## Ecosystem Processes and Dynamics Steering Group EGs Resolutions

## Resolutions approved in 2023

### Working Group on Oceanic Hydrography (WGOH)

**2023/MT/EPDSG01** The **Working Group on Oceanic Hydrography** (WGOH), chaired by Frederic Cyr*, Canada and Ricardo Sánchez Leal*, Spain will work on ToRs and generate deliverables as listed in the Table below.

| | Meeting dates | Venue | Reporting details | Comments (change in Chair, etc.) |
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| Year 2024 | 8-12 April | Hybrid meeting<br>Tenerife, Spain | Interim e-evaluation report by 31 May 2023 to SCICOM | Outgoing chairs: Caroline Cusack, Ireland; and Tycjan Wodzinowski, Poland<br>Incoming chairs: Frederic Cyr, Canada and Ricardo Sanchez Leal, Spain. |
| Year 2025 | TBD | TBD | Interim e-evaluation report by Date (TBD) May to SCICOM | |
| Year 2026 | TBD | TBD | Final e-evaluation report by Date (TBD) May to SCICOM | |

### ToR descriptors

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
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| a | Through a growing network of oceanographers, examine the hydrographic variability of the North Atlantic and adjacent seas. Identify events, trends and drivers in the region. | The experts of the WGOH will compile a wide range of observations taken by various national programmes. This exercise helps to monitor developments of the environmental conditions that they sample. | Code 1.1; 1.2; 1.9 | 3 years | Annual WGOH meeting featuring a series of regional presentations, covering the evolution of hydrographic conditions and development of monitoring programmes. The synthesis of these changes are summarised in the IROC products. |

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| b | Standard Sections and Stations summarised into the production of the IROC-online products (web: https://ocean.ices.dk/core/iroc) | The Working Group recognises the need to disseminate climate information in a timely and appropriate manner. IROC products (content and structure) are revised every year. Improvements are proposed and implemented when possible. | Code 1.1; 1.2; 1.9 | 3 years | i) A summary of data series are uploaded to the IROC website, annually.<br>ii) IROC Highlights available ~2 - 3 weeks after the WGOH annual meeting, summarising conditions in the previous year.<br>iii) IROC report published as an ICES CRR document once every three years. Target: Release in summer, before the ASC. |
| c | Explore and continue to increase the international profile and exposure of this EG across national and international events and engagement with the broader ocean observing system community (e.g. GOOS; GO-SHIP, EOOS ). | Participate in and/or organise national and international events. Enhanced information exchange benefits both ICES and international monitoring programmes. There is an increasing need to establish stronger connections between hydrographic monitoring programmes involved with WGOH and the broader GOOS community. The contact established with Ocean-OPS (formerly JCOMMPS) and GO-SHIP should be maintained. | Code 1.2; 1.9; 3.4 | 3 years | EG members will publish in the proceedings of suitable events. Outcomes of engagement activities with the broader ocean observing system community are documented as part of the 3rd year progress report. The WGOH will connect with and provide requirements to GO-SHIP (e.g. through the Horizon Europe funded project EuroGO-SHIP) and will continue to work toward providing GO-SHIP information about WGOH metadata and data links with Ocean-OPS. |

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| d | Support for ICES processes on hydrographic data and ocean scale marine climate variability. Including Data Centre, other EGs, requests by the parent steering group EPDSG (Ecosystem Processes and Dynamics Steering Group) and advice programme as required. | Oceanic hydrography remains a fundamental component of assessing the state of marine ecosystems. WGOH documents interannual to multidecadal variability and trends in the oceanic hydrography for most ecoregions. WGOH can provide expert advice to ICES in relation to observing systems (GOOS), CMEMS (Copernicus Marine Environment Monitoring Service) recently referred to as Copernicus Marine Services or policy (MSFD, Marine Strategy Framework Directive). | Code 1.2; 1.9; 6.3 | 3 years | Delivery of timely data and advice, upon ICES request or by WGOH initiatives in development that depend on ocean hydrography (Ecosystem Overviews, ICES Oceanography Review, Integrated Ecosystem Assessments, etc.). Assessment of ocean hydrography issued upon request. |

