Integrated Ecosystem Assessment Steering Group EGs Resolutions

Working Groups transferred from IEASG to HUDISG

The following groups have been transferred to the resolutions file for Human Dimension Steering Group (HUDISG) Expert Groups; although they formally belong to IEASG until 1 January 2024:

- Working Group on Social Indicators (WGSOCIAL)
- Working Group on Balancing Economic, Social and Ecological Objectives (WGBESEO)
- Working Group on Maritime Systems (WGMARS)

Resolutions approved in 2023

WGINOSE - Working Group on North Sea Integrated Ecosystem Assessment

2023/MT/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 2024	13–17 May	ICES HQ	E-evaluation by 31 May	
Year 2025	5–9 May	ICES HQ	E-evaluation by 23 May	
Year 2026	18–22 May	ICES HQ	Final ICES Scientific Report and E-eval by 30 June to IEASG	

ToR descriptors

ToR	Description	Background	Science Plan Codes	Duration	Expected Deliverables
a	Update and operationalise strata specific ecosystem trends analysis including the application and possible development and integration of indicators of ecosystem state and function by working closely with WGECO, WGSFD, WGBIODIV, WGCERP. Investigate methods (e.g including ecosystem model outputs) for communicating trends and significant changes in ecosystem state, using ecosystem summary sheet or report card style approaches.	a) Science Requirements The stata specific ecosystem trend analysis require an yearly update toward the operationalisation of the information, and for the integration of indicators of ecosystem state and function. b) Support Advisory Requirements The strata scpecific ecosystem trend analysis provides relevant information for the ICES advice on Ecosystem Overview. c) Requirements from other EGs The strata specific ecosystem trend aanlysis, benefit from a close collaborations with WGECO, WGSFD, WGBIODIV, WGCERP, in providing relvant information on the integration of indicators of ecosystem state and function.	1.1, 2.1	3 years and on-going annually	Report card/ESS methods in supporting IEA science that supports advice. Scientific publication.

b	Continue to apply and maintain the existing human actvities and pressure mapping tool for the ICES 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, WGSHIP, WGCEAM to inform appropriate methods for CEAs.	a) Science Requirements Mapping the existing human activities and pressure for the ICES Greater North Sea Ecoregion provides the best-available science for providing relavant information for the ICES advice on Ecosystem Overview. c) Requirements from other EGs The information required for the mapping analysis, will benefit from a closer collaboration with WGSFD, WGSHIP, WGCEAM, for advacing the current methodologies. d) Support Advisory Requirements, e.g. EO The mapping of existing human activities and pressure provides the required information for the update of the ICES advice on the Ecosystem Overview for the Geater North Sea Ecoregion.	4.1, 1.1, 2.1	3 years and on-going annually	Updated dynamic map of assessed human activities, pressures and impacts for WGINOSE webpage.
c	Utilizing the output from ToR a, b, develop and apply strata specific assessment methods and tools to evaluate trade-offs between different human activities and ecosystem components, and services to support ecosystem magement and advice (e.g. through EwE/Ecospace models and network analysis, mental models, bow-tie and etc.). Establishing links with WGSAM, WGBIODIV, WGCEAM, WKOMRE, WGOWDF, WGRMES, WGIAB.	a) Science Requirements The operationalization of EwE/Ecospace models, and other models for strata specific assessment for the Greater North Sea Ecoregion, provides the best-available science for quntifying and evaluate trade-offs between different human activities and ecosystem components, and services. Th output from these models will provide relevant information to support ecosystem management advice, and provide a common methodologies for the ICES IEA.	2.2, 2.3, 3.2	3 years and on-going annually	Scientific Paper on applications/actions in supporting ecosystem assessments and management advice.

d	Work in preparation of the next revision post-2026 of the greater North Sea Ecosystem Overview as required, and according to the guidelines.	a) Science Requirements Provide the best-available science for the update of the ICES advice on Ecosystem Overview for the Greater North Sea Ecoregion, b) Advisory Requirements To provide the updated mapping of existing human activities and pressures. c) Requirements from other EGs In collaboration with WGSFD, WGSHIP, WGCEAM, for updating the require information for the mapping of existing human activities and pressures. d) Provide an update of the existing human activities and pressure for the ICES advice on Ecosystem Overview for the Greater North Sea Ecoregion; and also provide feedback on the risk assessment methodology	1.2, 2.1	As required - ongoing	Draft North Sea ecosystem overview sections. Produce an infographic product.

Summary of the Work Plan

Year 1	The first year will continue to update and operationalise strata specific trend analysis and communication, especially in relation to and/or application of indicators of ecosystem state and function**;** 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. Further develop and apply strata specific assessment methods and tools to evaluate trade-offs between different human activities and ecosystem componenets, and services in support of ecosystem management and advice.
Year 2	Continue to develop and apply strata specific assessment methods and tools to evaluate trade-offs between different human activities and ecosystem components, and services in support of ecosystem management and advice. Update on trend analysis signals for ecosystem state and function, and reporting tools to inform management advice.
Year 3	Update of activities and pressure mapping and analysis for an expected revision of the Greater North Sea Ecoregion EO. Drafting a scientific paper on application/actions to support ecosystem assessment and management advice. Finalizing report card/ESS methods to support IEA science and management advice.

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 partcipants, 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 groups 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, WGSHIP, WGCEAM, WKINTRA, WGBESIO, WGFBIT, WGBIODIV, WGSAM, WGCEAM, WKOMRE, WGOWDF, WGCERP, WGRMES, WGIAB.
Linkages to other organizations	OSPAR (ICG-EUT, ICG-EMO), HELCOM, NAFO, JRC, DG-ENV, DG-MARE, EMODnet, Copernicus

WGECOBAL - Working Group on Ecosystem-Based Fisheries Management of the Western Baltic Sea

2023/MT/IEASG02 A **Working Group on Ecosystem-Based Fisheries Management of the Western Baltic Sea** (WGECOBAL), chaired by Christian Möllmann*, Germany, Stefan Neuenfeldt*, Denmark and Heike Schwermer*, Germany, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2024	28–31 May	Lyngby, Denmark	E-evaluation due 17 June	
Year 2025	May	Hamburg, Germany	E-evaluation	
Year 2026	May	Kiel, Germany	Final report 6 weeks after annual meeting to IEASG	

