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31 October – 3 November 2011

Bergen, Norway



ICES

International Council for
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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

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Executive summary

The inaugural Working Group on Maritime Systems (WGMARS) meeting was hosted by the Institute of Marine Research in Bergen, Norway 31 October – 3 November 2011. The WGMARS interdisciplinary team reviewed the 2011 Reports of two assessment working groups (WGs), the Arctic Fisheries WG (AFWG) and the Herring Assessment WG (HAWG) as well as two non-stock assessment WGs, the WG on Ecosystem Effects of Fishing Activities (WGECO) and the WG of Marine Planning and Coastal Zone Management (WGMPCZM). The purpose of these reviews was to assess and analyse the reports in regards to transparency and saliency of science communication in light of marine governance. In addition, the WGMARS team conducted two analyses for each of the reviewed WGs: 1) an analysis of “ICES science synergies” resulting from a simple social network analysis, and 2) a mapping of the origins of each WG’s Terms of Reference (ToRs). WGMARS found the exploratory mapping of “ICES science synergies” a meaningful exercise that can give some preliminary insights into scientific capacities for integrated ecosystem advice.

WGMARS was also asked to give advice to the proposed ICES Training Course for Working Group Chairs. WGMARS agrees with the Training Course proposal of “old ICES hands” as instructors, but notes that new thinking as far as ICES WG meeting procedures and best practices is also important to include in the course. Therefore, a healthy mix of ICES “insiders” and ICES “outsiders” who are experts in leadership and effective organization techniques is preferred. This course should be obligatory for all Chairs, regardless of seniority or age. The Training Course can thus be seen as an “entrance ticket” to chairing an ICES WG. Two specific recommendations are as follows: 1) Emphasize the importance of integrity and credibility in leadership, and 2) Encourage leadership that promotes innovation and challenges the status quo.

Common themes of the importance of communication, governance and leadership are found throughout this report. Good governance is supported by effective science-advice communication that is supported by good WG Report writing. Good report writing comes from a combination of good science lifted up by good teamwork resulting from good leadership within the team (e.g. WG). These realizations show the interconnectedness of ICES leadership, teamwork and resulting publications.

1 Opening of the meeting

The meeting opened at noon on 31 October, 2011 by the Chair Dorothy Dankel. Introductions started the meeting and each participant included a quick verbal assessment of “what expertise I will bring to the meeting”. These 1–2 word quick assessments were noted on a flip chart that hung in the meeting room the rest of the meeting. Thus the breadth of the participants’ expertise was transparent which helped organization of meeting and report tasks. After Introductions, the Chair presented the Agenda and her vision for the meeting followed by a group dialogue.

2 Adoption of the agenda

The agenda outlined in Annex Two was proposed and adopted.

3 Report of the 2011 Meeting

3.1 Attendance

This year WGMARS attracted five previous WGMARS members and six brand-new members. New members resulted from initiatives by the WGMARS Chair. This year’s participants continued the tradition of interdisciplinary work, benefitting from expertises within the following fields: stock assessment and fisheries science, systems theory, science-policy interface and governance, mathematics, resource planning, ecological/economic model integration, spatial planning, participatory methods towards the ecosystem approach and political science.

Since ToR a) this year included a review of ICES AFWG 2011 Report, Bjarte Bogstad (AFWG Chair) attended parts of the WGMARS meeting when AFWG-related issues were discussed. Absent from the meeting were the Chairs from WGEKO and WGMPCZM (also included in ToR a), but WGMARS communicated with them after the meeting to ensure their comments to ToR a) could be considered before this Report was published.

WGMARS benefited from a visit from Victor Hjort, co-ordinator Nordic Marine Think Tank (NMT) and Andreas Stokseth, Norwegian Ministry of Fisheries and Coastal Affairs. Victor and Andreas presented the NMT initiative and vision to WGMARS on 1 November. The WGMARS Chair will be attending the inaugural meeting of the NMT on 30 January 2012 in Copenhagen.

The following management and industry representatives expressed their intention to attend the WGMARS meeting: Jarle Hansen, Norwegian Fishermen’s Sales Organization for Pelagic Fish (Norges Sildesalgslag); Harald Østensjø, Norwegian Fishing Boat Owners’ Association (Fiskebåtrederens Forbund); Peter Gullestad (by written comments), Norwegian Fisheries Directorate. However, these persons were prevented from attending the WGMARS meeting as it happened to be simultaneous with the Norwegian Fisheries Regulation Meeting held 100 meters away. WGMARS reflected on the absence of industry members present at the meeting and concluded that WGMARS Chair will present the 2011 Report to them in other meetings in 2012 as they see fit. WGMARS has an open door policy for its meetings to encourage dialogue with industry representatives.

3.2 Terms of Reference

The ToRs for the 2011 WGMARS meeting were as follows:

ToR a): Review 2011 reports from key Expert Groups that report to ACOM to get a picture of ICES advice contributions from a perspective of marine governance.

ToR b): Based on this review, evaluate current practices in ICES in light of best practices of the science-policy interface. We will point out areas where improvements can be made.

ToR c): Review, suggestions and remarks to the proposed ICES Training Course for Chairs of ICES Expert Groups (Science and Advice).

The following subsections outline the WGMARS presentations and discussion on the three ToRs.

3.3 Introduction

3.3.1 Integrated knowledge and communication to facilitate governance of marine systems

ICES recent strategic plan formulates a vision of being “an international scientific community that is relevant, responsive, sound, and credible, concerning marine ecosystems and their relation to humanity” (ICES, 2008). ICES will contribute to the realization of this vision through “advancing the scientific capacity to give advice on human activities affecting, and affected by, marine ecosystems” (ICES, 2008). As pointed out in ICES strategic plan, this mission requires that the scope of ICES advice on the uses of marine resources is expanded from its current emphasis on fisheries in order to become an integrated ecosystem-based advice. A broadening of advisory scopes and capacities becomes particularly pertinent as other uses of marine spaces and of resources than those related to fisheries increasingly seem to gain weight and legitimacy. In accordance with ICES vision and its strategic plan, the change of the name of this working group from the “Working Group on Fisheries Systems” (WGFS) to the Working Group on Marine Systems (WGMARS) reflects this demand for a broadening for the scope of marine research and advisory capacities (Figure 1).

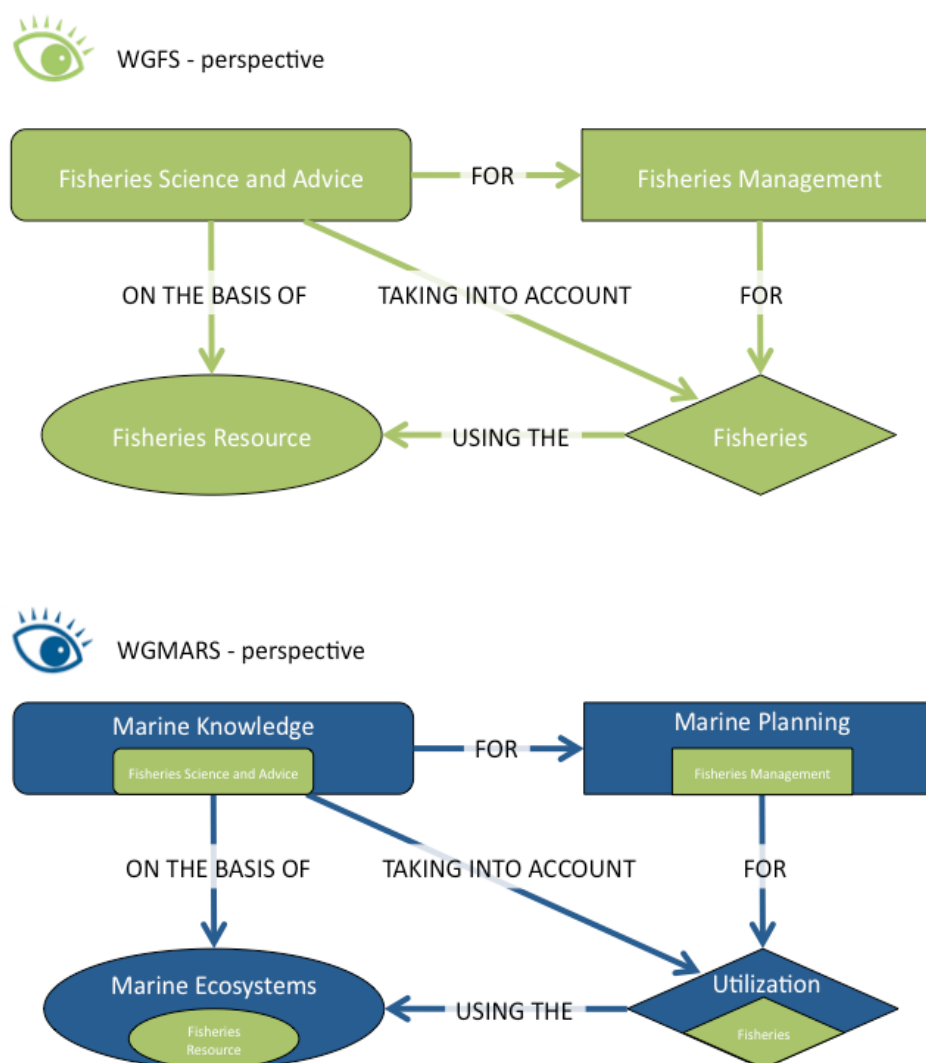


Figure 1. The transition from a “Fisheries Systems” focus to a “Marine Systems” perspective for the ICES Working Group on Marine Systems (WGMARS). Whereas the former WG Fisheries Systems (WGFS) had a fisheries focus (top scheme in green), WGMARS has a wider scope (bottom scheme in blue).

The shift from a fisheries system to a marine system focus takes place within the overall framework of an ecosystem approach. Definitions of the ecosystem approach abound in the literature and range from narrow biophysical interpretations to broader social-ecological systems-based interpretations (Yaffee, 1999). Regardless of interpretation, the expanded knowledge base and associated data demands, the increased levels of interactions, complexity and uncertainty and the greater number of user groups inherent in an ecosystem approach all point toward a requirement for improved attention to governance aspects. This governance focus within an overall ecosystem approach to marine management is apparent in a 2005 ICES report which stresses the need for management to be based on a shared vision, clear objectives and requires user participation (ICES, 2005).

WGMARS is a forum for articulation of ideas as to how knowledge production and advisory capacities in ICES, as well as in cooperation with external partners, can be integrated and broadened in order to facilitate sustainable governance of marine

ecosystems meeting the knowledge demands associated with multiple uses of marine resources. With a focus on the production, dissemination and use of knowledge, a marine systems perspective is useful to study the interfaces, linkages and interactions between ICES and the users of ICES science and ICES advice. In turn, the analytical perspective of governance:

“...includes the processes, conventions and institutions that determine how power is exercised in view of managing resources and interests; how important decisions are made and conflicts resolved; and how various stakeholders are accorded participation in these processes” (Renn and Roco, 2006)

For the purposes of WGMARS, the scope of governance is the marine system (Figure 1). A governance perspective emphasizes normative dimensions of knowledge production, knowledge dissemination, and decision-making. Importantly, a governance perspective examines how such processes may be distributed differently than when organized into traditional “top-down” or “command and control” management.

The question of how production and use of knowledge may facilitate enhanced governance of marine systems renders the issue of *communication* focal. The issue of communication within and beyond ICES is therefore central to the first set of Terms of References (ToRs) for WGMARS, which were suggested at the 2010 WGFS meeting and later endorsed by the ICES Science Committee (SCICOM) and the ICES Advisory Committee (ACOM):

- ToR a): Review key 2011 reports from key Expert Groups that report to ACOM and SCICOM to get a picture of ICES advice contributions from a perspective of marine governance.
- ToR b): Based on this review, evaluate current practices in ICES in light of best practices of the science-policy interface. We will point out areas where improvements can be made
- ToR c): Review, suggestions and remarks to the proposed ICES Training Course for Chairs of ICES Expert Groups (Science and Advice).

3.3.2 Interpretation of our ToRs

We here explain how we interpreted these ToRs. Regarding ToR a and b we note that the task of reviewing reports from experts groups from a perspective of marine governance is not about reviewing the content and technical quality of these reports. This would not be within the scope of WGMARS, and it is unlikely its members would be qualified for doing so. As indicated earlier we prefer to consider our ToRs with a *communication perspective*, specifically as relevant to the challenge of how ICES may allow or enhance marine governance through its science and advice. Relevant virtues to consider in regard to communication in this context include transparency and saliency. The question of how a text communicates with its readers is a central one. While the working group’s peer review committee (i.e. ACOM or SCICOM) may often comprise its imagined “target reader” it is important that knowledge can communicate with other audiences (e.g. audiences external to ICES) as well. In particular this is important if the knowledge is to facilitate governance of the “bottom-up” kind. This is one dimension of the issue of transparency. Saliency is about whether we are addressing the right questions. In the language of ICES working groups, this is often a question of ToRs. This focuses our attention on the pathways of formulating and adjusting ToRs. In the context of marine governance, robustness of knowledge is not only about its statistical validity but also concerns the soundness of basic theoretical

conceptions as well as assumed parameters. While having less short-term quantitative precision, integrated knowledge of ecosystems may yet be more useful for policy advice in the long term than outcomes of single species based models, if the underlying assumptions are sound.

The importance of communication points to the need for arenas of interaction. The WGs need to be aware of each other's work in order to achieve synergies between them. The call for integrated advice motivates active facilitation by ICES to ensure linkages between the different competencies represented by the WGs.

Communication of the working groups include also the internal, within ICES, communication, needed to link up and build synergies with other groups. However the links are not always clear, although working groups should state linkages to other groups in their resolutions. Thus it seems that ICES should facilitate ways to increase synergies.

Regarding ToR a) and b), the limited time available for our meeting made it necessary to find a way to limit our reviews to a manageable but yet relevant task. We did this by characterizing two main types of expert groups, and reviewing two examples of each type. The first expert group type comprises the traditional stock assessment working groups, which reports to ACOM. The output of these expert groups, which then provides the basis for the formulation of ICES advice on fisheries, were in focus of the WGFS. Benefitting from the presence of their respective chairs, the two assessment working groups addressed at this WGMARS meeting were the HAWG (Herring Assessment Working Group) and the AFWG (Arctic Fisheries Working Group). These two working groups have a long history in ICES, and they may be taken to represent an ICES assessment working group tradition. The reports of these WGs follow a template corresponding to a set of generic "assessment" ToRs. This, in combination with the standardized form of ACOM advice on fisheries that it supports, serves in structuring the formal science-policy boundary between ICES and the formal recipients of ICES advice on fisheries resources (Nielsen, 2008). The assessment reports, then, contribute and support a standard form of communication between ICES and decision-makers in a fisheries assessment/advice/management context. Being oriented towards undertaking the annual task of producing stock assessment, catch forecast and TAC advice, these assessment WGs are cranking the handles of the "TAC Machine", i.e. the established fisheries management system, which is primarily based on the recommendation, distribution, regulation and monitoring of (single species) TACs (Holm and Nielsen, 2004; Nielsen and Holm, 2007; 2008). The machine metaphor here emphasizes the reiterated and highly standardized features of this work; the outcome of the assessment WG becomes a "standard product", requested by a generic set of ToRs. In this context, change (e.g. towards a different form of assessment/advice (e.g. ecosystem based) may be regarded problematic in so far it would not fit with the rest of the management machinery.

