request from the Pelagic Advisory Council to catalyse a stakeholder-scientist meeting on herring spawning ground mapping. This request was a follow-up to the results from ToR C in 2013 when the Advisory Councils met at the WGMARS meeting to discuss the future of stakeholder integration in ICES. ToR C culminated in a successful stakeholder-scientist workshop that has started a process with the Herring Assessment Working Group (HAWG) to increase the knowledge base regarding data on spawning grounds for herring in the North Sea.

1 Introduction of the 2014 Meeting

1.1 Opening of the meeting and adoption of the agenda

The WGMARS Chair Dorothy Dankel opened the annual meeting at 2:00 p.m. on Tuesday, 2 December 2014. She introduced and presented the ToRs, which were unanimously agreed. The WGMARS participants adopted the agenda. The Chair opened the floor for brief introductions of each of the participants. This was especially important as WGMARS was host to representatives from the Pelagic Advisory Council and the European Dredgers Association (see Annex 1).

1.2 Attendance

The meeting was well attended this year. Ten scientists participated in the entire meeting (a couple of our members were mainly attending the neighboring ACOM meeting, but participated in WGMARS partly), from Norway (2), Germany (2), Sweden (2), Denmark (1) and the Netherlands (3). The gender ratio is four women: six men. The complete list of participants is in Annex I, including the chair-invited stakeholder guests in the workshop held on 3 December 2014. See Annex 3 for selected presentations given during the WGMARS meeting and Annex 2b for Agenda for the one day workshop held on Wednesday 3 December 2014.

1.3 Terms of Reference (ToRs)

The ICES Working Group on Maritime Systems (WGMARS) is an expert group based on interdisciplinary collaborations and understandings of the coupled human/ocean system. WGMARS is a forum to articulate interdisciplinary perspectives regarding sustainable ecosystem science, advice and governance.

The group operates around two multi-annual Terms of Reference (ToRs) spanning 2013–2015. The first is to continue examining the detailed questionnaire and ICES expert group participation data collected in 2012. Using social network analysis, we describe how ICES conducts ecosystem science and delivers it to its clients in light of synergies, interdisciplinary ecosystem science, and governance. WGMARS communicates with ACOM, SCICOM and interested expert group chairs on this topic.

The second ToR reviews Management Strategy Evaluations (MSEs) and Management Procedures (MPs) in the EU. We are preparing a perspective and reflexive paper on the different roles of individuals and institutions in the development, review and communication of management plans.

In 2013, WGMARS collaborated with the European Advisory Councils (ACs) on how ICES-stakeholder relationships can best move forward and in 2014, this was expanded to an actual workshop between the Pelagic Advisory Council and WGMARS on herring spawning ground mapping.

The ToRs for the 2014 WGMARS meeting were:

a) Social Network Analysis of ICES Expert Groups: focus on three regional seas networks

b) Analysing roles of institutions and scientists in Management Strategy Evaluations (MSEs) and Management Procedures (MPs) in the EU

c) Stakeholder integration: Workshop on mapping herring spawning grounds in the North Sea

2 ToR A: Social Network Analyses of ICES

Thanks to the ICES Science Fund 2014, we realized an extensive social network analysis of ICES Expert Groups (EGs). For the analysis, we used ICES participation data from 2010 until 2013 representing active participation of individual scientists in ICES EGs. Data were provided by the ICES secretariat. Statistical analysis and data visualization was realized with UCINET and NETDRAW software. During a two-week research stay at the Stockholm Resilience Center, different analysis steps were performed to answer the following questions:

1) How are ACOM and SCICOM Expert Groups interrelated?

2) What is the importance of Workshops (WK) in connecting working groups (WG) and Study Groups (SG) within the ICES network?

3) In which way is the ecosystem-based approach (EBA) addressed in the ICES network? Which EGs are required for an EBA for selected ecosystems? Do these networks already exist? Which EGs are not connected? What is the role of the integrated assessment in WGs?

4) Which EGs are the major 'hubs' and what is the role of individual EGs in the whole ICES network?

In this report, we focus solely on the first and the third question. All results will be submitted for publication next year.

Question 1: How are ACOM and SCICOM EGs interrelated (2012)?

We anticipated that (i) ACOM EGs would, to a considerable extent, relate to SCICOM EGs through shared membership ties. This way one would envision an integration of scientific knowledge in advice. Furthermore, we assumed that shared membership contributes to (knowledge) exchange between different EGs. The resulting Network Map is shown in figure 1.

Our H0 was that the inter-group exchange through shared membership is significantly higher than it would be in a group of randomly distributed ties, where node attributes are not considered.

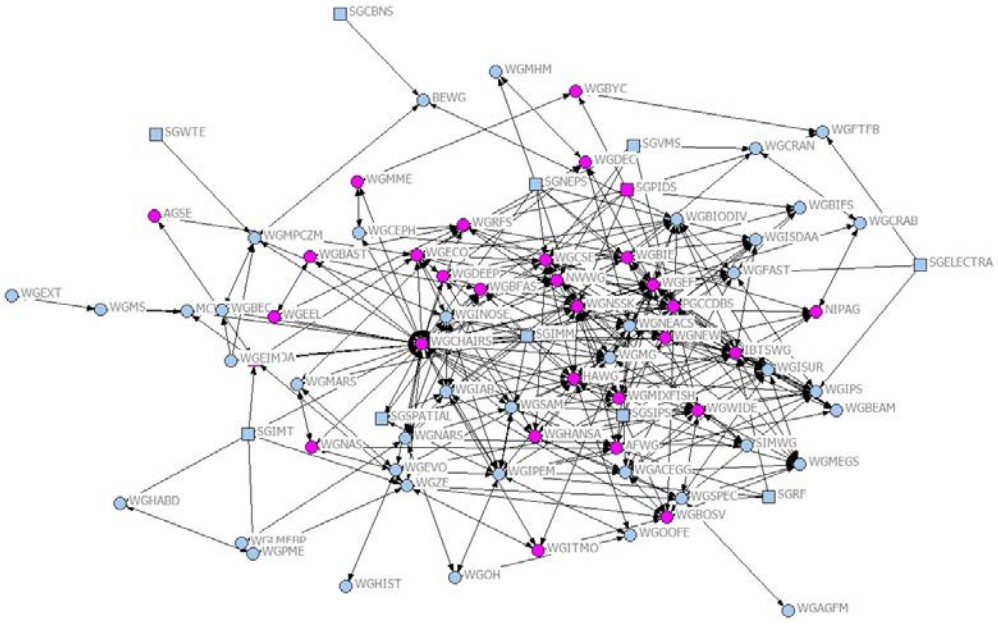

Figure 1. Network Map showing ACOM and SCICOM groups without WKs for 2012.

Nodes: ICES EGs Links: shared membership Colors: pink = ACOM, blue = SCICOM; circles = WGs; squares = SGs

Results: We applied a statistical analysis (Join-count statistics) to answer the question.

Old Code New Code

======== ========

1 => 1 (1 = ACOM)

2 => 2 (2 = SCICOM)

Number of iterations = 10000

		1	2	3	4	5
		Expected	Observed	Difference	P >= Diff	P <= Diff
1	1–1	42.949	93.000	50.051	0.000	1.000
2	1–2	148.101	140.000	-8.101	0.815	0.211
3	2–2	120.949	79.000	-41.949	0.996	0.005

The results show that there was a much higher rate of shared ties across different ACOM EGs (line 1, 1–1) than expected considering the H0. Whereas, the number of shared ties that were observed across SCICOM EGs (line 3, 2–2) was significantly lower than it was expected to be under H0. Furthermore, there was a slightly smaller number of links between ACOM EGs and SCICOM EGs (line 2, 1–2) than it would have been expected.

Question 3: In which way is the ecosystem-based approach (EBA) addressed in the ICES network?

Based on expert opinion, we identified those EGs required to implement a regional ecosystem-based approach. Therefore, we selected three case study areas: the Baltic Sea, the North Sea and the Barents Sea. In a first step, we extracted subgraph networks for these regions were extracted (Figure 2). A statistical analysis was conducted to check whether the density of ties within and between two groups differed from what would have been expected, if the ties were randomly distributed across all pairs of nodes (Hanneman and Riddle, 2005: Chapter 18). Thus, we were able to assess, whether there was an association between sharing the same attribute (i.e. being a required EG for EBA) and the likelihood of a tie between two EGs. Furthermore, we can predict the number of ties expected in each of the sub-networks and compare them with the observed number of ties to identify the current degree of knowledge exchange.

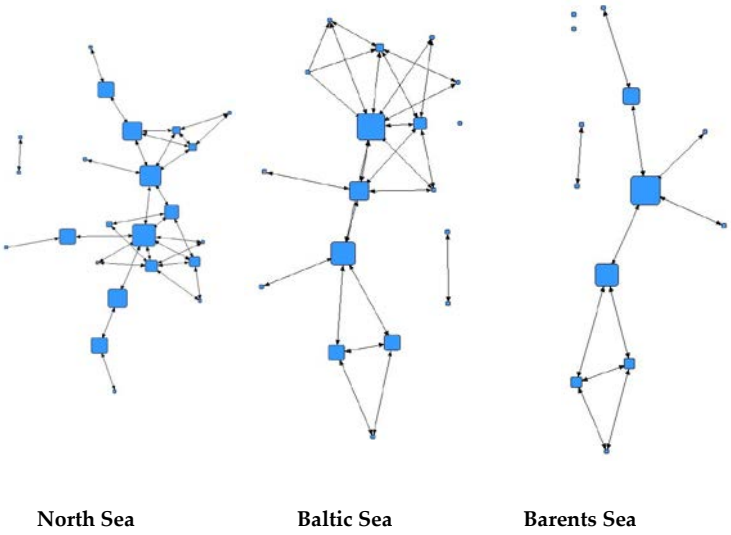

Figure 2. Representations of the connectivity of the expert groups in the ICES network related to three regions: North Sea, Baltic Sea and Barents Sea.

