WORKSHOP ON CHALLENGES, OPPORTUNITIES, NEEDS AND SUCCESSES FOR INCLUDING HUMAN DIMENSIONS IN INTEGRATED ECOSYSTEM ASSESSMENTS (WKCONSERVE)

VOLUME 2 | ISSUE 10

ICES SCIENTIFIC REPORTS

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ISSN number: 2618-1371 I © 2020 International Council for the Exploration of the Sea

ICES Scientific Reports

Volume 2 | Issue 10

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Recommended format for purpose of citation:

ICES. 2020. Workshop on Challenges, Opportunities, Needs and Successes for Including Human Dimensions in Integrated Ecosystem Assessments (WKCONSERVE)
ICES Scientific Reports. 2:10. 30 pp. http://doi.org/10.17895/ices.pub.5950

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i Executive summary

To support the implementation of the Ecosystem Based approach to Management (EBM), ICES strives to provide evidence-based scientific advice and relevant management options that also assess potential trade-offs among sectors or between environmental status and human uses. To help achieve this, the Workshop on Challenges, Opportunities, Needs and Successes in including human dimensions in Integrated Ecosystem Assessments (IEAs) (WKCONSERVE) focused on economic, social, and interdisciplinary research and data needed to inform on the societal drivers and objectives of marine resource use as context for advice. More specifically, the workshop goals were to a) summarize social and economic data, indicators and relevant research done across ICES IEA regions and other IEA regions, b) Identify goals for including social and economic data and analyses in different IEAs, and c) to develop a roadmap for including social and economic data and analyses in IEAs, identifying common needs across groups and unique priorities of each region.

Discussion across IEA groups made clear that while great strides have been made in ICES IEA groups to identify and provide important ecological measures relevant to EBM, far less attention has been given to providing comparable economic and social information. WKCONSERVE identified a number of practical steps to take to include more societal measures relevant to EBM. These differ among regions, depending on data availability and ecosystem context, and are detailed in IEA roadmaps developed during the workshop. However, in general, the first step involves including social scientists in the IEA groups. Key topics and data for each IEA region were identified. It was, however, repeatedly noted that more interaction with stakeholders will help both IEA and human dimensions Expert Groups to better develop research and data collection efforts to address stakeholder needs. A lack of funding is a key obstacle to the development of IEAs, both regarding science and advisory products.

It is now up to each IEA group to use the developed roadmaps to include the human dimension in IEAs. Furthermore, to support the development of methods for integration, follow-up workshops should be organized on a regular basis (e.g. every other year).

ii Expert group information

Expert group name	Workshop on Challenges, Opportunities, Needs and Successes in Including Human Dimensions in Integrated Ecosystem Assessments (WKCONSERVE)
Expert group cycle	Annual
Year cycle started	2019
Reporting year in cycle	1/1
Chair(s)	Alan Haynie, USA
	Jörn Schmidt, Germany
	Mette Skern-Mauritzen, Norway
	Eva-Lotta Sundblad, Sweden
Meeting venue(s) and dates	8-10 October 2019, ICES Secretariat, Copenhagen, Denmark (28 participants)

1 Introduction to meeting topics

The Final Agenda from the workshop, which lasted 3 full days, is listed in Annex 2.

The workshop combined presentations from participants with group work and plenary discussions.

Many members of the workshop were well acquainted with each other, but considerable time was spent in introductions and socially to have a chance for informal conversation. A special event was organized as part of lunch on the first day, when WKCONSERVE participants shared lunch with members of the ICES Bureau. This was a great opportunity for members of both groups to understand the priorities, needs, and interests of the other group.

The workshop was planned so that information was presented on the following topics:

- Current status of ICES and partner human dimensions related groups and available data
- Human dimensions goals and experiences of ICES IEA Groups
- Presentations on a diversity of related groups, activities, and analysis frameworks related to the inclusion of human dimensions work in IEAs.

After presenting context for developing roadmaps for the different IEA groups, the workshop alternated between plenary discussions on common issues and individual group time where the roadmaps were developed.

2 Summary of Past and Current Social and Economic Activities in ICES Human Dimensions Groups and Related Organizations

Below is a brief summary of the presentations of the following groups and topics. Section 4 contains more information specific to IEA groups.

- WGECON
- WGSOCIAL
- WGMARS
- The United States National Standards
- Human Dimensions in US IEAs
- The Planned WGBESEO Workgroup
- Benguela Current
- Discussion of Previous All-IEA Workshops.

Olivier Thébaud presented ongoing work in **WGECON**. The group was established to address the challenge of bringing fisheries economics into ICES science and advice, with the growing recognition that this can assist process understanding of uses of marine ecosystems, their drivers and responses to changes, and assessment and communication of trade-offs that include economic, social and ecological dimensions. The group has progressed in two complementary directions: (i) drafting a scientific manuscript reviewing current research and future needs for economic science in ICES; (ii) discussing the information flow needed to provide trade-off analysis. In particular, the group agreed that a clear distinction needs to be established in such analyses between economic impacts and welfare changes. A review of the available economic data showed that a significant body of information exists in Europe and in the US to describe the economic status of commercial fisheries. A recent survey of the fisheries economics colleagues (primarily WGECON members) showed that more than 80% of the respondents would be interested in contributing to IEAs. WGECON has also actively sought to develop links with other ICES Working Groups and initiatives, and to the organization of international conferences and meetings.

WGECON - Working Group on Economics

Three questions which are key to the process of including an economic perspective in IEAs:

- **What is it that «people» care about** (e.g. supply availability/provisioning services, other ecosystem services including cultural, livelihood security, economic efficiency, social acceptability, etc.)? This should drive the efforts devoted to identifying economic variables to consider in assessments;
- **What is our understanding of the linkages between ecological and economic variables of interest?** This will be central to our capacity to develop an IEA drawing from an analytical understanding of interactions between ecological and economic processes;
- **What is the scale of the social system at which synthesis information is deemed relevant / useful?** How do we select the economic information, which is usually generated at the national level, to use in

assessments that relate to ecoregions, or areas within those. This will depend on responses to the first two questions, above, and may require dedicated efforts to develop a generic and flexible approach to the generation of indicators at multiple scales. For the European context, this should be pursued in collaboration with colleagues involved in the Scientific, Technical and Economic Committee for Fisheries (STECF) work on economic data collection for European fleets.

WGSOCIAL - Working Group on Social Indicators

Lisa Colburn and **Marloes Kraan** provided an overview of **WGSOCIAL** objectives and TORs as they relate to data. A broad description of the social-ecological context included the following points:

1. Societal risk must be included in risk assessments;
2. We need to include stakeholders to understand what society wants to know about Ecosystems;
3. We need to understand human behaviour in order to understand appropriate mitigation measures;
4. Only then can we operationalize indicators (concepts) with available quantitative and qualitative data.

A key objective of WGSOCIAL is to improve the integration of social sciences in ICES Ecosystem Overviews and IEAs through the development of culturally relevant social indicators. To that end, the presentation was primarily focused on addressing progress toward WGSOCIAL TOR b, "Identify culturally relevant social indicators, data gaps, data collection needs and research, including institutional needs and training." Lisa Colburn provided an overview of the status of the NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Thirteen indicators focused on social and gentrification pressure vulnerability, commercial and recreational fishing dependence, and climate change risk are available for over 4,600 coastal communities in 24 US states. These indicators can be used to illustrate the social characteristics of fishing dependent communities. A benefit of the use of indices is that it is possible to identify the importance of fishing to coastal communities without violating confidentiality laws. The CSVIs can serve as inspiration for the development of culturally relevant social indicators in Europe and specifically for ICES Member Countries. Several WGSOCIAL members have begun to acquire the data needed to develop indicators for Portugal, Spain, Ireland, UK and France. Maps showing data such as fisheries employment, vessel counts, and permits were provided during the presentation. A further step toward addressing WGSOCIAL ToR goals is that WGSOCIAL members will develop indicators of community dependence on fishing for the countries found in the ICES Celtic Seas Ecosystem Overview (EO). This initial effort will serve as a proof of concept. The process will be well documented with the objective of replicating it for other ICES EOs.