The second type of expert group we identified are of the type that facilitates knowledge integration within ICES in order to develop a broader advisory basis relevant to providing advice on different uses of marine space and resources in an ecosystem context. The two examples of these working groups are the Working Group on Ecosystem Effects of Fishing Activities (WGECO) and the Working Group for Marine Planning and Coastal Zone Management (WGMPCZM). These working groups are of a crosscutting kind; they are nurtured and strengthened by linkages with a range of other expert groups. In contrast to reports of assessment working groups, their

ToRs are more diverse and originate from several different sources in addition to their formal parent committee, reflecting e.g. current SCICOM Strategic Initiatives. It is not so clear if and how their output is used, directly or indirectly, as a basis of advice to external bodies as is the case for the reports of the assessment working groups. In contrast to the assessment working groups that make possible and maintain the established order of fisheries management the capacity to foster change implicitly appear to be seen as an important virtue for this second type of WG. However, unlike the assessment WG they do not have as established audiences.

Box 1: Template questions used for ToR a)

REPORT STRUCTURE

- How is the report laid out?
- What “kind of science” is being done in this WG?
- Is there a structure for the argument started in the Intro and ended in the Conclusion?
- How does the length contribute to the science/understanding/accessibility?
- Does the WG make explicit who the target audience is?

THE ToR “LANDSCAPE” FOR THIS WG

- Where are the ToRs coming from? And WHY are these ToRs proposed?
- Who is using the ToRs? /who is the customer?
- Who is the ideal/target reader for each ToR?

3.3.3 Our Methods to address ToRs a) and b)

As an aid to our review of science communication, we bring the “Message Box” from the book by Nancy Baron Escape from the Ivory Tower (Figure 2).

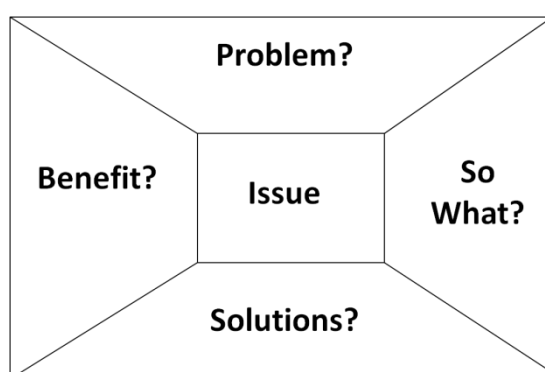


Figure 2. The “Message Box”, redrawn from Baron (2010).

For our purposes, the “Issue” at the center of the box in Figure 2 represents a WG’s ToR (Term of Reference). It is imperative for good communication and understanding that the reader understands the problem the issue/ToR is addressing, why this problem matters, the potential solutions and the resulting benefits to either science or society, or both.

In addition to the Message Box, we formulated a template of questions in plenary to guide the review during our meeting, found in Box 1. The template in Box 1 was created in plenary and revised several times by WGMARS during the meeting. Each of the reviews (AFWG, HAWG, WGECON, and WGMPCZM) used this template in plenary discussion, but the texts of each review in this report do not stringently use the same sub-headings.

Specific observations relating to ToR b) immediately follow ToR a) for each WG that we reviewed. More general suggestions for improved science communication are found in Section 3.9.

3.3.4 Preliminary Social network analysis

In order to analyse the connection of the group under review with other ICES groups, a simple (one-level) social network analysis was performed. Based on the participant list of the 2011 meetings, names were looked up in the ICES address manager and a list of groups which were listed under each name were taken as groups linked to the person, without investigating if the person actually attended the most recent meeting of that group. All groups were visually linked to the core group and line thickness adjusted according of the number of links (people) between the two groups. Links where the chair of the other group attended the meeting were highlighted in green and groups other than expert groups, e.g. ACOM or SCICOM, were highlighted in red.

3.4 Review of Arctic Fisheries Working Group (AFWG) Report 2011

What kind of science is done in this WG?

The AFWG is noted as being the oldest continuous ICES Working Group (since 1959) and is a traditional stock assessment WG that collects fisheries-independent (survey data) and fisheries-dependent (industry data) data for 8 Arctic stocks. Multispecies interactions have been taken into account in the management of Barents Sea fish stocks since the mid-1990s. Predation by cod on capelin is explicitly taken into account in the half year prediction of capelin biomass from 1 October to 1 April (from the acoustic survey until spawning time; Gjøsæter *et al.*, 2002, ICES, 2011a). Also, predation by cod on young cod (cannibalism) and haddock is included in the assessment (ICES, 2011a). This can be done because there is an extensive cod stomach content dataset, with annual sampling since 1984 (Dolgov *et al.*, 2007).

For the Barents Sea (and other areas with relatively few dominant species and strong interactions) it is important to include multispecies interactions not only in studies of management strategies, but also in short-term predictions of growth, mortality and recruitment. The reason for this is that strong cod-herring-capelin interactions may lead to large variability of these processes in the short term (1–3 years), as discussed e.g. by Gjøsæter *et al.* (2009) and Hjermann *et al.* (2010).

The Arctic Fisheries Working Group (AFWG) has been the main arena for implementing species interactions in the assessment and management of Barents Sea fish stocks. The people developing the multispecies models and approaches used in management are either members of AFWG or they work in close cooperation with AFWG members.

AFWG assess cod, capelin, haddock, saithe, redfish and Greenland halibut. Thus, not all interacting stocks in the Barents Sea are handled by AFWG. Norwegian spring-spawning herring is handled by WGWIDE, shrimp by NIPAG, harp seals by

WGHARP and minke whales by IWC (although the actual whale assessment and management is in practice done by Norway). The links between these groups (AFWG participants know the relevant persons in the other groups) are sufficient to exchange data and knowledge relevant to multispecies modelling.

The ICES WG on Multispecies Assessment Methods (WGSAM) is seen by AFWG as a good forum for exchange of ideas and knowledge of multispecies modelling, and some AFWG participants also take part in WGSAM. AFWG has at the moment no links with WGECON (Figure 3).

There is a gradual evolution in the science being done within the AFWG and oceanographic considerations in particular are increasingly being accounted for. The group receives about 20 working documents from external sources each year, mainly raising routine stock assessment issues. The submission of working documents to the AFWG is seen by the chair as the best way to promote new thinking within the group.

Synergies with other Expert Groups

Figure 3 shows the number of other ICES Expert Groups of which attendees at the 2011 AFWG are members. The majority of the connections only have a strength of 1 (i.e. they are dependent on a single individual being a member of another WG) and hence are fragile. The strong link to WKBENCH 2011 and WKRED 2012 are due to the fact that some AFWG assessed stocks are currently being benchmarked. The AFWG chair has commented that in order for ecosystem considerations and species interactions to be more fully accounted for stronger links to WGHARP and WGWIDE would be desirable.

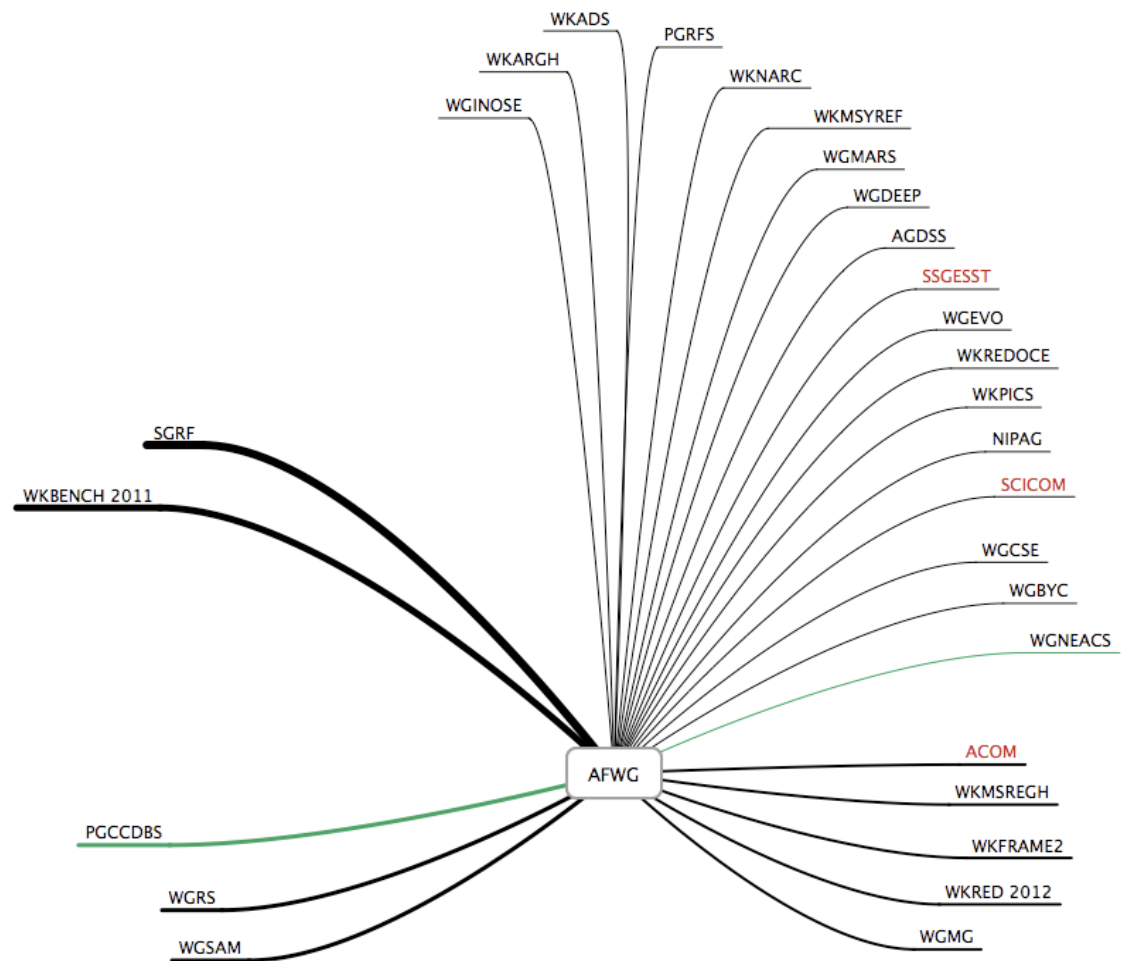


Figure 3. Synergy analysis for the ICES Arctic Fisheries Working Group (AFWG). Lines indicate a link through a member of the group, which has attended the 2011 meeting of AFWG being also a member of the other group. The thickness of the line indicates the number of members who are also members of the other group. Green lines indicate groups where one of the co-chairs has attended the 2011 meeting and groups written in red are not expert groups, but overarching groups (ACOM, SCICOM, steering groups or strategic initiatives).

How does the Report length contribute to the science/understanding/accessibility of the Report?

Report length is an important issue for the AFWG (688 pp.). Much of the length of assessment WG Reports is due to that they include many tables and figures which comprise important data sources like weights-at-age and catch statistics. It is clear that ICES uses the assessment WG reports as references/placeholders for this type of data. The question is: should new and historic data tables and figures be included in assessment WG reports, or is there a better place for them?

Broader readership (and hence, broader governance saliency) of the AFWG Report is exemplified by the following anecdote the AFWG Chair discussed with WGMARS: The 2011 NEA cod assessment included some model changes which were not included in the advice report but the fishermen's representatives found this discrepancy in the AFWG Report (ICES 2011a) and asked the Chair to explain this to them in the Fiskeriforhandlingsrådet ("Quota Negotiation Council", see below for more details on this meeting of Norwegian stakeholders).

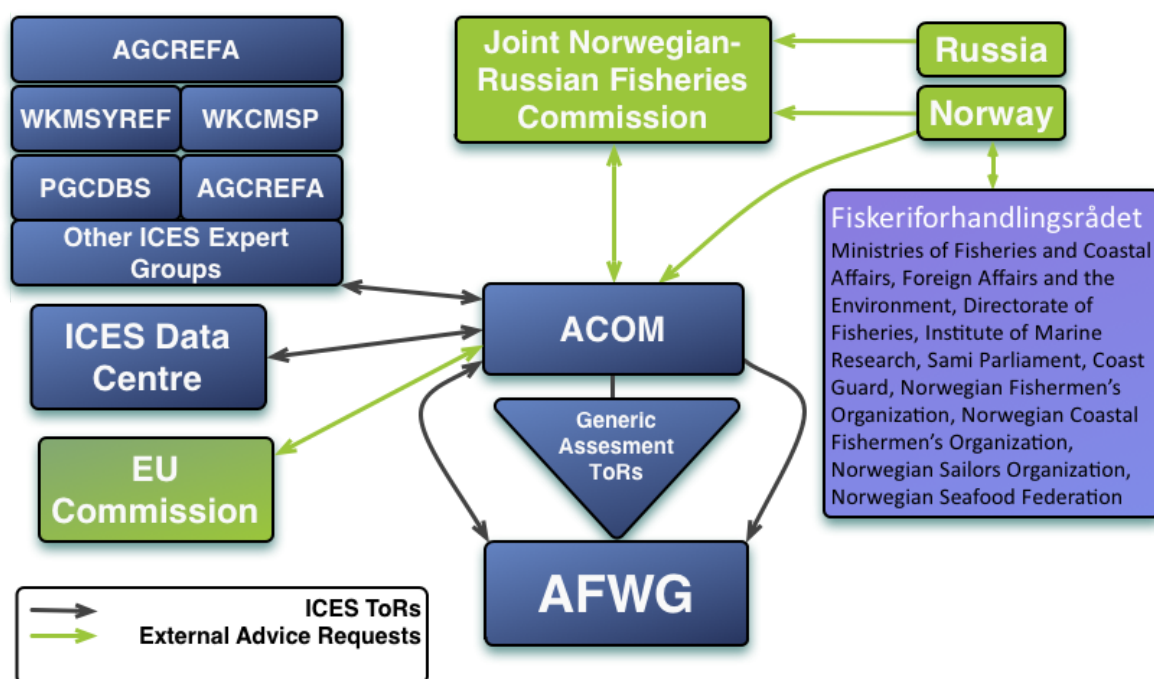


Figure 4. The ToR landscape for the Arctic Fisheries Working Group (AFWG). The figure illustrates the origin of the 2011 ToRs for AFWG. ACOM acts as a filter for all ToRs for the group, however, external organizations can choose to approach the group directly by communication with the Chair.

Where are the ToRs coming from and why are these ToRs proposed?

The AFWG Report consists of thirteen ToRs (a-m) that also apply to: HAWG, NWWG, NIPAG, WGWIDE, WGBAST, WGBFAS, WGNSSK, WGCSE, WGDEEP, WGHMM, WGEF and WGANSA. The AFWG 2011 was instructed to focus on:

ToRs a) to g) for stocks that will have advice,

ToRs b) to f) and h) for stocks with same advice as last year.

ToRs b) to c) and f) for stocks with no advice.

An example of a special ToR in the 2011 Report is from the Joint Norwegian-Russian Fisheries Commission (JNRFC) and managers about migration of fish into the Arctic Ocean. This ToR illustrates also a political readership of the AFWG Report. The AFWG Chair discussed with WGMARS that since this special ToR was not very clear, it was necessary to have a colleague assist with advice on reasonable wording. This is just an example of the need for WGs to “translate” ToRs in order to deliver understandable science to managers and the need for English expertise when dealing with tricky formulations to a potential contested political situation in the High Seas.

Who is the target audience?

The AFWG writes for other readers beside ACOM, namely for the fishing industry who reads the report with such interest that the Chair receives communication on small details after the report is made available. ACOM and the fishing industry are the main readers and customers of the AFWG report. Scientists who need to look up specific data for the Arctic fish stocks also are users of the WG Report. The length of the 2011 Executive Summary for AFWG is two and a half pages long. The ICES Secretariat guidelines state that the Executive Summary should not exceed 1 page, only in

very special circumstances. Given the amount of ToRs the AFWG had in 2011, it is reasonable to go over the limit. However, the guidelines also state that the Executive Summary should be written for a general audience, and the AFWG used terms like “**Saithe in Sub-areas I and II (Northeast Arctic)** was assessed using XSA with the same settings as last year....” which is not understandable for a general audience.