We anticipated that different EGs required for science or advice in an EBA are working stronger together than randomly drawn EGs. The statistical analysis showed a significant higher intra-group cooperation in all three case studies confirming this. In the case of the Baltic and the North Sea, the integrated assessment groups were marginal within the sub-network while other EGs played a far more important 'role' in connecting different groups or clusters within the sub-network. In all three sub-networks, there were 'important' EGs that were marginal and not connected to the rest of the network. These EGs did not share members with other EGs.

Qualitative interviews

Prior to WGMARS 2014, an interview guideline was elaborated to corroborate findings from the quantitative SNA with qualitative data from structured interviews of selected interviewees from ACOM and SCICOM to gain further knowledge of the structural characteristics of ICES. During WGMARS 2014, 15 interviews were conducted. The interviews will be evaluated in detail in a next step of the analysis and with the anticipated help of ICES Science Funds from a 2015 grant.

Presentation of results

During the annual ACOM meeting, WGMARS presented finding from the SNA to ACOM. The discussions afterwards revealed a big interest in continuing the research process and in using network analysis as a valuable tool to evaluate intra-group and intergroup relations in the ICES network.

2.1.1 References

Bodin, Ö., and Tengö, M. 2012.Disentangling intangible social-ecological systems. Global Environmental Change, 22(2): 430–439.

Hanneman, R. A., and Riddle, M. 2005. Introduction to social network methods: free introductory textbook on social network analysis.

3 ToR B: Operationalizing Management Strategy Evaluations (MSEs) and Management Procedures (MPs) in the EU

3.1 What hat are you wearing? A reflection on the different roles of fisheries scientists in the ICES community

WGMARS has a policy of publishing the collaborative work we do as much as possible. Last year, we started the ideas for a manuscript based on our ToR B. Our discussions led us to focus on the importance of the different "roles" that ICES scientists are currently taking on, and how this affects the science-policy interface. The core group of Dankel, Stange and Nielsen have a mature manuscript that they intend to send in to the ICES JMS in the first quarter of 2015. Below are excerpts of the manuscript, focused on ToR B.

3.1.1 Extended abstract of the upcoming manuscript "What hat are you wearing? A reflection on the different roles of fisheries scientists in the ICES community"

The role of science in society is changing, and so is the role of scientists. Formal and informal conventions through history have defined and shaped expectations about how a scientist should act. The classic notion of what it means to be a scientist is characterized by Merton's "ethos of science" (Merton [1942]). According to Mertonian norms, good science is guided by the principles universalism, communism, disinterestedness, and organized skepticism. These norms correspond with a view that science is at its best when it is not disturbed - or "corrupted"- by external influences, and reflects the ideal of science as an 'independent republic' (Polanyi, 1962). If it ever was, however, science is no longer pursued in isolated academic "ivory towers". More open and diverse forms of knowledge production have emerged and tend to dominate, captured by the concepts 'mandated science' (Jasanoff, 1990), 'Mode 2 science'(Gibbons *et al.*, 1994; Gibbons, 2000) and 'Post Normal Science' (Funtowicz and Ravetz, 1993). In contrasts to viewing science as the value free, curiosity driven, and independent pursuit of knowledge, these concepts refer to the types of scientific knowledge production that result from a much closer interaction with public and private interests in society. Such interests may have a significant role in defining what is to be researched, and how research is carried out, for instance through the consolidated role of research funding agencies (Rip, 1994) , through privately funded and prioritized research (Rabeharisoa and Callon, 2002) or through direct participation knowledge production by lay people, as denoted by the term 'participatory research'(Cornwall and Jewkes, 1995). New operational spaces emerge in which societal and scientific problems are framed and defined, and solutions negotiated. Among other things, this perspective recognizes that science is not value free and that scientists have stakes too.

Societal trends influence the production of science and advice for fisheries management and policy within the International Council for the Exploration of the Sea (ICES). Requests for scientific advice from ICES increasingly call for holistic approaches such as ecosystem based advice and management, and integrated environmental assessments (Dickey-Collas 2014). ICES strategic plan responds to this call as it intends to promote" the use and delivery of integrated advice in an ecosystem-based approach to fisheries and environmental management" (ICES 2013).

In addition, there is a general call for more participatory and transparent processes and these developments imply new tasks and challenges for ICES. Participatory processes

need to be facilitated. Transparency in the production of scientific advice must be ensured (Wilson, 2009). Uncertainty in fisheries science and advice needs be efficiently communicated to a diverse audience, and this requires context specific tools and skills (Dankel *et al.*, 2012). One way for ICES to respond to these new demands is by organizational changes (Stange *et al.*, 2012). Reforms in 2007–2008 established new routines for the ICES advisory process which made it possible for stakeholders to participate as observers in workshops, advice drafting groups, and meetings of the Advisory Committee (ACOM).

We use the word "hat" as a metaphor for the different standard roles that fisheries scientists might have. These roles are informed by formal or informal conventions or rules (or "scripts" as in Goffmann (1959)) that define or establish expectations about how a scientist should act in different situations. For instance, the terms of employment for a scientist working at a marine research lab formally informs and sets conditions for the types of behaviour that is acceptable for the scientists at work. Similarly, formal agreements establish and bound the mandate of a member of ICES Advisory Committee (ACOM). The roles of scientists are also informed by normative believes about how a scientist should act in general, such as those described in Robert Merton's Ethos of Science (Merton, 1996). Among other things, this ethos requires that scientists act in accordance with norms of disinterestedness, universalism and communalism, and organized scepticism with regard to knowledge claims. Finally, standard roles are informed by established local practises in a given type of situation. For instance, we can imagine a newcomer being informed about what the "normal practise" is in this situation.

For individual scientists, the societal trends towards more open and participatory knowledge production processes imply new roles and scripts. For example fisheries scientists increasingly engage in collaborations with stakeholders with the aim of producing knowledge that is aligned with the needs of managers and policy-makers (Mackinson *et al.*, 2011; Rockmann *et al.*, 2012; Stange *et al.*, 2014). Whether the purpose of the collaboration is to address a research question, a management dilemma, or a combination of the two, the scientists often find themselves is situations where skills beyond "just doing science" are required. The scripts that define what it means to be a fisheries scientist are changing.

We address the multiple roles that fisheries scientists in the ICES community encounter when doing work tasks related to operationalization of fisheries management strategies in Europe. We identify and describe four roles: the "developer", the "reviewer", the "judger" and the "messenger". Three cases are used to illustrate how the different roles are manifested in processes of developing and evaluating management plans and harvest control rules for pelagic fish stocks in European waters. We discuss the work tasks related to these four roles, the skills needed, and the potential conflict of interest that may emerge if a scientist takes on multiple roles associated with the same issue. The term "ICES scientist" is used here when the output of the work done is recognized as an ICES product, e.g. an Expert Group report or ICES Advice. With this reflexive exercise we wish to draw attention to how societal trends towards more integrated forms of knowledge production influence the work of fisheries scientists, and to enhance awareness within the ICES community about legitimacy, transparency and credibility issues in fisheries science and advice.

While performing work tasks related to these four different roles described above, a scientist's identity is also associated with an institutional affiliation. The scientist might be carrying out a work task with a mandate from his or her employer (e.g. a national

marine research institute, a university, or the industry), as a member of an ICES Expert Group, as a member of the European Commission Scientific Technical and Economic Committee for Fisheries (STECF), or as an independent consultant. Table 1 gives a matrix of multiple combinations of roles and affiliations in a specific European contest.

Table 1: Work tasks done by scientists in different roles - wearing different "hats"- during the process of producing management plans. Sources: Information collated by the ICES Workshop on Guidelines for Management Strategy Evaluations (ICES 2013), discussion within the Working Group for Maritime Systems (ICES 2013, 2014) and interviews conducted for this study.

Affiliation/Role	Developer	Reviewer	Judger	Messenger
National Inst.	X	X		X
ICES	X	X	X	X
STECF		X	X	X
Independent	X	X		X
Industry				X

The crosses in the matrix (Table 1) reflect that a fisheries scientist can encounter number of different situations where their mandate might need clarification. The fact that multiple combinations of roles and affiliations - or "hats" -are manifested in management strategy-related work triggers the question "What hat are you wearing?" The reply from the scientist might be: "I am employed by the National Research Institute to develop a management plan," or "I am judging this harvest control rule with a mandate from the ICES Advisory Committee (ACOM)".

The new CFP requires adoption of multiannual plans, however: there is no prescription on the data basis, the participation level, the scientific input or rigor. Based on the experience regarding the western horse mackerel management plan, their inception and implementation (if applicable) is a hurried process, where stakeholder participation was less than desired (albeit more than the norm) and dependent on funding and scientific participation was on top of already full workloads (Hegland and Wilson, 2009b). This is not a sustainable set up for any parties involved. The saying "time is money" is applicable to the workload of scientists in the ICES community. In discussions with fisheries scientists, the issue of time and money related to roles of developer, judger and messenger come up often. From a "time is money" perspective, it makes sense to concretely outline the steps associated with developing, judging, delivering and implementing a management plan before the work is instigated. By doing this, one can foresee the workload, the expense and the need for competent scientists. Perhaps even conduct a cost–benefit analysis.

