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

2021/MA2/IEASG04 The **Working Group on Integrative, Physical-biological, and Ecosystem Modelling (WGIPEM)**, chaired by Solfrid Sætre Hjøllo, Norway and 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	March/April	Brussels, Belgium	ICES scientific report by 4 July	Ute Daewel, Germany, incoming Chair, Solfrid Hjøllo to continue for 1 year (knowledge transfer), Marie Maar as outgoing Chair.
Year 2023	March/April	ICES headquarters, Copenhagen, Denmark	ICES scientific report by TBD	Solfrid Hjøllo as outgoing Chair
Year 2024	March/April	Southern Europe	Final ICES scientific report by TBD	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	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	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

	- Patterns and drivers of plankton phenology and productivity across models and ecosystems - Bentho-pelagic coupling in models	and should be better described in the models. IEA groups, WGZE and BEWG.			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 multispecies 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.