The Quota Negotiation Council (Norwegian: Fiskeriforhandlingsrådet) is an annual meeting held before the fisheries negotiations between Norway and other Parties (Russia, EU, herring/mackerel/blue whiting negotiations with EU/Russia/Iceland/Faroes). The participants are the Arctic fisheries “stakeholders” that take part in the negotiations, i.e. (for Norway-Russia): Ministry of Fisheries and Coastal Affairs, Directorate of Fisheries, Institute of Marine Research, Ministry of Foreign Affairs, Ministry of the Environment, Sami Parliament, Coast Guard, Norwegian Fishermen’s Organization, Norwegian Coastal Fishermen’s Organization, Norwegian Sailors Organization (they organize fishermen employed on larger vessels), Norwegian Seafood Federation (represents the majority of companies within the fisheries and aquaculture sectors in Norway (Figure 4). This meeting has the form of a closed ‘hearing’ and takes place over 1 or 2 days. Scientists present the status and advice for the stocks in question, and then there is a discussion about what Norway’s positions should be in the various negotiations. Based on this hearing, the Ministry decides what the Norwegian positions should be. In this context, positions means not only total quotas, but also division of quotas between parties, exchange of quotas, access to fishing in other parties’ EEZ, technical regulations etc.

This meeting has (under different names) been held for many years, and is the only forum within Norway where “all” stakeholders meet (Since Norway is not in the EU, Norway does not formally fit into the EU Regional Advisory Councils (RACs)). There are, however, many meetings through the year where some of the stakeholders (fishermen, industry, scientists, managers etc.) meet, and there is a good dialogue between the parties.

3.4.1 ToR b) for AFWG: Suggestions for improvements in light of science communication and governance

WGMARS has a few general comments after reviewing the 2011 AFWG Report. First, very few participants in AFWG have English as their first language. This is a process issue of communication within the WG itself. In addition there is a question of how much scientific jargon one should put into the WG Report, since it needs to be understandable for everyone in the group. A recommendation here is for the Chair and other leaders in the AFWG problem of scientific language/jargon is needed but needs to be explained depending on the Target Audience. This is an important issue of communication within and outside the WG to support good governance. Contextualization is also important for the WG to think about in their communications; since readers put the text in their own context, the WG should be aware of this for good communication.

Regarding science synergies, WGMARS made the following observation. AFWG has observed a much faster maturation schedule of northeast Arctic cod today compared to 50 years ago. The life-history strategy phenomenon “fisheries-induced evolution” (FIE) is mentioned in the report; however AFWG does not really interact with ICES WGEVO that specifically studies FIE using NEA cod as the chief case study. With the exception of one AFWG member (in 2011 by correspondence) there are no firm synergies between the data gatherers (AFWG) and the ecological theorists (WGEVO) except in relation to a publication by Hjermann, Bogstad *et al.* (2010). Although some

Russian participants have written about evolutionary effects of maturation (Kovalev and Yaragina, 2009), WGMARS and the Chair of AFWG realize that links and synergies between ICES WGs are people-based (you tend to collaborate with people with whom you eat lunch).

A generic ToR (ToR j) from ACOM included a request to report how AFWG deals with the label GES ("Good Environmental Status") for its stocks and ecosystem. And if one reads between the lines, there's actually a vague request in ToR k) to create synergies between WKCMS (Figure 3).

Other observations from the 2011 Report review:

- 1) AFWG is moving in a multispecies direction but the Ecosystem Approach gets more cursory treatment. There are a number of factors contributing to this problem.
- 2) The gradual proliferation of ToRs impacts on implementation of the Ecosystem Approach as the groups workload is expanding and additional ToRs which may not generate a feeling of "ownership" by WG scientists tend to be dealt with as quickly and efficiently as possible. This begs the question of whether a two stage assessment WG process would be better able to deal with different types of ToRs – generic assessment ToRs at the WG meeting and other ToRs in a different forum?
- 3) Implementation of the Ecosystem Approach can also be moderated by political factors as it raises issues about balancing trade-offs. An example of this can be seen with the capelin resource - asking what the best use of the resource is requires both ecological information and a debate on trade-offs between industry sectors and this kind of open debate may not be politically desirable. This goes back to the governance issue of clarity of objectives and explicit discussion of trade-offs.
- 4) The 2011 AFWG report discussed interpretation issues surrounding high indices for 7 year old cod but the advice sheet did not. The difference in the TAC depending on the interpretation choice was approximately 150,000 tonnes - the non-inclusion of this in the advice sheets raises questions about the communication of uncertainty, underlying methodological assumptions and target readership.
- 5) The technical language used in the AFWG Executive Summary creates an argument to supplement official texts by summaries written in cooperation with a communications professional.

3.5 Review of the Herring Assessment Working Group (HAWG) 2011 Report

What kind of science is done in this WG?

The HAWG Report is an annual WG report that assesses the state of 7 herring stocks and 3 sprat stocks. This report is written for ACOM's purposes as a basis for the annual quota advice.

The scientific purpose HAWG includes turning the handle of the "TAC machine" (Nielsen and Holm, 2007; 2008) to produce quotas in light of the precautionary approach as well as reviewing scientific findings that have to do with herring biology and applying those when evaluating the state of the related herring stocks.

The ecosystem considerations and other highly relevant scientific inputs are included in the HAWG report solely based on a person-related basis; some of the members of

HAWG are involved with ongoing work with respect to the revision of the MSFD, GES in pelagic systems, ecosystem approach to fisheries advice, etc., and thus able to contribute to these sections of the report. However, the link between those ongoing processes and HAWG are sensitive to the presence/absence of those particular people. As seen in Figure 5, a vast amount of other ICES related groups are represented by the members of HAWG and thus the links to relevant work appear strong, however, this has as a prerequisite that those members turn up and share their knowledge yet again requiring them to be active members of the relevant ICES groups. A more formalized flow of information between linked groups in ICES would ensure a beneficial information flow.

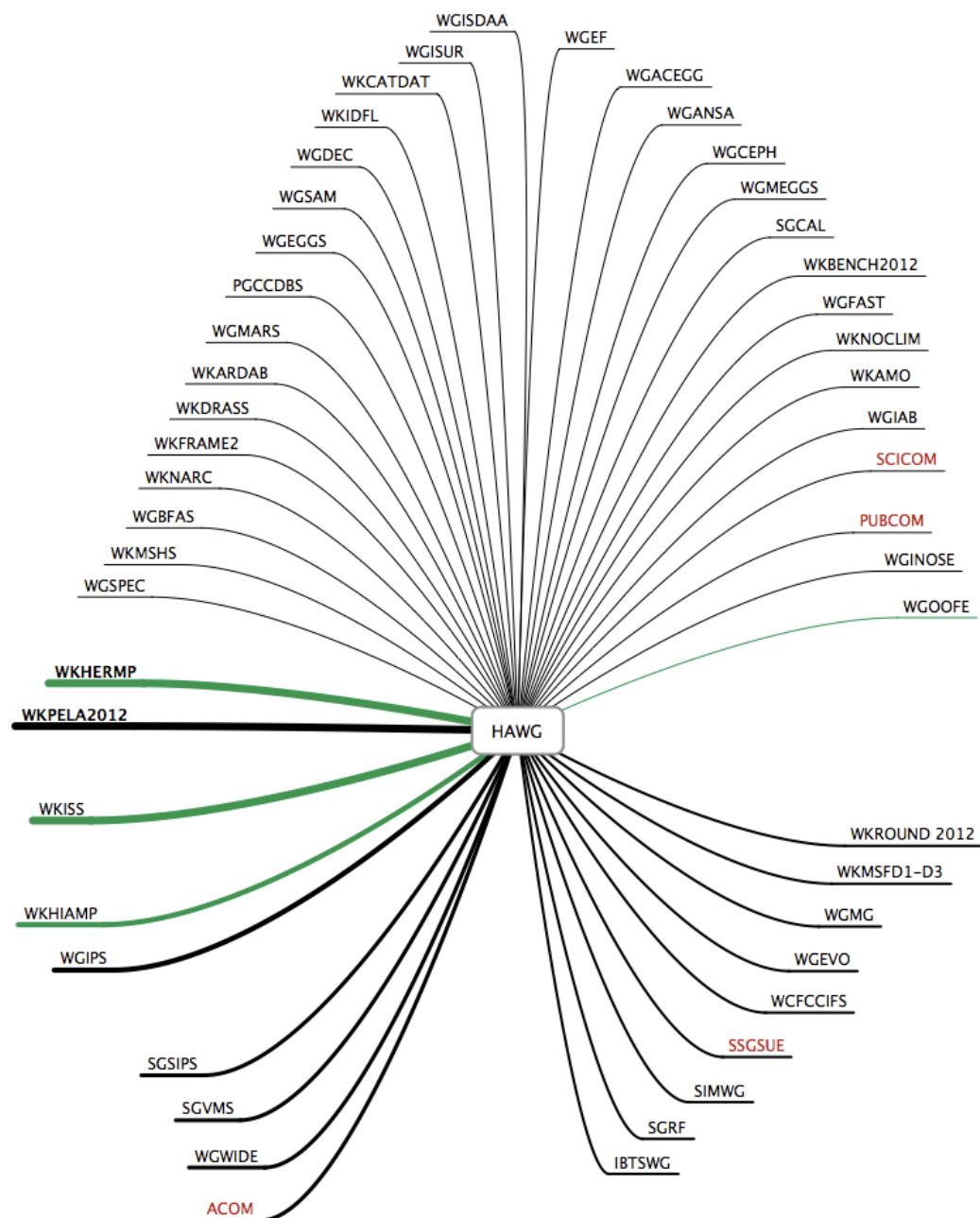


Figure 5. Synergy analysis of the ICES Herring Assessment Working Group (HAWG). Lines indicate a link through a member of the group, which has attended the 2011 meeting of HAWG who is also a member of the other group. The thickness of the line indicates the number of members who are also members of the other group. Green lines indicate groups where one of the co-chairs has attended the 2011 meeting and groups written in red are not expert groups, but overarching groups (ACOM, SCICOM, steering groups or strategic initiatives).

The 'social network' (Figure 5) for HAWG highly underlines the vast involvement of the HAWG members in other ICES groups and thus the potential for an information flow between sections of ICES, including the more overarching organs as SCICOM and ACOM. Obviously this is a strength for the group to have those links, however, it is not clear from the report how those links add to the work of HAWG in terms of governance. The strongest links are not surprisingly with groups directly related to the HAWG (evaluation of LTMP for herring, benchmarks for herring, stock identity of herring, etc), however the links to other relevant groups, such as data-, method- and ecological related groups, appear promising for the information flow to the work

of HAWG although the links to the ecosystem and scientific related groups within ICES appear somewhat vague for HAWG.

How does the length contribute to the science/understanding/accessibility of the Report?

Report length is an issue as the HAWG 2011 report as mentioned is 763 pages, many of which include tables and figures of important data sources like weights-at-age and catch statistics. Recognizing that ICES uses the assessment WG reports as references/placeholders for such data, the question is: should new and historic data tables and figures be included in assessment WG reports, or is there a better place for them?

The first part of the report (48 pp) is structured: i) responses to special requests, ii) reviews of groups/projects important for the WG, iii) commercial catch data collation, iv; Stock assessment) Methods used, v) discarding by Pelagic Vessels, vi) Ecosystem considerations, MSFD and SISAM for sprat and herring. The next section of the report is on a stock by stock basis; each of the 10 stocks assessed has its own section with a template of subsections that includes a description of the fishery, biological composition if the catch, etc. The rather standardized format of the HAWG report seems to serve a purpose for both the receiving audience and the group itself. The audience would know where to find specific information without having to read the entire report and the HAWG have a way of quality assuring/checking that all necessary information is included in the particular report.

Where are the ToRs coming from and why are these ToRs proposed?

As with all assessment working groups there is a set of 'Generic ToRs for the assessments' which are the base of HAWG and they come from ACOM. All remaining ToRs, which are filtered through ACOM, may come from various groups within ICES and from outside the ICES system (Figure 6). The HAWG can suggest ToRs for the group itself for future years, those are usually based on findings of shortcomings related to the recent assessment discovered by the group during the course of the meeting. In the most dramatic cases, the HAWG suggests a particular stock to be benchmarked. Stakeholder groups can also suggest ToRs for HAWG, again this goes through the ACOM filter, however, in the most recent year, Pelagic RAC approached the HAWG directly by a written letter to the chairs inquiring information on particular issues. The response to this letter solely depended on the will of the chairs, and in turn the HAWG as a group, and was not a 'genuine' ToR asked by ACOM. However, it appears welcomed by the HAWG to have such exchanges of information and opinions and what is stated in the 2011 HAWG report potentially paves the way for future communication between the HAWG and institutions outside ICES.

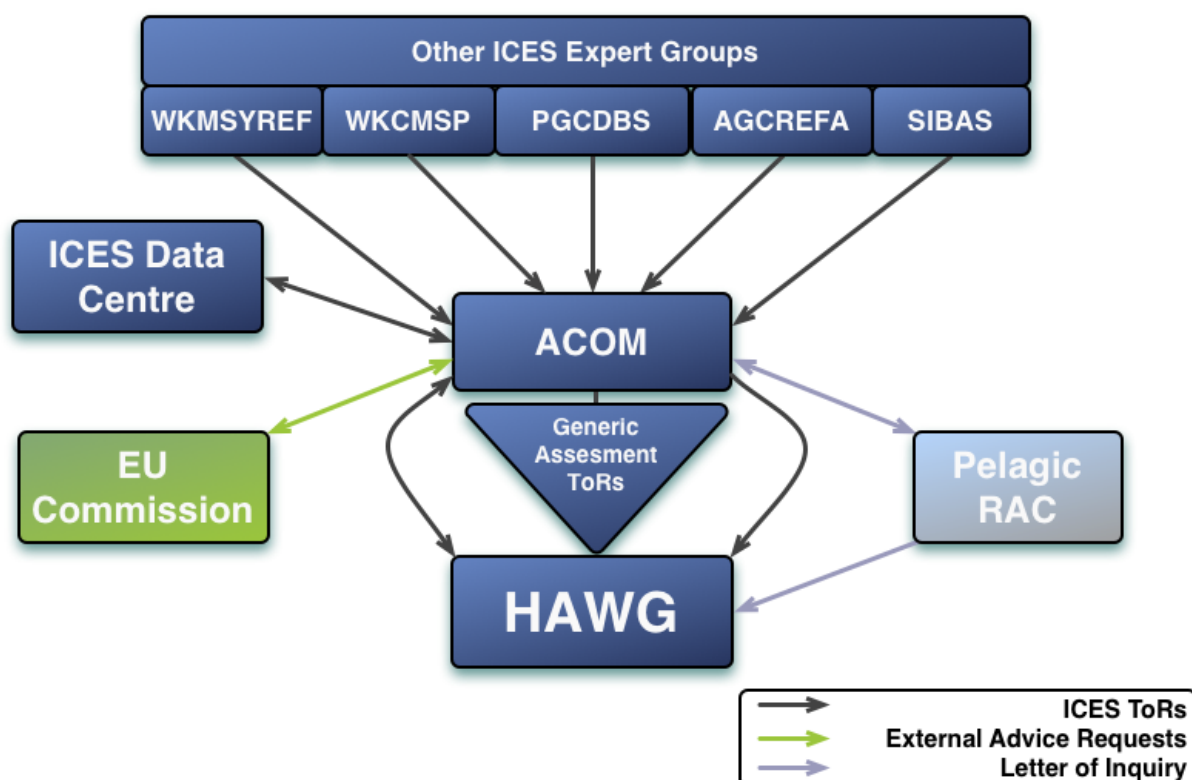


Figure 6. The ToR landscape for the Herring Assessment Working Group. The figure illustrates the setting of ToRs for HAWG. ACOM acts as a filter for all ToRs for the group, however, external organizations can choose to approach the group directly by communication with the Chairs.