ToR descriptors

ToR	Description	Background	Science Plan Codes	Duration	Expected Deliverables
a	Literature review of recent ecological knowledge on climate change effects on the Western Baltic ecosystem, especially focusing on fish community structure and functioning.	Better understanding of ecosystem functioning under climate change; provide environmental background for fisheries advice	1.1., 1.3, 1.7	Years 1 and 2	Review paper

b	Develop a set of environmental and socio-economic indicators to assess changes in the social-ecological system	Better understanding of ecosystem functioning under climate change; provide environmental background for advice. ToR developed in tandem with WGIAB.	1.1, 6.5, 7.1	Years 1 and 2	Peer-reviewed publication; indicator sheets to support single-species stock assessments
c	Conduct management strategy evaluations to test environmentally-informed reference points for key fisheries species	Include environmental information into advice; improve MSY approach	2.5, 5.1,5.2	Years 1, 2 and 3	Peer-reviewed publication; environmentally-informed reference points to support single-species stock assessments
d	Conduct ensemble modelling on the future of the social-ecological system under climate change	Evaluate future socio-economic potential of the Western Baltic fisheries	2.5, 5.2, 6.6	Years 2 and 3	Peer-reviewed publication
e	Develop adaptation scenarios for a sustainable future of the Western Baltic social-ecological system	Evaluate future socio-economic potential of the Western Baltic fisheries	5.4, 7.5, 7.6,	Year 3	Potential storylines on sustainable development pathways for Western Baltic fisheries

Summary of the Work Plan

Year 1	Annual meeting, intersessional work to progress on TORs a, b, c
Year 2	Annual meeting, intersessional work to progress on TORs a, b, c, d
Year 3	Annual meeting, intersessional work to progress on TORs c, d, e

Supporting information

Priority	The activities of this Group aim to better understand environmental (especially climate) effects on the living marine resources of the Western Baltic Sea. The ultimate goal of the Group is to support stock assessments and ecosystem-based advice for Western Baltic fish stocks, especially for cod and herring. Activities of the Group include the evaluation of climate adapatiation measures for the related fisheries. Consequently, these activities are considered to have a very high priority.
Resource requirements	The research programmes 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	The Group will be attended by some 20–25 members and guests.
Secretariat facilities	Standard communication, annual meeting, and sharepoint support.
Financial	No financial implications.
Linkages to ACOM and group under ACOM	WGBFAS, HAWG, WKCLIMAD

Linkages to other committees or groups	There is a very close working relationship with all the groups of IEASG and especially to the Working Group on Integrated Assessments of the Baltic Sea (WGIAB). WGECOBAL, in contrast to WGIAB, focusses specifically on developing an ecosystem-based fisheries management apporach for the Western Baltic. Cooperation between the WGECOBAL and WGIAB is especially envisioned for TOR b where there is complimentarity in approaches, and limited data availability. WGECOBAL will focus this work on supporting fisheries advice for Western Baltic stocks, while WGIAB will focus on the Integrated Assessments. Limited overlap in participation between the groups is envisioned, but some shared membership and communication between the Chairs and with the IEASG Chair will ensure complimentarity and communication, whilst minimising redundancy. Work may also be of interest to WGSOCIAL and WGECON.
Linkages to other organizations	HELCOM

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

2023/MT/IEASG03 Working Group on Integrated Ecosystem Assessment of the Greenland Sea (WGIEAGS), chaired by Søren Post*, Greenland, and Colin Stedmon, Denmark, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2024	4-8 November	Nuuk, Greenland	Interim E-eval due 22 November 2024	During 2023 Søren Post (Greenland) replaced Jesper Boje (Denmark) as chair
Year 2025	8-11 November	ICES HQ, Denmark	Interim E-eval due 25 November 2025	
Year 2026	3-6 November	Nuuk, Greenland	Final ICES Scientific report and E-eval by 18 December	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Assemble stakeholder information, such as knowledge about the area's use, current and future user objectives, and ecosystem goals	Stakeholder knowledge is critical to IEAs and will be collected through workshops	1.1	Years 1-3	Report to ICES
b	Dialogue with scientists and stakeholders on operational approaches and analytical tools for conducting an integrated ecosystem assessment.	Before starting data analysis, basic discussions on suitable methodological/analytical approaches are required.	1.1	Years 1-3	Report to ICES

c	Assemble data for describing spatial and temporal changes in the Greenland Sea ecoregion.	The database will contain physical, chemical and biological (incl. higher trophic levels) oceanographic data.	1.1	Years 1-3	Merged database. Metadata to be reported to ICES.
d	Report on the status and trends in the ecoregion, based on integrated analysis of multiple datasets, incl. associated with major hydroclimatic changes and human activities	This ToR will be based on activities and advancements of the above. The aim is to produce scientific manuscripts, inform IEAs and future iterations of the EOs.	1.1	Years 2-3	Report to ICES. Manuscript to be submitted to peer-reviewed science journal
e	Revise Ecosystem Overview for the Greenland Sea	This is advisory requirement.	1.3	To be initiated year 3 and finalized in the next round of ToR.	Relevant draft sections of the Ecosystem Overview submitted to ICES
f	Identify knowledge gaps and priority research needs to improve future integrated ecosystem assessments. Provide recommendations for improvement of data collection and monitoring in the ecoregion	To further advance the IEA for the region, identification of knowledge and data gaps is inevitable, together with considering improvements in data collection.	1.1, 3.1, 3.2	Year 3	Report to ICES

Summary of the Work Plan

Year 1	Assemble stakeholder information, such as knowledge about the area's use, current and potential user objectives, and ecosystem goals. Continue dialogue between scientists and stakeholders on operational approaches and analytical tools for conducting an integrated ecosystem assessment in line with stakeholder objectives. Continue to gather relevant data to describe spatiotemporal changes in the Greenland Sea ecoregion as input to integrated ecosystem assessments. Identify additional scientists/partners and invite them to join the EG.
Year 2	Continue assembling relevant datasets and update the database. Continue discussions on methodological approaches and analytical tools for conducting integrated ecosystem assessment. Prepare the first analysis on the ecosystem status and trends. Continue collecting stakeholder knowledge and objectives. Incorporate stakeholder information to the Science Report.
Year 3	Prepare manuscript on the status and trends of the Greenland Sea ecosystem. Identify knowledge gaps and priority research items that can improve future integrated ecosystem assessments and provide recommendations to improve the monitoring.