WGMARS - Working Group on Maritime Systems

Trish Clay presented on **WGMARS** (Working Group on Maritime Systems). WGMARS is a multi- and transdisciplinary group that has been researching aspects of IEAs since 2012. Our members are split across social and natural scientists. Currently, we are working on a paper examining the implementation of IEAs in ICES. The paper is based on a literature review of conceptualisations of IEAs and interviews with the chairs of all 8 Regional Seas Working Groups. We presented preliminary results at the ICES ASC in Göteborg and plan to have the paper under journal review around the end of 2019. Our current ToRs also include finalizing a previous Social Network Analysis of ICES institutions and then updating it, as well conducting one or more behavioural economics projects on fisheries management topics currently being finalized.

The United States National Standards

Alan Haynie gave an **overview of the ten United States National Standards**, one element of the Magnuson Stevens Fishery and Conservation Act (MSA). The National Standards provide a suite of factors that managers must consider when fisheries management plans are amended. This structure provides a valuable and transparent framework that requires the analysis of a diverse suite of biological, social, and economic factors, including optimum yield and an assessment of the management impact on communities.

Human Dimensions in US NOAA IEAs

Steve Kasperski presented on **Human Dimensions in US NOAA IEAs** and provided some background on the history and evolution of the NOAA IEA Program and how we are applying the IEA process in the US He then described the NOAA IEA loop and how human dimensions information has been utilized in each aspect of the IEA loop: defining EBM goals and targets, developing indicators, assessing the ecosystem, analysing risk and uncertainty, and evaluating strategies. IEAs in the US span a number of different spatial scales (from LME/ecoregion to a community/place-based IEA) and address a variety of questions based on stakeholder and manager needs. One important lesson learned has been the necessity of leveraging other products and projects to get others doing similar ecosystem or human dimensions indicators or ecosystem assessments and bring them in to the IEA process. This brings people together into the IEA to work together and deepen interdisciplinary relationships, creates a better IEA product, and gains efficiencies by not duplicating similar work. However, not every natural or social indicator is going to be relevant for the questions that each IEA is attempting to address and IEAs should try to avoid becoming large compendiums of time-series information. It has proven most valuable for IEAs to remain tied to engaging with stakeholders and managers to define ecosystem goals and objectives to answer their questions rather than a summary of the ecosystem from the scientists' perspective.

Planned Working Group WGBESEO

David Langlet presented the **Working Group on Balancing Economic, Social, and Ecological Objectives in Integrated Assessments (WGBESEO)** (built upon the November 2017 Workshop on Balancing Economic, Social, and Institutional Objectives in Integrated Assessments (WKBESIO) and referred to as a potential WGBESIO in some documents). WGBESEO will aim to develop a framework for identifying and characterizing/classifying objectives in a multi-level governance setting, thus providing a tool for the practical integration of such objectives into future analysis and advice. Linking the work of WGBESEO with other WGs, in particular WGSOCIAL and WGECON, will be crucial for an effective and successful work process. The work also requires the involvement of stakeholders, including decision-makers, to ensure the practical relevance of the methodology and the resulting "landscape" of objectives to be developed.

Commenting on the draft ToRs, David noted that 'Institutional Objectives' should probably be replaced by 'Ecological Objectives' in the group's name since institutional objectives tend to be instrumental in relation to economic, social and ecological objectives, and that even if ecological objectives may be the best known objectives in an ICES context, they still need to be part of the WG's work.

Benguela Current

Astrid Jarre presented a **"view from the Benguela"**. Although no formal IEAs are carried out at present, the member countries of the Benguela Current Commission - South Africa, Namibia and Angola – have all signed to implement an ecosystem approach to fisheries (EAF) at the 2002 UN World Summit on Sustainable Development in Johannesburg, South Africa (WSSD 2002). Standard social science methodology, such as participant observation, interviews and focus groups has been used to make progress in establishing general and specific management objectives and linked indicators in human dimensions. For the South African small pelagics fishery targeting sardine, for example, general objectives span well-being of industry, news entrants and fishing communities. Indicators pertaining to specific objectives document the continued dependence of new entrants on processing by established industry, and the inertia of benefits from high catch volumes trickling down to the communities of factory workers (Paterson et al. 2010). Generally, the learning curve has been to keep an open mind, in terms of both *process and product*, and to facilitate accordingly. Last but not least, starting with simpler methodology (such as, in the Benguela, the ERAs and semi-quantitative modelling) and gradually increasing complexity is in line with the winning concept of rapid prototyping, as also implemented in NOAA/ICES WGNARS work in the Mid-Atlantic Bight, and probably a good way forward for truly integrated IEAs in the ICES area.

Discussion with WKCONSERVE participants highlighted the benefits of collaboration between government agencies and other research institutions, such as universities, for integration of human dimensions into systems-based approaches.

Summary of Past All-IEA workshops in ICES

Jörn Schmidt presented a summary of past ICES IEA workshops (WKBEMIA (2012), WKRISCO (2014), WKIDEA (2016)). Since 2012 biennial workshops have been organized to allow IEA groups to share experiences, challenges and lessons learned, with specific focus on a topic at each workshop. WKBEMIA discussed IEAs in the ICES context, discussing ICES wants and needs and how IEAs could be operationalized. The workshop showed what had been done so far in three groups, WGNARS, WGIAB and WGEAWESS and provided a roadmap for integrated advice in ICES (annex 3 in the WKBEMIA report). Two years later, at WKRISCO, IEA achievements and products were shared and commonalities and differences among IEA groups were discussed. The meeting invited regional conventions secretariats (OSPAR and HELCOM) and the European Environment Agency to discuss requirements for the ecosystem approach and how ICES could support the work of these organizations through the IEA groups. At WKIDEA in 2016, the common approaches of IEA groups were summarized and a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis performed on the methodological approaches taken by IEA groups. This WK demonstrated that the regional IEA work was converging with regards to analyses performed and output products.

3 Summary of Current Social and Economic Activities Across IEA Groups

3.1 Summaries of IEA Groups Presented in Workshops

ICES IEA groups span a diversity of ecoregions, as shown in Figure 1.