The MSY framework trickles down to the HAWG and changes how the WG gives TAC advice, in light of FMSY. Thus the settings for answering the Generic ToRs are rather rigid for HAWG. This does not in itself pose a problem for HAWG; however, it should be more clearly stated in the introduction of the report, rather than referring to the general context of ICES advice.

The assessment ToRs are used directly by ACOM in preparation for the annual quota advice that ICES gives for HAWG stocks. Special science ToRs are written for a more general scientific audience, including ICES colleagues in other WGs that may be able to use the conclusions of special ToRs. Requested ToRs are analysed and written for the group that requested them, for example, the Pelagic RAC. This type of communication with stakeholders is good and increasing, but communication with managers (on a Commission level) is not there. EU Council (fisheries minister from each country) can't write proposals (size of quotas and shares; essentially), the EU Commission must write them. Because of this bureaucracy, it would be unusual to communicate with managers through requested ToRs directly to the HAWG. These would come filtered through ACOM and become a generic ToR.

Who is the target audience?

Whereas the core of the report (the assessments of the various stocks) are written for an audience clearly capable of performing assessments themselves or at least able to understand the principles behind stock assessment and the related science, the Stock Annexes give a more broad introduction to the individual stocks, their biology and the reasoning behind the settings and assessment choices for those particular stocks. Reading the entire report, there is no 'readers guide' which could point the reader to

the relevant sections when inquiring information on either stock status, methodology, biology, ecosystem considerations, fishery-related issues, etc.

It is obvious that the structure for the report and the various sections dealing with the stocks, their status, the input data, the assessment, are following a specified pattern, which appears to be working well for the enlightened reader. The interpretation of the assessments and the advice based on this, which is the crucial output of the HAWG report, could benefit from a more guided introduction so that people not educated in the applied modelling would be able to understand the conclusions more readily than it appears to be the case at present.

In regards to communication and transparency in the advice, HAWG tries to maintain stability in advice which is much appreciated by stakeholders, as this gives a transparent and predictable advice under given stock statuses, however, the stability also in some cases dramatically restricts the exploration of a particular stock, which obviously results in additional requests from the Industry and Managers for re-evaluation of the advice given (as seen recently for the North Sea Autumn Spawning herring, ICES, 2011b). Such situations arise solely because HAWG is quite transparent when setting up the Catch options for the stocks, showing the potential exploitation possibilities under a set of management rules.

The assessment working group's communication with stakeholders (SHs) is good and increasing, but communication with managers (on a Commission level) is not there yet and this potentially creates miscommunication between the expert group giving advice and the end-users applying the advice in negotiations.

The HAWG report directly addresses Expert readers, thus as such, only a reader with knowledge of how assessments are done and a good quantitative ability to read such information will be able to get all points and issues covered in the rather comprehensive report. Readers need good background knowledge of the ICES structure and the advisory system; however, those are exactly the audience targeted by the HAWG report. ICES could consider making a readers guide to all assessment working group reports for a non-expert reader facilitating a wider outreach of the very specialized assessment working groups. This would in turn make it clearer to the 'outside world' how ICES operates and how the work performed by the assessment groups contributes to governance via the advisory system.

The advisory sheet, on the other hand, is where the assessment group struggles in condensing the advice outcome of all the processes performed in the assessment and conveying this in a clear, transparent and less exclusive manner to a wider audience (stakeholders, managers, etc).

3.5.1 ToR b) for HAWG: Suggestions for improvements in light of science communication and governance

First, WGMARS has some specific observations on how HWAG communicated uncertainty in their 2011 Report. In the Catch Option table, which forms the fundament for all advice given for a particular stock, an option for the Precautionary Approach is always shown, essentially giving the formal operational way to deal with the uncertainty of the assessment and a measure of 'how far' the stock is from these limits. However, the options given do not display any confidence interval or the like, giving a somewhat erroneous impression of an accurate digit.

HAWG does communicate uncertainty in the assessment process and the in the internal review of the quality of the assessments, the input data and the perception of

the individual stock; however, if the reader only judges from the Catch Option table, the outcome of the assessments appears rather definite, only presenting the precautionary approach (PA) option and not any CI's on the figures given. Admittedly this would probably make this table even more complicated to read, however, a solution to mention the non-definite character of the figures given in the table would soften the impression of the numbers.

Regarding the readability/availability of the WG reports to a larger audience, the body of the HAWG report is certainly not for readers unfamiliar with the general context of ICES advice, and the report would improve greatly if it introduced the underlying concepts for the answers to the generic ToRs for the group. Such clarification could be done in a section describing the ToRs and the HAWG interpretation of these. This should not necessarily be a long section; however, it would improve the odds for outside readers to follow the logic and structure of the report. Additionally will new ToRs and their potential improvement/adding to the HAWG outcome be underlined and readers, which are used to reading the HAWG reports, would know where to look for additions to the 'normal' outcome.

Acknowledging the very limited time allocated for a large amount of work done during HAWG, it would still be recommendable that the group could find time to report more thoroughly on the ToRs beyond the generic assessment ToRs, thus the ToRs adding new information and discussion to the production of HAWG (e.g. GES, multispecies issues, reform of the CFP, etc.). Perhaps widening Chapter 1 or even make a new chapter for such new efforts would be a suggestion to be considered.

3.6 Review of the Working Group on the Ecosystem Effects of Fishing Activities (WGECO) 2011 Report

What kind of science is done in this WG?

WGECO is one of the cross-cutting groups within the ICES structure, which aims to enable ACOM to deliver integrated advice. According to the Supporting Information in Annex 3 of the report, the activities of WGECO "will lead ICES into issues related to the ecosystem effect of fisheries, especially with regard to the application of the Precautionary Approach". WGECO appears to be loosely positioned between ACOM and SCICOM. It formally reports to ACOM but is not represented in the annual meeting for ACOM WG chairs and it gets several of its ToRs via SCICOM. The group attracts several experts who have many years of experience within the ICES system and who are also engaged in other international working groups and committees. Though ToRs are filtered through the parent committee ACOM, the ToRs for the 2011 meeting originated from a variety of sources including SCICOM strategic initiatives, other ICES EGs, and client commissions (e.g. OSPAR). This means that there are several different audiences for the output from WGECO. Topics currently discussed relate to the science underpinning the implementation of the Marine Science Framework Directive (MSFD) and the establishment of Marine Protected Areas (MPAs).

The WGECO 2011 report structure follows the order of the six ToRs that are up for discussion. An annotated list of the ToRs is found in an Annex in the form of a draft agenda; however, it is not clear exactly how each ToR was originally formulated when given to WGECO. The 5-page long Executive Summary is more extensive than the 1-page length suggested by the "Guideline for the Production of Executive Summaries" (ICES, 2008). It provides background information on each of the ToR and summarizes how the issues are reported. This helps make the report more accessible to the reader.

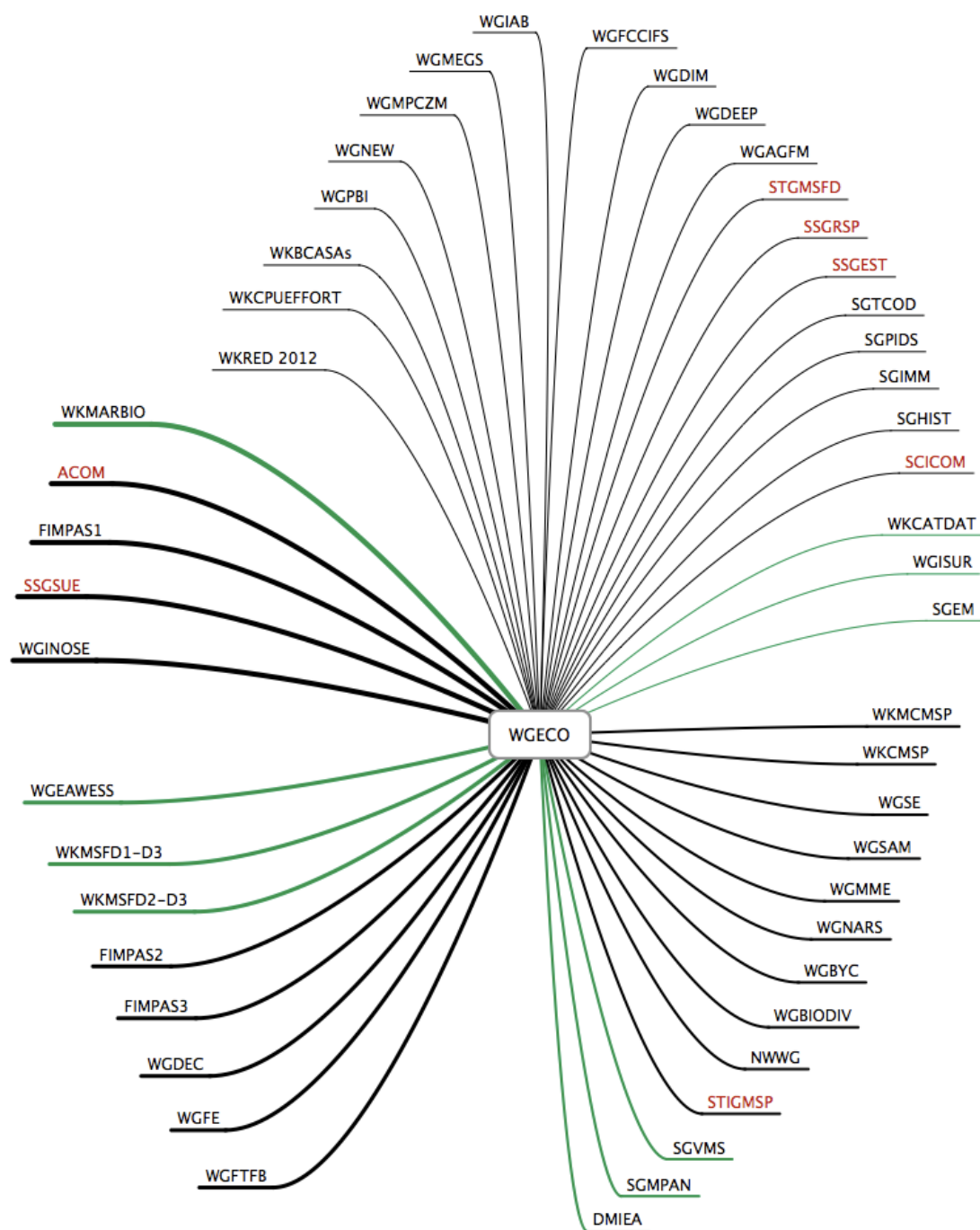


Figure 7. Synergy analysis for ICES Working Group on the Ecosystem Effects of Fishing Activities (WGECO). Lines indicate a link through a member of the group, which has attended the 2011 meeting of WGECO and was also a member of the other group. The thickness of the line indicates the number of members who are also members of the other group. Green lines indicate groups where one of the co-chairs has attended the 2011 meeting and groups written in red are not expert groups, but overarching groups (ACOM, SCICOM, steering groups or strategic initiatives).

Figure 7 illustrates the links between WGECO and other ICES EGs. WGECO appears well connected within the ICES system. The Chair of WGECO also chairs five other groups and is a member of yet four other EGs. There are links between WGECO and ACOM and SCICOM. Several of the SCICOM Steering Groups and SCICOM Strate-

gic Initiatives are also represented. About half of the links have multi-person strength, contributing to the robustness of the affiliation with several other groups.

How does the length contribute to the science/understanding/accessibility of the Report?

The WGECO 2011 report is 166 pages long. The ToRs can be read separately. This is probably intentional, given that the ToRs are coming to WGECO from various sources and are thus addressing different audiences. It could also be a practical consequence of how the report is produced, with subgroups working in parallel during the WG meeting. With clear headers and an informative Executive summary to guide the reader, the length of the report *per se* is not a problem in this case.

The introduction of each ToR in the Executive summary clarifies to some extent how the ToRs ended up on the WGECO 2011 agenda. However, an explanation of who the target audience is could be made clearer for each of the ToRs in the main body of the report.

The reader gets the impression that an effort has been made to summarize what has been done in previous WGECO reports or other relevant background documents and to specify in what way the group has taken the issues further in their 2011 report. Most of the ToRs - or subsections of ToRs - have an introduction and a conclusion. However, there is not always a clear argument going through the sections leading to the conclusions, leaving the reader without a clear take-home message.

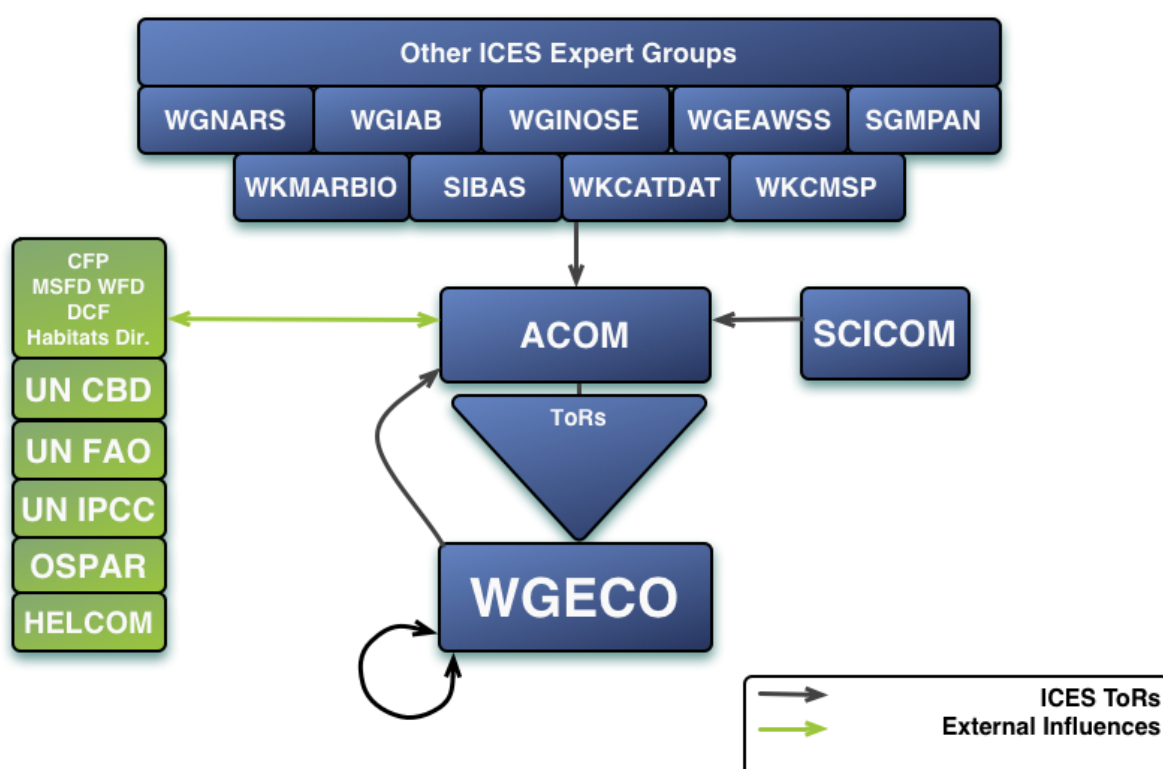


Figure 8. The ToR "landscape" for the Working Group on the Ecosystem Effects of Fishing Activities (WGECO). The figure illustrates the setting of ToRs for WGECO's work in the 2011 Report. ACOM is the parent committee for WGECO and acts as a filter for all ToRs coming to the group. The ToRs on the 2011 agenda originated in several initiatives both within and outside of ICES. WGECO also discussed issues originating from their own ideas and initiatives.