Supporting information

Priority	Incorporating stakeholder information, gathered through their local knowledge and objectives, is crucial for a holistic and contextually accurate ecosystem assessment of the Greenland Sea. This input provides vital insights into ecosystem dynamics, fosters community engagement and support, and ensures that advice on ecosystem management is both scientifically robust, socially relevant and consequently useable for the clients. This inclusive approach enhances the assessment's credibility and contributes to informed, sustainable decision-making.
Resource requirements	Data acquisition for this initiative will primarily rely on the outcomes of collaborative workshops, where valuable insights and information from scientists, stakeholders, and experts will be gathered. These workshops serve as our key data sources. In addition to these, we will tap into existing research programs, accessing data available through public databases and established research networks. Crucially, external funding from the Nordic Council of Ministers has been secured to underpin starting this effort, facilitating financial stability.
Participants	Initiated by DTU and GINR. Participation will be seeked from Greenland, Denmark, Iceland and Norway, with experise spanning oceanography and fisheries. Participants from other nations are also welcomed.
Secretariat facilities	SharePoint site. Support for meetings at ICES HQ, when appropriate
Financial	No financial implications
Linkages to ACOM and groups under ACOM	Link to ACOM through development of Ecosystem Overview, NWWG and WGWIDE.
Linkages to other committees or groups	All ICES IEASG expert groups, several EGs under HAPISG and EPDSG. Human Dimensions steering group HUDISG in ICES
Linkages to other organizations	Arctic Council, PAME, IASC, NEAFC

WGICE - Working Group on the Integrated Ecosystem Assessment of Iceland waters

2023/MT/IEASG04 Working Group on the Integrated Ecosystem Assessment of Iceland waters (WGICE), chaired by Warsha Singh*, Iceland, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2024	18–22 November	Reykjavik, Iceland	E-evaluation by 5 December	
Year 2025	November	Reykjavik, Iceland	E-evaluation by TBC	
Year 2026	November	Reykjavik, Iceland	End of term Science report and E-evaluation by TBC	

ToR descriptors[1]

ToR	Description	Background	Science Plan Codes	Duration	Expected Deliverables
a	Review and compile spatiotemporal data from the various components of the ecosystem including associated human activities and impacts and other pressures, and develop indicators to analyze changes.	This will summarize data from the physical, chemical, biological, economical, and social components to establish an overview of the ecosystem and related impacts and risks.	1.1, 2.1	Years 1–2	WG will create and synthesise the evidence base for the ecosystem overview..
b.	Develop functional food-web connections via the Ecopath with Ecosim model, and broaden the ecosystem scope to integrate economic and social dimensions using Atlantis end-to-end ecosystem model.	This will contribute to ecosystem-informed science and advice	2.2, 7.3	Years 1–3	Scientific Papers focusing on utilization and implementation of ecosystem assessments and management recommenda-tions. Contribution to relevant advice products
c.	Use appropriate methodology to identify relevant stakeholders to participate in an integrated ecosystem assessement of Iceland waters.	To ensure relevant stakeholders are identified for future involvement in the integrated ecosystem assessment process.	7.2, 7.7	Year 3	WG report
d.	Revise and update the Ecosystem Overview for Iceland waters.	This is advisory requirement	6.5	Revision to be initiated in Year 1 and finalized in 2026 and to be repeated every 5 years. Update graphs annually as per ICES requirements.	Relevant draft sections of the Ecosystem Overview submitted to ICES.

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

Summary of the Work Plan

Year 1	Intersessional work to progress on ToRs a&b, initiate work on ToR e. Annual Meeting and working group report.
Year 2	Intersessional work to progress on ToRs a & b, ToR a to be delivered, initiate work on ToR c, continue work on ToR e. Annual Meeting and working group report. Initiate the drafting of a review paper on trend analysis across ecosystem components.
Year 3	Intersessional work to progress on ToRs a-c, initiate work on ToR d, finalize work on ToR e. Annual Meeting and working group report.

Supporting information

Priority	The current activities of this group will lead ICES to develop an Intergrated Ecosystem Assessment for Icelandanic waters as a step towards implementing ecosystem based management in the region. These activities are considered to have a high priority for this region that is vulnerable to climate change and relies highly on fisheries resources economically and culturally. It also contributes towards advancing ecosystem science which is identified as a priority in the ICES Science Plan.
Resource requirements	The monitoring and research programmes which provide data on the physical, chemical and biological componenets of the ecosystem are already underway, and resources are committed.
Participants	Initiated by MFRI. Domestic participation will be sought from other governmental, research and academic institutions. International participation will be sought from Greenland, the Faroe Islands and Norway. A diverse scientific competence is required to comprehend all ecosystem components.
Secretariat facilities	Sharepoint site
Financial	No financial implications.
Linkages to ACOM and group under ACOM	Link to ACOM and SCICOM through development of Ecosystem Overview (ADGEO), NWWG, WGDEEP and WGWIDE.
Linkages to other committees or groups	There is a very close working relationship within the IEASG and HUDISG. It is also very relevant to the WGIEAGS,WGINOR, WGSOCIAL, WGECON, WGENGAGE.
Linkages to other organizations	Arctic Council, PAME, IASC, NEAFC, CAFF

WGCERP - Working Group on Common Ecosystem Reference Points

To be submitted (pending)

Resolutions approved in 2022

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	15-19 May	Halifax, Canada	Interim E-eval by 1 July to IEASG	
Year 2024	14-17 May	Online meeting	Interim E-eval by 30 May to IEASG	
Year 2025	TBD	Halifax, Canada	Final report and E-eval by TBD to IEASG	New USA Chair will be appointed

ToR descriptors[2]

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. Invitiation 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 Develmpent 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.

[2] 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	Develop and explore decision support tools, report on outcomes. Manuscript on enhancing IEAs through the inclusion of other decision making frameworks. Exploring IEAs for single species or multi-species) decision making.
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	Communication tools, report on outcomes Report on use of participatory modelling or mapping for objective setting in IEAs or EBM. Continue to explore and report on out-of-the-box communication tools.

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.

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	28–31 March	Cascais, Portugal	E-evaluation due 21 April	Outgoing chair: Marcos Llope
Year 2024	13–17 May	Galway, Ireland	E-evaluation due 3 June	
Year 2025	To be decided	To be decided	Final ICES Scientific Report by to IEASG	

ToR descriptors[3]

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)

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

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
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	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). The work related to new To**R**s 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).
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	Group leaders ToRs: a) Sigrid Lehuta b) David Reid c) Debbi Pedreschi d) Jacob Bentley and Clive Fox e) Jacob Bentley f) Marcos Llope

Supporting information

Priority	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). 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.
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 groups 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	Online	E-eval by 24 February 2023 to IEASG	Addition of chair Andreia Braga-Henriques
Year 2024	7–9 February	Horta, Azores, Portugal	E-eval by 23 February 2024 to IEASG	
Year 2025	10–14 February	Horta, Azores, Portugal	End of Term E-eval due 28 February Final report due 31 March 2025 to IEASG	

ToR descriptors[4]

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 context of ecosystem-based management (EBM).	1.1, 1.4, 1.9	3 years	Inform IEAs/EO. Results in the final report or/and as a collaborative paper.
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.

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

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 (THIS WILL BE DISSOLVED AT THE END OF YEAR 2023)

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 Sólvá Káradóttir Eliasen, 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 seabirds). 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. 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	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. 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. 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. 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. The process will be iterative with a number of phases which will increase the relevance, impact and quality of the ecosystem overviews.
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.