**Summary of the Work Plan**

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| Year 1 (2024) | a) | IROC 2023 web products (data and maps) and the early release of highlights of North Atlantic hydrographic conditions with a special focus on any significant events. |
| | b) | Review the current roadmap for IROC evolution. Implement modifications to IROC format and content as feasible. |
| | c) | WG Activities progress report (Interim working group e-evaluation) including status of WGOH time series and update on linkages with the broader community (e.g. oceanographic, policy). |
| | d) | Review climate monitoring, reanalysis and forecasting programmes relative to ICES work. |
| Year 2 (2025) | a) | IROC 2022, 2023, 2024 web products (data, maps and report) production including early release of highlights of North Atlantic hydrographic conditions. Implement modifications to IROC format and content as feasible. |
| | b) | WG Activities progress report (Interim working group e-evaluation). |
| Year 3 (2026) | a) | IROC 2025 (data and maps) web products production and review of content and requirement to continue IROC process. |
| | b) | WG Final report (i.e. End of Term e-evaluation of fixed term working group). |

**Supporting information**

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| Priority | Oceanic hydrography remains a fundamental component of assessing the state of marine ecosystems. WGOH documents interannual to multidecadal variability and trends in the oceanic hydrography setting the vital context for prevailing conditions & ecosystem change. The IROC has been cited more than 220 times (http://tinyurl.com/ICES-IROC) demonstrating that it is an important resource for the marine science community within and beyond ICES. |

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| Resource requirements | The research and operational monitoring programmes which provide the main input to this group are already underway, with resources committed. Resources required to undertake additional activities in the framework of this group are negligible.<br>The WGOH need ICES support to ensure there is a clear line of communication (contacts) and instruction (list of oceanography and ocean climate change information required) from EGs who need WGOH input when updating their Ecosystem Overviews.<br>ICES secratariat support as listed below under "Secretariat facilities" is also appreciated. |
| Participants | The Group meetings are normally attended by about 15–20 members and guests (in-person) with other members joining online. The EG composition is constantly changing. Currently, the WGOH group consists of 56 delegates from 16 countries representing 36 institutions. In recent years (2021 and 2022) up to 36 people attended the online meetings with 60 people attending the 2023 hybrid meeting (this includes the 23 external guests who attended the mini-symposium). |
| Secretariat facilities | Support required:<br>- ICES scientific officers for logistical and technical support for meetings and reporting.<br>- ICES editorial staff for the IROC production.<br>- ICES data management team for advice on data governance, management and support to update and improve the on-line IROC interactive website products.<br>ICES communication officers to help raise the profile of WGOH outputs. |
| Financial | No financial implications. |
| Linkages to ACOM and groups under ACOM | The group is open to requests regarding environmental policy as required. Currently, WGOH outputs feed into the ICES advice products "ecosystem overview reports".<br>To date, the EG has provided input to the reports of the following ecoregions (a) 2022 Celtic Seas, (b) 2022 Greater North Sea, (c) 2022 Bay of Biscay and the Iberian Coast ecoregion, and (d) 2021 Greenland Sea. |
| Linkages to other committees or groups | There is a close working relationship with many EPDSG EGs. The most direct link is to WGOOFE (Working Group on Operational oceanographic products for fisheries and environment) where the activities of the 2 groups are complementary. WGOH focuses on the larger Atlantic space and long-term climate scales. In recent years, the WGOH has worked with a number of the Integrated Ecosystem Assessment EGs (e.g. WGEAWESS, WGINOSE, WGIEAGS) providing supporting oceanographic and climate information for consideration in the ecosystem overview reports. Link to ICES editorial team for the annual production of the IROC. |
| Linkages to other organisations | Intergovernmental Oceanographic Commission of UNESCO ( IOC-UNESCO) led programmes, i.e. Global Ocean Observing System (GOOS), The Global Ocean Ship-based Hydrographic Investigations Program (GO-SHIP), The International Center of Excellence for Coordination and Monitoring of Meteo-Oceanographic Observing Systems that are part of the Global Ocean Observing System (WMO-IOC OceanOPS), The Northwest Atlantic Fisheries Organisation (NAFO). |

