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WGNARS - Working Group on the Northwest Atlantic Regional Sea

2022/FT/IEASG01 The Working Group on the Northwest Atlantic Regional Sea (WGNARS), chaired by Jamie C. Tam, Canada, and Kimberly J. W. Hyde, USA, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2023	15-18 May	Halifax, Canada	Interim report by 1 July to IEASG	New Canadian Chair will be appointed
Year 2024	TBD	Woods Hole, USA	Interim report by TBD to IEASG	
Year 2025	TBD	Halifax, Canada	Final report by TBD to IEASG	New USA Chair will be appointed

ToR descriptors¹

ToR	ToR Description	Background	Science plan topics addressed	Duration	Expected Deliverables
a	Improve regional capacity to conduct, co-create, co-produce, and communicate science to support marine ecosystem based management.	Enhance capacity to perform transdisciplinary research. Continue to develop bilateral/cross jurisdictional collaborations.	1.1, 6.5	1-2 years	Report on recent activities related to IEAs, US, Canada and Regional Fisheries Management Organizations (e.g. NAFO). Increase joint projects between Newfoundland, Maritimes, NEUS regions. Invitation to Gulf Region members from DFO. Improved membership from management bodies, industry, stakeholder or academics. Annual Seminar or Workshops to invite non-members to present their work and how methodologies might improve IEAs or EBM.
b	Explore, develop, and refine indicators (e.g. habitat, social-cultural, climate) across a variety of temporal and spatial scales	Improve understanding of system drivers through review of external initiatives/reports which may be of relevance to WGNARS, e.g. The NOAA State of the Ecosystem reports, U.S. Offshore Wind Development IEA, Joint US and Canada Habitat Seminar, Canada's State of the	1.1, 1.2, 2.1, 6.6, 7.1, 7.5	3 years	Review and develop additional indicators relevant for IEA, and incorporate where relevant. Report on outcomes.

¹ Avoid generic terms such as "Discuss" or "Consider". Aim at drafting specific and clear ToR, the delivery of which can be assessed

		Ecosystem Report, revised Canadian Scientific Advice Secretariat (CSAS) processes and reviewing Canada's EBM Framework.			
c	Expand examination of trade-offs within and among multiple ocean uses.	Examine risk and/or vulnerability for species, habitats, ecosystems, fisheries, and human communities	2.7, 6.6, 7.1	3 years	<p>Develop and explore decision support tools, report on outcomes.</p> <p>Manuscript on enhancing IEAs through the inclusion of other decision making frameworks.</p> <p>Exploring IEAs for single species or multi-species) decision making.</p>
d	Develop transparent tools, resources, and collaborative workflows to improve accessibility and coproduction of knowledge across disciplines, communities, and regions.	Ongoing engagement with Rightsholders, stakeholders, and decision-makers.	7.1, 7.5	3 years	<p>Communication tools, report on outcomes</p> <p>Report on use of participatory modelling or mapping for objective setting in IEAs or EBM.</p> <p>Continue to explore and report on out-of-the-box communication tools.</p>

Summary of the Work Plan

Year 1	Improve regional capacity through WGNARS focused projects that involve case studies. Continue to collaborate where possible with other groups. Improve and develop indicators for habitat through seminar. Develop a joint, cross-regional IEA project.
Year 2	Continue to collaborate with other groups and gain interest in long-term participation in WGNARS. Explore habitat indicators and how they can be incorporated into conceptual models or other models developed through WGNARS. Explore novel communication tools for IEAs and EBM. Develop a seminar on new communication tools based on outcomes from ICES ASC 2023.
Year 3	Complete cross-regional joint projects on IEAs. Continue to expand on components of the IEA loop to identify gaps in knowledge and where WGNARS can provide support and research.

Supporting information

Priority	The current activities of this group will lead ICES into issues related to IEAs and EB(F)M. With some linkages to ICES EOs.
Resource requirements	The research programmes(e.g. in the US: State of the Ecosystem Reporting, Offshore Wind IEA; in Canada: Blue Economy of American lobster, EBM/EBFM/EAM working group) which provide the main input to this group are already underway, but resources and capacity are limited.

Participants	The group meetings are normally attended by some 20–25 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a somewhat close working relationship with all the IEASG working groups, but will continue to improve relationships between groups.
Linkages to other organizations	There is a close working relationship with the NAFO Working Group on Ecosystem Science and Assessment (WG-ESA). There is also a close working relationship between members from NOAA-NEFSC and related New England and Mid-Atlantic Fisheries Management Councils.

WGMARS - Working Group on Maritime Systems

2022/FT/IEASG02 A Working Group on Maritime Systems (WGMARS), chaired by Jessica Fuller*, Norway, Patricia Clay, USA, Leyre Goti, Germany, and Jennifer Bailey, Norway, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2023	Europe/Hybrid		Final ICES Scientific report by 31 August 2023	Jessica Fuller, Norway, as incoming chair
Year 2024	USA/Hybrid		Final ICES Scientific report by 31 August 2024	Patricia Clay, USA, outgoing chair
Year 2025	Europe/Hybrid		Final ICES Scientific report by 31 August 2025	

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLE
a	Analyse how the use of behavioural economics can support EBFM implementation	Fisheries management requires insight into human behaviour to understand how users respond to policy interventions. WGMARS will use behaviour economics as a tool to provide insight in behavioural mechanisms and responses.	6.3, 7.4, 7.5	Years 1 and 2	Paper submitted to peer-reviewed journal
b	Apply Social Network Analysis as a tool to assess ICES network connectivity and preparedness to	Finalize analyses for ICES IEA Expert Groups and complete and submit the current SNA draft that was	6.3, 7.4, 7.5	Year 1	Paper submitted to peer-reviewed journal

	address IEAs and the ICES Science Plan	initiated with support from the ICES Science Fund			
c	Investigate how/to what extent sex and gender (of Expert Group (EG) participants and of human research populations) are considered in the science of ICES EGs, through review of their Terms of Reference and interaction with the chairs.	The terms “sex” and “gender” are often conflated or overlooked, in science generally and within ICES. This work will provide an important baseline and contribution to the ICES Gender Equality Plan and the qualitative target “Awareness of sex/gender issues in research and projects”.	6.4, 6.6, 7.1, 7.2	1-3	Creation of an initial dataset; A news article featured in the ICES Newsletter
d	Analyse and compare the implementation and linkages of IEA/EBM/MSP and fisheries in the EU, and a selection of individual European and non-European member states.	EBM is a core ICES goal, and it may be implemented via the MSP or IEA tools. ICES has supported the use of both. This work will provide more detailed information on current uses of and connections between IEA and MSP at multiple and cross-jurisdictional levels.	7.4, 6.2, 6.1	1, 2	ICES Cooperative Research Report
e	WGMARS’ IEA paper uncovered some facilitating factors and barriers to the uptake of IEAs in ICES. Organisational theory, based in sociology and including new-institutionalism and meta-organizational theory, offer avenues to improving understanding these and other barriers	Use organizational theory to understand mechanisms and barriers to implementation of IEAs in ICES.	6.2, 6.3, 6.4	1-3	Paper submitted to peer-reviewed journal Identified barriers detailed in end of year/term WG report/s

and facilitating factors to fulfilling ICES' goals. Outputs will be used to inform ACOM, SCICOM and IEASG Chair on possible tools to overcome identified barriers. Possibilities to connect with ICES's IEA work will be further explored.

Summary of the Work Plan

YEAR 1	<ul style="list-style-type: none"> Map the use of Ecosystem-based Management (EBM via Integrated Ecosystem Assessment (IEA), and Marine Spatial Planning (MSP) in a variety of contexts. Submit paper reporting on social network analysis (SNA) of ICES. Continue and consolidate work in behavioural economics Begin exploration of organizational theory and gender issues in connection with already completed SNA work.
Year 2	Continue development of organizational theory and gender themes with respect to the operation of ICES and its work.
Year 3	<ul style="list-style-type: none"> Submit papers to journals on the applicability of organizational theory and gender analysis Explore feasibility of future work.