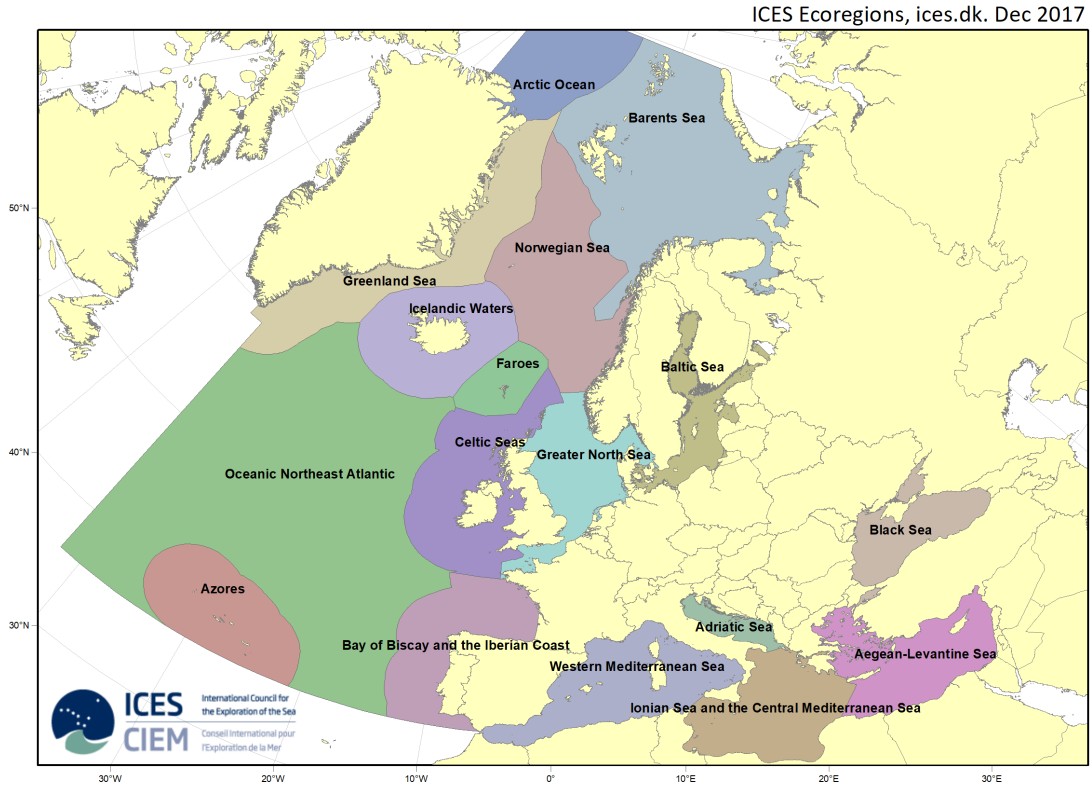


Figure 1, Map of ICES Ecoregions Map

In the first day of the workshop, presentations were given to summarize the past and current activities of many of the ICES IEA groups. Summaries of the current status of these groups are presented below.

WGINOR and WGIBAR

Mette Skern-Mauritzen presented an overview of the work of WGINOR and WGIBAR. Both WGIBAR and WGINOR has a strong focus on trends and dynamics in the natural system, across ocean climate, primary production and diverse functional groups. Particularly in the Barents Sea, climate warming has already significantly impacted the system, with an ongoing large-scaled 'borealization' of the system: Boreal species are increasing in abundance and distribution, while arctic species are contracting and declining. In both systems there are high abundances of key fish species, including commercially important species. With the high abundances also comes strong species interactions, either as predator – prey interactions or through competition for food. In the Norwegian Sea, decreasing body size with increasing abundance in

the pelagic fish stocks mackerel, herring and blue whiting indicate interspecific competition. In the Barents Sea, the large cod stock consumes around 3 million tons of capelin, which is comparable to the total stock size of capelin. As all these stocks are commercial, there may be significant trade-offs to be explored, between stocks, fleets and societal opportunities and impacts, through the development and testing of multispecies management strategies. Finally, supporting research projects focusing on ecosystem risk assessments are ongoing, including balancing benefits in the form of ecosystem services and impacts across and trade-offs among operating sectors. Strengthening the human dimension in these IEAs could include:

- Social and economic indicators from fisheries; related to métier, fleet group, societies (e.g. counties);
- Social and economic indicators from other sectors; petroleum, shipping, aquaculture ;
- Ecosystem services – how to represent and compare across management objectives; Identify and assess trade-offs, climate change perspectives;
- Climate vulnerabilities; sectors, societies, management objectives and management strategies (fisheries, cross sector - e.g. spatial).

WGEAWESS

Debbi Pedreschi presented ongoing work in **WGEAWESS** which contributes to two ecoregional IEAs and ecosystem overviews; the Celtic Seas and the Bay of Biscay/Iberian Coast, with a focus on past and future efforts to include human dimensions and movement towards socio-ecological systems thinking. WGEAWESS does not currently have any economists or social scientists directly involved in the group and as such has a focus on collaboration and coordination with other groups to maximize impacts and outputs, particularly in relation to progressing aspects under development in groups such as WGSOCIAL and WGECON. The plans for further development were outlined. Help/advice was sought on how to involve stakeholders when no funding is available. We would also like to encourage WGECON and WGSOCIAL members to get involved in their regional IEA groups.

WGINOSE

Andrew Kenny presented an overview of the work of **WGINOSE**. During the early years the focus of the group was on collating data on various abiotic/biotic parameters to describe state changes in the North Sea ecology using various multivariate statistical methods. The most significant component links (trophic interactions) have been identified and modelled and routines developed in R to semi-automate the analysis of trends on an annual basis. These data and analyses provided the basis for defining ecologically coherent subregions of the North Sea, of which 14 have been defined. More recently the group has been working with other groups (e.g. WGMARS and WGBESEO) to identify relevant assessment objectives from different policy drivers. The group has also embarked on developing subregional conceptual models in collaboration with stakeholders to better understand the key issues of concern and to identify specific components of the system of most interest (from a social, economic and ecological perspective). This topic of activity will be the focus for the group going forward, especially in relation to further dialogue with stakeholders to co-develop assessment approaches and the integration (or coupling) of ecological, social economic models.

WGNARS

Geret DePiper presented ongoing work in **WGNARS** with a particular focus on the integration of social sciences in the IEA process. The linkage between WGNARS and the United States Mid-Atlantic Fishery Management Council was explored, with respect to objectives, the Council's Risk Assessment completed in 2017, and ongoing work on conceptual modelling within the Summer Flounder fishery.

WGIAB

Martin Lindegren presented past and planned HD activities in WGIAB. Past activities in WGIAB have touched upon and accounted for only a restricted set of HD aspects. These include primarily economic considerations of fisheries through the use of coupled ecological-bioeconomic models (aiming to study ecological and economic considerations and trade-offs in multispecies fisheries). In future, the intent is to include a wider perspective of HD as demonstrated by current ToRs that aim to include social and economic aspects within several steps of the IEA cycle. However, several obstacles and needs remain that need to be solved to ensure the concrete inclusion of these aspects including:

- Identifying key goals and objectives including HD at a spatial scale relevant to ecosystem-based management. (The planned work of WGBESEO would be very helpful in this respect.).
- Defining indicators and thresholds mapping onto the social and economic objectives above.
- Collecting data for each indicator showing the current status and trends (preferably in relation to a preferred threshold).

3.2 WKCONSERVE Survey

Eva-Lotta Sundblad presented the results of a survey that was distributed among people invited to WKCONSERVE in summer 2019 prior to the workshop. Twenty people responded to the survey (of 45 invited). The purpose was to prepare the participants for the meeting by providing a shared baseline of information. The presented results were organized in relation to the expert groups. In general, the current level of social, economic and institutional aspects in ToR or practical work of the IEA-groups is limited with a few exceptions. On the other hand, the ambitions to contact people with knowledge of these aspects and to link to relevant groups were high.

The first question in the survey asked if the group has or plan to have ToRs addressing Social, Economic or Institutional (SEI) aspects for their ecoregion. The answers among the IEA groups of ICES differ between yes and no, while the other groups have various reasons to relate to SEI-aspects.

Answers item 1 IEA groups	Social	Economic	Institutional
IAB	Yes	Yes	-
INOR	No	No	No
INOSE	No	No	No

IBAR	No	No	No
EAWESS	Yes	No	No
NARS	Yes	Yes	Yes?

Answers item 1 **Other groups**	**Comments**
ACOM	No, but ecosystem overviews
Social, Econ, MARS and BESEO not an ecoregion YES	
SED	Aquaculture Social and Econ
IPEM	Yes, we seek contact
BIFS	No
CERP	Management drivers
RMES	YES
NOAA IEA	Yes - Guide development

The concrete ambitions for the groups the next couple of years to work on social and economic analyses and their interaction with ecological analyses covered a number of varying approaches: To integrate social and economic dimensions in the IEA, or in current ecosystem models was common answers. To integrate data regarding social and economic aspects in the Ecosystem Overviews was another common answer.

The reported challenges among IEA groups to reach their ambitions for social, economic and institutional aspects included “lack of expertise in the group”, “resources”, “to understand and predict”, “definition and data”. WGNARS that has worked with these issues since long reported “methods to assess trade-offs, and a need for more social scientists”.