WKFISHCARBON - Workshop on Assessing the Impact of Fishing on Oceanic Carbon (THIS WILL BE DISSOLVED AT THE END OF YEAR 2023)

2022/WK/IEASG06 The **Workshop on Assessing the Impact of Fishing on Oceanic Carbon (WKFISHCARBON)**, chaired by Dave Reid, Ireland, and Emma Cavan, UK, will meet in person at ICES Secretariat, Copenhagen, and be open to online participation, from 25-28th April 2023 to:

a) Review and consolidate the existing knowledge, and identify knowledge gaps, on the functioning of the oceanic carbon pump in terms of the role of fish in carbon fluxes in the open ocean,

including the extent of oceanic carbon released into the atmosphere due to the removal of fish; (Science Plan codes: 1.1, 2.1, 6.1);

b) Review and consolidate the existing knowledge on direct emissions from fishing fleets using different extraction methods, and indirect emissions from disturbance of the seabed, in terms of their contribution to climate change; (Science Plan codes: 1.1, 2.1, 6.1);

c) Discuss how the existing approaches for assessing and prioritising the main ecosystem stressors can be adapted to enable the assessment of fishing impacts on the carbon sequestration processes. Report on the implications of the findings from ToR a and b for inclusion in the Ecosystem and/or Fisheries Overviews; (Science Plan codes: 2.5, 4.1);

d) Identify how the knowledge on the role of fishing (by fish removals, seabed abrasion and emissions) could be translated to advice to inform ecosystem-based (fisheries) management (EBFM/EBM), and to develop a roadmap for what needs to be done next and whether further workshops would useful (Science Plan codes: 6.4);

WKFISHCARBON will report by June 2023 for the attention of the SCICOM.

Supporting information

Priority	The workshop is a targeted response to the role of fisheries in blue carbon sequestration, as was listed as an emerging issue in WGECO ICES. 2021. Working Group on Ecosystem Effects of Fishing Activities (WGECO).ICES Scientific Reports. 3:83. 33 pp. http://doi.org/10.17895/ices.pub.8279. The impact of climate change on marine ecosystems is a key issue that ICES builds into its work. The activities of this workshop will contribute to knowledge related to the carbon impacts of fisheries, as well as the climate implications of fish extraction, thus contributing to EBM development. Since ocean carbon sequestration is highly important from the climate change mitigation and adaptation point of view, these activities are considered to have a very high priority.

Scientific justification	In recent years, the scientific body of evidence describing the role of marine ecosystems in climate adaptation and mitigation has considerably grown. As a consequence, there is a noticeable interest in the scientific community and among fisheries managers and policy-makers in exploring the unwanted side effects of fishing and the extent to which fishing activities reduce carbon sequestration and/or increase emissions from the ocean. Assessing and measuring this impact may allow redirecting fishing pressure to the right places, identification of fishing methods which minimise the negative ecosystem and climate impacts. This is consistent with the ICES approach to support EBFM and the need to expand the evidence base for EBM. *Term of Reference a)* Several ICES working groups focus on the functioning of ecosystem components, including the fish species. WGECO activities are centred on the ecosystem impacts of fishing, but these do not directly consider the role of marine life in the ocean carbon pump. Fish and other marine organisms sequester and mediate carbon fluxes to the deep sea, but this contribution has not yet been accounted for. WKFISHCARBON will explore current and report on knowledge and gaps for future research. *Term of Reference b)* The cumulative impacts of human activities on marine ecosystems and their services, such as the disturbance of benthic habitats or changes in food web structures, are already assessed by ICES working groups. However these assessments do not currently consider the carbon emission (climate mitigation) impact of fishing, either through the burning of fossil fuel or the disturbance of carbon stored in the seabed. The WKFISHCARBON will discuss these considerations. *Term of Reference c)* This ToR will investifate how knowledge from ToRs A & B (and future developments) could be integrated into the existing EO and or FO advice products to ensure inclusion of the full suite of impacts of fishing, and the scale of the climate services provided by the biological carbon pump. *Terms of Reference d)* The aim of this ToR is to evaluate the ecosystem knowledge to support the progression of ecosystem-based fisheries advice more widely, and identify additional pathways to advice for the idenfified knowledge.
Resource requirements	ICES Secretariat support and meeting facilkities. Participants will be expected to prepare input in advance of the meeting, and participate during the meeting dates.
Participants	The workshop is expected to attract about 25-30 participants, members of WGECO, IEASG, WGFBIT, WGBIODIV, the authors of the Frontiers in Marine Science Research Topic, NGO representatives and European Commission staff including from DG MARE research unit and DG ENV marine unit.
Secretariat facilities	ICES Secretariat support and meeting facilkities
Financial	No financial implications.
Linkages to advisory committees	Workshop outputs are expected to be of interest to ACOM
Linkages to other committees or groups	WGECO, WGFBIT, WGBIODIV, IEASG
Linkages to other organizations	OSPAR, HELCOM

WGIBAR - Working Group on Integrated Assessments of the Barents Sea

2022/FT/IEASG07 A **Working Group on the Integrated Assessments of the Barents Sea (WGIBAR)**, chaired by Bérengère Husson, 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	20 February	Online Meeting	Interim E-eval by 6 March 2023	Outgoing chair: Elena Eriksen; Incomming chair: Bérengère Husson.
Year 2024	TBD	TBD		
Year 2025	TBD	TBD		
Year 2026	TBD	TBD		

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Provide support to ongoing stock and ecosystem assessments and evaluations in the Barents Sea	Respond to Science and advisory requirements as needed	2.1, 2.2; 2,7; 6.1	Year 1, 2, 3, 4	Annual report
b	Improve the methodological framework of the ecosystem assessment, including regarding the reproducibility and transparency of the assessment process	Move towards FAIR principles, aiming to engage with ICES transparency and reproducibility work (e.g. Data Profiling Tool) of science and advice in order to reduce work load by producing and sharing analyses scripts and workflows	4.1, 4.2, 4.3, 6.1	Year 1, 2, 3	Propose reproducibility and transparency frameworks for IEA
c	Publish integrative studies from the assessment databases	Synthetise knowledge gained during 19 years of ecosystem survey in the Barents Sea. This survey constitute the basis of most results reported by WGIBAR.	2.2, 2.7, 4.3	Year 1, 2	Peer review paper (e.g., spatial-temporal trends to describe the last two decades of changes in the Barents Sea), ICES data base

Summary of the Work Plan

Year 1	Provide support to ongoing stock and ecosystem assessments and evaluations in the Barents Sea