Supporting information

Priority	ICES continues to use and promote interdisciplinary approaches to explore how to improve ICESs' management and advice. WGMARS will be building on its own work in this area, in particular work designed to enhance ICES' ability to support IEAs and other fisheries management tools. Consequently these activities are considered to have a very high priority.
Resource requirements	Resource requirements are covered by WGMARS members, including through already funded projects and in some cases with institutional support.
Participants	The Annual Meeting is normally attended by some 10-15 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a very close working relationship with the IEASG. WGMARS is also very closely connected to the Strategic Initiative on Human Dimensions and involved in its activities. WGMARS will seek to enhance linkages with other WGs, especially those dedicated to the integration of social and economic approaches and data, in the coming ToR period. WGMARS is very relevant to the Integrated Ecosystem Assessment Working Groups, and involved in Workshops such as the recent WKCCMM.
Linkages to other organizations	WGMARS reaches out to various stakeholders and EBM professionals outside of ICES.

WGEAWESS - Working Group on Ecosystem Assessment of Western European Shelf Seas

2022/FT/IEASG03 A Working Group on Ecosystem Assessment of Western European Shelf Seas (WGEAWESS), chaired by Jacob Bentley, UK, and Sigrid Lehuta, France, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2023	To be decided	To be decided	E-evaluation	Outgoing chair: Marcos Llope
Year 2024	To be decided	To be decided	E-evaluation	
Year 2025	To be decided	To be decided	Final ICES Scientific Report by to IEASG	

ToR descriptors²

ToR	Description	Background	Science Plan Codes	Duration	Expected Deliverables
a	Review and update the Bay of Biscay/Iberian Coast (BoB-IC) and Celtic Seas (CS) ecoregion Ecosystem Overviews (EO) as necessary.	Linked to ICES advice, data profiling. The ToR work includes exploring potential additional products from other EGs (e.g. WKASCAPES), processes (e.g., OSPAR, EEA, STECF) and upcoming/ongoing research projects	4.1, 6.1, 6.5, 6.6	Ongoing	Ecosystem overviews (EO)
b	Perform a full cycle of Integrated Ecosystem Assessment (IEA) of the Celtic Sea region from scoping to outputs to inform advice.	The work will build on ongoing research projects related to IEA and EBM (Seawise, Mission Atlantic, EcoScope, etc.). It will provide risk assessment, management strategy evaluation, trade-off evaluation, co-construction of scenarios, and work to identify pathways into the advice via the ICES ecosystem-based management (EBM framework).	6.1, 6.4, 6.5	3 years	Chapter in group final report, potential peer-reviewed publication, and possible ICES Viewpoint

² Avoid generic terms such as “Discuss” or “Consider”. Aim at drafting specific and clear ToR, the delivery of which can be assessed

c	Improve the inclusion of human dimensions in the integrated ecosystem assessments and Ecosystem Overviews (as appropriate).	The work aims at increasing understanding of relevant objectives, socio-economic issues, expert knowledge and human behaviour (e.g. improved fisheries fleet modeling). Potential tools include surveys, participatory mapping and mental modelling with stakeholders.	7.1, 7.2, 7.3	3 years	Report on identification of methods and progress made to improve the inclusion of human dimensions in WGEAWESS IEAs and EOs.
d	Develop ecosystem knowledge to support the progression of ecosystem-based fisheries management (EBFM) advice and identify options and opportunities to contribute to ICES fisheries advice (catch options)	This ToR will build on the work of WKIrish and investigate potential ecosystem indicators for advancing ecosystem-based fisheries advice in the Celtic Seas and Bay of Biscay and Iberian Coast. This ToR aligns with WGIABs ToR b, with whom we will work closely to develop consistent methodologies for operationalising ecosystem information in ICES advice.	5.2, 5.3, 6.1, 6.6	3 years	Paper on EBFM (likely focused on the development of ecosystem-based fishing mortality reference points (Feco)); results reported in the final report;
e	Use ecosystem models to develop food web indicators in support of ongoing assessment work across the Celtic Seas and Bay of Biscay and Iberian Coast ecoregions, and identify options and opportunities to contribute to the Ecosystem Overviews.	This ToR will further develop and use the ensemble of models gathered by WGEAWESS (while also bringing in additional models) to develop food web indicators in relation to requirements for the Marine Strategy Framework Directive (MSFD) and Good Environmental Status (GES) reporting of D4.	1.9, 6.3, 6.5, 6.6	3 years	Paper on food web indicators; intermediate results reported in the final report.
f	Finalise sub-regional Integrated Trend Analysis (ITA) applications. Investigate methods to standardise and automate ITA and report on significant trends in the ecosystem. Investigate the impact of spatial scales at which ITA are performed on perceived trends.	Build on previous WGEAWESS progress, and apply methods and recommendations developed by WKINTRA.	1.4, 1.9, 6.5	Years 1 & 2	Paper on ITA application to sub-regions. Proposals for products related to ITA for EOs.

Summary of the Work Plan

Year 1	<p>The main task will be related to finalising the papers for Tor F. The group will continue to work toward the update of EO focusing on the application of the data profiling tool and improvement of the knowledge stream to EOs through communication with other relevant groups and automated processes (ToR A & C).</p> <p>The work related to new ToRs will be launched in relation with research projects (Tor B), in collaboration with other groups (ToRs D & E with WGIAB) and by reaching to stakeholders and SIHD WGs (Tor C human dimension).</p>
Year 2	Continue with year 1 activities. Annual meeting, intersessional work and meeting to progress on ToRs.
Year 3	Continue with year 2 activities. Annual meeting, intersessional work and meeting to progress on ToRs, finalise papers and other outputs. Begin planning for BoB-IC EO update.
All years	<p>Group leaders ToRs:</p> <ol style="list-style-type: none"> Sigrid Lehuta David Reid Debbi Pedreschi Jacob Bentley and Clive Fox Jacob Bentley Marcos Llope

Supporting information

Priority	<p>WGEAWESS will focus on the North Atlantic European continental shelf. Regional area of interest includes the Celtic Seas (Celtic Sea, Irish Sea, West of Scotland), Bay of Biscay (French continental shelf, Cantabrian Sea) and Western Iberia (Iberian Upwelling, Gulf of Cadiz), involving five countries (Ireland, UK, France, Spain and Portugal).</p> <p>The group will demonstrate and consolidate its advice capacity by strengthening the knowledge stream to EOs and developing a viewpoint on the IEA of the Celtic Sea. It will conduct research toward the development of new knowledge and associated tools to fill identified gaps pertaining to food web functioning and ecosystem-based fisheries management. The group will work toward the wider inclusion of the human dimension within IEAs to improve the understanding of users' stakes and behaviour and reflect trade-offs between objectives.</p>
Resource requirements	There is no resource implication for ICES. Working group plan is based on synthesis of data and results from existing data sources and in line with existing funding/ scientific programs. Scope of activities is dependent on this funding. Assistance from the ICES Secretariat and IEA Steering group Chair will be useful in identifying and making connections with relevant groups.
Participants	The Group is normally attended by some 20-30 members and invited guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and group under ACOM	Direct link to ADGEO when updating the EOs.
Linkages to other committees or groups	There is a very close working relationship with the IEASG and many of its expert groups and workshops. It is also very relevant to WGECO, WGCERP, WGSAM, WKIrish, along with stock assessment groups such as WGHANSA, WGBIE, WGCSE, WGMIXFISH. Collaborations for the new ToRs have been instigated with WGIAB, WGSOCIAL, WGCOMEDA, WGECON and WGMARS. The work and membership of this group is also critical to workshops such as WKEWIEA and WKINTRA which are co-chaired by group members, and feed back to the work of WGEAWESS.
Linkages to other organizations	DC- MAP- DG MARE, MSFD DG ENV, OSPAR.