The challenges among the other groups reported “funding”, “expectations and views from various actors”, ”data availability”, “casting of expertise”, “members with expertise” (in statistics, GIS, Policy analyses).

The number of existing analyses or products with SEI-aspects for ecoregions are very limited. IAB report that they have some smaller studies, EAWESS report that they include some aspects in some subregions. On the other hand WGNARS report that they work both with indicators as well as models covering these aspects.

The availability to necessary information /data were commented by all groups. Two IEA groups reported that they currently lack basic social data, but they are working on the issue. WGNARS reported that there is a lack of operations goals and objectives for the S E and I aspects.

Some of the non-IEA -groups responding to the survey report a different situation as SEI aspects are the key focus. ACOM reported a lack of management objectives for fleet and gear, WGSOCIAL and WGECON reported that there is a lack of relevant data but they are working on getting an overview. Others, such as WGMARS and WGRMES reported YES to data availability.

Only two of the IEA groups, WGIAB and WGNARS, report that they have economists or social scientists in the group. Still, they need more of these and also from following disciplines; cultural anthropology, political science, and history.

Only WGIAB and WGNARS report that they have a framework to integrate social and economic aspects. The exemplified frameworks mentioned were IEA and EwE. On the other hand, both IEA groups and other groups mentioned that models and frameworks exist (WGRMES), or are under development (WGSOCIAL).

In general the groups have not worked on socio-economic or climate scenario development. However, several groups mentioned that some of their members did such work in their ordinary work.

Many of the groups wanted more interaction with the other groups. Methods mentioned to achieve that was to have joint members between groups, or to arrange back-to back meetings. This wish also included using WKCONSERVE to develop linkages with other relevant people and groups.

3.3 Four roadmaps for integrating the human dimension in ICES IEAs

During WKCONSERVE, the participants were divided into 4 smaller groups with a balance of regional expertise and expertise in natural, social and economic sciences:

- Northwest Atlantic, Barents and Norwegian Seas;
- North Sea;
- Western Shelf Seas;
- Baltic Sea.

The groups were asked to define and discuss a roadmap for integrating social and economic data and analyses in regional IEAs (ToR c). A key to the work was to identify relevant scientists from WGECON and WGSOCIAL for the regional IEA WGs, and to concretize the next steps for such collaborations. The resulting five roadmaps for the different regions are presented below, and followed by a short summary.

Roadmap WGNARS: Working Group on the Northwest Atlantic Regional Sea

IEA Group	WGNARS
IEA Members at WKCONSERVE	Geret DePiper, Trish Clay, Lisa Colburn
When did IEA group start?	2010
Do you have economists / social scientists active in your group? Who? When did they join?	Geret DePiper – Economist Trish Clay – Anthropologist Lisa Colburn – Anthropologist Fred Phelan – Economist Ian Stewart - Historian
Past Human dimensions information included	Objectives, indicators, modelling
Recent HD initiatives or changes?	HD work is sprinkled throughout current 3-year ToRs

Current Status of Human Dimension in the group

- Recently the focus has shifted towards expanding work to include wind energy development and climate change, particularly with respect to trade-offs in the human dimensions.

Future Goals, Needs, and Challenges

Primary topics of interest (ToRs):

- Expand into other regions and sectors: consider the role of women, and remote, low income, and indigenous communities;
- Increase the cross disciplinary capacity of IEAs in the region including social sciences;
- Evaluate and test indicators as responses to changing environment, especially those that indicate changes in human behaviour;
- Improve decision support tools addressing trade-offs.

The overarching question being addressed by WGNARS is: How can we best prepare science and advice in the face of climate change and shifting ocean use priorities.

Major challenges will likely include identifying relevant indicators particularly with respect to women, low income and indigenous people. Additionally, there is generally a lack of cultural indicators. The work will likely entail the development of qualitative indicators, facilitated by a literature review and possibly interviews to bolster the work.

A recommendation was made to touch base with Karen Hunter, who is a Canadian conducting substantial work on indigenous populations. Cultural practices tend to be driven more by traditions than desire for economic gain; deriving value from a way of life. Multigenerational fishing families can be an example of where this cultural value is important. Of particular interest is the roles of family members in relation to fishing industry; including the role of women, traditionally focused on processing, book-keeping, and second jobs to secure income.

In the US work will also include developing wind as a second sector of interest while continuing to support fisheries management councils as the primary client.

In Canada the focus has shifted towards marine spatial planning and Ecosystem Based Management more broadly, including issues of climate resilience and benefits to local communities.

With respect to climate change and regime shift – the focus is how to ensure equity in the face of change, and social and economic adaptations to change. For example, fishing behaviour might change to include longer trips; altering benefits and impacts on families and communities. Social restructuring following regime shifts – literature available from cod collapse (Canada; coast and stress project, Memorial University). Occupational diversity will likely play an important role in adaptation; including the alternatives outside of fisheries and economic state of community and community heterogeneity (e.g. poor, rich communities). New conflicts over resources are also anticipated, with a current example being pot fishing and Right Whale entanglements due to shifting right whale distributions. This indicates that a range of fisheries (including the most prosperous) will be impacted by climate change.

Offshore wind is important due to its scale, and varied impact on marine resource dependent communities; both socially and economically. On the one hand it will force changes in fishing locations and behaviour. On the other, the value of the wind industry develops potential for transfer payments and industry development that offsets these impacts. Nevertheless, offshore wind has the capacity to completely change cultures; with the wind sector aiming at employing fishers, impacts on climate vulnerability of communities.

Roadmap WGIBAR WGNOR: Working groups on Integrated Ecosystem Assessments of the Barents Sea) / the Norwegian Sea

IEA Group	WGIBAR / WGNOR
IEA Members at WKCONSERVE	Mette Skern-Mauritzen
When did IEA group start?	2012 / 2013
Do you have economists / social scientists active in your group? Who? When did they join?	No
Past Human dimensions information included	Fisheries – description of activities, catch and catch value. Stakeholder interactions, management objectives
Recent HD initiatives or changes?	The BarentsRISK project; ecosystem risk assessment of multiple impacts, including also risks to ecosystem services

History: how did your IEA group get to where it is?
Both WGIBAR and WGINOR has mainly focused on status and trends in natural systems, using ITAs and other approaches. Both WGIBAR and WGINOR status reports feed into Norwegian Management plans for the Norwegian sector of these ecoregions. Also, WGIBAR is central to the identification of special valuable and vulnerable areas for the development of a joint Norwegian Russian management plan for the Barents Sea.

Current ToRs in WGIBAR include:

- Perform an integrated analysis of multivariate datasets and other relevant information including model outputs;
- Analyse spatial patterns and trends with special emphasis on shifting distribution of communities and species, and valuable and vulnerable areas;
- Prepare an annual report on the status and trends of the Barents Sea ecosystem;
- Provide support to ongoing ecosystem assessments and evaluations in the Barents Sea;
- Evaluate the current monitoring of the Barents Sea ecosystem.

Current ToRs in WGINOR include:

- An integrated assessment of the pelagic ecosystem and develop a framework for identifying warning signals for management;
- Utilizing multispecies and ecosystem models to evaluate the effects of single and multispecies harvest control rules on fishing yield and ecosystem state;
- Development of forecast products (1-5 years) for key indices of ocean climate;
- Develop a foodweb assessment of the pelagic ecosystem in the Norwegian Sea, including hindcasts and conditional forecasts of the main species or trophic groups;
- Establish a dialogue between WGINOR and relevant pelagic fisheries stakeholders and managers to identify management needs;
- Update the ecosystem overview.