A testimony to the workload of fulfilling various roles lies in the multiple intricate and important "ad-hoc" elements of these mandates. Some examples of "ad-hoc" elements include testing the management plan under different assumptions of recruitment, understanding the sensitivity of the management plan to climate change, or communicating the management plan in different science fora, such as science conferences and meetings.

There are advantages of multiple roles being filled by a single individual when inevitable ad-hoc elements of the three mandates occur: flexibility to react promptly to a request by stakeholder organizations is one example. In addition, there is a quality in possessing intimate knowledge of the end-to-end system of management plan development. A disadvantage to the ad-hoc elements of role-playing, however, is the difficulty of comparing strategies and procedures with other international approaches. Fisheries scientists in the ICES community frequently complain of over-worked travel schedules and turn down invitations to engage with stakeholders and advisory councils, a symptom of gross inefficiencies due to increased demand of their roles. The cost of stakeholder participation, in developing management plans for example, namely for conservation groups, is pointed to and outlined in Hegland and Wilson (2009).

Transparency becomes essential to allow evaluation and quality assurance of the advice produced. We argue that ICES should carefully consider:

- Which roles do ICES scientists want to take on?
- What are the potential consequences of ICES scientists taking on multiple roles?
- How to organize tasks to efficiently fulfill the different roles?
- What is the role of ICES Secretariat in organizing participatory processes?

The questions raised are thus equally relevant to reflect upon for individual scientists in the ICES community as for ICES as a hierarchical organization. May individual scientists take on more than one role? If so, is it important that the roles are kept apart, and how could this be ensured?

Dankel *et al.* (2012) conclude that in order to uphold credibility and saliency in science and advice, ICES should improve their roles of advice development and communication, as well as extending the peer community, by acknowledging the field of "fisheries science for advice" as a "post-normal science" problem. Due to high systems uncertainties, reliance on quantitative models that are dependent on value-laden inputs, and the social and economic high stakes hinging on quota advice, fisheries science for advice goes beyond the realm of Kuhnian "normal" science and into the post-normal science, Mode 2 realm. Accordingly, we believe it is important that ICES as an organization and as a community of individual scientists are aware of, and reflect on, the different mandates and specific requirements of the roles we described as developer, judger, reviewer and messenger. If it cannot be avoided, we advise that ICES communicates openly about individual role crossovers with its clients and the broader public in order to protect the credibility and legitimacy of its research and advice.

3.1.2 Cited References

Dankel, D. J., Aps, R., Padda, G., Rockmann, C., van der Sluijs, J. P., Wilson, D. C., and Degnbol, P. 2012. Advice under uncertainty in the marine system. Ices Journal of Marine Science, 69: 3–7.

Funtowicz, S. O., and Ravetz, J. R. 1993. Science for the post-normal age. Futures, 25: 739–755.

Gibbons, M. 2000. Mode 2 society and the emergence of context-sensitive science. Science and Public Policy, 27: 159–163.

Gibbons, M., Limoges, C., and Nowotny, H. 1994. The new production of knowledge: The dynamics of science and research in contemporary societies, Sage, London.

Hegland, T. J., and Wilson, D. C. 2009. Participatory modelling in EU fisheries management: Western Horse Mackerel and the Pelagic RAC. Journal of Maritime Studies, 8: 75–96.

ICES. 2013. Report of the Workshop on Guidelines for Management Strategy Evaluations (WKGMSE). ICES CM 2013 ACOM 39. International Council for the Exploration of the Sea. Copenhagen.

ICES. 2014. Workshop on North Sea horse mackerel management plan (WKHOMMP), 17–18 June 2014, IJmuiden, the Netherlands. ICES CM 2014/ACOM:. 23 pp.

Jasanoff, S. 1990. The fifth branch: science advisers as policymakers, Harvard University Press, Cambridge, Mass.

Mackinson, S., Wilson, D. C., Galiay, P., and Deas, B. 2011. Engaging stakeholders in fisheries and marine research. Marine Policy, 35: 18–24.

Polanyi, M. 1962. The Republic of Science: Its Political and Economic Theory. Minerva, Volume 1: 54–74.

Rabeharisoa, V., and Callon, M. 2002. The involvement of patients' associations in research. International Social Science Journal, 54: 57–63.

Rip, A. 1994. The Republic of Science in the 1990s. Higher Education, 28: 3–23.

Rockmann, C., Ulrich, C., Dreyer, M., Bell, E., Borodzicz, E., Haapasaari, P., Hauge, K. H., *et al.* 2012. The added value of participatory modelling in fisheries management - what has been learnt? Marine Policy, 36: 1072–1085.

Stange, K., Olsson, P., and Osterblom, H. 2012. Managing organizational change in an international scientific network: A study of ICES reform processes. Marine Policy, 36: 681–688.

Stange, K., van Tatenhove, J., and van Leeuwen, J. 2014. Stakeholder-led knowledge production: Development of a long-term management plan for North Sea Ne*phrops* fisheries. Science and Public Policy. doi:10.1093/scipol/scu068.

Wilson, D. C. 2009. The paradoxes of transparency: science and the ecosystem approach to fisheries management in Europe, Amsterdam Univ Press.

4 ToR C: Stakeholder integration: Workshop on mapping herring spawning grounds in the North Sea

4.1 Introduction

In 2013, WGMARS collaborated with the European Advisory Councils (ACs) on how ICES-stakeholder relationships can best move forward and in 2014, this was expanded to an actual workshop between the Pelagic Advisory Council and WGMARS on herring spawning ground mapping. This Chapter reports on the workshop, the results and future prospects.

4.1.1 Background for ToR C

During the annual meeting in 2013 at the Stockholm Resilience Centre, WGMARS greatly benefited from hosting stakeholder representatives in a dialogue on how to support stakeholder/ICES collaborations in future. During this meeting, WGMARS members realized their position to be able to facilitate on some issues between ICES and stakeholders. To provide a clear focus and manageable workload, WGMARS proposed to focus future discussions through case studies of stakeholder-scientist interactions within the ICES area per annual meeting. These case studies can be loosely defined (e.g. it could be engagement in specific elements of research on a discard plan,

or engagement in an ICES benchmark or STECF meeting) and provided to the WGMARS Chair in advance of the annual meeting.

As a follow up on this focus, an open letter was sent to the AC secretariats in December 2013 in which WGMARS invited suggestions for specific stakeholder-scientist case studies rooted in the individual AC agendas that would fit into the outlined format. The Pelagic AC responded positively to this letter, suggesting a collaborative mapping exercise of herring spawning grounds in the North Sea under a ToR in the WGMARS 2014 meeting. Thus the ToR C for the WGMARS meeting in 2014 was formulated: *Science-Stakeholder integration: herring spawning ground mapping initial Workshop*

4.1.2 Workshop objective and planning

Over the past year, there have been discussions within the Pelagic AC to map herring spawning grounds in collaboration with the ICES Herring Assessment Working Group [HAWG]. Due to limitations in manpower and funding, nothing has happened beyond the initial steps of agreeing that this would be a valuable exercise for both stakeholders and HAWG. However, it was clear that HAWG would still be interested in the project and also the Pelagic AC has reconfirmed its willingness to contribute to the project. Thus, the objective for the WGMARS ToR C was to facilitate the initiation of the collaborative process of mapping the herring grounds. WGMARS appointed the co-chair of HAWG as coordinating scientist and together with the WGMARS Chair, an outline for the workshop was agreed on.

4.1.3 Workshop planning

The Pelagic Advisory Council (PAC) and herring scientists both have shown interest in collaboration on mapping herring spawning grounds. In August 2014, the Secretary of the PAC contacted HAWG Chairs and identified WGMARS 2013's suggestion to work on case studies. The WGMARS Chair and the HAWG Chair (also a WGMARS member) went forward with organizing a workshop during the 2014 WGMARS meeting in Copenhagen in early December. The ICES Secretariat and professional secretaries assisted the WGMARS Chair in identifying relevant stakeholders to invite to the workshop. Despite the narrow time frame available for inviting and planning the workshop, six stakeholders participated in the workshop.

4.2 Workshop agenda

The agenda was composed of both interactive mapping sessions and presentations and debate. The initial agenda point was a two-by-two mapping exercise in which pairs of participants produced a common map of the perceived herring spawning grounds in the North Sea. These maps were then saved for a later alignment to a common map in a larger group of participants.

Following this initial interactive session, representatives from science, fishery, and gravel extraction companies presented their state-of-the-art knowledge of the potential herring spawning grounds as well as the actual use of these spawning grounds by both fish and humans.

4.2.1 Presentations – conveying information

Harry Strehlow, natural resources scientist presented a recent concluded Interreg project 'HERRING' and the lessons learned from herring spawning ground management in the south Baltic Sea. The three case studies addressed were the GreifswalderBodden (Germany), the Vistula Lagoon (Poland) and the Blekinge Archipelago (Sweden).The

project highlighted that current fisheries management does not consider the ecological status of coastal spawning areas, which underlie increasing human uses and climate change impacts. Moreover, overlapping and conflicting competencies of regulating authorities often impede sustainable coastal management. Transnational stakeholder priority settings identified different impacting negative effects for each case study, e.g. eutrophication, coastal modification (dredging) and the lack of available knowledge of mapping/identification of herring spawning grounds. Consequently, best-practice recommendations included overcoming the land-water boundary (e.g. institutional arrangements), applying the precautionary approach to reduce the effects of human activity on spawning grounds and mapping the distribution of herring spawning sites. More general lessons learned included, that awareness of the importance of spawning grounds was different between and within stakeholder groups. A prioritization of certain areas should be avoided because the importance of individual sites may vary significantly within the spawning season and between years. Measures should aim to designate spawning and nursery areas as Reserve Areas in marine spatial planning.