WGIAZOR - Working Group on Integrated Assessment of the Azores

2022/FT/IEASG04 A Working Group on Integrated Assessment of the Azores (WGIAZOR), chaired by Andreia Braga-Henriques*, Azores, Portugal, Maria de Fátima Borges, Lisbon, Portugal, Régis Santos, Azores, Portugal, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2023	6-10 February	Horta, Azores, Portugal	E-eval by 24 February 2023 to IEASG	Addition of chair Andreia Braga-Henriques
Year 2024	XX February	Azores, Portugal	E-eval by Date Month 2024 to IEASG	
Year 2025	XX February	Azores, Portugal	Final report and E-eval by Date Month 2025 to IEASG	

ToR descriptors³

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Review and update information on landings, fishing effort and stock status for the Fisheries Overview (FO)	Linked to ICES advice. Maximising efficiency across relevant ICES working groups for FO development, eliminating redundancy.	5.3, 5.4, 6.6	3 years	Annual updates to Fisheries Overview (FO) and underlying data
b	Review and update regional knowledge (e.g., MSFD) and products for the Ecosystem Overview (EO)	Linked to ICES advice. Maximising efficiency across relevant groups for EO development, eliminating redundancy.	6.1, 6.5, 6.6	3 years	Inform Ecosystem Overview (EO) and collaborative networking (IEA groups) with improved workflow.
C	Define sub-regions features according to oceanographic and ecological units to identify and report on commonalities and divergences among sub-areas, with a focus on climate variability for management advice.	Responding to requests for standardisation of ecosystem advice products and inclusion of climate change information in Ecosystem Overviews. Linked to IEASG and the commitment to provide advice in the	1.1, 1.4, 1.9	3 years	Inform IEAs/EO. Results in the final report or/and as a collaborative paper.

³ Avoid generic terms such as “Discuss” or “Consider”. Aim at drafting specific and clear ToR, the delivery of which can be assessed

		context of ecosystem-based management (EBM).			
D	Assess the sustainability of the Azorean fisheries in terms of biological, socioeconomic, environmental and climatic performance.	Improving fisheries assessments based on new types of data and analysis to guide science-based policy in addition to traditional biological information and modeling.	6.6, 7.1, 7.7	3 years	Results in the final report or/and as a collaborative paper.

Summary of the Work Plan

Year 1	The main tasks will be related to presenting and drafting the outline for the papers/process for ToR D. Discuss social, ecological and economic scenarios from ToR D work. Begin revision of the Ecosystem Overview. Delivery of updates to the Fisheries Overview.
Year 2	The main tasks will be related to the ToR C. Continue revision of the Ecosystem Overview. Delivery of updates to the Fisheries Overview. Proposal of workshop with stakeholders to discuss the main outputs and connections with invited social scientists. The group will continue to identify data and outputs that may be potentially valuable to IEAs, ecosystem approach to fisheries management (EAFM), ecosystem-based management (EBM), and particularly the Ecosystem Overview (ToR B). The group will work to improve communication with other relevant groups linked to IEASG.
Year 3	Continue with Year 2 activities while liaising with relevant ICES WGs. Progress agreed upon methodologies for ToRs A,B,C&D. Finalise papers.

Supporting information

Priority	WGIAZOR will focus on integrated ecosystem assessment of the Azorean seas. Pressure on seas (biodiversity loss, climate changes, fisheries), lack of understanding of large marine ecosystem functioning and the context of ecosystem health indicators development (e.g. for the Marine Strategy Framework Directive (MSFD)) require regionally relevant approaches. Recently questions have arisen in relation to how to identify relevant scales for various processes, and how to summarise ecoregion level information from disparate, non-continuous data (e.g., surveys using different gears, different modelling approaches, and different socio-economic contexts). Furthermore, standardisation of approaches has become a key topic, particularly as ecosystem assessment moves more towards the realms of advice. WGIAZOR will work to address these challenges.
Resource requirements	There are no resource implication for ICES. Working group program is based on synthesis of data and results from existing data sources and in line with existing funding/scientific programs. Scope of activities is dependent on this funding. Assistance from the ICES Secretariat and IEA Steering Group Chair will be useful in identifying and making connections with relevant groups.

Participants	The group is normally attended by some 10 members plus guests.
Secretariat facilities	None apart from Webex and Sharepoint site provision.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Direct link to IEA steering group, ICES advice (Ecosystem Overviews and Fisheries Overviews).
Linkages to other committees or groups	There is a very close working relationship with all the groups of IEASG. It is also very relevant to establish relationships with ICES WGs such as WGSOCIAL and WGMARS. ToR a may involve collaboration with WGDEEP, WGEF, WGSOCIAL and WGMARS for the fisheries overview development. ToR b may rely upon working with WGDEC and WGML, among other groups that are contributing to the EOs.
Linkages to other organizations	DC- MAP- DG MARE, MSFD DG ENV, OSPAR.

WKEOF - Workshop for the production of the Ecosystem Overview of the Faroes Ecoregion

2022/WK/IEASG05 A Workshop for the production of Ecosystem Overview of the Faroes Ecoregion (WKEOF), chaired by Petur Steingrund*, Faroe Islands, Karin Margretha Húsgarð Larsen*, Faroe Islands, and Sólva Káradóttir Eliassen*, Faroe Islands, will meet in Torshavn, Faroe Islands, 17–20 January 2023 to:

- a) Review the content gathered and drafted (intersessionally) by the chairs for the Ecosystem Overview (EO) of the Faroes Ecoregion and identify knowledge gaps;
- b) Produce a conceptual model that identifies priority links for Human Activities-Pressures-Ecosystem Components for the Faroes Ecoregion following the ICES technical guidelines methodology;
- c) Prepare a complete draft EO for this ecoregion in line with the ICES technical guidelines for EOs;
- d) List gaps in knowledge and identify operational products to periodically revise the EO.

In their work, WKEOF shall describe the main environmental drivers for the ecoregion and link the main region-specific human activities to pressures on the ecosystem. The workshop will link these pressures to the state/impact of the ecosystem components (ice habitat and associated biota, pelagic habitat and associated biota, benthic habitat and associated biota, cephalopods, fish, reptiles, marine mammals and sea-birds). When possible/appropriate temporal trends of each ecosystem component will also be described.

WKEOF will report for the attention of ACOM and SCICOM by 3 February 2023.

Supporting information

Priority	The overviews are seen as a progression towards operational implementation of the ecosystem approach and as such are aimed at informing expert working groups and assisting Regional Seas Conventions and policy makers. ACOM aims to develop this product for all ICES ecoregions. The EOs should be prepared according to the ICES Technical Guidelines for Ecosystem Overviews .
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This workshop is an essential step to underpin a sound scientific basis for the management of the Faroes Ecoregion by recording sources of information and discussions on the decisions by the experts. The work of this workshop will feed directly into Advisory process and will allow comparison between different ecoregions. Consequently, these activities are considered to have a very high priority.

The ICES EOs are an integral part of ICES strategic plan to implement the Ecosystem Based Management (EBM). The EO for the Faroes Ecoregion will contribute to implementing EBM in the region and will be aimed at informing both the scientific community as well as states and intergovernmental management authorities and organizations.