Current Status of Human Dimension in the group

- No history of social or economic science in the groups;
- In WGINOR, a regular activity includes national stakeholder workshops as part of every WGINOR meeting, thus repeated every 3 years in Iceland, Faroe Islands and Norway, respectively;
- The BarentsRISK project, funded by the Norwegian Research Council, assess the risks to the natural system and ecosystem services of multiple stressors (e.g. climate change, fisheries, petroleum), and feeds into WGIBAR. Economists (from Norway and US) are included in BarentsRISK. This project also includes scoping workshops with managers and sector representatives.

Human dimensions goals and objectives

No specific goals are identified apart from those of the BarentsRISK project related to risk to ecosystem services and on stakeholder workshops for scoping management needs.

Future Goals, Needs, and Challenges

- Barents Sea and Norwegian Sea: Climate change core issue, with a focus on changing species distributions, stock productivity, and species interactions. Interactions, direct and indirect, of particular interest (of scientists, managers and fishers) are between commercial fish stocks, viewed in the perspective of multispecies management. A scoping process was conducted with managers in Norway, with no focus on economics or trade-offs between fleets and associated nations or communities. The different fisheries should be linked to society through landing harbours, home harbours by fleets, employment, economic values (further outlined below);
- Ecosystem models covering the regions include fishers' behaviour and economic aspects, including landing ports and home ports. Further development of these models, including use for IEAs, benefit from closer collaboration with economists;
- Barents Sea and the BarentsRISK project: How to balance impacts vs. benefits, framed as ecosystem services;
- Scoping for sector and management needs, to develop relevant products.

First steps identified to link biological processes to society is to include baseline indicators in the IEAs. Indicators to consider (by vessel size/type/fleet component/nation/county/municipality):

- Producer and consumer surplus, or some proxy measures of economic value for commercial fisheries, aquaculture, and recreational fisheries;
- Employment/participation/vessel/permit/company numbers (by county/municipality);
- Landing ports and home ports for different fleets; identifying communities directly benefiting from fisheries/fisheries dependencies; trends over time – also reflecting societal responses to restructuring of the fishing fleet. Maps with ports;
- Measures of economic diversity (value, landings, or other); relates to robustness relative to climate change impacts.

Additional steps include reaching out to economic and social scientists to engage in the IEA groups, with support from the ICES expert groups WGSOCIAL and WGECON:

- WGSOCIAL includes one member from Norway, but none from Russia, Iceland or Faroe Islands;
- WGECON includes members from both the Faroe Islands and Iceland, but none from Norway or Russia;

- In Norway, relevant scientific expertise is available at the University of Tromsø, University of Bergen, and at NHH Bergen;
- Expertise in other relevant countries were not known to the workshop participants (only Norwegian delegate present).

Specific policy questions of interest:

- Fisheriesvs.oil production;
- Impacts and benefits across sectors; fisheries, petroleum, shipping. Offshore windfarms and aquaculture are developing;
- Multispecies (biological interactions) harvesting strategies and multispecies management;
- Nexus of tourism and fisheries, how does changes in fishery affect tourism attracted to coastal fishing communities?

What are your needs in terms of researchers, data

- Specified above.

Roadmap WGINOSE: Working Group on the Integrated Ecosystem Assessment of the North Sea

IEA Group	WGINOSE (Core group 7 people)
IEA Members at WKCONSERVE	Andy Kenny, Eva-Lotta Sundblad, Andrea Belgrano
When did IEA group start?	2006
Do you have economists / social scientists active in your group? Who? When did they join?	Not permanently - *ad hoc*
Past Human dimensions information included	Link with BESIO, WGMARS
Recent HD initiatives or changes?	Conceptual modelling and stakeholder workshops

History: how did your IEA group get to where it is?

WGINOSE spent the first few years spending a lot of time and effort working with the ICES data Centre and other organizations holding data to underpin an integrated quantitative analysis of trends and elucidating links between components using different types of multivariate analyses. In more recent year's effort has been directed towards establishing links with a wider range of stakeholders to better understand the issues and objectives driving the scope of IEA.

Where are you now?

Establishing subregional conceptual models in partnership with subregional stakeholders.

Goals and objectives
To operationalize integrated trends analysis, to investigate and develop links between ecological models and socio/economic models to support ecosystem overviews and to undertake trade-off analysis.

Future directions
To establish clear links (individuals) and mechanizms (projects) which facilitate the integration between WGSOCIAL, WGECON, WGBESEO, WGIPEM, WGSAM, WGBIODIV, WGRMES:

- Update the North Sea ecosystem overview;
- Including advice of WGSOCIAL (ports) as soon as the method has been worked out in the Celtic Seas IEA (proof of concept);
- Co-Develop subregional IEA tools with stakeholders and in collaboration with the above mentioned WGs to support management advice.

History / current activities

- Links with WGBESEO (to identify relevant North Sea assessment objectives) and WGMARS, WGNARS, WGIPEM, WGRMES, (Mark Payne) to identify important ecological processes and long-term trends in climate.

Human dimensions goals and objectives:

- So as not to duplicate what is already happening by member states – it is important we identify and collaborate with scientists and managers in national jurisdictions who are developing ecosystem assessments under the MSFD and other policy drivers (e.g. OSPAR) and add value to what is already happening, whilst fostering a dialogue with stakeholders in co-developing conceptual models as part of our subregional approach;
- Co-development of an action plan with WGBESEO to describe the institutional setting of EU and relevant member states (depending on the case at hand) and the objectives in the different policies (MSFD, Natura 2000, CFP, national policies) which builds upon national initiatives (corresponding to the established subregional assessment areas in the North Sea Ecoregion) adds legitimacy to the ICES IEA approach and builds the Ecoregional assessment from the bottom up.

Future Goals, Needs, and Challenges:

- There is benefit in reconciling the spatial mismatch between the established ecological subunits and national jurisdiction assessment areas (EEZ), through the selection of ecological subregions which best match the extent of national jurisdiction assessment boundaries. This will facilitate the development of cross jurisdictional IEA which are optimized in relation to the defined natural boundaries in ecosystem state and dynamics;
- A focus on the Kattegat, Southern Bight and Oyster Ground, and the Norwegian Trench. A pilot study is currently being developed for the Kattegat with Sweden and Denmark participation. The WK highlighted the importance of work synergies in the IEA for the Kattegat, where joint efforts will be carried out by the IEA North Sea WGINOSE and by the IEA Baltic Sea WGIAB. The work will be based on the output from the first modelling scenarios with stakeholder's participation workshop (WKKEMSSP) that WGINOSE organized in 2019; in combination with scenarios exploration using the EwE model available for Kattegat, as well ITAs analysis for Kattegat; and including further consideration of the MSFD indicators as well as socio/economic indicators;

- Mechanizm by which the IEA can be driven from the bottom-up, working with WGBESEO in 2020 to develop a plan of action for the North Sea ecoregion to identify who is doing what, when and why, in relation to the case study subregions within national jurisdictions. Need to understand and be clear about what added value WGINOSE can provide;
- Establish clear links (individuals) and mechanizms (projects) which facilitate the integration between WGSOCIAL, WGECON and WGBESEO – but also on North Sea ecology via WGSAM, WGIPEM, WGRMES, WGBIODIV – that would have a focus on how we link (via indicators) social, economic and ecological systems (models) to support realistic (meaningful) trade-off analysis.

What are your needs in terms of researchers, data:

- Identify individuals from WGSOCIAL, WGECON and WGBESEO, and WGSAM, WGIPEM, WGRMES, WGBIODIV who can participate in WGINOSE to address future Goals, Needs, and Challenges;
- Different options to support integration between the above WGs should be explored, e.g. i. individuals that have a roving brief (job description) to link activities between WGs. ii. establishing IEA workshops to bring together experts from the WGs to progress specific IEA ToRs, iii. co-developing ToRs for each of the above mentioned WGs within the context of the North Sea IEA group. i.v. identify research project opportunities to facilitate the integration and work of the above mentioned WGs.