Lotte Worsøe Clausen, biologist and co-chair of the HAWG, presented the current state of knowledge of herring spawning behaviour, larval survival and the importance of the spawning ground for these initial life stages of herring. Spawning of the main North herring population begins in the north of the North Sea in September and then progresses southwards with time, ceasing in January in the eastern English Channel (Boeke, 1906; Cushing and Burd, 1957, Zijlstra, 1969; Burd and Howlett, 1974). Smaller coastal populations tend to spawn in spring (Redeke and van Breemen, 1907; de Groot, 1980; Fox, 2001, Roel, *et al.,* 2004), whereas anecdotal accounts suggest that small populations may spawn from July in the north of the North Sea. The number of spawning sites varies with stock size (Burd, 1985; Corten 1999a; 2001a) with a decline in spawning sites at lower biomass of North Sea herring. Atlantic herring spawn benthic eggs that stick to the substratum or each other (Blaxter and Hunter, 1982; McPherson *et al.,* 2003). In the North Sea, herring use gravel beds that are generally between 20–40m depth (see Cushing and Burd, 1957; Parrish *et al.,* 1959). Atlantic herring are spatial repeat spawners (McQuinn, 1997) and this behaviour is either caused by natal returns to the "home" spawning bed or adopted behaviour (Harden Jones, 1968; Wheeler and Winters, 1984; McQuinn, 1997 and references cited therein). Like Pacific herring, Atlantic herring are assumed to spawn in waves (temporally discrete cohorts, see Ware and Tanasichuck, 1989; McPherson *et al.,* 2003). Due to the herring laying demersal eggs, the yolk-sac larvae are highly associated with the spawning grounds (Postuma and Zijlstra, 1974). The abundance of young larvae is clearly linked to spawning potential (e.g. SSB) with a slight influence of temperature at time of spawning (Postuma and Zijlstra, 1974; Saville, 1978). As it takes about 10–15 days for the eggs to develop in the North Sea and the duration of the yolk-sac stage is 10–15 days, the total time for a spawning bed to be undisturbed in order for allowing a successful survival of spawn will on average be between 20–30 days.

The ICES larval survey time-series dates back to early 1970s and covers most of the North Sea spawning grounds at spawning time. The data analysis, however, is challenging and there are a number of unresolved issues with the dataseries, among other the question whether all spawning sites are covered by the survey. These data, however, may when used with other data on ecological features such as seabed composition, circulation patterns and observations of spawning, form the basis for modelling the variability of herring spawning in time and space and through several modelling steps ultimately an assessment of the impact of removing potential herring spawning habitat.

Martin Pastoors, chief scientist for the Pelagic Freezer Trawler Association, presented fishery observations from the Dutch herring fishery. A number of active fishermen had drawn on maps the temporal and spatial uptake of the seabed by herring spawning based on their own observations. These maps were corroborated by Alex Wiseman, a Scottish fisherman, as being the general areas for herring spawning activity in the North Sea. It was clear, however, that the herring spawning events are quite difficult to target as they are momentary, however, when observed, these spawning aggregations are very dense.

Mark Russell, Director, British Marine Aggregate Producers Association (on behalf of the European Dredging Association) presented the marine sand and gravel dredging in Europe. The majority of marine sand and gravel extraction takes place from licensed areas, with the extracted sediments used for construction aggregate, for coast defence purposes (beach nourishment) or for reclamation/fill purposes. The working group WGEXT collates annual data on sand and gravel extraction from licensed areas across ICES members, with the largest volumes being taken from licences on the continental shelves of Belgium, Denmark, the Netherlands, France and the UK for a range of end uses. Information on the area of seabed licensed and actually dredged is also collated (where available). The area of seabed dredged is derived from analysis of black box electronic monitoring systems, which record the position and status of individual vessels dredging activity. Although principally used for compliance purposes to ensure that dredging only occurs within licensed areas, the data from individual vessels can be collated to provide data on both the total extent of dredging activity and the intensity (based on hours occupied per unit area).

The black box data shows that the area of seabed dredged nationally is typically a small proportion of the total area of seabed licensed, while the greatest intensity of activity can be considerably smaller still (in the UK, the total area of seabed dredged in 2013 was 98.67km^2, from which 90% of hours dredged took place from an area of 39.2km^2). The small area of seabed being dredged represents a combination of policy and regulatory controls (to minimize environmental and spatial footprints), the requirement for operators to work deposits to economic exhaustion before moving to new areas (to enhance benthic recovery) and operators own resource management controls.

Although sand and gravel sediment on the seabed is relatively widespread the majority of these surface sediments are only of veneer thickness (<0.5m). To be considered commercially viable, marine sand and gravel deposits typically have to be >2m in thickness. Coarse sand and gravel tends to be dredged from the continental shelves of Denmark, France and the UK, reflecting the localized spatial distribution of these discrete geological deposits (generally derived from fluvio-glacial processes, and associated with infilled palaeovalleys or sheets). The deposits are fossil (>10,000 years old), and may be overlain by veneers of modern bedload sediment.

Ian Reach, Principle Marine Ecologist, MarineSpace Ltd, presented a mapping method for UK marine aggregate cumulative impact assessment. In 2013 the UK marine aggregate extraction industry commissioned an assessment of effect-exposure pathways of dredging activity with locations of seabed showing the potential to support Atlantic herring *Clupeaharengus* spawning. The assessment used a top–down spatial analysis of the Downs and Banks populations over a high-resolution seabed surface sediment map (BGS SBS v3) based on the Folk (1954) classification.

An extensive literature review identified sediment particle size distribution associated with known spawning beds (Bowers, 1980; de Groot, 1980, 1986; Aneer, 1989; Morrison

et al., 1991; Maravellias *et al.*, 2000; Mills *et al.*, 2003; Geffen, 2009; ICES, 2012). A classification of 'preferred' habitat (gravel and sandy gravel) and 'marginal' habitat (gravelly Sand) was developed and mapped.

Additional data, indicative of herring spawning events/beds, were sourced and mapped e.g. International Herring Larvae Survey, and VMS data related to herring fisheries. The data were ranked, for their spawning ground representativity in an extensive confidence assessment.

The location of, and overall potential for, spawning habitat, were mapped using the multiple data layers. These 'heat' maps indicated areas of seabed with low, medium and high confidence for supporting potential spawning locations.

David Goldsborough: Ecosystem Based Management (EBM) is a popular catch phrase in many arenas that deal with research on and management of the marine environment. Although there are diverging views on what EBM actually is, all existing definitions have in common that they consider human use of the system an important aspect. EBM is complex because it involves dealing with e.g. sustainability, multi-level governance and issues regarding cross-sectoral integration. Consequently, in almost all cases EBM requires trade-offs to be made. Therefore, understanding interaction between different stakeholder groups is crucial in dealing with specific EBM issues. We argue that awareness and understanding of interactions between stakeholder groups can help to make the implementation of EBM more effective. However, in our view not every EBM challenge requires the same 'degree' of interaction: Each EBM challenge needs a context specific approach. An extensive literature review focusing on participatory knowledge production, inter- and transdisciplinary research, boundary work and the role of science in decision-making was used to construct a stakeholder interaction triangle. The "interaction triangle" consists of three dimensions, representing interaction pathways between (A) decision-makers and scientists, (B) decision-makers and other actors, and (C) scientists and other actors (Figure 3).

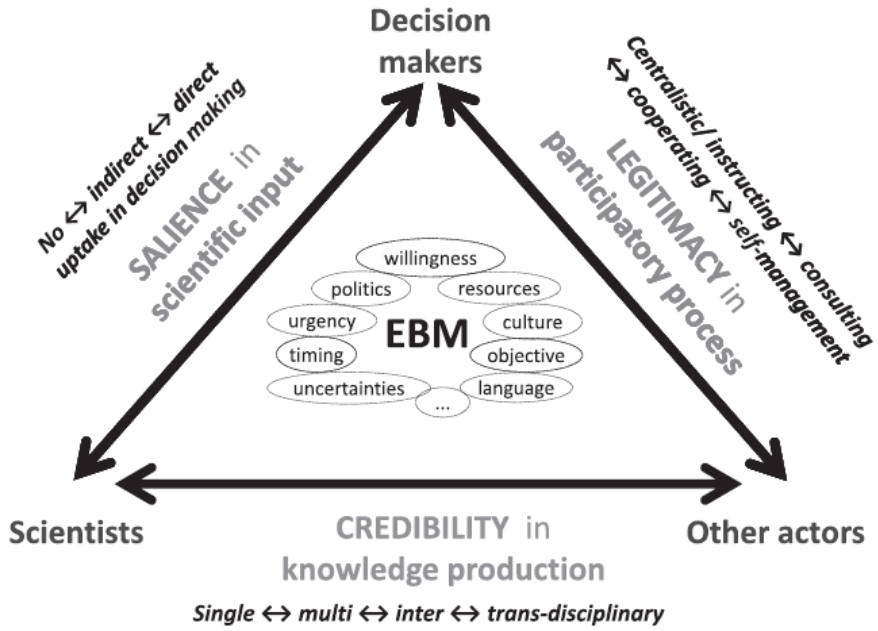

Figure 3. The interaction triangle (Röckmann *et al.*, 2015).