Scientific justification	<p>Environments and ecosystems vary over time, sometimes with a trend and sometimes with a step change. The regional ecosystem overviews are intended to provide advisory groups with information on natural variability, trends and step changes in the dynamics of their respective ecosystems based on the best available evidence that are expected to influence the advice.</p> <p>They will also summarize the impacts that human activities have on the state of living and non-living resources of the ecosystem components through the main pressures in the region. This information needs to consider both spatial and temporal variability, with priority given to changes that would lead to the most significant modifications to the advice.</p> <p>To support emerging policy developments, those developing advice on the impacts of specific sectors (e.g. fisheries catch options, contaminants, by-catch, seabird abundance, sensitive areas etc.) will need to understand and respond to the implications of their advice for a range of ecosystem components and attributes, with priority given to those impacts that may compromise known management objectives.</p> <p>This development of ecosystem overviews is one of a number of ICES initiatives to integrate the advice on managing the human impacts on marine ecosystems of the ICES area. ICES still does not have a good understanding of the distribution and scale of anthropogenic pressures across the marine system or a suitable ensemble of tools available to estimate their cumulative effects.</p> <p>The process will be iterative with a number of phases which will increase the relevance, impact and quality of the ecosystem overviews.</p>
Resource requirements	ICES Data Centre, Secretariat and Advice process.
Participants	The participation should reflect the diverse scientific competence needed to fulfill the objectives of the workshop. Participants join the workshop at national expense. Participation of stakeholders is not committed.
Secretariat facilities	Data Centre, Secretariat support.
Financial	This work will be done at national cost.
Linkages to advisory committees	The EOs are part of the ICES advice and the product of the workshop will enter into the ICES Advisory process to be approved by ACOM.
Linkages to other committees or groups	Several ICES working groups may contribute with text and data to the content of this EO (AFWG, NWWG, WGCEPH, WGDEEP, WGHABD, WGHARP, WGINOR, WGNAS, WGOH, WGSCALLOP, WGPME, WGWIDE, WGZE, etc.) as well as ACOM, SCICOM, IEA, FRSG.
Linkages to other organizations	The work of this group may be used or is closely aligned with work under OSPAR, NEAFC and National Programmes. Organizations with legal mandates to take binding action in the Faroes Ecoregion EO: NEAFC, EU, Coastal States, and OSPAR. Additional

IGOs of interest to this work: NAMMCO, IWC, ICCAT.

WGIBAR - Working Group on Integrated Assessments of the Barents Sea

To be submitted (pending)

WGCERP - Working Group on Common Ecosystem Reference Points

To be submitted (pending)

WGCOMEDA - Working Group on Comparative Ecosystem-based Analyses of Atlantic and Mediterranean marine systems

To be submitted (pending)

WGIEAGS - Working Group on Integrated Ecosystem Assessment of the Greenland Sea

To be submitted (pending)

WGBESEO - Working Group on Balancing Economic, Social, and Ecological Objectives in Integrated Assessments

To be submitted (pending)

Resolutions approved in 2021

WGINOR - Working Group on Integrated Assessments of the Norwegian Sea

2021/MA2/IEASG00 The Working Group on Integrated Assessment of the Norwegian Sea (WGINOR), chaired by Anna H. Ólafsdóttir, Iceland and Benjamin Planque, Norway, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2022	14-18 November	Tromsø, Norway	Interim report by 15 January 2023 to IEASG	New incoming Co-Chair, Benjamin Planque, Norway
Year 2023	November	Tórshavn, Faroe Islands	Interim report by 15 January 2024 to IEASG	
Year 2024	November	Reykjavík Iceland	Final report by 15 January 2025 to IEASG	

Terms of Reference a) – g):

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
A	Perform integrated assessment of the pelagic ecosystem in the Norwegian Sea and develop a framework for identifying important signals for management.	Addresses needs in the Science Plan for developing understanding of the ecosystem and its responses to human impact and other pressures. In addition, start developing reporting formats to meet the needs of ecosystem-based advice.	6.5	years 1-3	WG report to SCICOM and ACOM January following each year
B	Utilize multi-species and ecosystem models to evaluate effects of single and multi-species harvest control rules on fishing yield and ecosystem state of the pelagic ecosystem in the Norwegian Sea.	Addresses needs in the Science Plan for developing ecosystem-based advice for sustainable use of marine ecosystems resources.	5.3	years 1-3	WG report to SCICOM and ACOM January following each year

C	Continue development of forecast products (1–5 years) for ocean climate and initiate development of forecast products for other ecosystem components in the Norwegian Sea.	Aims at providing better understanding of links between the physical environment and productivity of the pelagic ecosystem in support of integrated ecosystem assessment.	1.2	years 1-3	WG report to SCICOM and ACOM January following each year
D	Continue improvement of workflow, transparency, and replicability.	Develop data sharing plans towards FAIR data principles.	3.2	years 1-3	WG report to SCICOM and ACOM January following each year
E	Develop a two-way dialogue between WGINOR and relevant stakeholders and managers in Norway, Faroe Island, and Iceland.	Guiding the work of the group so that it addresses management needs.	6.4	years 1-3	WG report to SCICOM and ACOM January following each year
F	Compile information for future ecosystem overview revisions based on the ICES technical guidelines.	Summarize key achievements in developing an understanding of the ecosystem and its responses to human impact and other challenges.	6.5	year 1-3	WG report to SCICOM and ACOM January following each year
G	Annually review and revise the ecosystem status summary to report trends and recent changes	These summaries will provide information on annual trends will also provide the foundational material for the ecosystem overview revision.	6.5	year 1-3	Norwegian Sea ecosystem status summary

Summary of the Work Plan:

Year 1	Work on ToRs a-g
Year 2	Work on ToRs a-g
Year 3	Work on ToRs a-g

Supporting information

Priority	WGINOR aims to conduct and further develop Integrated Ecosystem Assessment for the
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	Norwegian Sea, as a step towards implementing the ecosystem approach, addressing core priorities in the ICES strategic plan.
Resource requirements	<p>Term of Reference a) The two international fish-plankton surveys in the Norwegian Sea have in recent years been developed in the direction of ecosystem surveys that capture several key components of the ecosystem. This provides a firm foundation for performing an integrated assessment of the Norwegian Sea pelagic ecosystem. A framework for assessing warning signals has been developed with input from relevant projects at the involved institutions and provides the platform for doing this part of the ToR.</p> <p>Term of Reference b) This will be supported by work conducted in the IMR-project “Sustainable multi-species harvest from the Norwegian Sea and adjacent ecosystems” (SIS harvesting project), which represents a continuation of the work done in WGINOR during the last three-year term.</p> <p>Term of Reference c) This will be supported by work conducted in the SIS harvesting project and by oceanographic information collected during cruises in the Norwegian Sea and surrounding waters and supplied by satellite-based monitoring. The SIS harvesting project provides resources needed to complete development of a forecast system.</p> <p>Term of Reference d) This will be based on experiences made during implementation of this ToR. Some support from ICES secretariat may be required to implement FAIR, TAF, data profiling, and related approaches.</p> <p>Term of Reference e) This will be conducted on a national basis, at the time/place of the WGINOR annual meetings. No additional support required.</p> <p>Term of Reference f) Update of the elements of the ecosystem overview will be done based on existing projects and management initiatives, such as the Norwegian ecosystem-based management plan for the Norwegian Sea. The new elements focusing on climate change will be developed with a basis in ongoing projects and other assessment processes, such as IPCC. Additional resources will be required in the participating institutions to complete the latter work, in particular related to projections and assessments of anticipated effects of climate change in future. ToR f’s expected deliverables was updated to be clearer on the group’s plans to support the ecosystem overview revisions.</p> <p>Term of Reference g) Was added as the result of discussions following a recommendation from WGINOR to ACOM about their plans to produce the Norwegian Sea ecosystem status summary annually.</p>
Participants	The Group is normally attended by some 15-20 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	WGWIDE
Linkages to other committees or groups	IEASG

Linkages to other organizations	The work done in the group is highly relevant to other assessment initiatives, in particular the Norwegian ecosystem-based management plan for the Norwegian Sea and OSPAR.
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WGIAB – Joint ICES/HELCOM Working Group on Integrated Assessments of the Baltic Sea

2021/FT/IEASG03 The ICES/HELCOM Working Group on Integrated Assessments of the Baltic Sea (WGIAB), chaired by Carolyn Faithfull, Sweden and Riikka Puntila-Dodd, Finland, will generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2022				Intersessional work by correspondence
Year 2023	To be decided	To be decided	ICES Scientific report	Intersessional work by correspondence
Year 2024	To be decided	To be decided	Final ICES Scientific report	