Where are the ToRs coming from and why are these ToRs proposed?

See specific comments for each ToR below. There were six ToRs (a-f) on the agenda for the 2011 WGECO meeting. These ToRs were quite diverse and partly overlapping, reflecting that the ToR originated from various sources, see Figure 8.

WGECO ToR a): Provide guidance on the use of the proportion of large fish indicator in areas outside the North Sea.

This ToR was suggested by WGECO at their 2010 meeting as continuation of their previous work on developing the Large Fish Indicator (LFI). The development of indicators was linked to OSPAR-related work on Ecological Quality Objective (EcoQO). This year it came to overlap with other generic ToRs given to WGECO concerning indicators related to the implementation of the Marine Strategy Framework Directive (MSFD; ToR d).

WGECO ToR b): Review the use of science in the development and implementation of “integrated ecosystem management plans” (IEMPs) including objectives setting and performance evaluation as well as other considerations.

The topic of this ToR was also suggested by WGECO at their 2010 meeting as a follow-up on their work on integrated ecosystem assessment plans (EEAP). However, they decided to postpone this topic, given that the discussions should be informed by output from other EGs (shown in Figure 8). It is not clear who the target audience for this ToR is; however, the topic is aligned with the work of several other ICES EGs.

WGECO ToR c): Review and comment on the SGMPAN report which presents general guidelines for MPA network design processes that anticipate the effects of climate change on marine ecosystems

This ToR came from ACOM and it is not clear whether this task of reviewing the output from the Study Group on Marine Protected Area Networks (SGMPAN) was also given to other EGs. WGECO chose to focus on the theoretical framework and issues where they could see links between the output from SGMPAN and other activities. These synergies emerge from participants being involved in both WGECO and OSPAR work.

WGECO ToR d):

Identify elements of the WGECO work that may help determine status for the 11 Descriptors set out in the Commission.

Provide views on what good environmental status (GES) might be for those descriptors, including methods that could be used to determine status.

This generic ToR was developed by ACOM and SCICOM and given to several of EGs, reflecting the involvement of ICES in assisting with the implementation of the MSFD. WGECO has already been heavily involved in issues related to the development of descriptors related to Good Environmental Status (GES). This opens for interpretations from WGECO on how a contribution from them at this point could build on previous reports and take the issues one step further. It also points to the question of WGECO's parent committee ACOM acknowledging previous work done by this group when allocating such a generic ToR to them. It might be more inspirational for WGECO to get a task better tailored to reflect their experience and expertise? The concept of GES links to numerous other actors in the governance landscape, appearing among the “external influences” in Figure 8.

WGECO ToR e): ToR in relation to the Strategic Initiative on Biodiversity that is being developed by Simon Jennings and Mark Tasker. (This might not be the original wording).

This ToR originates from one of the ICES strategic initiatives, funnelled to WGECO through ACOM. The way the ToR is formulated in the report leaves it quite open in terms of what is supposed to be carried out by WGECO. It is not clear to the reader whether this is a specific request to WGECO or if it is a generic ToR which has also been given to other EGs. One of the names mentioned when introducing the ToR in the report is participating in WGECO 2011 as a participant. Similar to the GES-related ToR mentioned above, this biodiversity-related ToR also illustrates the numerous links that exist between different actors in the marine governance landscape, adding actors to Figure 8.

WGECO ToR f): This is in three parts;

take note of and comment on the Report of the Workshop on the Science for area-based management: Coastal and Marine Spatial Planning in Practice (WKCMSP)

provide information that could be used in setting pressure indicators that would complement biodiversity indicators currently being developed by the Strategic Initiative on Biodiversity Advice and Science (SIBAS). Particular consideration should be given to assessing the impacts of very large renewable energy plans with a view to identifying/predicting potentially catastrophic outcomes;

identify spatially resolved data, for e.g. spawning grounds, fishery activity, habitats, etc.

This ToR was a generic request from SCICOM and ACOM and WGECO contributed with input reflecting the competence represented in their group, e.g. on pressure indicators.

3.6.1 ToR b) for WGECO: Suggestions for improvements in light of science communication and governance

The 2011 WGECO Report is critically useful reading for managers and scientists involved in the selection of indicators and setting reference levels. The criteria suggested seem scientifically sound and the comments on the possible implementation are reasonably critical. One remark regarding the overall philosophy of WGECO: Why do we think that we are facing the “delicate balance of nature” and not the manifestations of “non-equilibrium ecology”? More general suggestions for improved science communication are found in Section 3.9.

3.7 Review of the Working Group Marine Planning and Coastal Zone Management (WGMPCZM) 2011 Report

The Working Group for Marine Planning and Coastal Zone Management (WGMPCZM) met for the first time under this name in March 2011. The group's origins date back to 2003, when a study group on Integrated Coastal Zone Management (ICZM) was established. This later turned into the Working Group on ICZM. Until 2009, WGICZM dealt with ToRs that focused mainly on reporting of national (and international) activities related to ICZM. Since 2009, the group's ToRs shifted in focus: less annual, administrative reporting and more focus on scientific questions. The group's name change in 2011 from WGICZM to WGMPCZM reflects the international developments in the coastal and marine policy landscape, with a strong focus on and push of MSP. Members of WGICZM as well as WGMPCZM range from theoretical scientists to administrators and practitioners, contributing a range of trans-disciplinary expertise.

The Working Group for Marine Planning and Coastal Zone Management (WGMPCZM) report follows the general ICES report template. The report deals with the seven ToRs one by one, in the order of the ToRs. There are nine annexes to the report; six annexes (Annexes 3-8) provide further information, more detail or summaries. The executive summary summarizes the conclusions of ToRs a), d), b), and c) (in this order); ToRs e)-g) are not dealt with in the executive summary.

What kind of science is done in this WG?

WGMPCZM is one of the “new/ non-traditional” EGs within ICES, striving to underpin delivery of integrated advice. WGMPCZM “consists of members representing science as well as people involved in administrative decision-making and is therefore truly transdisciplinary in its nature” (ICES, 2011c). The wide variety of WGMPCZM participants’ expertise is also revealed in the ICES WG synergy Figure 9, showing the ICES WGs that WGMPCZM experts also have (active or passive) links with. For example, those include WGs dealing with various aspects of the marine ecosystem (benthos, mammals, fishery), chemistry, pollution/contaminants, energy, sustainability.

The methods applied are reviewing (e.g. “analysis of framing documents”, “analysis of reviews of scientific literature”), case study reporting, and “group discussions reflecting different disciplinary and practical backgrounds and experiences of WG members” (ICES, 2011c).

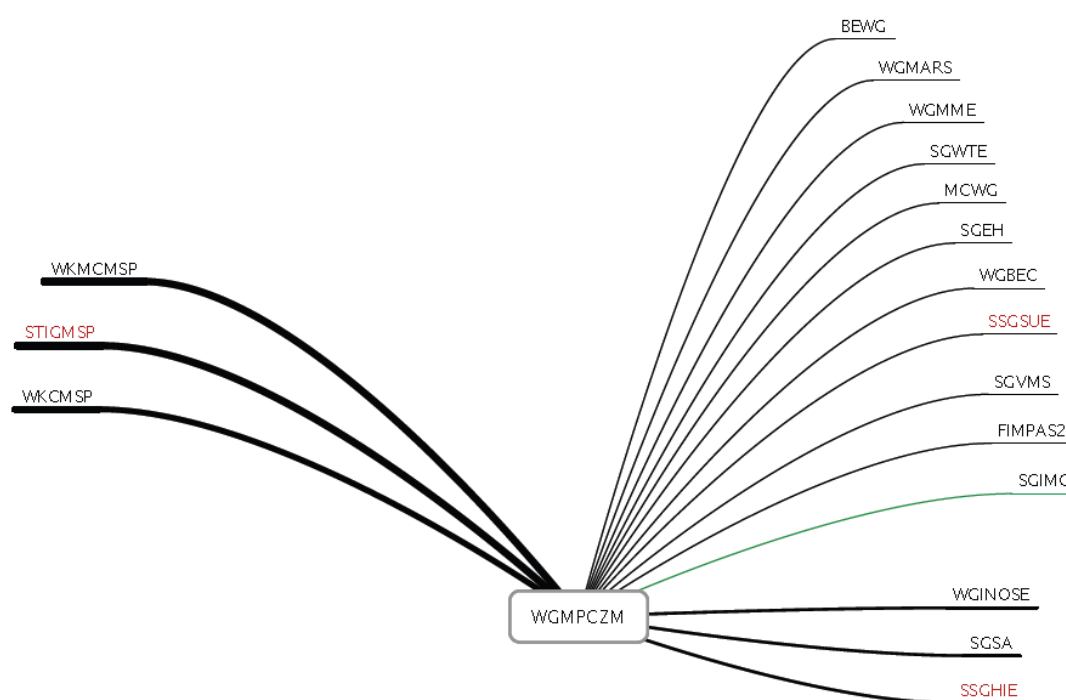


Figure 9. Synergy analysis for ICES Working Group on Marine Planning and Coastal Zone Management (WGMPCZM). Lines indicate a link through a member of the group, which has attended the 2011 meeting of WGMPCZM and was also a member of the other group. The thickness of the line indicates the number of members who are also members of the other group. Green lines indicate groups where one of the co-chairs has attended the 2011 meeting and groups written in red are not expert groups, but overarching groups (ACOM, SCICOM, steering groups or strategic initiatives).

How is the Report laid out? Is there a structure for the argument and ended in the conclusions?

Neither the report nor the executive summary state a purpose of the WG's meeting and report and do not convey a clear argument or motivation. The report lacks a general introduction and a final conclusion. The report follows a clear structure (the seven ToRs), however, this ToR structure does not appear very reasonable nor inspirational and instructive in terms of communicating an argument or a message to the potential reader. WGMARS feels that overlapping messages/ lessons learned and synergies from different ToRs and in particular from the different case studies analysed, could have been combined to facilitate the reading and convey a clear message.

The first four individual ToR chapters (ToRs a-d) do show a clear structure, starting with an introductory section and finishing with a conclusion. ToRs e)-g) can be read on its own. ToRs e) and f) also start with an introductory paragraph, and then present a short abstract, as requested by the ToR. ToR g) consists of just 1 paragraph, depicting and evaluating potential collaboration with other EGs.

At the end of the report, but also already at the end of each ToR chapter, the reader is left without any clear take-home message. The reader stays with the questions: What is the issue? What is the message to learn from what I have read?

How does the Report length contribute to the science/understanding/accessibility?

The WGMPCZM report comprises 57 pages of body text and 51 pages of Annexes, summing up to 108 pages in total. ToRs a)-d) cover 54 pages, including in total approximately 20 pages of case study presentations under ToRs b), c), and d). This dispersed presentation of case study results does not contribute to a good understanding of the science related to the case studies. Also, the lengths of 54 pages for ToRs a)-d) does not facilitate the understanding and accessibility of the text. As mentioned above, ToRs a-d could have been structured differently, focusing on the main messages to be conveyed from those ToRs, as well as focusing on each of the individual case studies as a whole. ToRs e)-g) are concise, covering 3 pages only.

Who is the ideal/target reader of the Report?

Neither the report nor the executive summary identifies any target audience. WGMPCZM reports to ACOM and SCICOM (Figure 10). It is not clear, though, whether WGMPCZM aims to convey a message to ACOM, SCICOM or any potential reader. The STIG-MSP is mentioned explicitly several times, in the executive summary as well as throughout the report. "WGMPCZM made specific suggestions for further cooperation" with STIG-MSP, hence, STIG-MSP should be a potential audience.

WGMPCZM recommended in the 2010 report that "group membership includes experts from MSP, socio-economics, IM practitioners." The executive summary of the 2011 report mentions the "different disciplinary and practical backgrounds and experiences of WG members". Such groups, and in general, anyone interested in MSP and ICZM could be a potential audience of this report.

The ICES science plan was a major driver of the formulation of WGMPCZM's ToRs. In contrast to the ToRs until 2009, the 2010 and 2011 ToRs became more specific, e.g. by adding two focal topics in 2011: ecosystem services and quality assurance (Personal communication Andreas Kannen (Chair WGMPCZM 2011)).

Seven ToRs (a-g) were on the agenda of the WGMPCZM 2011 meeting. ToRs a)-e) had been drawn up in the 2010 report. As stated in the report, ToR a) "is directly re-

lated to ToR d)". No background information on the selection of the ToRs is provided, neither in the executive summary nor in the body of the report itself. The report does not explain specifically, where the individual ToRs came from and why they were proposed. The executive summary just mentions that the ToRs "were new and focused on specific aspects of MSP and ICZM". The Executive Summary also briefly mentions the purpose of some of the seven ToRs ("to allow conceptually focused discussions... and to address open questions ...").

Additional information about the EG and the 2011 ToRs can be found in the WGICZM 2010 report (ICES 2010): "Redefinition of the WG and its ToRs in the context of current trends in marine policies and ICES new strategic plan", as a reaction to a "SSGHIE request on WG contribution to SICMSP". Based on this, the EG changed its name from WGICZM to WGMPCZM. It is thus the first meeting of this working group.

Who is the target audience?

Given that the WGMPCZM reports to SCICOM, this would be the first point of contact for receiving and distributing the output from the group (cf. Figure 10). Additionally, the Strategic initiative on Coastal and Marine Spatial Planning (STIG-MSP) is explicitly involved in ToR e), which also relates to a future collaborative activity between WGMPCZM and STIG-MSP (ICES ASC joint theme session in 2012). Other potential audiences are groups that WGMPCZM refers to in the report under the different ToRs, such as participants of research projects on MSP and ICZM.

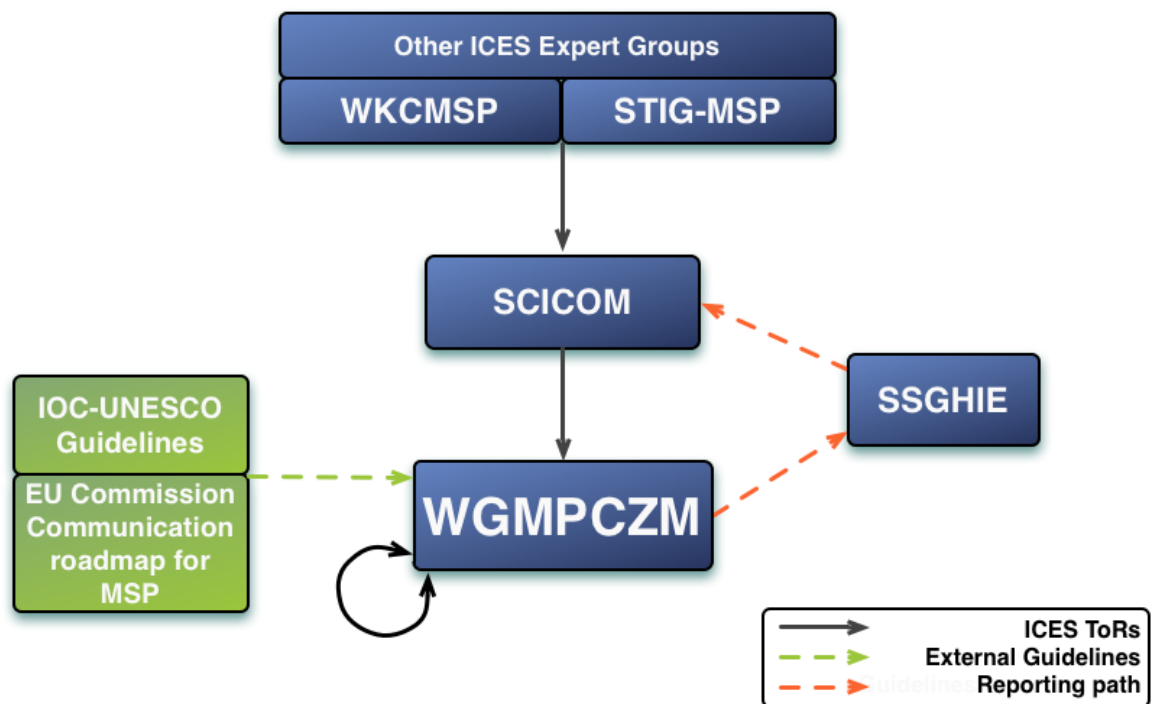


Figure 10. The "ToR Landscape" for the Working Group Marine Planning and Coastal Zone Management (WGMPCZM).