Roadmap WGEAWESS: Working Group on Ecosystem Assessments of Western European Shelf Seas

IEA Group	WGEAWESS
IEA Members at WKCONSERVE	Debbi Pedreschi; Marcos Llope (remotely)
When did IEA group start?	2011
Do you have economists / social scientists active in your group? Who? When did they join?	Not yet
Past Human dimensions information included	Institutional Information
Recent HD initiatives or changes?	Proposed (outlined below)
# of Active participants	14 at last meeting (30 officially)

History: how did your IEA group get to where it is?

WGEAWESS contributes to two ecoregions Celtic Seas and Bay of Biscay/Iberian Coast. We generally apply a hybrid of Holsman approach and the Levin cycle in theory - moving from qualitative to quantitative analyses, although we started out somewhat in the reverse - by gathering data, carrying out ITA and modelling, mostly Ecopath with Ecosim, Ecospace (MSP), ISIS-Fish, statistical regression models (GAMs) but also qualitative and semi-qualitative models/methods (e.g. ODEMM, GIS and multi-criteria decision meth-

ods, MSFD). We are involved in processes to improve and standardize these across IEA groups - WKEW-IEA and WKINTRA. Some of our specific models address human dimensions - such as specific trade-off analyses around local water use in the Gulf of Cadiz (see WG reports for details).

WGEAWESS has been thinking about HD for a few years but have been unsure how to progress them, largely due to struggling to meet basic IEA components through large geographical areas but low (consistent) group participation. No economists or social scientists are currently in our group, despite previous efforts to include them. We have had both economists and social scientists attend previous meetings, but they have not stayed in the group. We would like to change this and as such have made efforts to connect with WGECON and have a shared member with WGSOCIAL (DP) which has greatly facilitated collaboration.

WGEAWESS has limited member participation, and so reaches out to other ICES groups to try to maximize our impact and resources. We have had back to back meetings in recent years with WGIAB and WGCOMEDA. We have a large outreach into ICES groups - among 14 members of WGEAWESS we are members of 32 groups (21% of the ICES network is represented). We have also recently engaged directly with WGIPEM, WGCEAM, WGS2D, WGOOFE, WGMARS, WGHANSA and WGBIE. We actively propose/pursue our ecoregions being used as case studies by these groups to develop new EO products, and aim to facilitate this work by connecting the relevant skills (people), data and methods. We have previously attempted to engage with other groups that have not resulted in collaborative efforts. We consider collaboration across groups as critical to incorporating more products and aspects into the EOs.

We have initiated contact between WGSOCIAL members working on social indicators in Galicia and Portugal and our WGEAWESS members working on the BoB/IC EO. We had a presentation from Pablo Pita on his work to WGEAWESS this year. We are coordinating the development of text updates/narrative recommendations into the CS EO, and update of ports/fishing community maps, and investigating routes of incorporating STECF/JRC socio-economic data into EOs (with WGSOCIAL and WGECON).
Internally, we believe there are some 'easy wins' we can do within our group through wider stakeholder involvement in conceptual diagram development/ODEMM process, and through the inclusion of mental modelling to help frame the ecological issues in a social and economic context. We have developed a workshop proposal (with WGMARS) to facilitate common development (standardization) of approaches (for IEA chairs or nominated persons – limited capacity). These socio-economic issues can also be incorporated into foodwebs as has been done by WGINOSE. This year we developed a simplified adaptation of the ODEMM risk assessment process that merges with the ICES conceptual modelling guidelines but provides the space for expert and stakeholder input. We believe this process could be applied across groups and provide a stronger basis for the conceptual pressure diagrams (with more options for semi-quantitative analysis). It has thus far only been applied to expert groups, not stakeholder groups (although a full fisheries-focused ODEMM has been applied within WKIRISH). Part of the issue here is funding for the work, and even more so funding for facilitation/attendance.
We have engaged in the WKIRISH process which co-developed solutions with stakeholders. Here we included stakeholders in the development of an ODEMM risk assessment, 'crowd-sourced' foodwebs and effort trajectories for periods where there are no empirical data, and presented results of models back to the group for discussion. We enthusiastically encourage more of these processes – they will greatly inform IEA efforts, and progress the inclusion of human concerns. However there was no economic/social modelling included here - we recommend that this challenge is taken on for future efforts. We hope to be able to include a conceptual mapping exercise (to compliment/elaborate the ODEMM) at the next (and final) WKIRISH (November).

We have a number of proposals for progressing HD in future WGEAWESS efforts:

- Social and economic indicators and aspects are already high in the groups awareness when new models are being proposed/developed. We find this is generally easier for economic aspects. We will continue these efforts;
- We propose that during the next round of EO reviews, we will include WGECON and WGSOCIAL groups and local experts to review the texts/ make contributions;
- We propose to advertise our next meeting with WGECON, WGSOCIAL, MarSocSci and EAFE? MSEAS? Networks.

Help/advice on how to involve stakeholders (when no funding is available) would be appreciated. We would also like to encourage WGECON and WGSOCIAL members to get involved in their regional IEA groups. Integration needs to go both ways.

Narrative of other important group related events

- Data gathering, trend analysis, modelling (EwE, ISIS-FISH, among others) semi-quantitative risk assessment (ODEMM).

Current Status of Human Dimension in the group

See above summary. Biggest change has been in translating ambition into small actions that we hope will lead to bigger changes.

Human dimensions goals and objectives

To better meet the needs of true EBM/EBFM/IEA, and as awareness was heightened through higher profile of HD in ICES (SIHD). Also individual interests within the group, and a wish to include humans as a part of the ecosystem (affecting and affected).
Our ToRs include to review and update the EOs for the BoB/IC, and to scope, co-develop and integrate new indicators and products into our work and the EOs.

Future Goals, Needs, and Challenges

Celtic Seas (coming year for templates/proposals):

- STECF National data summary (and social indicators) (WGSOCIAL);
- Review of the text on institutional information (WGSOCIAL);
- Ports / fishing communities review (WGSOCIAL).

BoB/IC (coming year? templates/proposals):

- Social indicators (NOAA-style) (Portugal and Gallicia for BoB/IW EO).

Both regions:

- Follow up with WGECON - standardized data for economic (social) data (JRC) - investigate available scales:
  - - and potential future forward scenario testing (this year -candidate standardized products next year, future modelling 1-3 years)
  - Particularly interesting in relation to climate - economic projections for fisheries in line with the WGS2D model products expected to be included in future EOs
- Policy objectives (WGBESEO - in line with WGBESEO progress);
- Establishing relationships with Regional Advisory Councils (this year);

- Identify specific regional questions of interest that need addressing - key questions.

What are your needs in terms of researchers and data

- FUNDING FOR THIS WORK - even the roles of coordinators and synthesis are extremely time consuming and hard to progress if not funded;
- Social indicator specialists;
- Researchers familiar with STECF data;
- Economists (any flavour!);
- Policy specialists;
- Non-fisheries specialists (other sectors/disciplines - e.g. shipping, aquaculture, etc.);
- Ideas/advice on how to include stakeholders when no funding is available to facilitate;
- Definitions of what spatial scales we should be using?

Steps for interaction with stakeholders and defining objectives

- Engage with RACs - we usually alternate our meetings to be one year 'north' and the next 'south' - this timing may facilitate engagement each alternating year with RACs to update reviews and scope for issues/changes. We could assign a day each year for engaging - bearing in mind this will be longer for earlier years (establishing relationship) - note this is fisheries stakeholder limited;
- Use conceptual modelling techniques to incorporate stakeholder priorities into EOs - highlight important drivers, ES and socio-economic impacts;
- Engage with WGBESEO process.

References - background documents of different IEA Groups

WGEAWESS reports available here.