ToR descriptors

TO R	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Analyse and evaluate Baltic Sea food webs, and develop indicators to support ongoing assessment work in ICES and HELCOM	This ToR will evaluate food webs in different sub-basins of the Baltic Sea, aiming also to develop food web indicators in relation to requirements for MSFD reporting of D4. The work will build on previous work in ICES and HELCOM, and extend to e.g. HELCOM CG Foodwebs for identification of suitable outputs.	1.9, 6.3, 6.6, 6.5	3 years	-Research article(s) - Intermediate results reported in interim reports as well as the final report. -Contributions, as applicable, to Ecosystem overviews e.g. contribution to planned WK, and possible pipeline proposal.
b	Develop ecosystem knowledge to support the progression of ecosystem-based fisheries advice.	This ToR will investigate potential ecosystem indicators for advancing ecosystem-based fisheries advice in the Baltic Sea. The ToR is inspired by, and aims to contribute to, recent initiatives within e.g. WKEBFAB, building also on the work of	6.1, 6.6	3 years	- Research article(s) - Intermediate results reported in interim reports as well as the final report. -Contribution, as applicable to ICES fisheries advice carried out within WGBFAS

		other ICES EGs as relevant.			
c	Develop a wider range of decision-support tools for integrated ecosystem-based advice.	This ToR will develop decision support tools (e.g. Bayesian Belief Networks for ecosystem-based management in the Baltic Sea by combining a variety of information from models and expert knowledge, including human dimensions and ecosystem services. Additional tools and models to support the ToR are welcomed based on initiatives from within the group.	6.4, 7.1, 2.2	3 years	-Research article(s) - Intermediate results reported in the final report.
d	Revise the Baltic Sea Ecoregion Ecosystem Overview including review of the activity-pressure-state diagramme	Revisions of the EOs should occur every 5 years according to the EO technical guidelines. The last full revision was in 2018.	6.5, 6.6, 7.2	Year 3	- Revision of the Baltic Sea Ecosystem EO

Summary of the Work Plan

Year 1	Annual meeting, intersessional work: Workshop April: Present decision tools and models for integrated ecosystem based management. Identify additional needs/developments for decision support tools. Establish clear internal working groups for the three ToRs and goals for intersessional work. Initiate planning the EO revision
Year 2	Annual meeting, intersessional work across all ToRs, Revise the Baltic Sea Ecosystem Overview
Year 3	Annual meeting, intersessional work across all ToRs
All years	Group leaders ToRs: a) Carolyn Faithfull and Lena Bergström b) Maciej Tomczak c) Laura Uusitalo and Riikka Puntala-Dodd d) To be decided in April

Supporting information

Priority	WGIAB aims to conduct and further develop Integrated Ecosystem Assessments for the different sub-systems of the Baltic Sea, in support of implementing the ecosystem approach in the Baltic Sea.
Resource requirements	Assistance of the Secretariat in maintaining and exchanging information and requirements data to potential participants. Assistance of especially the ICES Data Centre to collect and store relevant dataseries.
Participants	The Group is normally attended by some 20 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	WGBFAS
Linkages to other committees or groups	WGINOSE, WGNARS, WGEAWESS, WGINOR, WGIBAR, WGCAMEDA, WGSOCIAL, WGMARS, SICCME, WGCERP, WKEFAB
Linkages to other organizations	HELCOM

WGICA - ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean

Extension to year 4 approved by ACOM/SCICOM 2022

2021/FT/IEASG01 A joint ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean (WGICA), chaired by Sei-Ichi Saitoh (Japan), Lis Lindal Jørgensen (Norway) and Martine van den Heuvel-Greve (Netherlands) will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2022				
Year 2023	April and October	Town, Country TBD (incl. online possibility)	Interim E-evaluation	
Year 2024	April and October	Town, Country TBD (incl. online possibility)	Interim E-evaluation	
Year 2025	TBC	TBC	Final ICES Scientific Report by DATE to SCICOM	To plan for the 2026 publication of the Cooperative Research Report (CRR)

ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN		DURATION	EXPECTED DELIVERABLES
			CODES			
a	<p>Identify and prioritize the relevant social, economic, and ecological (SEE) questions to be asked for the CAO in collaboration with the PAME CAO project.</p> <p>Identify relevant audience/stakeholders to the CAO-integrated ecosystem assessment (IEA).</p>	To be used in identifying which key questions are relevant to stakeholders in the CAO	1.1 1.2		Year 1-3	Relevant stakeholders and SEE questions for the present and future summer-free CAO.
b	Identify priority semi-quantitative and quantitative methods for doing <i>relevant</i> IEA for the CAO based on existing information already compiled in the WG's reports, EOs and CRR.	To link the social, economical, physical, chemical and biological CAO ecosystem to the human activities, pressures and impacts	2.1 2.2		Year 2-4	Overview of available datasets, methods and tools (qualitative, quantitative & semi-quantitative as appropriate), assessment methods, and initiation of analyses. Identification of key knowledge gaps.
c	Integrate and prioritize scientific SEE questions into the IEA for the CAO, this will include collaboration and development of methods with relevant IEASG and HAPISG groups.	To provide tentative figures showing qualitative and semiquantitative/quantitative linkages between identified components of the IEA, including risk and confidence based on existing socio, economic and ecologic information.	3.1		Year 2-4	<p>One or more output(s) (e.g. risk assessment, ITA, conceptual and ecosystem models) of the CAO IEA to be published in the open source ICES reports series.</p> <p>Begin drafting the Cooperative Research Report (CRRs) on Human Activities and existing Management Bodies and Integrated Ecosystem Assessment methods and processes.</p>

Summary of the Work Plan

Year 1	Writing of Report 2 on Human Activities, Pressures and Ecosystem vulnerability
Year 2	Identify the stakeholders and key scientific questions for an IEA of the CAO
Year 3	Identify and initiate IEA method(s) to address the key scientific questions
Year 4	Begin drafting the CRR section on IEA methods and processes to be included as part of the final report for this term

Supporting information

Priority	The current activities of this Group will lead ICES-PICES-PAME into issues related to the development of an Integrated Ecosystem Assessments for the Central Arctic Ocean as a step towards implementing an ecosystem approach in the region. These activities are considered to have a very high priority in this rapidly changing ecosystem and will also contribute towards advancing ecosystem science as identified as a priority of the ICES Science Plan.
Resource requirements	Assistance of ICES Secretariat in maintaining and exchanging information and data to potential participants, especially the services of the ICES data centre to generate data tables for analysis from selected variables held in the database and potentially webhosting relevant material. Assistance in the steps of the IEA process. Reporting support.
Participants	20-50 ICES-PICES-PAME members and guests
Secretariat facilities	Meeting support (both in person and online)
Financial	No financial implications identified
Linkages to ACOM and groups under ACOM	ACOM (CRR will advance sections of the CAO Ecosystem Overview)
Linkages to other committees or groups	IEASG and its working groups, especially WGINOR (Norwegian Sea), WGIBAR (Barents Sea), and WGIEAGS (Greenland Sea), and WGIEANBS-CS (Bering and Chukchi Seas) as these regions encircle the CAO and the Atlantic and Pacific gateways. Other relevant ICES groups conducting work on SEE-related topics include WGBESEO, WGECON, and WGSOCIAL.
Linkages to other organizations	PICES, Arctic Council working groups, and the Provisional Scientific Coordinating Group (PSCG) of the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean

Resolutions approved in 2020

WGINOSE - Working Group on North Sea Integrated Ecosystem Assessment

2020/FT/IEASG01 The Working Group on North Sea Integrated Ecosystem Assessment (WGINOSE), chaired by Andrea Belgrano*, Sweden and Morten Skogen, Norway, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2021	10 – 14 May	Online meeting	E-evaluation	Change of chairs: Morten Skogen, replacing Erik Olsen.
Year 2022	9–13 May	ICES HQ, Copenhagen, Denmark	E-evaluation	
Year 2023	8–12 May	ICES HQ, Copenhagen, Denmark	Final ICES Scientific Report by 31 May to IEASG	Change of chair: outgoing Andrew Kenny (United Kingdom), incoming Andrea Belgrano (Sweden)