Each interaction dimension contributes to the process quality of dealing with an EBM challenge. To highlight the key focus and importance of each interaction dimension, each dimension is designated to one particular management effectiveness criterion (although we recognize that there is overlap, the triangle highlights the key focus): (A) salience (~usefulness/relevance) in scientific input, (B) legitimacy in participatory processes, and (C) credibility in knowledge production.

4.2.2 Mapping and discussion – creating a common knowledge base

With off-set in the initial mapping exercise and the presentations of the knowledge and experience in relation to herring spawning behaviour and spawning sites, a second interactive mapping exercise was carried out, this time in larger groups. This exercise resulted in the formation of a map illustrating the collated knowledge of potential spawning sites, actual used spawning sites and the gaps in the knowledge between the participants in the workshop (Figure 4).

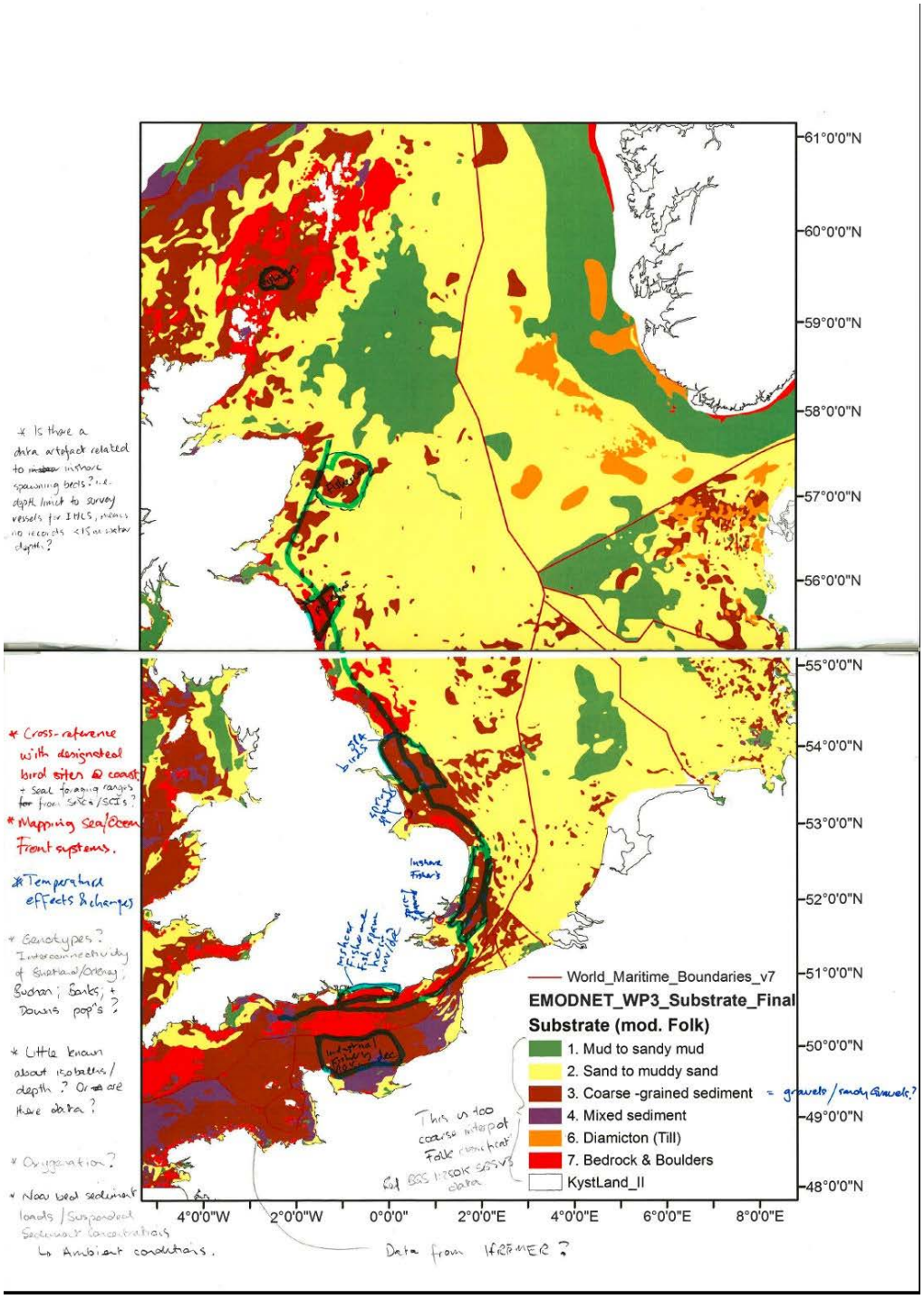

Figure 4: Sediment map of the North Sea, used in the Workshop for WGMARS ToR C. Collaboration among scientists and stakeholders on what is known of suitable herring spawning grounds is represented by the hand-written notes on the map and in the margins.

Through discussion of the map, it became apparent that the following points should be explored in an eventual follow-up process in order to make give the possible best data for the assessment of spawning habitat importance for the North Sea Herring:

- Historical comparison of data pre-crash related to herring uptake of spawning grounds and stock size/fishery; interesting to include this under the headline of temporal variability of the uptake of spawning habitats. Also,

include information from old maps (e.g. Figure 5) and anecdotal information from the fishing industry.

- Get higher resolution maps for future discussion (e.g. British Geological Survey 1:250 000 seabed sediment map) as indicator of potential areas of where herring are likely to spawn. Then discuss these high-resolution maps with active fishermen to narrow down the individual utilized spawning beds within the spawning ground. This should include the depth related spatial use of spawning beds for which the knowledge of the active fishermen in relation to where at the actual bank where they spawn. Corroborate this using the database of herring larvae < 5 mm, which is available in ICES.
- The temporal variation in the use of herring of the spawning grounds should be explored using longer time-series (e.g. on either side of the herring stock crash in the 1970'es) and observation from the active fishermen logs.
- The Coastal fisheries observation should be included in the common knowledge base. The 12-mile zone is not surveyed, thus data from fishermen, industry, and National sampling should be included.

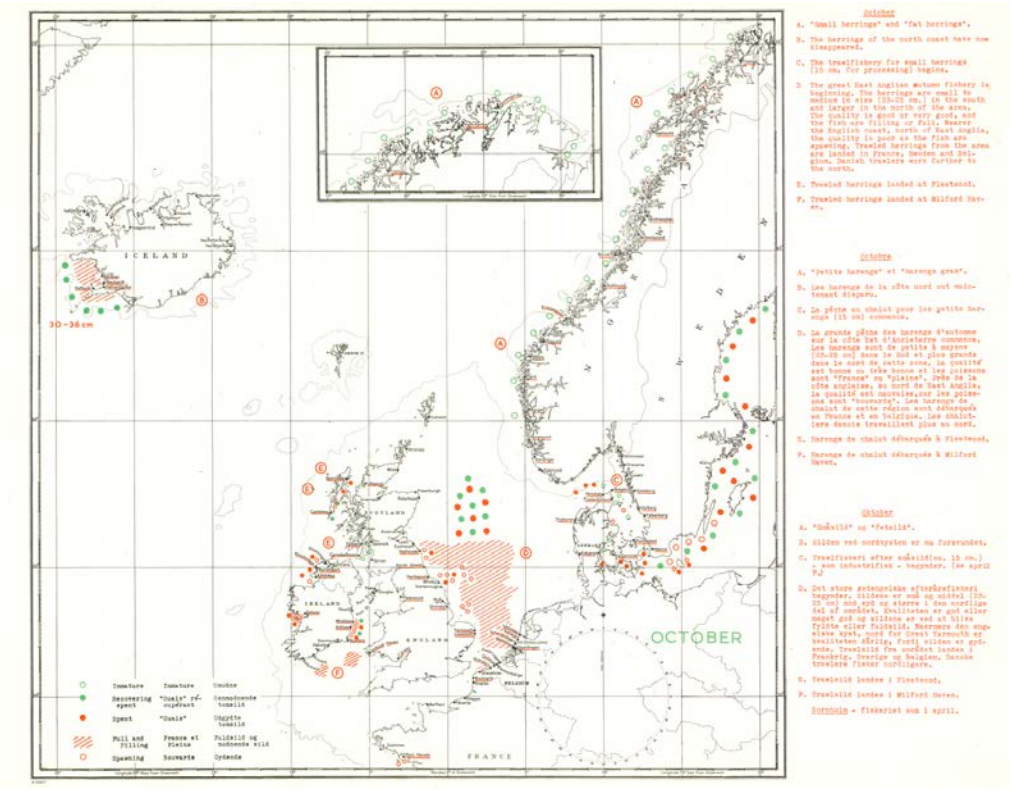

Figure 5. Historical map of the North Sea from: Herring Atlas (Fishing Ground, Landing Ports and Quality). International Council for the Exploration of the Sea Journal du Conseil, 1951)

The next steps were debated and the group reached to the conclusion that in a following process, it is important to invite a wider group of stakeholders: Fishermen from relevant Nations (including local inshore fishermen); dredging companies; wind farm companies; tidal turbine companies (Wind and Wave); data experts (statistical + mapping experts); geological input (variability in exposure of spawning habitat over geological time); herring biologists (larvae); survey experts (IHLS, MIK). All of these groups possess data which can be summed up, overlaid, and combined to visualize a)

potential spawning grounds, b) actual used spawning grounds, c) the character of the sediment, d) the effect of various activities on the seabed, including the time frame for the impact on a temporal scale. An idea could be to narrow down an area to test this as a generic approach to assess this overall issue of spatial overlap of interests for the North Sea seabed.