ToRs a)-d) overlap, and it is not clear, whether they are addressed to different audiences. Here, we reflect on the potential target audiences for ToRs a)-d) combined.

ToR a) Report on the development and use of MSP specifically identifying good practice and gaps in priority based decision-making and objective setting in IM and ICES countries;

ToR b) Prepare a review of existing practices in Quality assurance including a re-view of formal management standards for its use in IM;

ToR c) Prepare a review of the measurement and application of ecosystem goods and services in IM;

ToR d) Update and report on IM activities, including ICZM and MSP in different ICES countries including information on initiatives towards integrated governance in the CZ;

The report does not explain the “issues” and problems related to these four ToRs. It is not clear, who the target reader of these ToRs should be. Insiders can understand the importance of the ToRs, but an outsider-reader is left with the question of why these ToRs matter, why the exercises were carried out, and what the added value of reading the information would be. What is the purpose and role of the annexes?

Strictly speaking, these four ToR sub-chapters are structured by an introduction, main body text and conclusion, however, the questions of the “message box” are not explained. This missing information impairs general readership and does not make the text attractive to read.

ToR e) Receive a report on the Strategic Initiative on Coastal and Marine Spatial Planning and plan for the suggested ICES ASC Joint Theme session in 2012;

Target reader of ToR e seems to be the STIG-MSP.

ToR f) Report on the ICES 2010 ASC Theme Session B: The risk of failing in integrated coastal zone management progress and the publication of any suitable papers;

Target reader of ToR f could be participants of this ICES ASC theme session B, as well as those, who would have liked to participate or are interested in the subject.

ToR g) Evaluate potential for collaboration with other EGs in relation to the ICES Science Plan and report on how such cooperation has been achieved in practical terms (e.g. joint meetings, back-to-back meetings, communication between EG chairs, having representatives from own EG attend other EG meetings).

This seems to be a generic ToR. Given to all EGs.

3.7.1 ToR b) for WGMPCZM: Suggestions for improvements in light of science communication and governance

The first suggestion WGMARS has for WGMPCZM is to follow the guidelines of the “Message Box” (Figure 2 this report) in order to convey a clear message to the reader. This refers to the body text of the report as well as to the annexes (make explicit the purpose and usefulness of the annexes).

The approach of structuring the report based on the seven ToRs does not appear very instructive and inspirational. The WG should try to convey a message, and structure the body text around this message. The case studies could better be presented as a whole instead of dispersed. Splitting up the case study (CS) information per ToR does not facilitate learning from the CS. Instead, combining the dispersed CS parts and presenting them following a common structure for each CS could be useful in addressing the question: What is the added value of these local CS experiences?

Based on a presentation by Lars Ravn-Jonsen during the WGMARS 2011 meeting in Bergen, WGMARS suggests that a discussion of the theoretical departure of MSP could be useful. Does a definition of ‘what is a good plan’ exist? WGMPCZM could critically review the UNESCO guide on MSP and discuss whether these guidelines are sufficient or where they could be improved. Ravn-Jonsen (2010) reviews the pos-

sibilities of working scientifically with planning and management, which could be a helpful philosophical jumping-off point for WGMPCZM.

3.8 ToR c): Suggestions for the ICES Training Course for Expert Group and Workshop Chairs

WGMARS first reaction to the draft proposal for the Training Course for ICES Expert Group Chairs was positive. WGMARS feels that ICES Vision and Mission statements render such a course necessary (Box 1). It is imperative that ICES WG Chairs possess the tools needed for effective organization of WG and Workshop meetings. However, it was also clear upon first glance of the Proposal that “Leadership” is much deeper than PowerPoint and flipchart tools.

To address the larger concept of “Leadership”, WGMARS invited organizational leadership expert Elizabeth Housholder (Program Director, Office of Leadership Development Adjunct Faculty, Dept. of Strategic Communication, Temple University, Philadelphia, PA, USA¹), via a web-conference, to give a short introduction on models of leadership and suggest a direction for the proposed ICES Training Course for Expert Group Chairs based on ICES Vision and Mission (Box 2). According to Housholder, leadership theory has evolved over the past 100 years; many experts now agree that leadership is a relational and reciprocal process rather than a position or set of traits or behaviours for one person.

BOX 2: ICES’ Vision and Mission (from www.ices.dk)

ICES Vision: To be an international scientific community that is relevant, responsive, sound, and credible, concerning marine ecosystems and their relation to humanity.

ICES Mission: To advance the scientific capacity to give advice on human activities affecting, and affected by, marine ecosystems.

Housholder presented WGMARS with a definition of leadership most well suited for ICES:

“Leadership is a relational and ethical process of people together attempting to accomplish positive change.” (Komvives *et al.*, 2007)

Key to this definition are the terms “relational and ethical process” and “positive change”. This definition of leadership is an element of the “Relational Leadership Model” (Figure 11) and serves as an effective approach for small to medium-sized working groups, such as ICES Expert Groups. At the center of this model is a clearly defined “purpose” or shared vision, such as a ToR in the WG setting. Other key aspects of the Relational Leadership Model comprise of empowering and including all members and instilling an ethical drive around the group’s purpose.

¹ for transparency, Housholder is also sister to the WGMARS Chair

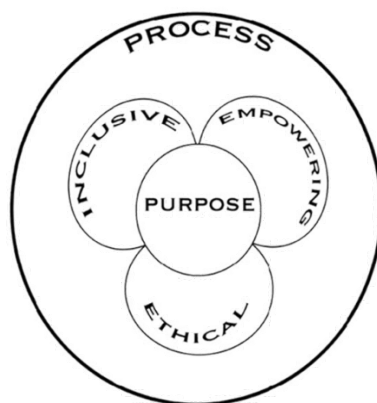


Figure 11. The Relational Leadership Model, from Komives *et al.* (2007).

Here we list Housholder's tips for effective WG meetings using the Relational Leadership Model with WGMARS' suggestions for Action Points for the Training Course (in italics):

- Craft the meeting agenda with feedback from group members.
 - *The course instructors can propose a template*
- Agree upon the goals at the beginning of the meeting.
 - *Training in using the flip chart or other tools to draft common goals among WG participants*
 - *Learn and understand how to inspire a shared vision.*
- Focus on collaborative decision-making.
 - *Training on active listening techniques*
 - *Understanding that communication is a 2-way process*
- Recognize and capitalize on strengths of the members.
 - *Learn how to identify and capitalize on the unique strengths and passions of team members.*
 - *An example Housholder shared with us was the StrengthsFinders Assessment Tool (www.strengthsfinder.com). This could be completed before the WG meeting and assessed in plenary as a part of Introductions at the meeting opening and as a basis for efficient WG work division based on strengths. Maybe self-assessed strengths could even be added to the names in the ICES address database!*
- Create the space for all to contribute.
 - *Differentiate the difference between "dictate," "delegate," and "entrust" to effectively enable others to act towards the common goals.*
- End the meeting with action-items for group members and ensure a culture of accountability.
 - *Training in empowering group members for the best of the Purpose (ToR or other action at hand)*
- Celebrate group accomplishments and have fun.
 - *Brainstorm about ways to have fun during WG meetings and what has worked in the past.*

Based on recommendations and inspiration from Housholder, WGMARS suggests the following concepts be included in the ICES Training Course for WG Chairs:

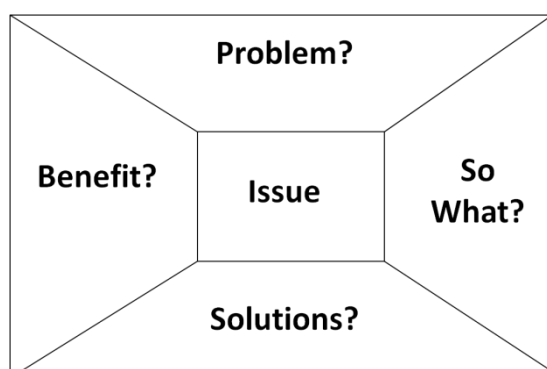
- *Emphasize the importance of integrity and credibility in leadership.*
- *Encourage leadership that promotes innovation and challenges the status quo.*

WGMARS agrees with the Training Course proposal of “old ICES hands” as instructors, but notes that new thinking as far as ICES WG meeting procedures and best practices is an important attribute to include in the course. Therefore, a healthy mix of ICES “insiders” and ICES “outsiders” who are experts in leadership and effective organization techniques is preferred. This course should be obligatory for all Chairs, regardless of seniority or age. The Training Course can thus be seen as an “entrance ticket” to chairing an ICES WG.

WGMARS requests to follow the further development of the course.

3.9 ToR b): General Suggestions for better science communication in light of marine governance

The Message Box below gives a general summary of this Report.



ISSUE: Communication of ICES science to various audiences.

PROBLEM: This communication supports advice for ecosystem management. How are ICES WGs communicating science to different audiences?

SO WHAT?: Science communication is vital to good governance. We examine how different audiences may understand ICES science communication in order to enlighten governance with the best available science.

SOLUTIONS: WGMARS used the Message Box (above) to examine the communication of 4 Working Group Reports from 2011. WGMARS made a schematic representation of the “ToR Landscape” for each of these WGs in order to examine where the WG’s ToRs come from. WGMARS also conducted a preliminary social network analysis to measure the current status of cross-connections within the ICES WG landscape.

BENEFIT: The effectiveness of ICES science communication may be improved by assessing WG reports from a critical third-person view (as well as the users’ perspective) to make informed suggestions on how to adjust the ICES WG Report template to meet user needs. The benefit of this exercise is to support the need for good communication of science for good governance.

3.9.1 Comment on the general ICES report template:

There is a need to clarify whom ICES sees as target audience of a WG report and what ICES expect of WG reports. Both the writing process and the final report will benefit if the working group and ICES have an agreement on who is the target audience.

The WG report template confuses a meeting minute structure with a report structure. WGMARS feels that in light of governance, holistic WG reports are important to reach a broader audience, such as FAO, and management institutions. To achieve this, WGMARS suggests separating the WG reports into two pieces: 1) Succinct meeting minutes either in the Annex or as one separate short report, and 2) A body text with the main conclusions from the content of the meeting, following the message box guidance.

3.9.2 Regarding the readability/availability of the WG reports to a larger audience:

ICES WG reports are produced in a special setting, in which a number of experts come together for a few days of intensive work. Substantial parts of the reports will often be texts compiled from other sources. Some new information will also be generated during the meeting. The reader will want to know which parts of the texts that are actually produced by the WG, i.e. how does this report contribute to advancing knowledge? It is worth considering templates for WG reports which encourage separation of information that can be found elsewhere (e.g. through links or references) and new information that is generated by the WG. This could also help making the reports less voluminous.

- Use the “Supporting information” box in the report to communicate key characteristics of the WG. For example, this part of the report would be a good place to include the mission of the group. Keep this information updated, and include which groups (within ICES and which external clients/groups/initiatives) that the group interact with.
- Encourage the “new” ICES WGs that are not locked into the stock assessment framework to be creative in their report output. Large number of pages should not be a goal when producing WG reports.
- Make it explicit in the report - both in the Executive Summary and in the body of the report - where the ToRs are coming from, and how the output will be used. This will help the reader put the issue in the right context. If the Chair/WG do not know this themselves, the WG work and output cannot possibly be tailored to any specific audience.

Generic ToRs that are sometimes given to several WGs can be less stimulating to work with. Such ToRs can be interpreted as “tossing the ball around between international organizations” (a WG chair interpretation). This strengthens our point regarding the need for clarity in terms of where ToRs are coming from and how the outcome will be used. Tailoring ToRs to each WG while also acknowledging their previous contributions on related topics could help the WGs feel that their efforts are worthwhile and help them make the most out of their meeting time.

- Think about ways to stimulate more bottom-up and two-way interaction in the annual meeting for WG chairs. General updates and guidance/instructions from ICES are needed, but make sure the focus is on dialogue with room for suggestions for improvements from WG chairs.

3.10 Conclusions

By the end of the WGMARS 2011 meeting, it became clear how interrelated ToRs a), b) and c) are with the common themes of communication, governance and leadership. Good governance is supported by effective science-advice communication that is supported by good WG Report writing. Good report writing comes from a combination of good science lifted up by good teamwork resulting from good leadership within the team (WG). These realizations show the interconnectedness of ICES leadership, teamwork and publications.

An interesting observation regarding target audiences is the difference between the assessment working groups (AFWG, HAWG) and the “new” type of WG (WGECO, WGMPCZM). These new groups do not have as established audiences as the assessment groups which signal the need for a different communication strategy. An example here is that WGECO has produced a lot of useful reports in the past that seem to have been overlooked, while AFWG gets phone calls and e-mails from all sorts of readers as soon as the report is published.

WGMARS made many observations of how uncertainty is quantified and discussed in the Reports reviewed above. ICES WGs do not have a scientifically solid, communicative and consequential understanding on how uncertainty should be dealt with. WGMARS therefore recommends a SCICOM/ACOM strategic initiative workshop on quantifying and communicating uncertainty in ICES WGs (see Annex 5). A well thought through template on how ICES understands and “deals with” uncertainty that WG Chairs adhere to across WGs would help science communication immensely.

WGMARS made many efforts to conduct helpful and accurate reviews of the 2011 WG Reports in ToR a). Specifically we have contacted and had a dialogue with each of the Chairs of the WGs reviewed in this Report. We feel we have brought some constructive criticism to the table and are open to feedback resulting from any misunderstandings or misinterpretations that may have occurred during our review and report writing. We hope for an ongoing constructive dialogue within ICES for effective WG Report writing and science communication for science advice support.