	Improve the methodological framework of the ecosystem assessment, particularly regarding the reproducibility and transparency of the assessment process. Publish integrative studies from the assessment databases. Due to the continuing uncertainty associated with the temporary suspension of experts from the Russian Federation, it is challenging to provide specifics in the work plan. WGIBAR will remain agile to the opportunities presented.
Year 2	Provide support to ongoing stock and ecosystem assessments and evaluations in the Barents Sea Improve the methodological framework of the ecosystem assessment, particularly regarding the **reproducibility** and transparency of the assessment **process.** Publish integrative studies from the assessment databases. Due to the continuing uncertainty associated with the temporary suspension of experts from the Russian Federation, it is challenging to provide specifics in the work plan. WGIBAR will remain agile to the opportunities presented.
Year 3	Provide support to ongoing stock and ecosystem assessments and evaluations in the Barents Sea Improve the methodological framework of the ecosystem assessment, particularly regarding the **reproducibility** and transparency of the assessment **process.** Due to the continuing uncertainty associated with the temporary suspension of experts from the Russian Federation, it is challenging to provide specifics in the work plan. WGIBAR will remain agile to the opportunities presented.
Year 4	Provide support to ongoing stock and ecosystem assessments and evaluations in the Barents Sea. Due to the continuing uncertainty associated with the temporary suspension of experts from the Russian Federation, it is challenging to provide specifics in the work plan. WGIBAR will remain agile to the opportunities presented.

Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem effects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities (ToR a, b and c) is needed.
Participants	The Group is normally attended by some 20–25 members and guests. The group, as of 2023, is at reduced capacity, and will only include Norwegian participants.
Secretariat facilities	SharePoint site, secretariat support for reporting
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Stock assessment groups in particular AFWG and WGWIDE.
Linkages to other committees or groups	There is a very close working relationship with all the groups WGINOR and WGICA. It is also very relevant to the groups WGSAM, WGOH, WGECO. Will engage with IEASG and other IEA groups on transparent framework for IEA.

Linkages to other organizations	The Joint Russian-Norwegian Fisheries Commission, in charge of joint fisheries management in the Barents Sea. The Joint Russian-Norwegian Environmental Commission, in charge of joint environmental management in the Barents Sea. The Norwegian Ministry of Climate and Environment, in charge of Norwegian holistic ecosystem-based management plan for the Norwegian part of the Barents Sea. Relevant groups within the Arctic Council. PAME/ICES workshop, PICES/ICES workshops. Norwegian monitoring group under the Norwegian Management Plan

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

2022/FT/IEASG08 A Working Group on Comparative Ecosystem-based Analyses of Atlantic and Mediterranean marine systems (WGCOMEDA), chaired by Sofia Henriques, Portugal, Giovanni Romagnoni, Germany, Paris Vasilakopoulos, EU and Maria Cristina Mangano, Italy 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	25–28 Sep	Ispra, Italy	Interim E-eval	Giovanni Romagnoni replaced Romain Frelat as chair in 2022.
Year 2024	21–24 May	Patras, Greece	Interim E-eval by 6 June	
Year 2025	May	TBD	End of term E-eval and final 3-year cycle report by December 2025 to IEASG.	

ToR descriptors

ToR	Description	Background	Science Plan Codes	Duration	Expected Deliverables
a	Improve the knowledge on key patterns and drivers of functional biodiversity across different marine habitats to support ecosystem-based assessments.	A) The topic is a follow up from the work in the previous cycles aiming to define the best representation of the functional structure across different marine habitats to support ecosystem-based assessments towards an integrated approach: pelagic-demersal-benthic links. This will include some marine habitats poorly assessed in previous cycles (such as pelagic habitats and rocky	1.4; 1.9; 2.2	3 years	1. Contribute to standardize the use of functional traits across different taxonomic groups and marine habitats (demersal-pelagic links; from coastal to deep sea areas). 2. Identify the best set of single or combined traits to represent ecological structure of different assemblages and/or habitats (from coastal to deep sea habitats) in order to integrate them in different contexts of functional assessments (e.g. food-webs, ecological-socio-economic

		reefs). B) Integrating the outcomes and findings of the topic A) with the other ToRs of COMEDA. For instance: using the best functional representation on network analysis (ToR B) and on the assessment of functional resilience (ToR C), discuss the best approaches to integrate the functional and socio-economic dimensions (ToR D). C) Advancing the findings and outcomes of previous COMEDA cycles by comparing habitats and integrating biodiversity patterns between coastal and deep-sea areas, in collaboration with other working groups.			links, marine resilience).
b	Investigating multitrophic interactions towards a coordinated application across regions	A) The topic is a follow up from the work in the previous COMEDA cycles. It aims to advance and integrate methods, approaches and tools for characterising multitrophic interactions and ecosystem functioning. B) Multiple approaches have been applied to investigate multitrophic dynamics. However, there is a lack of a structural understanding of the diverse potential and the complementarity of the various approaches. A systematic mapping of the application in terms of geographical location and scope of	1.4; 1.9; 5.2	3 years	1. Review existing food web models applications across Mediterranean and Atlantic systems. 2. Identify and address key geographical and methodological gaps that prevent multitrophic interaction network application across regions.

		investigation is lacking. C) The capability of the various methods to explore the link between structure and stability, and to investigate past and future changes in the system in light of disturbances, remains a key aspect to be further explored.			
c	Investigate shifts and resilience dynamics of marine systems in the Mediterranean and the Atlantic.	A) The topic is a follow up from the work in the previous COMEDA cycles, where we studied different types of marine systems (e.g. populations, communities, ecosystems, trait configurations, trophic webs) undergoing change in the NE Atlantic and the Mediterranean. B) Analysis of the multivariate temporal trends of systems and their stressors have been used to elucidate resilience dynamics and mechanisms of change. Resilience has been also inferred by the structural properties of marine systems and indicator-based approaches.	1.3; 1.9; 6.5	3 years	1. Further develop existing methods to track/interpret shifts and quantify resilience in real-life systems, and explore new approaches to assess resilience, such as structure-based or indicator-based approaches. 2. Compare the system dynamics and temporal occurrence of shifts, and identify common drivers of change in the NE Atlantic and the Mediterranean. 3. Explore approaches to improve our prediction capability of future shifts.
d	Explore options to integrate ecological and socio-economic dimensions to support integrated marine management	A) The topic is a follow up from the work in the previous COMEDA cycle and aims to collate the existing knowledge on incorporation of social, economic and cultural aspects to support the implementation of an Ecosystem Approach in regional ecosystems.	6.6; 7.1; 7.2;	3 years	1. Scoping/screening exercise focused across the Atlantic and Mediterranean marine systems to collate existing literature, best practices, protocols and case studies for the identification of future needs and gaps for socio-ecological-economic and cultural integration across the marine systems. 2. Develop a framework for

	B) There is a need to collate existing knowledge generated by regional case studies and promote comparative analysis of case studies to produce toolkits of best practices for both Mediterranean and Atlantic systems.	collective reporting (database) to support future potential data collection, data analysis and advice development.