**Working Group on Zooplankton Ecology (WGZE)**

**2023/MT/EPDSG02** The **Working Group on Zooplankton Ecology** (WGZE), chaired by Antonina Dos Santos*, Portugal and Todd O'Brien*, USA will work on ToRs and generate deliverables as listed in the Table below.

| | Meeting dates | Venue | Reporting details | Comments (change in Chair, etc.) |
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| Year 2024 | 6–8 February | Plymouth, UK | | Outgoing chairs: Sophie Pitois and Lidia Yebra<br>Incoming chairs: Antonina Dos Santos, Portugal and Todd O'Brien, USA |
| Year 2025 | TBD | TBD | | |
| Year 2026 | TBD | TBD | | |

| ToR | Description | Background | Science plan codes | Duration | Expected Deliverables |
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| A | Developing size-based indicators of plankton status and energy transfer efficiency | Size is a "master trait" in pelagic ecosystems, dictating the pace of a wide range of processes ranging from individual cell to ecosystem in scale. By considering size as a central theme, zooplankton can be linked to phytoplankton and as a conduit, of highly variable efficiency, to commercially exploited fish. We will continue to compile a database of plankton sizes to be used in conjunction with zooplankton time series to provide a scoping report on suitable data for size spectra analysis. This report will list the availability of suitable time series of data that provide complete abundance and mass indices among taxa that span from nanoplankton up to macroplankton. These suitable datasets will enable the construction of size spectra which provide a simple and robust in-situ index of how efficiently energy is transferred from primary production up to organisms the size of fish. The size-based indicator developed originally for ecosystem status assessment in the Baltic Sea, will be used and expanded across suitable ICES sites across the Atlantic to understand how the changing size structure of the marine ecosystem relates to environmental conditions. | 1.3, 2.2, 2.5 | Years 1-3 | An open access database of species-based zooplankton size data and other traits.<br>A compilation of suitable datasets and time series that provide high quality size spectra from the ICES area.<br>Report on the changes in plankton size and function across the ICES area and its relationship with ecosystem status with the aim of development of size-based indicators. |
| B | Assessing patterns and trends of zooplankton community properties | Zooplankton community changes have been observed across the North Atlantic in recent decades, associated with changes in ocean circulation and environmental conditions (e.g., water column mixing, water temperature, phytoplankton bloom dynamics). This ToR characterises and compares long-term trends and patterns in community changes across ICES time series. Changes in mesozooplankton, macrozooplankton and gelatinous groups will be considered. Changes in rank-based assessment of community structure at the sites will be assessed in terms of species functional traits and biogeographic associations, and their association with changes in environmental conditions (e.g., depth, distance from shore, region). Tracking and understanding changes in zooplankton community composition across time series stations and at the basin scale has applications to understanding pelagic ecosystem dynamics and implications for marine resource management. | 1.1, 1.3, 1.9 | Years 1-3 | A manuscript on changes in community trends and patterns in the ICES area. |