4.3 Conclusions and reflections

Given the role of WGMARS as only facilitating the offset of a dialogue and exchange of knowledge for the above process, the group will not be able to take the process through the following steps. What may kick-off such an endeavour would be HAWG carrying the results from the mapping workshop further, recommending the initiation of a collaborative research project.

The participants acknowledged that the work outlined would need funding and prioritization by several institutions. The final discussions in the workshop included reflections on the advice, which initiated the need for the workshop (ref to NSAS advice) and a potential pathway to the advice on a shorter time-scale. In particular, the consistency and nuances of the advice debated. As it stands now it appears quite unnuanced; while dredging is forbidden, bottom-trawling activities are allowed at the same site at the same time. The wording of the HAWG advice does not imply that other activities, such as fishing, also can disturb the seabed. This may be related to the way the resources are managed; the herring stock is managed as a whole independent of where the catches are taken – while the dredging activity is tied to a specific site. The advice formulation leaves no room for manoeuvring as it is rather categorical and specific. If the advice was expanded with words like 'unless properly mitigated/regulated…' or '…likely significant effect of the activity must be assessed…' the advice would reflect the current uncertainties around the effects of the use of herring spawning ground/bed.

The discussions in the workshop also made reference to the need for more effective linkages between existing and well established ICES Working Groups. For example, we discussed WGEXT (in which one stakeholder participant has attended and contributed to since 2001), and many workshop attendees were unaware that the group was originally established in the late 1970s in response to concerns around potential impacts on herring spawning. We need to avoid trying to reinvent the wheel, and instead look to build on the existing structures and experiences that are already available wherever possible.

To sum up, the workshop revealed two main points: 1) the knowledge base is important to collaboratively advance on, since the outcome of decisions is crucial to businesses and for ecosystems, and 2) consistency in advice is continually a point and the advice should reflect the depth of information and understanding of the collaborative knowledge base.

4.4 References

Aneer, G., 1989. Herring (*Clupea harengus* L.) spawning and spawning ground characteristics in the Baltic Sea. Fisheries Research, 8, 169–195.

Bowers, A. B. 1980. Characteristics of herring (*Clupea harengus*) spawning grounds. ICES CM 1980/H:13.

British Geological Survey (BGS), various dates. 1:250,000 seabed sediment map series. Version 3.(BGS SBS v3).

Folk, R. L. 1954.The distinction between grain size and mineral composition in sedimentary rock nomenclature. Journal of Geology, 62, pp. 344–359.

Geffen, A. J. 2009. Advances in herring biology: from simple to complex, coping with plasticity and adaptability. ICES Journal of Marine Science, 66: 1688–1695.

de Groot, S. J. 1980. The consequences of marine gravel extraction on the spawning of herring, *Clupea harengus* Linné. Journal of Fish Biology, 16: 605–611.

de Groot, S. J. 1986. Marine sand and gravel extraction in the North Atlantic and its potential environmental impact, with emphasis on the North Sea. Ocean Management, 10: 21–36.

ICES. 2012. Report of the Herring Assessment Working Group for the Area South of 62 N (HAWG), 13 – 22 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:06. 835 pp.

InterRAC. 2013. On the functioning of the Regional Advisory Councils within the current Common Fisheries Policy; Consolidated outcomes of discussions between the RAC Secretariats. http://www.nwwrac.org/admin/publication/upload/InterRAC_Letter_Functioning_RACs_15April2013_EN.pdf

Mackinson, S., Neville, S., Raicevich, S., and Worsøe Clausen, L. (eds) 2008. Good practice guide to participatory research between fisheries stakeholders and scientists. GAP project deliverable 1, 23p.http://gap2.eu/outputs/gap-good-practice-guide/

Mackinson, S., and Wilson, D. C. K. 2013 or 2014. Building bridges among scientists and fishermen with participatory action research Chapter 7. In Social Issues in Sustainable Fisheries Management, Springer.

Maravelias, C. D., Reid, D. G., and Swartzman G. 2000. Seabed substrate, water depth and zooplankton as determinants of the prespawning spatial aggregation of North Atlantic herring. Marine Ecology Progress Series, 195: 249–259.

Mills, C., Eastwood, P. D., and Rogers, S. I. 2003. Herring spawning grounds in the eastern English Channel. Cefas (FB-ECOS) Working Paper – Herring Spawning Grounds in the Eastern English Channel, pp 9.

5 Meeting Conclusions

This year's meeting had three main ToRs and thus three main highlights:

1) ToR A: Our 15 minute (which turned into 40 minutes due to high interest in the topic) interactive plenary meeting with ACOM allowed us to present the latest work we have done with the Social Network Analysis of ICES.

a) In 2014 (the inaugural year) WGMARS won a successful bid for the ICES Science Fund and got funding for Friederike Lempe and the Social Network Analysis. The funding allowed Friederike also to have a research stay with Örjan Bodin at the Stockholm Resilience Centre. WGMARS should definitely apply for the Science Fund again, and note that they see favorably on younger "early career" applicants. WGMARS (through Friederike, Harry and Dorothy *et al.*) is planning a new application to expand on the successful Social Network Analysis. The deadline for the 2015 ICES Science Fund applications is March 10, 2015.

2) ToR B: Much progress on the draft of the "What hat are you wearing?" paper and a goal to submit this paper for peer review in the first quarter of 2015.

3) ToR C: A successful stakeholder workshop hosted by WGMARS on collaborative mapping of herring spawning grounds in the North Sea. This will be followed up by HAWG through WGMARS member Lotte Worsøe Clausen.

Last but not least, it became clear in the aftermath of this meeting that Chair Dorothy Dankel is unable to continue her last year as chair due to the end of her contract (post-doc) at the Institute of Marine Research, Bergen, and no new contract, thus loss of funding for ICES EG participation. Dorothy has since handed over the duties for WGMARS 2015 to colleague David Goldsborough after a consensus decision within WGMARS. Dankel will try to stay active in WGMARS, and seek other funding to attend the 2015 and beyond. For further information regarding the recommendations of WGMARS see Annex 4.

Annex 1: List of participants for Working Group on Marine Systems, (WGMARS) 2-5December 2014 (*stakeholders who participated 3 December for ToR C)

NAME	ADDRESS	TELEPHONE/FAX	E-MAIL
Dorothy J. Dankel **Chair**	Centre for the Study of the Sciences & the Humanities, University of Bergen, Post Box 7805, 5020 Bergen, Norway	+47 95 83 77 76	dorothy.dankel@svt.uib.no
Friederike Lempe	Thünen-Institute of Baltic Sea Fisheries Alter Hafen Süd 2 19069 Rostock Germany		friederike.lempe@ti.bund.de
David Goldsborough	VHL, University of Applied Sciences PO Box 1528, 8901 BV, Leeuwarden, The Netherlands	+31 317484303	david.goldsborough@wur.nl
Lotte Worsøe Clausen	DTU Aqua – National Institute of Aquatic Resources Section for Fisheries Advice Charlottenlund Slot Jægesborg Alle 1 2920 Charlottenlund	+45 21362804 +45 33963333	law@aqua.dtu.dk
Robert Aps	University of Tartu, Estonian Marine Institute, Maealuse 14, 12618 Tallinn, Estonia		robert.aps@ut.ee
Martin Pastoors	IMARES (Wageningen UR) Haringkade 1, IJmuiden, The Netherlands PO Box 68, 1970 AB, IJMuiden, The Netherlands	+31 317 487 849	martin.pastoors@wur.nl
Sebastian Linke	Department of Philosophy, Linguistics, and Theory of Science University of Gothenburg, Box 200, SE 405 30, Göteborg, Sweden	+46 (0)31 7864754	sebastian.linke@sts.gu.se

NAME	ADDRESS	TELEPHONE/FAX	E-MAIL
Jörn Schmidt	Christian-Albrechts-Universität zu Kiel Department of Economics Wilhelm-Seelig-Platz 1 24118 Kiel Germany	+49 431 880 5632	jschmidt@economics.uni-kiel.de
Kari Stange	Wageningen University Environmental Policy Group PO Box 8130 6700 EW Wageningen The Netherlands	+31 618 968014	kari.stange@wur.nl
Harry Strehlow	Thünen-Institute of Baltic Sea Fisheries Alter Hafen Süd 2 19069 Rostock Germany	+49 38 18 11 61 07	harry.strehlow@vti.bund.de
Mark Russell*	British Marine Aggregate Producers Association Gillingham House 38-44 Gillingham Street London, SW1V 1HU UK	+44 23 8048 8766	mark.russell@mineralproducts.org
Ian Reach*	MarineSpace Ltd Stuart House – East Wing St John's Street Peterborough PE1 5DD, UK	+44 1733 475650	ian.reach@marinespace.co.uk
Alex Wiseman*	Scottish Pelagic Fishermens Association 1 Frithside Street Fraserburg, AB43 9AB UK		alexwisefish@aol.com
Verena Ohms*	Pelagic Advisory Council Treubstraat 17 PO Box 72 2280 AB Rijswijk The Netherlands	+31 63 3756 324 +31 70 399 9426	v.ohms@pelagic-ac.org
Claus Reedtz-Sparrevohn*	Pelagic RAC		crs@pelagisk.dk
Staffan Waldo	AgriFood Economics Centre Department of Economics Swedish University of Agricultural Sciences PO Box 730 220 07 Lund, Sweden		Staffan.waldo@slu.se