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Update and operationalise strata specific ecosystem trends analysis including the development and/or application of ‘warning’ indicators of ecosystem state by working closely with WGECCO, WGSFD and WKINTRA. Investigate methods for communicating trends in ecosystem state, especially significant changes, using ecosystem summary sheet or report card style approaches.	a) Science Requirements b) Support Advisory Requirements c) Requirements from other EGs	1.1, 2.1	3 years and on-going annually	Review paper on report card/ESS methods in supporting IEA science that supports advice

b	Operationalise the integration of human activity and pressure data, including data pathways, into strata specific IEAs for the Greater North Sea Ecoregion distinguishing between fixed structures (e.g. pipelines, windfarms) and on-going activities (e.g. dredging, fishing, shipping, underwater noise, litter) by working with WGSFD, WGSHP, WGCEAM to establish appropriate methods for CEAs	a) Science Requirements c) Requirements from other EGs	4.1	3 years and on-going annually	Updated dynamic map of assessed human activities, pressures and impacts for WGINOSE webpage.
c	Continue to develop and test/validate strata specific decision support tools to support ecosystem management and advice (e.g. through mental models, bow-tie and EwE/Ecospace models and network analysis)	a) Science Requirements	2.2, 2.3, 3.2	3 years and on-going annually	Paper on application of validated qualitative ecosystem models in supporting ecosystem assessments and management advice
d	Update the greater North Sea Ecosystem Overview as required	a) Science Requirements b) Advisory Requirements c) Requirements from other EGs	1.2, 2.1	As required - ongoing	Updated North Sea ecosystem overview

Summary of the Work Plan

Year 1	The first year will focus on further development of strata specific trend analysis and communication, especially in relation to 'warning' indicators and scoping ecosystem summary sheet/report card reporting at the North Sea scale. Work will also begin on drafting a review paper on trend analysis methods and communication approaches for IEA science that supports advice. Updates on human activities, pressures and impacts, especially in relation to CPUE and fisheries data from the English Channel will be undertaken. Further development of ecosystem assessment support tools, especially in relation to validating conceptual model outputs will be undertaken and a paper describing the integration of quantitative/qualitative models will be finalised.
Year 2	In addition to continuing work on the above items, a stakeholder workshop will be convened for the Kattegat so as to update stakeholders and managers on the validation and refinement of the Kattegat assessment tool/model, effectively as a follow on to WKKEMSSP. Plans will also be initiated to implement additional strata specific EwE models of the North Sea (e.g. Southern Bight and Norwegian Trench) so as to initiate subsequent follow-up engagement with stakeholders in these two regions. An update of the North Sea ecosystem overview will also be initiated this year.
Year 3	In addition to continuing with activities initiated in year 1 and 2, additional stakeholder workshops will be organised as follow-on to either the Norwegian Trench and/or Southern Bight strata.

Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the development of Integrated Ecosystem Assessments for the North Sea (a data rich ecosystem) as a step towards implementing the ICES Science Plan and the ecosystem approach, these activities are considered to have a very high priority.
Resource requirements	Assistance of the Secretariat in maintaining and exchanging information and data to potential participants, especially the services of the ICES data centre to generate data tables for analysis from selected variables held in the database and potentially web-hosting relevant material
Participants	The Group is generally attended by 10–20 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and group under ACOM	Relevant to the work of ACOM and SCICOM
Linkages to other committees or groups	There is a very close working relationship with all the IEASG working groups. It is also very relevant to the following ICES expert groups: WGSFD, WGECO, WGSHP, WGCEAM, WKINTRA, WGBESIO, WGFBIT
Linkages to other organizations	OSPAR, NAFO, DG-ENV, DG-MARE

WGSOCIAL - Working Group on Social Indicators

2020/FT/IEASG02 The **Working Group on SOCIAL indicators** (WGSOCIAL), chaired by, Amber Himes-Cornell, FAO, and Marloes Kraan, Netherlands, and will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
	30 March	Online meeting		
Year 2021	17 May	Online meeting	E-evaluation	Lisa L. Colburn will step down by end-2021
	10,11,15,17,18 June	Online meeting		
Year 2022	9-10 May	Online meeting	E-evaluation	
	16-19 May	Online meeting		
Year 2023	TBD	Europe	Final ICES Scientific report by (TBD) 2021	

ToR descriptors 2021 – 2023

ToR	DESCRIPTION	BACKGROUND	SCI-ENCE PLAN CODES	DU-RATION	EXPECTED DELIVERABLES
a	To continue building capacity for social science in ICES, giving consideration to research and institutional needs in all ICES member countries, as well as useful connections to international marine/ fisheries social science organizations, such as the Society for Applied Anthropology and the Centre for Maritime Research (MARE).	This builds on the initial scoping exercise within ICES to expand social science capacity building efforts, but also ensures coordination of activities with other international bodies and links to the wider scoping work in the Strategic Initiative for the Human Dimension (SIHD).	5.4, 6.6	Years 1 –3	Annual reporting
b	To identify and report on culturally relevant social indicators and community data gaps that point to priorities for data collection, research, institutional needs, and training in all ICES member countries; and where possible propose systems to collect missing data.	To aid prioritization of data collection, management and analysis to enable qualitative and quantitative analyses of social issues for Ecosystem Overviews, Integrated Ecosystem Assessments and future advice requests. The ToR also links to ICES Data Centre.	4.2, 5.4, 6.6, 7.1, 7.2, 7.7	Years 1 –3	Annual reporting, potentially also scientific manuscript

c	To investigate the approaches, methods, tools and information flow needed to provide trade-off analysis of the impacts of alternative management measures on communities and stakeholder groups	To develop a system to support potential future advice requests and development of Ecosystem Overviews and Integrated Ecosystem Assessments.	5.4, 5.8, 6.5, 7.3, 7.5, 7.6	Years 1 –3	Annual reporting
d	To assess and report on the social and cultural significance of commercial fishing and its management for selected coastal regions in the ICES area	To support future potential advice requests and development of Ecosystem Overviews and Integrated Ecosystem Assessments.	2.7, 5.8, 6.6, 7.1, 7.2, 7.7	Years 1 –3	Annual reporting, potentially also scientific manuscript(s)
e	To coordinate the provision of culturally relevant social indicators and analysis as part of integrated socio-ecological evaluations in support of Ecosystem-Based Management.	To contribute to the development of a framework for integrated assessment of alternative scenarios for marine fisheries, as part of broader Ecosystem-Based Management approaches.	2.7, 4.3, 6.5, 6.6,, 7.1, 7.2, 7.7	Years 1 –3	Annual reporting

Summary of the Work Plan

Year 1	Continue the current work and identification of ongoing needs for social science in ICES (ToR a). Continue defining culturally relevant social indicators and identifying data gaps for specific contexts and applications (ToR b). Link with the work on social indicators of STECF. Start work on defining the information flow needed to provide trade-off analysis (ToR c). Develop and maintain connections with other relevant groups within and outside ICES (ToRs a and e). Collaborate with WGECON on shared case studies (ToR e). Produce Interim Report.
Year 2	Work toward completion of case studies with WGECON (ToRs b, c and d) and assessing the social and cultural significance of commercial fishing (ToR d). Work with other relevant groups within and outside ICES (ToR e). Produce Interim Report.
Year 3	Aim to complete ToR c, d, and e, including the planned manuscripts. Discuss and plan strategies and concrete steps for future work. Produce Final Report.