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| C | Report on the status and trends of plankton in the ICES North Atlantic and inland seas | In collaboration with WGPME, this revival of the legacy ICES Plankton Status Report series will create a hybrid online product of interactive exploration tools and summary text based on satellite and in-situ plankton and environmental data. Splitting the content of the massive Plankton Status Report into smaller geographic regions and shorter summary texts will facilitate easier and more frequent updates (e.g., every 1-2 years online versus every 3-5 years per report), providing more recent and relevant material to the community. This will build upon existing content (e.g. https://wgze.net/metabase, https://wgpme.net/metabase, https://igmets.net/explorer) and further expand it with new capabilities and tools. This work will also enable focused studies on key trends discovered in the general summary results, leading to special reports and/or peer-reviewed papers. | 1.3, 1.9 | Years 1-3 with continuity | An interactive online web interface and a regularly updated summary text on regional plankton trends and status.<br><br>Contributions to ecosystem overviews as required. |
| D | Models and data requirements to understand zooplankton trends | Through its members' zooplankton monitoring sites, WGZE has access to zooplankton time series across the North Atlantic, Mediterranean and Baltic Seas, and it produces the Zooplankton Status Report summarizing trends among regions and over time. Since 2015, joint WGZE-WGIPEM meetings have provided an opportunity to discuss common interests, including gaps in knowledge and data needs for modelling lower trophic levels. In 2023 WGIPEM presented to WGZE a list of zooplankton information and data that would be useful for modelling lower trophic level rate processes and food web linkage. WGZE is interested in a dialogue between zooplanktologists and modellers- (dialogue/joint ToR with WGIPEM) not only about data requirement for models but also about the kind of models that would be most suitable to understand the complexity of ecosystems and zooplankton trends in the context of climate change. In addition to consideration of the list that WGIPEM presented, recent recommendations in the literature about plankton modelling data requirements and applications (e.g. Grigoratou et al. 2022: Bull. Limnol. Oceanogr. 31(1): 22-26. https://doi.org/10.1002/lob.10479) will be assessed as next action steps for implementation. | 1.1, 1.2, 1.3, 1.4 | Years 1-3 | Recommendations for standards in collection, reporting and dissemination of zooplankton data to facilitate marine ecosystem and biodiversity modelling.<br><br>Recommendations for process-oriented experiments and field observations needed for data generation<br><br>Steps to implement recommendations: Maintain dialogue with WGIPEM to achieve a solid collaboration platform. |
| E | Automated image analysis for zooplankton monitoring | Imaging is an increasingly common approach for sampling zooplankton and can provide new types of plankton data (e.g., continuous data as opposed to discrete, or in situ size). Each imaging instrument has individual characteristics, advantages and disadvantages, and each instrument produces slightly different types of images. New methods are required to harmonise data and intercalibrate between devices to determine how full advantage can be taken of system or suite of systems. A platform where information is collated on the instrument's description, its associated limitations and a record of captured images will be a useful tool to help selecting which instrument or combination of instruments are best suited for addressing specific ecological questions. The ecological insight obtained from these | 1.4, 4.3, 4.4, 3.2 | Years 1-3 | An up-to-date comparison table of existing instruments properties (e.g., size range, towed, static etc.) and who are using those instruments.<br><br>A list of ecological knowledge gaps which may be better answered by imaging methods<br><br>Identifying existing (and new potential) image-based time series that may benefit |