Summary of the Work Plan

Year 1	1.1 Standardize the use of functional traits across different taxonomic groups and marine habitats. This will start with a revision of the current available traits to standardise the trait nomenclature and with the discussion of the main trait properties that should be used to support the selection of core traits. This work will be towards Deliverables A1 and A2, in collaboration with other working groups. 1.2 Review and update databases of (i) existing food webs models and (ii) socio ecological systems approaches across Mediterranean and Atlantic systems (Deliverables B1 and D1). Both ToRs B and D start with a revision activity of data from the scientific and grey literature, as well as a survey of current work from participants of the working group. 1.3 The scoping/screening exercise of socio-economic-ecological systems followed by an evidence mapping (Deliverable D1) will depict the current work and identify future needs and gaps for social science when dealing with ecosystem-based approach and support the future potential data collection (Deliverable D2) fostering synergies with other ICES WGs. 1.4 Further development of the methodological tools used for shift analysis and resilience assessment of complex natural systems (Deliverable C1). Continuation of the work on the comparison of traits-based and species-based integrated assessments in the Atlantic and the Mediterranean Sea (Deliverable C2, linking to ToRs A & B). 1.5 Networking activities to ensure coordination with other international bodies and existing WGs within and outside ICES.

Year 2	2.1 Identification of the best combination of traits (single or groups of traits) to represent the ecological structure of the functional biodiversity, in order to integrate them in different contexts of assessments (e.g. food web networks - ToR B, ecological resilience - ToR C, ecological-socio-economic links - ToR D). This activity will be developed in order to integrate the current approaches among trophic levels and habitats (i.e. what traits should we use to understand linkages between plankton, fish and benthic invertebrates; what traits better represent the ecological structure of the different habitats), linking to deliverable A2. 2.2. Identification of key multitrophic network patterns and methodological applications across geographical regions (Deliverable B1).This, in combination with outcomes of ToR A and Deliverable B2, will contribute to outline key research priority areas for the application of Ecosystem Approach at European level. 2.3 Exploration of quantitative approaches to anticipate upcoming shifts in real-world systems (Deliverable C3). We will also explore the effect of such shifts to ecosystem services (linking to ToR D). 2.4. Case studies assessing and selecting relevant indicators dealing with socio-economic-ecological systems - Deliverable D1; e.g. the social and cultural significance of human activities related to fishing (coastal regions in both the Mediterranean and the Atlantic).
Year 3	3.1 Spatio-temporal analysis of functional diversity dynamics and analysis of the relationship between structure and stability in food webs - Deliverables A2 and B2 – in order to understand past dynamics and identify drivers of change across ecosystems in the NE Atlantic and the Mediterranean Sea. 3.2 Identification of gaps that prevent multitrophic network applications across regions (Deliverable B2), based also on outcomes of Deliverable B1 to refine an assessment of key research priority areas for the application of Ecosystem Approach at European level. 3.3 Assessment of past and future vulnerability and stability of Mediterranean and Atlantic ecosystems to different pressures, focusing on functional changes and food web structure to identify the ecosystem resilience to disturbances. This will allow us to explore resilience indicators using ecosystem models, as part of all ToRs. 3.4 Collective reporting (database) to assess the ecological, socio-cultural and economic significance of human activities exerted on marine coastal systems and support future potential data collection, data analysis, and advice development in a context of Ecosystem Approach to fisheries management - Deliverable D2. 3.5 Bringing together what has been developed over the previous years, finishing relevant papers and setting the scene for the next cycle (all ToRs).

Supporting information

Priority	The aim of this working group (WG) is to investigate both system-specific and cross-systems key questions to guide research and improve the ecosystem approach to management of living marine resources of the European Seas. To this end, we use existing data from regional systems of the Atlantic Ocean and the Mediterranean Sea. A comparative approach of marine ecosystems is essential to understand how Mediterranean and Atlantic ecosystems are structured, how they function, and also to identify which are the most sensitive species and most critical ecological processes to be managed within the ecosystem dynamics. Therefore, this WG aims at strengthening the scientific basis for the regional Ecosystem Approach for coastal and marine living resources through a comparative platform of research. This could also contribute to European marine policies such as the Common Fisheries Policy and some Descriptors of the Marine Strategy Framework Directive (MSFD), e.g. Descriptors 1 (Biodiversity), 4 (Food webs), and 6 (Seafloor integrity). During the previous three cycles, WG COMEDA established a strong network of collaborations that will continue contributing to the comparative knowledge of Atlantic and Mediterranean systems. The new ToRs build up on the past research of the group and propose to test novel approaches to assess the functional diversity, resilience, connectivity and complexity of marine assemblages, both across biological groups and between Mediterranean and Atlantic systems. Additionally, the new resolution will follow up and build on the previous effort to integrate the socio-economic dimension with advanced ecological knowledge, introduced with the last term of reference (ToR D; 2020-2022), to better understand the effects of both anthropogenic changes and management options on the ecosystems. Close collaboration with other WGs of the SCICOM/ACOM Steering Group on Integrated Ecosystem Assessments (SSGIEA) such as WGIAB, WGEAWESS, WGSOCIAL, WGBESEO and WGMARS will provide a solid basis to develop the research topics and ToR D of this new COMEDA cycle. Furthermore, during this new cycle we will invite colleagues working on ecosystem services and on linking socio-economic and ecological dimensions to the meetings to develop and improve COMEDA's current knowledge. The group aims to develop applied research to support integrated fisheries advice and marine management.
Resource requirements	Information from ICES, GFCM, JRC and STECF databases are the main input for this group. No additional resources are identified, although participation of some experts (especially early career scientists) to working group meetings depends on funding availability.
Participants	The Group is normally attended by some 20–25 members and guests.
Secretariat facilities	None.
Financial	To facilitate the participation of early-career scientists, WG chairs may apply to marine research consortiums to find financial support for early-career researchers who need travel funding
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.

Linkages to other committees or groups	There is a close working relationship with all the groups of IEASG, and especially Working Group on Integrated Assessments of the Baltic Sea (WGIAB); Working Group on Ecosystem Assessment of Western European Shelf Seas (WGEAWESS); Working Group on SOCIAL indicators (WGSOCIAL) and WGBESEO on Balancing Economic, Social and Ecological Objectives; Working Group on Maritime Systems (WGMARS) (especially ToR D). It is also very relevant to the Working Groups: Working Group on the Integrated Assessments of the Barents Sea (WGIBAR); Working Group on Integrated Assessments of the North Sea (WGINOSE); Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean (WGICA); Working Group on the Northwest Atlantic Regional Sea (WGNARS); Working Group on Biodiversity Science (WGBIODIV) (especially ToR B).
Linkages to other organizations	None.