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Annex 1: List of participants for Working Group on Maritime Systems, (WGMARS) 31 October – 3 November 2010

Name	Address	Telephone/Fax	E-mail
Robert Aps	University of Tartu, Estonian Marine Institute 14 Mäealuse Street EE-126 18 Tallinn Estonia	+372 5062597	robert.aps@ut.ee
Dorothy Dankel Chair	Institute of Marine Research PO Box 1870 N-5817 Bergen Norway	+47 55 23 85 56 +47 55 23 86 87	dorothy.dankel@imr.no
Christine Röckmann	IMARES (Institute for Marine Resources and Ecosystem Studies) PO Box 68 NL-1970 AB IJmuiden The Netherlands	+31 317 487 194	Christine.Rockmann@wur.nl
Kari Stange	Wageningen University Centre for Marine Policy PO Box 1528 8901 BV Leeuwarden The Netherlands	+31 317 48 70 91	kari.stange@wur.nl
Lotte Worsøe Clausen	Danmarks Tekniske Universitet Charlottenlund Slot Jægersborg Allé 1 2920 Charlottenlund Denmark	+45 35 88 33 64	law@aqua.dtu.dk
Mike Fitzpatrick	Coastal and Marine Research Centre, University College Cork, Ireland	+353 21 4703112	mike.fitzpatrick@ucc.ie
Jörn Schmidt	Christian-Albrechts- Universität zu Kiel Department of Economics Sustainable Fisheries Wilhelm-Seelig-Platz 1 24118 Kiel Germany	+49 431 880 5632	jschmidt@economics.uni-kiel.de
Lars Ravn- Jensen	University of Southern Denmark Niels Bohrs Vej 9 DK6700 Esbjerg Denmark		lrj@sam.sdu.dk

Name	Address	Telephone/Fax	E-mail
Jennifer Bailey	Department of Sociology and Political Science Norwegian University of Science and Technology N-7491 Trondheim Norway		jennifer.bailey@svt.ntnu.no
Kåre Nolde Nielsen	Norwegian College of Fishery Science, Faculty of Biosciences, Fisheries and Economics, Breivika N-9294, University of Tromsø, Norway		kare.nielsen@nfh.uit.no
Oddmund Otterstad	NTNU Social Research, Norwegian University of Science and Technology, N-7491 Trondheim, Norway	+47 91897177	oddmund.otterstad@ntnu.no
Katrina Aps	University of Tartu, Institute of Mathematical Statistics & Estonian Marine Institute 14 Mäealuse Street EE-126 18 Tallinn Estonia	+372 55949393	katrina.aps@ut.ee
Mihhail Fetissov	University of Tartu, Estonian Marine Institute 14 Mäealuse Street EE-126 18 Tallinn Estonia	+372 56262643	mihhail.fetissov@ut.ee

Annex 2: Agenda

	Monday 31 October	Tuesday 1 November	Wednesday 2 November	Thursday 3 November
09.15-12.00	Arrival Meeting Room, 3rd floor, IMR Main building (Nordnesgaten 50) Eat lunch before meeting! ☺	Kari: "Participatory research and fisheries management: ICES as a channel for uptake of new knowledge?" Discussion 11:00 Presentation of the Nordic Marine Think Tank by Victor Hjort General and strategic discussion	Lars: "My work on integrated assessments" Mike: "Analysis of a fisheries system and its associated Long-Term Management Plan" Oddmund: "NTNU (Norwegian Uni. of Science and Technology) projects of relevance on the science/policy interface" Discussion	Update on writing and discussion when needed Writing
12.00-13.30	Introductions Meeting Opening by Dorothy Opening of ToRc Presentation by Robert and colleagues	LUNCH	LUNCH	LUNCH
13.30-15.00	ToRa/b: WGECO Choose a rapporteur Core group leads discussion	ToRa/b: HAWG Choose a rapporteur Core group leads discussion	ToRc: 14:00 Liz Housholder, Assistant Dean, Widener University: "Leadership theory on working in groups and teams" ToRc Discussion	Walk-thru report Discussion on future work, next year's WGMARS
15.00-17.00	ToRa/b: WGMPCZM	ToRa/b: AFWG, with Chair Bjarte Bogstad	Distribution of report writing activities (paper/report) Writing	Travel home

Annex 3: Presentations given during WGMARS 2011

Participatory research and fisheries management: ICES as a channel for uptake of new knowledge?

Discussion paper presented at WGMARS 2011

Kari Stange, Wageningen University, Centre for Marine Policy

This paper gives an overview of the GAP2 project and introduces questions for discussions about the role of ICES in participatory research processes.

GAP2 is the second phase of a pan-European research project which aims to build bridges between science, stakeholders and policymakers within the area of fisheries management. Facts and figures are found at the project website www.gap2.eu. GAP2 continues the work laid down in a previous phase (GAP1, 2008-2009) in which partnerships between fishers and scientists were established and best practices and code of conduct for such collaborations were formulated. These collaborations are now continued and extended in GAP2 (2011–2015) within the framework of 13 case studies which involves participants from 11 European countries. The case studies are diverse in terms of the spatial scale of the issues addressed (local, regional, international) and the diversity of actors involved (fishers, scientists, managers, RACs). Several of the cases have an ambition to generate management plans through a collaborative process involving multiple stakeholders.

Different aspects of stakeholder involvement and participatory research will be addressed through five interlinked GAP2 Work Packages (WPs). The aim of WP3 is to establish and demonstrate concepts and mechanisms that will enable the uptake of participatory research knowledge and promote the application of stakeholder know-how to European policies on fisheries and the marine environment. There is a diverse flora of terms that are used in European fisheries management, e.g. TAC, SSB, MSY, and management plans. Concepts are understood and interpreted differently by different people and this poses a challenge to fruitful collaboration in multistakeholder settings (Verweij, 2010). Activities within WP3 will address these issues through the following tasks:

- Analysis of the use of shared concepts in transferring the knowledge required for evidence-based policy-making.
- Develop and apply concepts and mechanisms that effectively bridge the gap between different actor groups.
- Engage policy-makers, stakeholders and scientists in formulating expectations for research needs and contributing to the establishment of mechanisms for the uptake of participatory research outcomes consistent with the needs of the CFP, MSFD and Natura 2000.

Collaborations between fishers and scientists form the basis of participatory research related to fisheries management. The GAP2 aims to extend these collaborations to also include other stakeholders, i.e. NGOs, RACs, managers and policymakers. This is not a straightforward task as it opens up the discussion of the role of science in the science-policy interface: where does science stop and policy start? How can scientists be actively engaged in participatory research and at the same time refrain from being associated with the political aspects of the issues at stake? This will need to be kept in mind as the GAP2 activities are planned and executed.

The RACs play an important role in giving stakeholders a voice in European fisheries management arena. Several RACs are engaged as partners in GAP2. One area where the RAC involvement might be especially relevant to GAP2 research activities is the making of managing plans.

ICES activities feed into European fisheries management through coordination, production and delivery of science and advice at national, international and regional levels. The links between the scientific output from ICES to managers and policy-makers are established through MOUs with client commissions and Member States. ICES thus play an important role at the scientific output delivery-uptake interface. This crucial step is of interest when addressing mechanisms for allowing the uptake of participatory research knowledge within the GAP2 context.

- How is ICES involved in participatory research knowledge production today?
- How could ICES be more involved to facilitate uptake of participatory research knowledge in European fisheries management?

A role for ICES today is to facilitate networking through providing a forum for scientists with similar interests. WGFS has been a meeting place for social scientists and interdisciplinary collaborations with focus on stakeholder involvement in fisheries management. ICES WG meetings have been aligned with other events funded through European projects such as SAFMAMS and JAKFISH to facilitate attendance. WGMARS now continues this tradition. Cross fertilization can occur through exchange of information on ongoing activities in projects such as GAP2 and other projects addressing involvement of stakeholders and uptake of new knowledge.

References:

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Analysis of a fisheries system and its associated Long-Term Management Plan

Discussion paper presented at WGMARS 2011

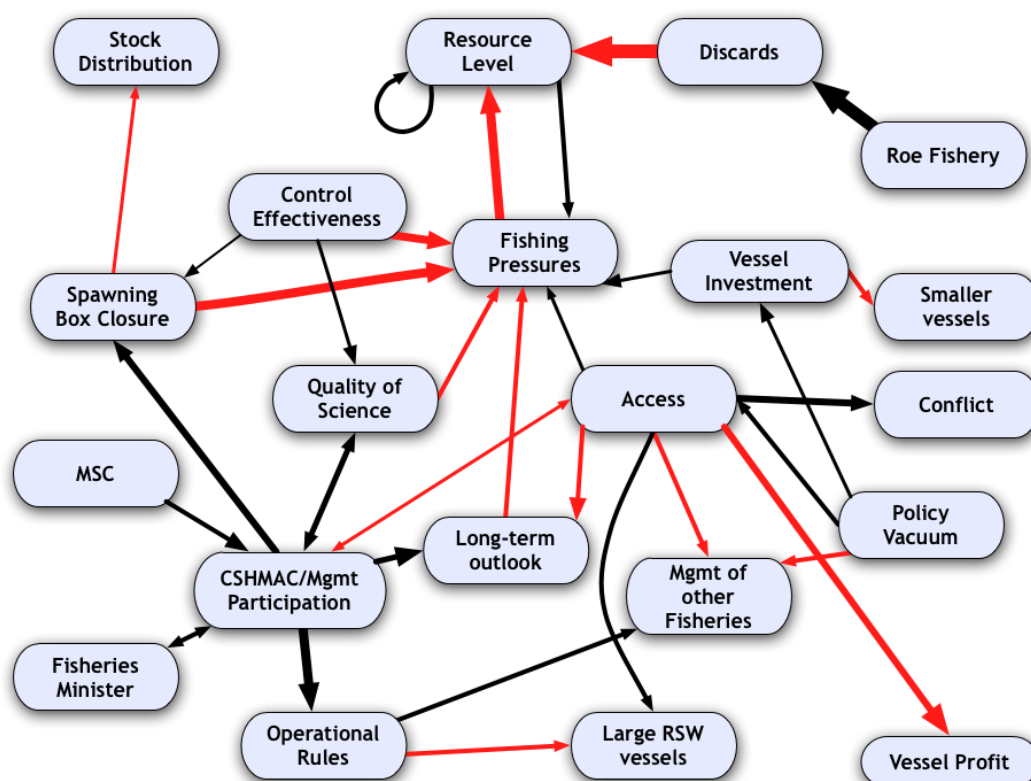
Mike Fitzpatrick, Coastal & Marine Research Centre, University College Cork, Glucksman Marine

Facility, Naval Base, Haulbowline, Cobh, Cork, Ireland.

Increasingly fisheries and wider natural resource management research has demonstrated the need for mixed strategies as opposed to panacea type approaches to solving "wicked" or complex and persistent problems. Fisheries governance has a long history of being derailed by unintended consequences of management measures. Some of these problems could be due to a "look after the fish and everything else will fall into place" school of thought which has ignored linkages between the social and ecological domains. The 5 key governance problems highlighted in the 2009 EU Commission Green Paper on Reform of the CFP are a good example of how lack of attention to broader governance considerations will produce negative outcomes. However due to the complexity in social-ecological systems detailed knowledge of

each fishery is required in order to guide choices of combinations of management measures and how they should be applied.

The presentation outlined an approach to mapping the dynamics of a fisheries system in order to gain an understanding of the nature and strength of these social-ecological interactions. The approach used was cognitive mapping, which has been used as a method of generating qualitative models of complex systems with high uncertainty and loose causal links. The Celtic Sea Herring fishery which this presentation covers has recovered in the past 5 years from near collapse to being at historically high stock levels yet which suffers from a number of governance related problems which are resulting in increased conflict and may threaten the long term sustainability of the fishery. The recent development of a Long Term Management Plan (LTMP) was a source of frustration for some stakeholders as they felt that the LTMP, which deals with target biomass and fishing mortality levels, did not address many other important factors. Cognitive mapping involves the construction by stakeholders in the fishery of qualitative models mapping the main social, economic, and ecological elements and the strength and direction of their interactions. From these individual models a group or social model can be generated which represents a collective understanding of system dynamics. A draft representation of the group model of the Celtic Sea Herring fishery is shown in the figure below. The thickness of the lines represent the degree of consensus concerning the strength of the relationship.



These kinds of models do not provide any certainty about the status of component elements but are useful in understanding how these elements interact and affect each other. The group map supports the LTMP in that the most central elements are stock status and fishing pressures but it also illustrates that a wide range of other factors

are important influences on these LTMP elements and that an understanding of these relationships can increase the range of management options.

The systems approach: EU 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).“

R. Aps¹, K. Aps^{1,2}, M. Fetissov¹, S. Mackinson³

¹*University of Tartu, Estonian Marine Institute, Tallinn, Estonia*

²*University of Tartu, Institute of Mathematical Statistics, Tartu, Estonia*

³*Centre for Environment, Fisheries and Aquaculture Science (Cefas), Lowestoft, UK*

Abstract

The aim of the GAP2 project is to promote and enable processes for open and effective participation of stakeholders in research and management, and to demonstrate through specific examples and critical evaluation, the role and value of stakeholder driven science in the governance of fisheries and the marine environment. The outcomes from GAP2 will provide a concrete realization of specific Science in Society objectives for engaging the public in research, enabling effective two-way communication between scientists and other stakeholders, and helping to make policy based on scientific evidence and research knowledge. The aim of this Working Paper is to present objectives of the GAP2 Baltic Case Study „Mapping the Baltic fisheries in support of maritime spatial planning“, as well as the main methodology and the expected major deliverables.

The GAP2 Baltic Case Study: „Mapping the Baltic fisheries in support of maritime spatial planning“

The aim of the Baltic Case Study is:

- to identify and map the actual or planned competing sea uses and assess their possible impact on spatial/temporal allocation of fishing possibilities for the Baltic fisheries,
- to develop credible, relevant and sound arguments which can be used in balancing environmental, economic and social interests in a process of Maritime Spatial Planning, and
- to build-up the BS RAC stakeholder capacity for informed participation in a process of the Maritime Spatial Planning and in support of the sound governance of the Baltic Sea marine space.

The objectives of the Baltic Case Study are:

- to develop a user-friendly BaltFishPlan Web interactive application to be used for Maritime Spatial Planning related Mutual Learning events, with objectives: (a) to capture the knowledge for later use (identifying and mapping spatial resources and competing human uses), (b) to communicate the knowledge captured so it is easy to understand for other stakeholders, (sense-making/communication), and (c) to connect different social groups in the construction of new localized social arrangements while the

negotiation of differences between different groups is fundamental to the construction of GIS technology based boundary objects,

- to use the PlayDecide, ConceptMaps and the Bayesian Belief Network methodologies to support the Mutual Learning events,
- to deliver a series of Mutual Learning events with aim of developing credible, relevant and sound arguments to be used in balancing environmental, economic and social interests in a process of the Maritime Spatial Planning and in support of the sound governance of the Baltic Sea marine space.

It is expected that the knowledge base collaboratively developed in a course of a Mutual Learning: 1) will encourage communication and/or learning among different stakeholders and between scientists, stakeholders and the politicians, 2) will promote co-learning, 3) will be readily translatable across socio-economic groups, and 4) will be suitable for use by members of the larger community. It is also expected that the products generated by tools used in Mutual Learning events 1) will be reasonably accurate and precise, 2) will express understanding of uncertainty, and 3) will provide results that are readily communicated to target groups, and are clear and appealing to policy/decision-makers.

Background

Baltic Sea fisheries governance system of systems

The basic architecture of the Baltic Sea fisheries governance system of systems is presented in Figure 1.