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| | | methods may enable answering long-standing ecological questions unanswerable with traditional methods. Canvassing experts in the field to detail these questions might provide guidance for how to best deploy these tools. A list will be drawn up with existing and new research questions that may be resolved by these instruments. As sampling becomes increasingly digital, it is prudent to ensure new time series or time series where methods are migrating to digital solutions, can be integrated into existing time series and repositories. These repositories exist (e.g. Copepod database, ICES data portal) but image data remains absent. Developing a pipeline that can be used to migrate existing image-based time series to online databases, following the FAIR principles, will result in increased data accessibility. | | | from being uploaded to existing repositories. |
| F | Improving representation of under-surveyed macrozooplankton and non-crustacean taxa | Marine zooplankton is a diverse assemblage spanning 15 phyla and covering wide size spectra as well as several trophic niches from filter feeders to grazers and predators. Yet, zooplankton surveys are traditionally highly biased towards crustacean mesozooplankton, particularly the numerically dominant copepods, resulting in a relatively narrow representation of the existing phylogenetic, ecological, and functional diversity, and potentially missing ongoing changes concerning the other taxa. There are several reasons for this, such as methodological constraints in sampling, sample processing and preservation, subsampling practices resulting in a poor representation of the less numerous predatory species, lacking taxonomic expertise, and general down-prioritisation. With the marine systems facing rapid human-induced environmental changes, likely to result in altered structure and functioning of zooplankton communities, there is a need to expedite the accumulation of ecological and biodiversity data across the entire plankton community. ToR F contributes to improved data acquisition on macrozooplankton, including non-crustacean zooplankton, and other under-surveyed groups. Taxa of interest include e.g. cnidarians, ctenophores, tunicates, chaetognaths, gastropods, polychaetes, mysids, euphausiids, as well as various meroplanktonic larvae. | 1.6, 3.1 | Years 1-3 | Joint report outlining the current monitoring practices, challenges and a roadmap towards improved representation of undersurveyed taxa; Openly available resources for improved data acquisition on target taxa, such as: methods/protocols; identification materials (in collaboration with WGIMT); reference sequences/images.<br><br>Propose relevant theme sessions to conferences (e.g. ICES ASC, 7th ZPS). |
| G | Outreach, mentoring and training | Outreach activities in WGZE are extremely important to connect all researchers working on zooplankton in the ICES area, spreading knowledge and expertise within the group and transferring it to other scientists in the ICES community and to the public. This ambition is connected to the present ICES Science Plan as one of its outcomes is to have marine science with a high and beneficial impact on society. On the other hand, training is becoming more and more a necessity through the zooplankton science community, especially in terms of assessing biodiversity and integrative identification of plankton species that are key to many ecology studies. Finally, mentoring is regarded as a way to bring early career scientists to the group and ICES, in order to expand the current pool of experts. This ToR will also | 1.2, 1.4, 1.6 | Years 1-3 | Submission of theme sessions to the ICES ASC.<br>To have WGZE members as mentors in the ICES ASC and 7th ICES/PICES Zooplankton Production Symposium (ZPS).<br>Support to the organisation of training courses and workshops on zooplankton (e.g. *WS4: Zooplankton morphological identification. Is it still necessary?* at the 7th ZPS). |

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| | support the editors of the ID Leaflets for Plankton and the development of theme sessions for the ICES ASC within the WGZE community. |

## Working Group on Marine Mammal Ecology (WGMME)

*Only experts appointed by national Delegates or appointed in consultation with the national Delegates of the expert's country can attend this Expert Group.*

*Approved on the resolutions forum in February 2024*

**2024/MT/EPDSG03** The Working Group on Marine Mammal Ecology (WGMME), chaired by Sophie Brasseur, The Netherlands, and Peter Evans, UK, will meet on 12-16 February 2024 at ICES headquarters, Copenhagen, to:

a) Review and report on any new information on seal and cetacean population abundance, distribution, population/stock structure in the NE Atlantic (including North Sea and Baltic Sea), including information on rare or vagrant species of marine mammals in the area of interest and updating the seal database with abundance estimates and new data points with particular emphasis on the DGMARE ETP priority species list for bycatch advice.

b) Review and report on any new information on seal and cetacean management frameworks (including indicators and targets for MSFD assessments) in the NE Atlantic (as defined above) – after a discussion at Monday's Plenary, we might decide not to do this ToR, this year.

c) Review and report on any new information with particular emphasis on the DGMARE priority ETP species list for bycatch advice on i) seal and cetacean and anthropogenic threats (including cumulative effects) to individual health and population status in the NE Atlantic (as defined above); ii) identify gaps in our knowledge with regards to anthropogenic threats to marine mammals in the NE Atlantic.

d) In collaboration with WGBYC, contribute to the Roadmap for ICES PETS bycatch advice by:

   i. Reviewing and providing input to the general methodological approaches proposed by WGBYC in 2023 regarding Qualitative Bycatch Risk estimation and Metadata Table, for those species for which information on Bycatch per Unit Effort is unavailable (i.e. data-poor situation). Provide information that can feed into a Metadata Table for relevant species (see section 5 of the WGBYC 2023 report[1]).

   ii. In relation to Bycatch Evaluation and Assessment Matrix (BEAM) (see Table 1 and Table A1 of the 2023 ICES advice[2]), provide information on the most updated abundance estimates for marine mammal species and areas contained in the final results' table.