WKFoodWeb – Workshop on the operational use of Food Web indicators and information

2022/WK/IEASG09 The **Workshop on the operational use of Food Web indicators and information (WKFoodWeb)**, chaired by Maciej T. Tomczak (Sweden), Eider Andonegi (Spain), Marian Torres (Spain), and Jacob Bentley (UK) will be established and will meet in Copenhagen, Denmark, 19–23 February 2024 to work on the following Terms of Reference (ToRs):

a) Streamline existing examples, knowledge, experience, and recommendations on food web, trophic level and other ecological indicators from across the ICES network (e.g., from IEA groups, WGECO, WKFOOWI, WKASCAPES) and beyond (e.g. MSFD, OSPAR, HELCOM, UKMS, etc.).; (Science Plan codes: 1.3, 1.4, 1.7, 6.3);

b) Identify priority areas where food web information/indicators could enhance existing advice and align with the ICES EBM framework (including advancing the Feco approach).; (Science Plan codes: 2.2, 5.1, 5.2, 5.3, 6.1, 6.2, 6.3, 6.4);

c) Prepare a roadmap, including risks and opportunities, for the systematic and transparent use of food web models to support ICES advice with information on trade-offs.; (Science Plan codes: 2.5, 4.3, 6.6);

d) Develop a pipeline proposal to strengthen the 'food web' component of ICES ecosystem advice (ICES Ecosystem Overviews) that can be applied in a consistent way across ICES ecoregions and preferentially on the short-term timescale.; (Science Plan codes: 1.3, 1.4, 1.7, 1.9, 6.5).

WKFoodWeb will report by June 2024 for the attention of the SCICOM.

Supporting information

Priority	WKFoodWeb will address the growing requests from previous workshops (WKEO3, WKCONSERVE, WKFOOWI, WKEWIEA, WKASCAPES, WKIRISH, WKEBFAB) and working groups (WGECO, WGIAB, WGEAWESS) for the operational use of food web indicators and information in ICES advice. It will be the priority of this workshop to (i) review existing and developing evidence products, (ii) identify methods for evidence production that can be systematically applied across ICES ecoregions, and (iii) develop and demonstrate the use of a pipeline to operationalise food web products within ICES advice.
Scientific justification	Term of Reference a) Advances in food web indicator creation and assessment are ongoing within ICES, across research programs, and within governing bodies to measure progress against national and international biodiversity commitments. ToR a aims to provide a review of the current state of play to help identify opportunities and avoid duplicating efforts. Term of Reference b) Marine ecosystem services are impacted by environmental and ecosystem variation. It is = likely that there are opportunities where accounting for these impacts in our advice could enhance existing management. However, making ecosystem information operational often requires a developed understanding of the existing regulatory and advice frameworks to deliver pragmatic solutions. ToR b will identify priority areas where food web information could enhance advice and explore/advance routes for its integration. Term of Reference c) Food web models (e.g. Ecopath with Ecosim (EwE) and Atlantis) are being increasingly used across ICES and by decision makers to guide the delivery of EBM, EBFM, and EAFM. Often models (even those built using the same simulator, e.g. EwE) operate under different assumptions, at different resolutions, and with different policy origins. Their utility to provide food web information is clear and progress should be made to use them in an operational management context (see recent paper by Craig and Link (2023) in Fish and Fisheries). Their current application within ICES is unsystematic relative to the use of less complex models. ToR C will explore options to enhance how food web models are used across ICES to support the delivery of ecosystem-based advice. Term of Reference d) The ICES EOs include food web sections but they remain largely disparate between EOs and often lack information or indicators of status. Food web indicators were identified as a priority for EOs by WKEO3. ToR d will explore options and development needs (building on ToRs a-c) for the development of an evidence pipeline to systematically improve the food web information included in EOs.

Resource requirements	Hybrid meeting (online component only mornings or afternoons: TBD)
Participants	This will be of interest to participants who are involved in food web and ecosystem research and the integration of ecosystem information into ICES advice. Members from the following groups may be particularly interested: WKFOOWI, WKEWIEA, WGECO, WGIAB, WGEAWESS, WGINOSE, WKASCAPES, WKIRISH, WKEBFAB, WKEO3, WKCONSERVE, WGIPEM, WGSAM. Chairs intend to reach out to a list of participants who are heavily involved in this work area (also open to nominations from SCICOM), with wider attendance being driven by advertising of the WK on the ICES website and social media. If the workshop is oversubscribed, ICES reserves the right, in consultation with the workshop Chairs, to select the final workshop participants based on their expertise and geographical distribution.
Secretariat facilities	Meeting facilities (in person and online), registration support.
Financial	No financial implications.
Linkages to advisory committees	ACOM, SCICOM
Linkages to other committees or groups	IEASG and IEA working groups. Builds on work and requests of WKFOOWI, WKEWIEA, WGECO, WGIAB, WGEAWESS, WGINOSE, WKASCAPES, WKIRISH, WKEBFAB, WKEO3, WKCONSERVE, WGIPEM, WGSAM
Linkages to other organizations	OSPAR, HELCOM, JRC, Ecopath International Initiative (EII)

WKBALEO - Workshop for the revision of the Ecosystem Overview of the Baltic Sea Ecoregion (THIS WILL BE DISSOLVED AT THE END OF YEAR 2023)

2022/WK/IEASG10 A **Workshop for the revision of Ecosystem Overview of the Baltic Sea Ecoregion (WKBALEO)**, chaired by Carolyn Faithfull, Sweden, and Puntila Riikka, Finland, will hold a hybrid workshop 6–8 November 2023 in Gdynia, Poland and work intersessionally online to:

a) Review the content gathered and drafted (intersessionally) by the chairs for the Ecosystem Overview (EO) of the Baltic Sea;
b) Develop a wire diagram informed by a driver - pressure – ecosystem state approach using a linkage framework and pressure assessment process that examines and scores all direct pressures and human activities for the Baltic Sea ecoregion following the ICES technical guidelines methodology;
c) Prepare draft advice on the Baltic Sea EO;

d) List gaps in knowledge for the Baltic Sea and identify operational products to potentially improve the scientific basis of the advice for future iterations of the Baltic Sea EO.

In their work, WKBALEO 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 seabirds). When possible/appropriate temporal trends of each ecosystem component will also be described.

WKBALEO will report for the attention of ACOM and SCICOM by 7 June 2024.