Annex 2a: Agenda for WGMARS 2014

ToR A: Social network analysis of ICES Expert Groups

ToR B: "What hat are you wearing?" manuscript (Reflexive exercise for ICES JMS "Food for Thought")

ToR C: Science-Stakeholder integration: herring spawning ground mapping initial Workshop

Time	Topic	Contributions/ Activities	Purpose and resources [on sharepoint] http://groupnet.ices.dk/wgmars2013/
Tuesday, December 2, 2014 ICES Secretariat, "Biscay" room			
09:00-09:30	Welcoming, getting situated	Meeting room "Biscay" open for WGMARS business, check SharePoint accessibility	*Everyone must have access to SharePoint, and if you don't, e-mail Claire Welling at claire@ices.dk!*
09:30-10.30	WGMARS relevant work, presentations	Robert: GAP2 Baltic CS results on participatory process and the mutual learning? Tentative title "GAP2 - from planning for society to planning with society". Dorothy: Nordic Marine Think Tank, Allocation project ++?	*update on recent work relevant to WGMARS*
10:30-12:00	WGMARS relevant work, presentations/ToR C final preparations	Steffan Waldo: "Management of Swedish pelagic fisheries" Lotte: overview of Wednesday's herring spawning ground Workshop	
12:00-13:00	Lunch		
13:00-14:00	**ToR A: Social network analysis of ICES Expert Groups**	Friederike/Harry: update on ICES Science Project work and latest results, interview plans, manuscript plans *Discussion on what to include in presentation for ACOM (pres is on Thurs @09.00)*	*we received funding from the ICES Science Fund for this project & are conducting interviews this week during the ACOM meeting*

Time	Topic	Contributions/ Activities	Purpose and resources [on sharepoint] http://groupnet.ices.dk/wgmars2013/
15:00-16:00	**ToR B: "What hat are you wearing?" manuscript**	Dorothy/Kari: intro to current manuscript, plenary discussion who can contribute as co-authors?	*we have conducted interviews and have a mature manuscript; discussion of the main conclusions and suggestions on how to bring the manuscript forward*
16:00 -16:30	Tea/coffee break		
16:30-18:00			
Wednesday, December 3, 2014 ICES Secretariat, "Biscay" room			
ToR C, Stakeholder integration: Scientist-Stakeholder WORKSHOP: Collaborative mapping of the North Sea herring spawning grounds			
09:00-10:30	Plenary: WORKSHOP presentations Lotte Worsøe Clausen (DTU Aqua) Pelagic Advisory Council European Dredgers Association ++ more to be announced ++		*presentations from various scientists and stakeholders*
10:30-11:00	Tea/coffee break		
11:00-12:00	Plenary: WORKSHOP presentations, continued		
12:00-13.00	Lunch at own expense		
13:00-14:30	Group work: WORKSHOP mapping activity		*hands-on mapping exercise*
14:30-15.00	Plenary: WORKSHOP mapping activity, summing up		*include this discussion in the WGMARS 2014 Report, ToR C*

Time	Topic	Contributions/ Activities	Purpose and resources [on sharepoint] http://groupnet.ices.dk/wgmars2013/
15:30	Conclusion of WORKSHOP, Coffee/Tea		
16:00-18:30	Group: Report writing for ToR C		
19:00	Group dinner downtown for those who want!		
Thursday, December 4, 2014 ICES Secretariat, "Biscay" room			
09:00	*Dorothy & Friederike present Social Network Analysis of ICES Expert Groups to ACOM* ToR A&B group work		
11:30-12:30	Plenary : work updates & discussions		
12:30	Lunch		
13:30	ToR A&B group work		
19:00	Group dinner for those who want!		
Friday, December 5, 2014 ICES Secretariat, "Biscay" room			
9:00	Plenary: Re-convene, ToR work updates		
9:30	ToR A&B group work		
12:00	Lunch		
13:00	Group ToR A&B group work; (Plenary as necessary)		

Time	Topic	Contributions/ Activities	Purpose and resources [on sharepoint] http://groupnet.ices.dk/wgmars2013/
11:00	Plenary Meeting Report review, final discussions for: ToR A: Friederike/Harry ToR B: Kari ToR C: Lotte *decision for WGMARS 2015 date*		Make sure the Report sections are "in place" before people start to depart
17:00	Meeting formally closed		

***Suggestions* on WGMARS participants' group responsibilities (division of labor) based on expertises/willingness:**

ToR A, Social network analysis of ICES science & advice, start of formal experiments and first paper: Friederike*, Jörn, David, Harry, Dorothy...++?

ToR B, Management strategy evaluations vs. Management plans; a "food for thought" paper: Kari*, Martin, Dorothy, Christine... ++?

ToR C, Stakeholder integration: Herring spawning grounds mapping WORKSHOP: Lotte*, Martin, Dorothy….++?

***: Report rapporteur**

Annex 2b: Agenda for the North Sea herring spawning groups mapping workshop

North Sea Herring Spawning Grounds Mapping Workshop

Wednesday, December 3, 2014 @ ICES Secretariat, Copenhagen

Coordinator: Dorothy J. Dankel (Chair, WGMARS)

Scientific Coordinator: Lotte Worsøe Clausen (member WGMARS and Chair, HAWG)

The aim of the workshop is to collate and discuss existing knowledge from fishermen, other stakeholders and existing surveys: try to get information on where and when herring spawn. This will then inform the further process of modelling the variability of herring spawning in time and space to link to existing knowledge.

ICES Secretariat, H.C Andersens Boulevard 44-46, Copenhagen	
09:00-09:15	Coffee, settling in
09:15-09:30	Welcome by WGMARS Chair Dorothy Dankel *Review of the Workshop agenda, aims & expectations*
09:30-10:00	Participant introductions (with a twist!...)
10:00-10:15	First mapping activity: Individual session examining maps and plotting where you think crucial spawning sites are
10:15-10:25	Project HERRING – lessons learned from herring spawning ground management ***Harry Strehlow (Thünen Institute, WGMARS member)***
10:25-10:45	Science observations: where do herring spawn; why should we leave them alone while they do this and for how long should the seabeds be undisturbed? ***Lotte Worsøe Clausen (DTU Aqua, Chair ICES Herring Assessment Working Group)***
10:45-11:00	Coffee/Tea break
11:00-11:25	Fishery observations: where do the herring spawn; how long are they there and is it even possible to single out those beds? Is there any fishing activity in those areas, any conflicts? **Pelagic Advisory Council representative**
11:25-11:45	Planned activities, impact on seabed by their work, etc. **Mark Russell (Director, Marine Aggregates) & Ian Reach (European Dredging Association representatives)**
11:45-12:05	"Stakeholder interactions and understanding ecosystem based management" **David Goldsborough (VHL, University of Applied Sciences, WGMARS member)**
12:05-13:00	Start of collaborative mapping session: overlay the individuals maps to discuss any conflicting/overlapping issues

13:00-14.00	LUNCH catered @ICES, *those wishing to join pay Dorothy 100 DKK (cash or bank transfer)*
14:00-14:30	Collaborative mapping session continues: we discuss how to mitigate and investigate potential clashes of spawning herring and human use of seabed
14:30-14:45	Plenary Discussion: how to mitigate and investigate potential clashes of spawning herring and human use of seabed.
14:45-14:55	Coffee/Tea break
14:55-15:15	Final Summary & Way Forward, Dorothy Dankel moderates

Annex 3: Selected presentations given during WGMARS 2014

3.1 GAP2 – Maritime Spatial Planning – connecting science, stakeholders and policy

Robert Aps, University of Tartu, Estonian Marine Institute, Maealuse 14, 12618 Tallinn, Estonia.

Summary

The aim of the 7FP Project „Bridging the gap between science, stakeholders and policy-makers Phase 2 - Integration of evidence-based knowledge and its application to science and management of fisheries and the marine environment (GAP2)" is to promote and enable processes for open and effective participation of stakeholders in research and management. The GAP2 Project's Baltic Sea Case Study „Mapping the Baltic fisheries in support of the Maritime Spatial Planning" is building on a Mutual Learning as a basic principle of transdisciplinarity that incorporates processes, methodologies, knowledge and goals of stakeholders from science, industry, and politics.

This study is addressing the Mutual Learning as the adaptation process inherent in interaction and joint problem solving between the public authorities, scientists and stakeholders involved into the actual MSP process. Issue is exemplified by the presenting the results of the GAP2 Project's Baltic Sea Case study related stakeholder's Mutual Learning aimed at the integration of fisheries into the actual process of the maritime space planning for Pärnu County's marine area in Estonia (Gulf of Riga, Baltic Sea).

Pärnu County's MSP related Stakeholder's mutual learning meetings in 2013–2014 based on step-by-step approach toward collaboration essentially contributed 1) to collaborative identification and mapping the actual fisheries related problems and the fisheries interests, 2) to further development of salient (relevant and timely), credible (authoritative, believable, and trusted), and legitimate (developed in a process that considers the values and interests of all relevant stakeholders) arguments to be used in balancing environmental, economic and social interests in a process of the MSP, and 3) to building up the fisheries and all other stakeholder's capacity for informed interest based and collaborative participation in the process of the MSP.