Supporting information

Priority	<p>Nations are concerned about the sustainability of fish stocks and marine ecosystems, not least because they can contribute to human well-being and food security; therefore, these natural resources have a societal value. The social dimension is increasingly an integral part of marine science and scientific advice regarding the use and conservation of marine resources.</p> <p>In 2017, ICES realised that the demand for science and advice to address social and societal considerations was increasing, and the Strategic Initiative on the Human Dimension (SIHD) has served to raise the profile of social science in ICES in the last few years. With WGSOCIAL, ICES has an EG that addresses social issues and focuses primarily on the development of social metrics and core social analyses that are demanded in parts of the ICES network (e.g., further development of ecosystem overviews).</p> <p>The benefits of expanding the engagement of ICES in social science were highlighted in the MSEAS meeting 2016, resulting in a second MSEAS meeting, planned for 2021.</p>
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	<p>The recent ICES webinar on COVID-19 also demonstrated the value of social science for marine science and ICES commitment to it. Although there has been no official request of social indicators as of 2020, it is clear that interest is growing for interdisciplinary approaches. DGMARE is also exploring what the social dimension of the Common Fisheries Policy is and can be. Within ICES there is recognition that it is desirable to add social metrics to ICES ecosystem overviews and thus to recognize people and their livelihoods as part of the ecosystem.</p>
Resource requirements	<p>The group will rely on ongoing international and national research projects to support involvement of WGSOCIAL members. WGSOCIAL will work with the ICES Data Centre to obtain port data in order to develop a socio-economic product for the ecosystem overviews.</p>
Participants	<p>41 participants, from 15 countries</p>
Secretariat facilities	<p>None.</p>
Financial	<p>No financial implications.</p>
Linkages to ACOM and groups under ACOM	<p>In the longer term the EG will be ready to support ACOM in addressing advisory requests from ICES clients if these are forthcoming.</p>
Linkages to other committees or groups	<p>The subject area of this EG has close linkage with the following ICES groups: WGEAWESS, WGBESEO, WKCONSERVE, WGMARS, WGCOMEDA, WGIMM, WGBIE, WGIAB, WGSEDA, WGECON, WGIMM, WGRMES, WGNARS, WGHIST and the Strategic Initiative SIHD.</p> <p>Frequent interaction with WGECON and SIHD is especially important to ensure the smooth and efficient introduction of further social and economic science into the ICES network.</p>
Linkages to other organizations	<p>Society of Applied Anthropologists (SfAA), NOAA Fisheries Human Dimensions and IEA Program, the Centre for Maritime Research (MARE), the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES), Organisation for Economic Cooperation and Development (OECD), Scientific, Technical and Economic Committee for Fisheries (STECF EWG 20-14), Coast Action, PICES, IMBER Human Dimension group, Future Coasts</p>

WGIPEM - Working Group on Integrative, Physical-biological, and Ecosystem Modelling

2021/FT/IEASG06 The Working Group on Integrative, Physical-biological, and Ecosystem Modelling (WGIPEM), chaired by Erik Askov Mousing*, Norway, Sonja van Leeuwen, Netherlands, and Ute Daewel, Germany, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in chairs, etc.)
Year 2022	24-27 October	Texel, The Netherlands	ICES E-eval by 1 December	Ute Daewel, Germany, incoming Chair, Solfrid Hjøllø to continue for 1 year (knowledge transfer), Marie Maar as outgoing Chair.
Year 2023	27-31 March	ICES HQ, Copenhagen, Denmark	ICES E-eval and scientific report by 12 May	Solfrid Hjøllø as outgoing Chair, incoming Chair, Erik Askov Mousing, Norway.
Year 2024	March/April	Southern Europe	Final ICES scientific report and E-eval by TBD	New incoming chair TBD, Sonja van Leeuwen to continue for 1 year (knowledge transfer).

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCI-ENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	<p>Improve model interaction between trophic levels by:</p> <ul style="list-style-type: none"> - Investigating the importance of spatio-temporal scales for trophic match-mismatch - Assessing human activities on effects on ecosystems, including cumulative impacts 	<p>Fundamental science lying behind the structural and parametric needs for these types of model.</p> <p>Important for IEA groups and WKEWIEA.</p> <p>Linked to Marine Ecosystem Research Program</p>	2.2, 2.5	Annual	<p>Report or paper on how human activities affecting marine ecosystems can be described in models.</p> <p>Evaluation of the ICES ASC 2021 session on 'Impacts of human pressures on ecosystem components assessed by dynamic modelling. organized by the group; status, knowledge gaps and future perspectives.</p> <p>Further develop contact to the social science EG's.</p> <p>Where appropriate peer reviewed publications are endorsed.</p>
b	<p>Improving lower trophic level models by investigating:</p> <ul style="list-style-type: none"> - Parameterization of functional diversity (community 	<p>More research is needed to improve model description of diversity, adaptation and traits in lower trophic level models.</p>	1.3, 1.9	Annual	<p>Collaborative paper on productivity and drivers across models and ecosystems.</p> <p>Collaborative paper on productivity across ecosystems.</p>

	<p>structure, traits) and adaptations</p> <ul style="list-style-type: none"> - Patterns and drivers of plankton phenology and productivity across models and ecosystems - Benthic-pelagic coupling in models 	<p>The benthic-pelagic coupling is important for nutrient and energy fluxes and should be better described in the models.</p> <p>IEA groups, WGZE and BEWG.</p>			<p>Report on impacts of human pressures on ecosystem components assessed by dynamic modelling.</p> <p>Where appropriate peer reviewed publications are envisioned.</p>
c	<p>Improve higher trophic level models by investigating:</p> <ul style="list-style-type: none"> - Effects of connectivity, climate and habitat on emerging species distribution, to support management and fisheries - Key process formulation (mortality, physiological rates, etc.) - Movement algorithms 	<p>Understanding the connectivity between networks of MPAs and biological hot-spots under influence of climate change is vital. Connectivity is also essential to defining the spatial structure of stocks and better understanding of the recruitment process.</p> <p>Fundamental research is needed to improve the description of key physiological processes in models.</p> <p>Important for IEA EG's, spatial planning EG's, BWEG, WGBIOP and for advice.</p>	1.3, 1.4	Annual	<p>Report on impacts of human pressures on ecosystem components assessed by dynamic modelling.</p> <p>Collaborative report or paper on movement algorithms used in modelling.</p> <p>Appropriate peer reviewed publications are envisioned.</p>
d	<p>Assessment of model skill evaluation methods by:</p> <ul style="list-style-type: none"> - Comparison of existing guidelines and metrics of skill assessment using existing examples and applying these methods to models used by the group to conclude on the feasibility of the currently existing approaches and identify possible weaknesses - Investigate uncertainty analysis (structural, parameters, scenarios) including model ensembles - Exploring representativeness and use of observations for ecosystem model validation 	<p>The lack of systematic evaluation of ecosystem model performance and sensitivity currently limits their use in an operational and management context.</p> <p>Evaluation is challenged by the complexity of the models themselves, as well as model vs sparse dataset comparisons, where characterizing different types of variability (mean or trend; interannual or seasonal; rare or extreme events etc.) are needed.</p> <p>Links to all EGs using multi-species and ecosystem modelling (e.g. WGSAMS, WGIMM, working groups on integrated assessments).</p>	1; 3, 5.3	Annual	<p>Collaborative report or paper on representativeness.</p> <p>Appropriate peer reviewed publications are envisioned.</p>

Summary of work plan

Year 1	Annual meeting to report on the state-of-the-art of the topics in ToRs a-d, planning of joint papers and specific workshops on selected topics.
Year 2	Annual meeting to report on the state-of-the-art of the topics in ToRs a-d and joint meeting with other expert groups. Specific workshop on some of the identified topics.
Year 3	Annual meeting and final report on the state-of-the-art of the topics in ToRs a-d, and joint meeting with other expert groups.