[1] ICES. 2023. Working Group on Bycatch of Protected Species (WGBYC). ICES Scientific Reports. 5:111. 334 pp. https://doi.org/10.17895/ices.pub.24659484

[2] ICES. 2023. Bycatch of endangered, threatened and protected species of marine mammals, seabirds and marine turtles, and selected fish species of bycatch relevance. In Report of the ICES Advisory Committee, 2023. ICES Advice 2023, byc.eu. https://doi.org/10.17895/ices.advice.24681123

e) Review stranding records (number/species/age, other details if available) frequencies and trends in causes of death for each cetacean and seal species by country/region as determined from post-mortem examinations; consider metrics used to determine these frequencies.

f) In coordination with developments of the Offshore Renewable Energy (ORE) ICES Roadmap, review current guidelines and standards for marine mammal monitoring per country/region and provide inputs to evaluate trade-offs between ORE and marine mammal biodiversity (to be introduced for discussion and then developed intersessionally, following the ICES ORE Workshop planned at the end of April).

WGMME will report by 5 April 2024 for the attention of ACOM.

**Supporting information**

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| Priority | The activities of this Group contribute to the understanding of the ecological role of marine mammals. |
| Scientific justification | ToRs a) and b) are standing terms of reference. Its scope was expanded by toR c) since it would be useful to include information on threats to population status, including cumulative effects of multiple stressors. ToR d) reflects common interests between WGMME and WGBYC, and WGMME contribution to the roadmap for ICES bycatch advice.<br><br>ToR e) reflects a core ineterest of the WG since samples collected from strandings can provide relevant information in relation to cause of death (e.g. population health, bycatch), life history, or diet. Detailed content of ToR d) and e) will be agreed between WGMME and WGBYC in consultation with the ICES Secretariat. ToR f) reflects a recent research need given the current expansion of offshore reneable installations. |
| Resource requirements | None. |
| Participants | The Group is expected to be attended by 15–20 members. |
| Secretariat facilities | None beyond sharepont facilities and editorial support for the report. |
| Financial | None. |
| Linkages to advisory committees | ACOM |
| Linkages to other committees or groups | WGBYC, WGHARP, WGBIODIV, WGMPAS, WGSAM, WKWIND, WKCETAB, WGJCDP, EPDSG, SCICOM |
| Linkages to other organizations | OSPAR, HELCOM, ASCOBANS, IWC, NAMMCO |

**Working Group on Fisheries-Induced Evolution (WGEVO)**

To be submitted

**ICES/IOC Working Group on Harmful Algae Blooms (WGHABD)**

*Approved on the resolutions forum in April 2024*

**2024/MT/EPDSG04 Working Group on Harmful Algal Bloom Dynamics (WGHABD)**, chaired by Dave Clarke, Ireland, and Lars Johan Naustvoll, Norway' will work on the following ToRs for the 2024–2026 cycle, and generate deliverables as listed in the Table below.