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. This workshop is an essential step to underpin a sound scientific basis for the management of the Baltic Sea 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 revision of the EO for the Baltic 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	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. 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. 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. 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. Risk assessment methods will be used to obtain a better understanding of the distribution and scale of anthropogenic pressures across the marine system and to estimate their impacts. The process will be iterative with a number of phases which will increase the relevance, impact and quality of the ecosystem overviews.
Resource requirements	ICES Data Centre, Secretariat and Advice process.
Participants	The participation should reflect the diverse scientific competence needed to fulfil 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 (WGBFAS, WGCEPH, WGDEEP, WGHABD, WGHARP, WGOH, WGSCALLOP, WGPME, JWGBIRD, WGSOCIAL, WGZE, WGECON, etc.) as well as ACOM, SCICOM, IEA, FRSG, HUDISG, HAPISG.
Linkages to other organizations	The work of this group may be used or is closely aligned with work under HELCOM and National Programmes. Organizations with legal mandates to take binding action in the Baltic Ecoregion EO: HELCOM, EU Coastal States. Additional IGOs of interest to this work: NAMMCO, IWC, ICCAT.

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	20–23 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

	Norwegian Sea, as a step towards implementing the ecosystem approach, addressing core priorities in the ICES strategic plan.
Resource requirements	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. Term of Reference b) This will be supported by work conducted in the IMR-project "Sustainable multi-species harvest from theNorwegian Sea and adjacent ecosystems" (SIS harvesting project), which represents a continuation of the work done in WGINOR during the last three-year term. 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. 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. 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. 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. 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.
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.

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				Intersessional work by correspondence
Year 2024	To be decided	To be decided	Final ICES Scientific report	

ToR descriptors

ToR	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 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 Puntila-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, WGCOMEDA, 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 (Netherland) 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				
Year 2024	TBC	TBC		
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 Codes	Duration	Expected Deliverables
a	Identify and prioritize the relevant social, economic, and ecological (SEE) questions to be asked for the CAO in collaboration with the PAME CAO project. Identify relevant audience/stakeholders to the CAO-integrated ecosystem assessment (IEA).	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-ice free CAO.
b	Identify priority semi-quantitative and quantitative methods for doing *relevant* 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	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. Begin drafting the Cooperative Research Report (CRRs) on Human Activities and existing Management Bodies and Integrated Ecosystem Assessment methods and processes.

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 2020/2021

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 Hjøllo to continue for 1 year (knowledge transfer), Marie Maar as outgoing Chair.
Year 2023	27–31 March	ICES HQ, Copenhagen, Denmark	ICES E-eval by 14 April 2023	Solfrid Hjøllo as outgoing Chair, incoming Chair, Erik Askov Mousing, Norway.
Year 2024	11–15 March	A Coruña, Spain	Final ICES E-eval due 1 April and scientific report by 31 May	New incoming chair TBD, Sonja van Leeuwen to continue for 1 year (knowledge transfer).

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Improve model interaction between trophic levels by: - Investigating the importance of spatio-temporal scales for trophic match-mismatch - Assessing human activities on effects on ecosystems, including cumulative impacts	Fundamental science lying behind the structural and parametric needs for these types of model. Important for IEA groups and WKEWIEA. Linked to Marine Ecosystem Research Program	2.2, 2.5	Annual	Report or paper on how human activities affecting marine ecosystems can be described in models. 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. Further develop contact to the social science EG's. Where appropriate peer reviewed publications are endorsed.

b	Improving lower trophic level models by investigating: - Parameterization of functional diversity (community structure, traits) and adaptations - Patterns and drivers of plankton phenology and productivity across models and ecosystems - Bentho-pelagic coupling in models	More research is needed to improve model description of diversity, adaptation and traits in lower trophic level models. The bentho-pelagic coupling is important for nutrient and energy fluxes and should be better described in the models. IEA groups, WGZE and BEWG.	1.3, 1.9	Annual	Collaborative paper on productivity and drivers across models and ecosystems. Collaborative paper on productivity across ecosystems. Report on impacts of human pressures on ecosystem components assessed by dynamic modelling. Where appropriate peer reviewed publications are envisioned.
c	Improve higher trophic level models by investigating: - Effects of connectivity, climate and habitat on emerging species distribution, to support management and fisheries - Key process formulation (mortality, physiological rates, etc.) - Movement algorithms	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. Fundamental research is needed to improve the description of key physiological processes in models. Important for IEA EG's, spatial planning EG's, BWEG, WGBIOP and for advice.	1.3, 1.4	Annual	Report on impacts of human pressures on ecosystem components assessed by dynamic modelling. Collaborative report or paper on movement algorithms used in modelling. Appropriate peer reviewed publications are envisioned.
d	Assessment of model skill evaluation methods by: - 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 weakness - Investigate uncertainty analysis (structural, parameters, scenarios) including model ensembles - Exploring representativeness and use of observations for ecosystem model validation	The lack of systematic evaluation of ecosystem model performance and sensitivity currently limits their use in an operational and management context. 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. Links to all EGs using multi-species and ecosystem modelling (e.g. WGSAMS, WGIMM, working groups on integrated assessments).	1; 3, 5.3	Annual	Collaborative report or paper on representativeness. Appropriate peer reviewed publications are envisioned.

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, 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				Extension granted to extend ToRs to 2024
2024				

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 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	There are several indigenous Alaskan and Russian communities that can provide specialized Indigenous and Traditional Knowledge unavailable from other sources about characteristics and changes of the Northern	1.1, 1.3, 7.1	Year 1	Reports submitted to ICES and PICES

	(Articles 11.2, 31).	Bering – Chukchi Sea LME			
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
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 2-4	Reports submitted to ICES and PICES and/or paper(s) submitted to peer-reviewed journal

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.
Years 2-4	During years 2-4, shared conceptual models including both Indigenous Knowledge and science will be developed. Meetings will take place at PICES ASM; and other venues as opportunities arise with preference to those in Arctic communities.

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	• 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 2023

Res. Code	EG name	Chairs
2022/WK/IEASG05	WKEOF - Workshop for the production of the Ecosystem Overview of the Faroes Ecoregion (To be dissolved after the report is delivered/published in 2023)	Petur Steingrund, Faroe Islands, Karin Margretha Húsgarð Larsen, Faroe Islands, and Sólvá Káradóttir Eliasen, Faroe Islands.
2022/WK/IEASG06	WKFISHCARBON - Workshop on Assessing the Impact of Fishing on Oceanic Carbon (To be dissolved after the report is delivered/published in 2023)	Dave Reid, Ireland, and Emma Cavan, UK.

2022/WK/IEASG10	WKBALEO - Workshop for the revision of Ecosystem Overview of the Baltic Sea Ecoregion	Carolyn Faithfull, Sweden, and Puntila Riikka, Finland.