Roadmap WGIAB: Working Group on Integrated Assessments of the Baltic Sea

IEA Group	WGIAB
IEA Members at WKCONSERVE	Martin Lindegren, Jörn Schmidt
When did IEA group start?	2007
Do you have economists / social scientists active in your group? Who? When did they join?	Yes – but not on a regular basis. Examples include: Matilda Walman (political scientist) 2017, Jörn Schmidt and Rudi Voss (since 2008 but infrequent participation)
Past Human dimensions information included	Yes – some examples of coupled ecological-bioeconomic modelling aiming to study ecological and economic considerations and trade-offs in multispecies fisheries management (e.g. Lindegren et al., 2009; Voss et al., 2014; Blenckner et al., 2015), as well as pilot case studies including human wellbeing on Baltic salmon and herring (ICES 2018).
Recent HD initiatives or changes?	Yes – HD are featured as part of our newly adopted ToRs aiming to include social and economic aspects within several steps of the IEA cycle.

Current Status of Human Dimension in the group

As is evident from the table above our past activities have briefly touched upon only a restricted set of HD aspects (primarily fisheries economics). But our intention is to the extent possible include a wider perspective of HD. This is featured by our current ToRs aiming to include social and economic aspects within several steps of the IEA cycle. However, several obstacles and needs remain (listed below) that need to be solved to ensure the concrete inclusion of these aspects.

Future Goals, Needs, and Challenges

The goals of our group are clearly articulated by past and current ToRs. In short, we aim to provide a concrete demonstration (using specific case studies) how the IEA process and its various steps can be setup and developed in order to inform and implement future ecosystem-based management advice within a Baltic Sea context.

What are your needs in terms of researchers, data

- Identify key goals and objectives including HD at a spatial scale relevant to ecosystem-based management. (The planned work of WGBESEO would be very helpful in this respect);
- Define indicators and thresholds mapping onto the social and economic objectives above;
- Collect data for each indicator showing the current status and trends (preferably in relation to a preferred threshold);
- Collaboration and engagement with economists and social scientists within the group and between ICES groups (including WGECON, WGSOCIAL, WGMARS, WGBESEO etc).

4 Discussion and Conclusion

Workshop participants commend everyone involved in the IEA process throughout ICES countries. IEAs are daunting undertakings to which many great scientists have contributed enormous amounts of effort. This workshop made it clear that there are significant limitations in trying to develop IEAs without involving economists and other social scientists, but there is a great base of ecological work that has been done that can be built upon.

The ICES Science Plan clearly indicates the prominent role of humans in the ecosystem and the need for ICES science to include robust economic and other social science analyses to fully characterize the social ecological system.

Common themes of WKCONSERVE

Workshop participants somewhat facetiously commented that we should change the name IEAs to Integrated Social Ecological Assessments (ISEAs) to be very explicit that the social system is integral to and inseparable from the ecological system. We need to have a clearer, more consistent definition of social ecological systems (SESs) in the IEA groups. We need to have national and working group social scientists involved in all IEA groups for them to actually be IEA groups rather than ecosystem status reports. There are context-specific elements that vary across IEAs so the exact manner of participation and needed expertise will vary. Yet there are many overlapping interests with regards to e.g. sectors and trade-off analyses.

There has also been an absence or very limited amount of stakeholders and managers in many IEA groups. It is a challenge to most groups and stakeholder interaction was a major topic of discussion throughout WKCONSERVE. The following bullets summarize some aspects of this discussion:

- It is important that stakeholder work is done right. Note this is not prohibitively expensive, but should involve social scientists and people who understand the human aspects of the system;
- We need a description of governance and legal frameworks relevant for the IEAs. WGBESEO work will be valuable for many groups to clarify objectives;
- Indigenous peoples and other resource users also need to be included, especially for the Arctic;
- There are challenges with developing systems to include user input and different knowledge systems;
- It is challenging to have the right managers in the process so that it actually leads to decision-making. Sometimes managers don't want to collaborate;
- Building stakeholder participation at a grassroots level can be powerful for developing trust in the scientific process;
- We need to keep a holistic view while also transferring ownership of the IEA to different management bodies;
- We need to better identify the different places where people meet – or identify the lack of forums;
- It was mentioned that there could be value for ICES to consider hiring an outreach specialist to connect ICES work to fishers and other stakeholders and provided better communications with those groups and scientists.

As we consider how to develop a roadmap for an "ideal" IEA process, there is not a complete example that thoroughly integrates economics and social sciences in the process. While it does not focus explicitly on

economic and social science elements and the focus was on improving single-species stock assessments, the series of workshops on an Ecosystem-based Approach to Fishery Management for the Irish Sea (WKIRISH) provides a good example of an iterative process that incorporates stakeholders from the beginning. A total of 6 workshops were held over a period of 5 years. WKIrish1 (September 2015) focused on information sharing and scoping of issues together with stakeholders, with a focus on what the science could do to address stakeholder questions. WKIrish2 (September 2016) was the fisheries data evaluation workshop. WKIrish3 (February 2017) performed stock assessment benchmarks. At WKIrish4 (October 2017) stakeholder input was solicited for ecosystem and foodweb models, scenarios to test with these, as well as populating fisheries elements of an IEA risk assessment (ODEMM) process (scoring and assessing all pressure coming from various fishing sectors). WKIrish5 (November 2018) developed the modelling work and further explored management scenarios. WKIrish6 (November 2019) finalized the series and provided advice on means to operationalize the WKIrish regional benchmark process by species. The workshops involved industry and environmental NGO stakeholders, and included a conceptual mapping exercise to scope social and economic issues of relevance to the stakeholders in this region.

Many lessons have been learned and it became clear that time and commitment from institutes are needed to successfully work on the issues identified and to take stakeholder and interdisciplinary work to support EBM seriously. The process also showed great benefits to all actors involved, from a scientific point of view, from a management perspective, and from the stakeholders perspectives. Future efforts should be undertaken to learn further from this process. Furthermore, consideration should be given to the forums available for such interactions; currently there are no WGs established that bring together stock assessment and IEA groups in order to develop and provide ongoing operational ecosystem-based fisheries advice.

Improving Human Dimensions in IEAs:

- We need to share and communicate about economic and social science case studies across IEAs;
- Climate impacts are a common challenge across IEAs;
- There are often challenges that result from the mismatch of management and ecosystem scales;
- There are increasing non-fisheries analytical needs arising from shifting ocean use priorities;
- There is a need for case studies;
- Subregional focus is common among the IEA groups. Need to tie the subregions to the specific, available data and questions;
- There is an overlap of economics and other social sciences;
- Some participants commented that it would be valuable to standardize how the data are processed and the reports are generated. Further consideration should be given to how to work with staff to ensure effective standardization;
- Social science training is valuable for helping IEA groups to do good stakeholder engagement.

Funding:

- Funding for work; need to have national institutes and/or other sources fund IEAs;
- Funding / process of getting research and relevant researchers into IEAs;

Vision: Implementation of Roadmaps with Economics and Other Social science Integrated in IEA Groups

The group work on the roadmaps (Section 4) and associated discussions during plenary presentations demonstrated different starting points for the roadmaps; two of the IEA WGs already had experience in and concrete plans for social and economic sciences in the IEAs, whereas other IEA groups defined their first steps at the WK. The two IEA WGs with strongest integration of socio-economics had social and/or economic scientists among their WG members. Other IEA WGs have, in the past, had shared meetings with socio-economic EGs, or social or economic scientists attending their WG meetings. The experience from these more *ad hoc* meetings were that they were challenging, as i) the ToRs for the expert groups and hence agenda for the meetings were defined in advance and difficult to adjust depending on who was attending the meeting, and ii) identifying common ground and shared interests across disciplines takes time. With no or limited funding for ICES IEA work, the development of IEAs, also into social sciences, remains slow.