Supporting information

Priority	This group's activities will support the ecosystem approach to fisheries science by combining knowledge of physical and biological processes, and modelling expertise that is required to strengthen our understanding of ecosystem functioning. The group will foster the development of and report on the application of "end-to-end" modelling tools. The activities of the group will foster international collaboration and networking among established and young scientists in a rapidly evolving science field, and should be given high priority.
Resource requirements	The research programs which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	It is envisioned that this group will attract a large community of biologists / experimentalists, and modellers – with an annual meeting attended by some 15–25 members and guests.
Secretarial facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages, but discussion and/or workshops with other groups are envisioned.
Linkages to other committees and groups	There is a very close working relationship with all the groups of IEASG. It is also very relevant to WGSAM, WGBE, WGS2D, WGINOSE and WGSPF.
Linkages to other organisations	There are natural linkages to PICES Working Group 40: Climate and Ecosystem Predictability, and Joint IMBeR/Future Earth Coasts Continental Margins Working Group (CMWG), and the group will seek to establish communication with these organizations. Several members are involved with OSPAR ICG-EMO and with the Nansen Legacy and the European Marine Board. We also have several members employed at Joint Research Centres (EU). Member presentations at annual meetings ensure the group knows of developments within these organisations.

Resolutions approved in 2019

WGIEANBS-CS – ICES/PICES Working Group on Integrated Ecosystem Assessment of the Northern Bering Sea-Chukchi Sea

2019/FT/IEASG11 A ICES/PICES Working Group on Integrated Ecosystem Assessment of the Northern Bering Sea-Chukchi Sea (WGIEANBS-CS), chaired by Elizabeth Logerwell, USA, and Yury Zuenko, Russia, will work on ToRs and generate deliverables as listed in the Table below.

YEAR	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
2021	14 April	Online meeting		Extension granted to start 2021 instead of 2020
	23 September	Online meeting	Interim e-evaluation	
2022				
2023	September (ICES ASC)	TBD	Final e-evaluation and ICES Scientific Report by end of November	
	October (PICES AM)	TBD		
	September (Arctic community workshop)	TBD		

Other intersessional meetings and workshops will occur as the opportunities arise.

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	Science plan codes	DURATION	EXPECTED DELIVERABLES
a	Determine approach and methodology for conducting an IEA in the Northern Bering – Chukchi Sea	Before starting data analysis, basic discussions on suitable methodological/analytical approaches are required. This can be started after initial datasets are assembled.	1.1, 1.3, 7.1	Year 1	Reports submitted to ICES and PICES
b	Compile an inventory of scientific metadata	The inventory will contain physical, chemical and biological (incl. higher trophic levels) oceanographic data.	1.1, 1.3	Year 1	Meta-database
c	Development of	There are several	1.1, 1.3, 7.1	Year 1	Reports submitted to

	indigenous knowledge sharing with knowledge holders, to facilitate co-production of knowledge while protecting intellectual property as per the UN Declaration on the Rights of Indigenous Peoples (Articles 11.2, 31).	indigenous Alaskan and Russian communities that can provide specialized Indigenous and Traditional Knowledge unavailable from other sources about characteristics and changes of the Northern Bering – Chukchi Sea LME			ICES and PICES
d	Compile an inventory of institutions and programs active in the region	There are several institutions and programs active in the NBS-CS that could contribute to the IEA	1.1, 1.3, 7.1	Year 1	Inventory. Reports submitted to ICES and PICES
e	Describe the key physical, biological and human elements of the ecosystem	Identification of key characteristics is needed to develop conceptual models of the ecosystem	1.1, 1.3, 7.1	Year 2	Reports submitted to ICES and PICES and/or paper submitted to peer-reviewed journal
f	Develop shared conceptual models including both Indigenous Knowledge and science; and review of hypotheses for ecosystem dynamics. Identify potential indicators. Describe goals and targets; and objectives and values	A dynamic description of the ecosystem can be achieved or supported through construction of conceptual models. This should encompass human activities along with the natural (non-human) components and processes of the system. Development of these conceptual models be done in close collaboration with Indigenous Peoples and relevant stakeholders, using Indigenous/Traditional and Local knowledge (TLK) along with knowledge from physical, biological and social sciences.	1.1, 1.3, 7.1	Year 2	Reports submitted to ICES and PICES and/or paper(s) submitted to peer-reviewed journal
g	Assess ecosystem status and trends. Identify potential impacts/risks at the LME-scale; and at the local scale with emphasis on human use and Indigenous Knowledge	This ToR will be based on activities and advancements of the above. It is a hope to produce scientific manuscript.	1.1, 1.3, 7.1	Year 3	Reports submitted to ICES and PICES and/or paper(s) submitted to peer-reviewed journal, possibly a special issue
h	Knowledge gap analysis	To further advance the IEA for the region, identification of	1.1, 1.3, 7.1	Year 3	Reports submitted to ICES and PICES and/or paper(s)

	knowledge and data gaps is inevitable, together with considering improvements in data collection.	submitted to peer-reviewed journal, possibly a special issue
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Summary of the Work Plan

Year 1	During Year 1, the foundation will be created for conducting an IEA of the NBS-CS. Meetings will take place remotely via web/teleconferences. Cultural awareness training for WG members will be offered. The WG will determine the approach and methodology for the IEA and will compile information about existing datasets (as metadata), institutions and programs. The WG will also develop methods and approaches to facilitate co-production of knowledge.
Year 2	During Year 2, the key elements of the ecosystem will be described and shared conceptual models including both Indigenous Knowledge and science will be developed. Meetings will take place at ICES ASC and PICES ASM; and other venues as opportunities arise with preference to those in Arctic communities.
Year 3	Year 3 will see the culmination of the first two years of preparatory work. Meetings will take place at ICES ASC and PICES ASM; and in an Arctic community. An IEA of the NBS-CS will be published. This report (and collection of scientific papers) will assess the ecosystem status and trends; identify impacts/risks at the LME-scale and at the local scale with emphasis on human use and Indigenous Knowledge; and report on knowledge gaps.

Supporting information

Priority	The Northern Bering Sea-Chukchi Sea (NBS-CS) region is experiencing unprecedented ocean warming and loss of sea ice as a result of climate change. Seasonal sea ice declines and warming temperatures have been more prominent in the northern Bering and Chukchi seas as almost all other portions of the Arctic. As an inflow shelf, the Chukchi Sea provides essential sources of nutrients, freshwater and heat to the Arctic Ocean, affecting processes in adjacent shelf systems as well as the deep basin. Chronic and sudden changes in climate conditions in this Arctic gateway are increasingly impacting marine species and food-webs and expanding opportunities for commercial activities (shipping, oil and gas development and fishing), with uncertain and potentially wide-spread cumulative impacts. There are strong concerns about the impacts of climate change and industrial activities, and these impacts may be particularly pronounced in Arctic indigenous communities dependent on the health and stability of the ecosystem. The combination of unprecedented, rapid change and increased interest in the Arctic in general and the NBS-CS specifically make this an opportune time for a synthesis of issues and knowledge. An Integrated Ecosystem Assessment (IEA) can accomplish this synthesis.
Resource requirements	No resource requirements from ICES
Participants	The group is expected to attract between 25 to 35 members and guests with broad coverage of ecosystems within ICES and PICES regions; and with representation from Indigenous/Traditional Knowledge as well as science.
Secretariat facilities	The group will request meeting rooms / times associated with the ICES ASC, for a half-day meeting. This will require some assistance from members of the secretariat organizing those events. Similar requests will be made of the PICES secretariat.
Financial	No financial requirements from ICES
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.

Linkages to other committees or groups	There is a very close working relationship with all the groups IEASG. It is also very relevant to the Working Groups on Ecosystem Assessment in other regions, such as WGEAWESS, WGIAB, WGIBAR, WGIEAGS and particularly WGICA.
Linkages to other organizations	<ul style="list-style-type: none"> • Joint partnership between ICES and PICES: the proposal has been approved by PICES; • International Arctic Science Committee (IASC), interest in co-sponsorship has been expressed • Arctic Council Protection of the Arctic Marine Environment (PAME), interest in co-sponsorship has been expressed • NOAA Integrated Ecosystem Assessment Program, interest in co-sponsorship has been expressed • Bering Sea Elders Group

EGs dissolved in 2022

Res. Code	EG name	Chairs
2021/WK/IEASG04	WKASCAPES - Workshop on ASsessing CAPacity to supply Ecosystem Services (To be dissolved after the meeting in November 2022)	Andrea Belgrano, Sweden, and Gerjan Piet, Netherlands,