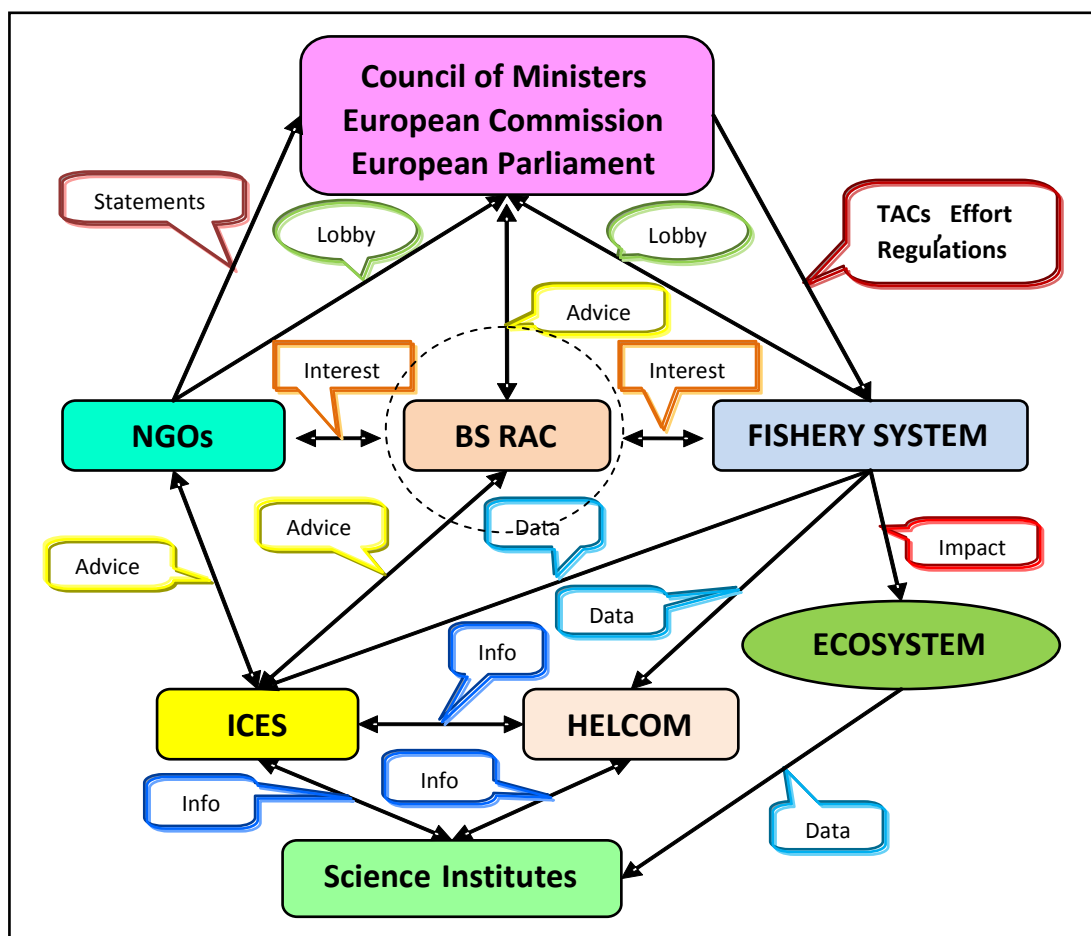


Figure 1. The basic architecture of the Baltic Sea fisheries governance system of systems (Aps *et al.*, 2011).

The main elements of the Baltic Sea fishery governance system of systems are 1) the network of universities and science institutes – e.g. ICES only works with an international community of over 1600 marine scientists from 20 member countries, 2) International Council for the Exploration of the Sea (ICES) -intergovernmental organization concerned with marine and fisheries science, 3) Helsinki Commission (HELCOM) - the governing body of the "Convention on the Protection of the Marine Environment of the Baltic Sea Area", 4) Baltic Sea Regional Advisory Council (BS RAC) - the main aim of the BS RAC is to prepare and provide advice on the management of the Baltic Sea fisheries in order to achieve a successful running of the EU's Common Fisheries, 5) Fishery System – the complex system of the Baltic Sea fishing industry, 6) NGOs - the complex network of environmental and other public interest groups, ECOSYSTEM – the Baltic Sea ecological system with exploitable fish stocks as one of the system's elements, and finally 7) the European Union's political and decision-making level - European Parliament, European Commission and the Council of Ministers.

The problem

The BS RAC as important player

The BS RAC was set up in March 2006 with the aim to contribute to sustainable use of the Baltic Sea fishery resources under EU Common Fisheries Policy. The BS RAC can be seen as an international boundary organization mixing scientific and political elements, and mediating between the institutions of science and politics (Aps *et al.*, 2009). However, Linke *et al.* (2011) state that a non-consensual way of formulating recommendations on fishing advice (TACs) has become a central feature of the BS RAC over the years, while the environmental NGOs complain that the fishing industry interests are often overrepresented and dominate the RAC proposals. The authors add that "It is the BS RAC's objective to include different forms of knowledge through the inclusion of different stakeholders, and thus to fulfil a task of evaluating scientific advice that is established on certain propositions. However, because of the mentioned oppositions in how to interpret ICES scientific input due to individual stakeholder agendas, this task seems not to be fulfilled".

Positional vs. interest based negotiations

Rahwan *et al.* (2003) define the *negotiation position* of an agent in terms of the resource(s) that agent wants to acquire from its negotiation counterpart while an agent's *negotiation interests* reflect the underlying goals it wants to achieve using these resources. Authors point out the drawbacks of the *positional negotiation* in which the dialogue between participants is focused on their negotiating positions and suggest the *interest based negotiation* format that allows negotiators to exchange additional information and correct misconceptions during interaction (agents may *argue* about each other's beliefs and other mental attitudes in order to *justify* their negotiation positions, and *influence* each other's negotiation positions).

Focus question

How do we increase the collaboration and consensus among BS RAC members in negotiating the advice on the management of the fisheries of the Baltic Sea on behalf of the fisheries sector and other interest groups in order to achieve a successful CFP?

The BS RAC's advice is forwarded to the Fisheries Council of the European Community, the European Commission, individual Member States of the European Community, the European Parliament, the Commission's Advisory Committee on Fisheries and Aquaculture (ACFA), the International Council for Exploration of the Sea (ICES), the Helsinki Commission (HELCOM), and other bodies as decided by the BS RAC.

Hypothesis

Based on recent scientific publications it is assumed that the *positional negotiation format* used by the BS RAC members in negotiating the advice on the management of the fisheries of the Baltic Sea on behalf of the fisheries sector and other interest groups is limiting the ability of negotiating parties to make consensual decisions.

According to our working hypothesis it is expected that a possible move from *positional negotiation format* to more *collaborative interest based negotiation format* based on *Mutual Learning Events* would facilitate the more consensual decision-making by the BS RAC.

Mutual Learning

Nedergaard (2007) argue that „in the social constructivist approach to learning, learning is, basically, when people together with other people give meaning to the world as a social reality *through concepts*.“

Checkel (1999) based on a social-constructivist approach to learning defines social learning (i.e. mutual learning) as “a process whereby actors, through interaction with broader institutional contexts (norms and discursive structures), acquire new interests and references.”

Flockhart (2004) defines social learning or mutual learning as a “change of beliefs at the individual level, either in relation to values, norms, procedures or new routines.”

In the context of the GAP2 Project the Mutual Learning means science, stakeholders and policy-makers exchanging knowledge of issues of common concern, to improve coordination and decision-making. The aim is to raise the quality of the science-policy co-production by strengthening networking between science, stakeholders and policy-makers so they can learn from each other’s experiences and practices.

The Common Ground

Stalnaker (2002) states that the „common ground is just common or mutual belief, and what a speaker presupposes is what she believes to be common or mutual belief. The common beliefs of the parties to a conversation are the beliefs they share, and that they recognize that they share: a proposition ϕ is common belief of a group of believers if and only if all in the group believe that ϕ , all believe that all believe it, all believe that all believe that all believe it, etc.“

Efficient formation of Common/Mutual Beliefs and Knowledge is considered to be a critical precondition for any collaborative negotiations to take place. Meggle (2002, 2003) introduces the notions of Common Belief and Common Knowledge (everybody believes / knows that everybody believes / knows that ...) and the notions of Mutual Belief and Mutual Knowledge (everybody believes / knows that everybody else believes / knows that ...), explains the formal differences between these notions and shows that Mutual Belief is something weaker than the Common belief. However, the notion of Mutual Belief is successfully used in formalization of the notion of Joint Beliefs, Joint Intentions and the Joint Commitments (Panzarasa and Jennings, 2001; Panzarasa *et al.*, 2002).

Joint commitment

Based on a standard belief-desire-intention (BDI) framework Panzarasa and Jennings (2001) introduce the operators $Bel(a_i, \varphi)(t_i)$ and $Int(a_i, \varphi)(t_i)$, which mean that at time t_i agent a_i has, respectively, a belief that φ holds and an intention towards φ , where φ is a well-formed formula. Furthermore, authors introduce operator $M - Bel(gr_i, \varphi)(t_i)$, which means that, at time t_i , group gr_i has a *mutual belief* that φ holds and the operator $J - INT(gr_i, \varphi)(t_i)$, which means that at time t_i group gr_i holds a *joint intention* towards φ . Notion of joint commitment is presented as follows:

$$J - COMM(gr_i, \phi(t_j))(t_i) \equiv M - BEL(gr_i, \phi(t_j))(t_i) \wedge J - INT(gr_i, \phi(t_j))(t_i) \wedge \forall a_i \in gr_i \\ [COMM(a_i, gr_i, \phi(t_j)) \wedge M - BEL(gr_i, Comm(a_i, gr_i, \phi(t_j)))(t_i) \wedge \gamma(t_i) \wedge M - BEL(gr_i, \gamma)(t_i)]$$

Where

$$\gamma \equiv \left[\begin{array}{l} J - INT(gr_i, \phi(t_j))(t_i, t_j) \vee \exists t_k (t_i < t_k \leq t_j) \text{ such that} \\ \left(\left(M - BEL(gr_i, \neg \phi(t_j)) \vee \exists a_i \in gr_i \text{ such that} \right. \right. \\ \left. \left. \left(\neg COMM(a_i, gr_i, \phi(t_j)) \wedge M - BEL(gr_i, \neg COMM(a_i, gr_i, \phi(t_j))) \right) \right) \right)(t_k) \\ \wedge \forall t_h (t_i \leq t_h < t_k) \end{array} \right]$$

Informally, at time t_i , a group gr_i has a *joint commitment* to making ϕ true at $t_j(t_j > t_i)$ iff:

- (1) in gr_i it is mutually believed that ϕ will be true at t_j ;
- (2) gr_i has the joint intention that ϕ will be true at t_j ;
- (3) it is true (and mutual belief in gr_i) that each member of gr_i is socially committed towards gr_i to making ϕ true at t_j ; and
- (4) it is true (and mutual belief in gr_i) that (2) will continue to hold until it is mutually believed in gr_i either that ϕ will not be true at t_j , or that at least one of the members drops its commitment towards gr_i to making ϕ true at t_j .

It is stated (Panzarasa *et al.*, 2002) that in compliance with the definition of joint commitments an agreement reached by a group gr_i at time t_i about an action sequence e_i represents the outcome of a collaborative decision-making process, a joint decision, iff at time t_i , gr_i has a joint commitment that action sequence e_i will eventually be performed.

Transformation of commitments constitutes the essence of collaborative negotiation - coming to an agreement transforms the stakeholders' joint commitment towards a state ϕ into a joint commitment to performing a plan for achieving that state (Panzarasa and Jennings, 2001):

$$\forall gr_i, \forall e_i, \forall t_i, t_j (t_j > t_i) [J - COMM(gr_i, \phi(t_j)) \wedge \forall a_i \in gr_i Int(a_i \langle plan(gr_i, e_i, \phi) \rangle(t_j)(t_i))] \\ \supset J - COMM(gr_i, \langle plan(gr_i, e_i, \phi) \rangle(t_j)(t_i))$$

Coordination mechanism

According to Jennings (1993) the unifying model of coordination has the concepts of (joint) commitments and (social) conventions at its core and is based on *Centrality of Commitments and Conventions Hypothesis*: all coordination mechanisms can ultimately be

reduced to (joint) commitments and their associated (social) conventions. The author argues that commitments (pledges to undertake a specified course of action) and conventions (means of monitoring commitments in changing circumstances) are the foundation of coordination in multi-agent systems. Commitment means a pledge or promise negotiating parties can make both about actions and beliefs and these pledges can either be about the future or the past while Conventions describe circumstances under which a negotiating party should reconsider its commitments and indicate the appropriate course of action to retain, rectify or abandon the commitment.

From planning to governance of marine space

Southerland and Nichols (2006) argue that „The governance of any geographical area, including marine spaces, is actually the management of stakeholder relationships with regard to spatial-temporal resource use in the pursuit of many sanctioned economic, social, political, and environmental objectives while good governance is based on recognition of the interests of all stakeholders, and inclusion whenever possible.“

MSP is seen as a fundamental tool for the sustainable development of marine areas and coastal regions, and for the restoration of Europe's seas to environmental health (EC, 2007). The EU Roadmap for Maritime Spatial Planning (EC 2008) is considering MSP as a tool for improved decision-making that provides a framework for arbitrating between competing human activities and managing their impact on the marine environment with objective to balance sectoral interests and to achieve sustainable use of marine resources in line with the EU Sustainable Development Strategy.

The BaltFishGov Web application in support of the Baltic Sea fisheries governance

It is believed that fisheries management could be seen as the natural element of the MSP based integrated governance of the marine space including (*modified after S. Nichols et al., 2000*):

- 1) allocation of fishery resource ownership, control, stewardship and use at international and national level,
- 2) regulation of fishery resource use (e.g. environmental protection, development and exploitation, rights to economic and social benefits),
- 3) monitoring and enforcement of the various interests; adjudication of disputes, including inclusive processes,
- 4) management of spatial and other types of information to support all of the above functions.

BaltFishGov Web will be created on a platform of BoundaryGIS (Fetisov and Aps, 2011) with aim of supporting the Baltic Sea fisheries governance related collaborative (participatory) processes. In particular, the BaltFishGov Web based Mutual Learning Events will be conducted to explore and evaluate the BS RAC's possible new functions in light of evolving regionalization of the EU fisheries governance.

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Annex 4: WGMARS terms of reference for the next meeting

The Working Group on Maritime Systems (WGMARS) chaired by Dorothy Dankel, Norway, will meet in Kiel, Germany from 11–15 June, 2012 to:

- a) Social Network Analysis of ICES Working Groups based on questionnaires distributed to WG Chairs in March 2012 to assess participation in ICES WGs
 - i) *where and what kind of synergies are needed to advance ecosystem science and ecosystem advice?*
 - 1) the product: Short communication / a peer reviewed scientific paper directed to a general readership (with ICES as a case study), aim for high-impact journal
- b) The Social network analysis will also enlighten the following terms:
 - i) What do we mean by “synergy” and how to determine these “kinds”?
 - ii) What discipline is “ecosystem science”, e.g. systems science of human-natural interface or something similar?
 - iii) What is “ecosystem advice” – maybe it is advice on ecosystem based management/governance of human activities?

WGMARS will report by 1 August, 2012 (via SSGSUE) to the attention of the SCI-COM.

Supporting Information

Priority:	The main focus of WGMARS is the maritime system and the role of scientific advice within that system. Effective communication across the science-policy interface is also a priority for WGMARS to research and inform ICES of developments.
Scientific justification and relation to action plan:	The system-based approach relates directly to priorities such as developing an ecosystem-based approach to management and the effective implementation of the precautionary approach. Consequently, these activities have a very high priority. The work of the Group is also essential if ICES is to advance the development of realistic projections of fisheries development that account for the reaction of other parts of the overall maritime system including governance.
Resource requirements:	Secretariat support for meeting.
Participants:	These include scientists working with fisheries management, both from an economic, social and biological perspective. Participation is from ICES countries and scientists both from disciplines and scientific circles not traditionally represented at ICES.
Secretariat facilities:	No additional software/hardware is anticipated beyond that which is currently available.
Financial:	No financial implications.
Linkages to advisory committees:	The goal for this Working Group is to better understand the greater maritime management systems which are a central element of the work of ACOM.
Linkages to other committees or groups:	All Expert Groups that give knowledge to the greater maritime system.
Linkages to other organizations:	WGMARS will continue to seek to widen participation for this group, including contact with relevant academic and inter-governmental organizations.

Annex 5: Recommendations

Recommendation	For follow up by:
1. SCICOM/ACOM strategic initiative workshop on quantifying and communicating uncertainty in ICES WGs	SCICOM/ACOM