All IEA WGs include a focus on the fisheries sector, while several IEA WGs also include or plan to include sectors such as transportation, ports, wind farms, petroleum and aquaculture in their assessments. Hence, there is an interest in and need for social and economic information linked to these sectors as well as fisheries. There is also a broad interest among groups for natural, societal and economic responses and adaptations to climate change. The type of social and economic information includes both management objectives and other objectives, indicators, and input to or output from ecosystem models (e.g. EwE and Atlantis). For EU regions, much relevant dataseries are available through the Joint Research Centre (JRC) and the Scientific, Technical and Economic Committee for Fisheries (STECF). For other regions (e.g. US, Canada, Iceland, Norway, Russia), availability of national statistics varies,



Figure 2: The Classic NOAA IEA Loop Figure.

In summary, IEA groups have focused on developing indicators and assessing the natural ecosystem, including the development and status of physical conditions, nutrients, primary and secondary production, ecosystem structure and function, and key ecological or commercial species. Fisheries are regularly included, with focus both on commercial catches and ecosystem impacts. Assessed against the key steps in the IEA loop proposed by Levin et al. (2013, Figure 2), it is clear that few, if any, IEA groups cover all the steps. Furthermore, the loop does not capture well where and how economic and social analyses should be integrated in the IEAs to support the process. This is a topic that should be further explored.

On the final day of the workshop, we had lively discussions about directions for the future. We discussed directions for research and collaboration and how to support the future development of the IEAs, including the implementation of the roadmaps. The WK participants agreed that there was a need for follow-up meeting places and communication after WKCONSERVE. A number of possibilities were identified:

- Organizing an IEA conference with workshops focusing on all parts of the loop. This would bring together US, ICES, Australian, South African and other IEA practitioners;
- Quarterly or monthly webinars that are topic-focused. Possible topics include: social indicators, EU economic / social data, and spatial scale challenges;
- WKCONSERVE2, a follow-up workshop, in two years' time;
- MSEAS and ASC were identified as useful meeting arenas, and can include sessions with IEA presentations, stakeholder interactions, panel discussions. Propose a Network or Theme session on ASC 2021;
- Propose ideas for the UN Decade on the Ocean or potentially propose a side event in Portugal at the UN Oceans Conference in June 2020;
- Looking at upcoming funding calls to consider if a project could support a series of workshops and related work. This could include a BESEO-related project to describe and improve stakeholder engagement.

5 Recommendations from WKCONSERVE

With regards to developing ICES ecosystem advice, it was recognized that economic and social information and analyses needs to be included in the ecosystem and fishery overviews. Also, WKCONSERVE-related work offers valuable components of the Ecosystem Advice Framework that is currently in development in ICES and is relevant in the planned Ecosystem Advice Meeting with ICES clients and stakeholders that will be held in January 2021 in Brussels.

The workshop generated a number of recommendations regarding the three areas of Stakeholder Engagement, Funding, and Promoting Interdisciplinary Integration.

Stakeholder Engagement:

We recommend that ACOM facilitate the participation of IEA community members from the social, economic and natural sciences in the Miria and Miaco meetings to provide these scientists with a better understanding of ICES stakeholders. IEAs involve stakeholders but there is not enough discussion of social and economic research connection to the evaluation of management impacts and effectiveness.

We recommend that ACOM also facilitate more engagement between the ICES IEA human dimensions community and the regional advisory councils.

We recommend that ACOM and SCICOM should encourage the use of social science expertise to connect to traditional and indigenous user groups. ACOM and SCICOM chairs should discuss this with national representatives to develop contact with relevant researchers.

Funding:

We recommend that SCICOM and ACOM reiterate with national delegates that funding is essential to interdisciplinary work, IEAs and ecosystem advice; it takes time to establish relationships and connect research areas.

Promoting Interdisciplinary Integration:

We recommend that SCICOM and ACOM support the creation of the workgroup WGBESEO. All of the IEA groups that participated in WKCONSERVE reported on the need to better understand the priorities of stakeholders.

We recommend that SCICOM and ACOM support a future WKCONSERVE-2 workshop and facilitate the communication of this work across ICES IEA groups.

We recommend that SCICOM and ACOM develop an effective process for handling future special requests for advice including social and economic information, that are likely to grow.

Annex 1: List of participants

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Annex 2: Final Agenda

WKCONSERVE Agenda, Final Version, Thursday October 10

Location: ICES Secretariat 4th Floor, Copenhagen, Atlantic and Biscay Rooms

October 8, 2019 (Tuesday) - ***Meeting the larger Atlantic Room until 3pm***

09:00 Welcome and getting sorted

- WebEX connections will be available and established.
- Brief Introductions by all
- Assign "work teams" that integrate IEA members with participating economists / social scientists

09:30 WKCONSEVE Introduction by workshop chairs

- Discuss Steps in Draft IEA "Human Dimensions Profile"
    - How did you get to where you are? Where are you now? Goals and objectives, Future directions
- Introduction to planned paper: "Human dimension activities and opportunities across ICES IEA Groups"
- Draft report partially written - small assignments made on sections to be completed later.

10:00 Context: Overview of Recent Activities by SIHD and other HD-related groups

- Brief Summaries of historical and recent meetings (Jörn)
- WGECON (Olivier) and WGSOCIAL (Lisa) discuss current status
- WGMARS survey and activities (Trish and Johanna webex)

10:30 -1045 Break

10:45 - 11:15 More ICES HD related group activity discussion

- WKEO3 (Mette)
- WKCONSERVE Survey responses and discussion (Eva-Lotta)
- WGBESEO Discussion (David and David)

11:15 - 12:30 Presentations by current IEA groups of Human Dimension (HD) activities. Evolution and current status of HD activities and needs. (will continue after lunch if necessary.)

- WGIBAR/INOR (Mette)
- WGINOSE (Andy Kenny)
- WGEAWESS (Debbi Pedreschi)
- WGNARS (Geret DePiper)
- WGIAB (Martin Lindegren)
- WGIPEM (Sonja van Leeuwen)

12:30 - 1:30 Lunch ICES cafeteria (upstairs from our rooms) with ICES Bureau members

1:30 - 2:00 Short report back from lunch break-outs with Bureau

2:00 - 3:00 Available data and discussion by chairs of WGECON (Oliver) and WGSOCIAL (Lisa).

3:00 - 3:15 Break (*and CHANGE room to Biscay*)

3:15 - 3:45 NOAA IEA Overview (Steve K.)

3:45 - 5:30 Discussion of common and group-specific HD challenges and needs

5:30 Happy Hour at ICES

7pm Dinner at the Restaurant Wagamama (Directions from ICES)

October 9, 2019 (Wednesday) Biscaye Room

900 - 9:30 Recap of Day 1 and Setup; Summary of talks -- Comments

10 - 10:30 Break out in groups and discuss future goals and needs

9:30 - 10:30 Econ and social modelling talks and case studies of social science in IEAs. NOAA IEA and other analyes (Steve K and Alan), Marloes Kraan (Social Science Methods)

10:30 - 10:45 Break

10:45 - 12:00 Method discussion with applications to IEA groups

12:00 - 1:30pm Lunch out of ICES in smaller groups

1:30 - 2:30 Discussion in group

2:30 - 4pm IEA and topic specific work group meetings. The IEA chairs will have the option to catch up with members of their IEA groups (WebEx, Skype calls in ICES offices).

4-5pm Discussion across groups of IEA Human Dimensions Profile - work to make more progress on each group's profile. (Everyone)

6pm Drinks and Dinner at Warpigs Brewpub

October 10, 2019 (Thursday) Biscaye Room

9-930am Recap and planning for the day

9:30-12 Discussion of each groups IEA Human Dimensions Profile, with a goal for each group to have a draft complete today. Formulation of common conclusions.

12-1:15pm Lunch out of ICES in smaller groups

1:15-3pm Planning for next steps - close of workshop.

- Report and paper planning
- Next steps

3:00 - 3:30pm Group hug / goodbyes

3:30-5pm Workshop Chairs work on Report

6:30pm Drinks and Dinner for those interested

Annex 3: References – background documents of different IEA Groups and Works Cited

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