3.2 Management of Swedish Pelagic Fisheries

Staffan Waldo, AgriFood Economics Centre, Department of Economics, Swedish University of Agricultural Sciences

Summary

Prior to the Swedish ITQ-reform in 2009, the pelagic fishery was characterized by over-capacity and low profitability. In a comparison with management systems from the other Nordic countries (Nielsen *et. al.*, 2012) the pelagic fishery was found to have a low resource rent but large potential for improvements. Using the Swedish Resource Rent for the Commercial Fisheries (SRRMCF) the over-capacity was found to be approximately 50% of the fleet (Waldo *et. al.*, 2013). The analysis further shows that changing the Baltic eco system from sprat dominated to cod dominated would reduce the pelagic fleet, but the total profitability for Swedish fisheries would increase due to increased demersal fishing. In 2009, an ITQ system was introduced for the large-scale pelagic fleet in Sweden, which implied a sharp reduction in the fleet size and increased profitability. The small-scale fishery (vessels below 12 meters) was exempted from

ITQs. This fishery is allocated a coastal quota defined as a share of the total Swedish quota. This quota has increased by about 50% since the introduction of the ITQ system both due to increases in the pelagic TACs and due to extra allocations of quota to the small-scale fishery (Waldo and Blomquist, 2014, Annex to ITQ evaluation by Swedish Agency for Marine and Water Management).

References:

Nielsen, M., Flaaten, O., and Waldo, S. 2012.Management of and Economic Returns from Selected Fisheries in the Nordic Countries. Marine Resource Economics, 27(1):65–88.

Waldo, S., and Blomquist, J. 2014. Analys av kustkvot och regional fördelning av landningar inom det pelagiska systemet, i HaV: "Effekterna av systemet med överlåtbara fiskerättigheter inom pelagiskt fiske". Download at www.agrifood.se

Waldo, S., Paulrud, A., Ringdahl, K., Lövgren, J., Bergenius, M. *Cod or clupeids? Economic consequences for fisheries operating in different ecosystem states*. 2013. Aqua reports 2013:21, Department of Aquatic Resources, SLU.

3.3 Nordic Marine Think Tank Report: Quota allocation of highly migratory fish stocks

Dorothy J. Dankel, Centre for the Study of the Sciences and the Humanities, University of Bergen

Summary

Traditional international cooperation on the allocation among national states of trans-boundary fish stocks is based on the notion that each stock is managed and allocated as individual and independent stocks. This practical approach has served the purpose of simplifying the political discussion on allocation keys. Furthermore, these allocation keys are often discussed on the basis of relative few parameters, notably historical catches.

The Nordic Marine Think Tank report, funded by the Nordic Council of Ministers, sets out to contribute to the development of a framework to secure improved and transparent international cooperation on the sharing and utilization of fish stocks. The situation we consider covers stocks that are typically distributed between National Economic Zones (NEZs) and international waters.

The aim of the report is to initiate an informed debate in the Nordic countries and territories on how to allocate the trans-boundary fish stocks in the Northeast Atlantic in the medium to long term and how to resolve allocation conflicts. We believe this work will resonate with the international development in general and with the reformed EU fisheries policy, where it is stated for the external policy, that 'The European Union shall actively support the development of

This report revisits the paper by Hamre (1993) which demonstrated how that fisheries science can provide extensive documentation on zonal attachment as background for an allocation scheme and also can offer a variety of possibilities for the managers to choose from. It is not clear from any convention/fisheries agreement which options that are to be preferred. This must be decided in each specific case.

The report presents many different options for quota allocation, and will be publically available in the first quarter of 2015.

The report is authored by an interdisciplinary project group named here (alphabetical order):

Dorothy Dankel, fisheries biologist, Norway; Gunnar Haraldsson, fisheries economist, Iceland; Jesper Heldbo, fisheries engineer, Denmark; Kjartan Hoydal, fisheries biologist, Faroe Islands; Hans Lassen, fisheries biologist, Denmark; Helle Siegstad, fisheries biologist, Greenland; Mogens Schou, fisheries economist/sociologist, Denmark; Sten Sverdrup-Jensen, fisheries economist, Denmark (Chair); Staffan Waldo, fisheries economist, Sweden

Annex 4: Recommendations

RECOMMENDATION	FOR FOLLOW UP BY:
1. To provide a clear focus and manageable workload, WGMARS proposes to focus future discussions up to two (2) "Stakeholder interactions case studies" within the ICES area per WGMARS annual meeting. The case-studies can be loosely defined (e.g. it could be engagement in specific piece of research on a discard plan, or engagement in an ICES benchmark or STECF meeting). A suggested outline of the steps are: 1. Case studies must be outlined and presented in writing to the Chair (who is David Goldsborough for 2015) at least two (2) months in advance of the meeting. The Chair will review the scope and appropriateness of the proposals to ensure it is consistent with the overall aim of WGMARs prior to disseminating it to the WG members. 2. At least one stakeholder representative of the case study must be present at the WGMARS for its presentation and to participate in discussions and Report writing. 3. Evaluate and analyse case studies by measuring a "happiness index" representing the quality and utility of the interaction from both the stakeholder(s) and scientist(s; including ICES as an institution) perspectives. 4. Use the outcomes of the analysis as a basis for advising on specific progressive improvements that promote engagement where it is needed.	SCICOM/ACOM

Annex 5: WGMARS – new meeting dates for 2015

TENTATIVE: The Third Interim Meeting of WGMARS chaired by David Goldsborough, the Netherlands, will be held at Woods Hole, Massachusetts (USA) 15–19 June 2015.

WGMARS will report on the activities of 2015 by 1 August 2015.

2012/MA2/SSGSUE06 The **Working Group on Maritime Systems** (WGMARS), chaired by David Goldsborough, the Netherlands, will meet at the Woods Hole, USA from 15-19 June 2015 to work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2013	4-8 November	Stockholm, Sweden	Interim report by 6 December 2013 to SSGSUE	
Year 2014	2-5 December	ICES Headquarters, Copenhagen	Interim report by 5 January 2015 to SSGIEA	Dorothy Dankel to resign as Chair end of 2014
Year 2015	15-19 June	Woods Hole, USA	Final report by 1 August 2015 to SSGIEA, SCICOM	David Goldsborough to act as Chair from 2015

ToR descriptors

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverable
a	Analyses of the May 2012 questionnaire data in regards to the human networks of ICES	ACOM/SCICOM importance for examing ICES networks and their functioning	34: Contributions to socio-economic understanding of ecosystem goods and services, and forecasting of the impact of human activities	3 years	3-4 published papers
b	Critiquing Management Strategy Evaluations (MSEs) & Management Procedures (MPs) in the EU	Links to how EGs relate and organize their work according to MSEs and MPs and ad-hoc analyses	33: Marine spatial planning, effectiveness of management practices (e.g. MPAs), and its role in the conservation of biodiversity 34: Contributions to socio-economic	3 years	Published review paper on terminology, and practices of MSE/ MP. Cost/benefit analysis related to the definitions in the above review paper, comparing MSE/MP processes against the current HCR/long term management plan process.

			understanding of ecosystem goods and services, and forecasting of the impact of human activities		
c)	Stakeholder integration: Workshop on mapping herring spawning groups in the North Sea	Practical exercises & case studies for WGMARS interdisciplinary consulatation on how to best integrate stakeholder knowledge into ICES science	Integration of stakeholders into ICES Expert Groups, extended peer review, creating the best-available knowledge base	2 years (2013 & 2014, year-by-year need basis)	Collaborative reporting in the WGMARS Report

Summary of the Work Plan

Year 1	i)	Submit paper based on ICES 2012 ASC Session K oral presentation on ICES social network analysis to *ICES Journal of Marine Science*.
	ii)	Initiate a review paper on terminology and practices in respect to MSEs and MPs (based on discussions originating from WFC2012 ICES Theme Session on Management Strategy Evaluations in Edinburgh) for *ICES Journal of Marine Science* or similar journal. Include terminology and practices of the Integrated Ecosystem Assessments (IEAs) as an important element of the Ecosystem Based Approach to management/governance of the European fisheries and the marine space. To that effect create a closer link to the ICES Working Group on the Northwest Atlantic Regional Sea (WGNARS) that is the „pioneer" ICES WG in this area.
	iii)	Using an ICES stock case study as an example, initiate a cost/benefit analysis related to the definitions in the above mentioned MSE/MP review process compared to the current HCR/long-term management plan process as a basis for explicit dialogue with stakeholders.
	iv)	Collect and generate additional "experiments" and hypotheses regarding the SNA datasets.
	v)	Continue work towards other peer-reviewed scientific papers.
Year 2	i)	Continuation of publishing papers from Year 1.
	ii)	Explore feasibility of integrating the MPs and MSEs into the final phase of the IEA that evaluates the potential of different management strategies to influence the status of the ecosystem.
Year 3	i)	Condensed summary publication of SNA and MSE work in WGMARS to a high-impact journal.

Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem effects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Resource requirements	There is a necessity that WGMARS continues to have active participants that collectively comprise an interdiciplinary angle for WGMARS to meet its ToRs. This includes, but is not limited to biologists (including stock assessment scientists), economists (bio-economists), social scientists and political scientists. The inclusion of stakeholders in the marine ecosystem would be beneficial.
Participants	The Group is normally attended by some 6–10 members and guests.
Secretariat facilities	Normal annual report support and additional (minimal) ICES database support
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Many linkages with ACOM that require a continuous dialogue.
Linkages to other committees or groups	Since WGMARS is involved with social netowrk analyses of all of ICES EGs, there are potential linkages to al ICES EGs.
Linkages to other organizations	Definite linkages to ICES Member Countries and clients, as WGMARS analyses the organizational base of ICES EGs in regards to the ecosystem approach to marine science and advice.