| | Meeting dates | Venue | Reporting details | Comments (change in Chair, etc.) |
|---|---|---|---|---|
| Year 2024 | 16th – 18th April | Ifremer, Nantes, France | Interim e-evaluation | |
| Year 2025 | March - TBC | SMHI, Gothenburg,Sweden | Interim e-evaluation | |
| Year 2026 | April - TBC | Marine Institute, Galway, Ireland | Final report by 1 May 2026 to SCICOM | |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
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| a) | Deliver National Reports on harmful algal events and bloom dynamics for the years 2023, 2024 and 2025 | HAB events may affect human activities and marine ecosystems at different levels. Understanding can best be achieved by integrating multiyear data sets. This links to ICES Science Priorities *Ecosystem Science, Seafood Production, Conservation and Management Science.* | 1.3, 5.6, 6.5 | Year 1,2,3 | Yr 1-3 Summary of national reports in Annex in WGHABD annual scientific report. These will also support events reported in ICES-PICES-IOC HAEDAT database and annual HAEDAT maps that will be used |
| b) | Identify and access the interactions of HAB dynamics with multidimensional environmental stressors on marine faunal mortalities and morbidity | Marine mortalities are a common factor linked to HAB events within the ICES region and thereby collectively reported within HAEDAT under ToR (c). Unfortunately, combining mass mortalities invariably associated with high biomass blooms (either toxigenic or not), tends of obscure | 5.6 | Year 1,2,3 | Activities under this ToR would be networked with initiatives under the IOC-IPHAB Task Team on Fish-Killing Algae and Ecosystem Effects, ICES WG on Pathology and Diseases of Marine Organisms |

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| | | the distinction of mechanisms of action causing mortalities.<br>Within this ToR, fish- killing algal blooms will be considered in the functional content of caged-fish aquaculture, wild fish populations and other collateral damage to marine fauna and coastal ecosystems. Particular focus will be directed on defining the specific mode of action of dynamic ichthyotoxic blooms on salmonid aquaculture, the major fish aquaculture group impacting socioeconomic interests in the ICES region. Evidence that multifactorial environmental stressors, plausibly linked to climate change and/or anthropogenic factors, can amplify and attenuate the effects of HABs on fish mortalities and health status. | | | (WG PDMO) and ToR on HAEDAT and emerging toxin detection methods |
| c) | The ICES-PICES-IOC harmful algal event database (HAEDAT) will be updated by delegates on an annual basis.<br>HAEDAT can be used to produce 'products' such as spatial descriptions of harmful algal events in the ICES area. Examples include maps of incidence of management actions associated with toxicity and/or mortalities which can be fed into ICES Ecosystem Overviews that can be updated annually or as required. The processes of using HAEDAT during the production of the IOC Global HAB report will be reviewed. The feasibility of compiling a parallel dataset of phytoplankton and toxicity data from selected stations in | The ICES-PICES-IOC database plays a key role in the production of the first ICES Harmful Algal Event Status Report and remains an important source information about the global distribution of Harmful Algal Events.<br>This will continue to be updated so that the ICES area can contribute to future HAB reporting initiatives such as updates to the IOC Global HAB Status Report, OSPAR assessments and more.<br>This ToR links to Science Priorities Ecosystem Science, Seafood Production, Conservation and Management Science as well as contributing to the 'Safe Ocean' objectives of the UN Decade for Ocean Science for | 1.3, 5.6, 6.5 | Year 1,2,3 | Yr 1-3 Delegates update HAEDAT. Liase with IOC about HAEDAT as required.<br>Yr 1 Entry forms reviewed, particularly in relation to fish mortalities, and recommendations passed to IOC.<br>Yr 2 Identify time-series of phytoplankton counts and toxin concentrations and products to be generated.<br>Yr 3 Review of reporting products from HAEDAT and time series |

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| | the ICES area as a supplement to event data and to build time series of HAB and toxicity occurrences will be investigated. | Sustainable Development. | | | datasets. Presentation at ICHA conference.<br>Production of factsheets from the ICES area to promote information from HAEDAT. |
| d) | HABs: Mitigation and Bloom Control | Progressive climate-driven changes over the next decades are expected to increase demand on wild fisheries and aquaculture- based food supplies to maintain food security.<br>The pressures on coastal systems also continue to increase with the expansion of coastal communities and tourism. Both of these needs are threatened in many regions of the world by increasingly problematic HABs. Moreover, the increasing reliance on aquaculture as a food resource is in contrast to a decrease in the willingness for insurers to provide coverage for the aquaculture industry as aggregate HAB-related losses drive them from the marketplace. There is thus an escalating industry and societal desire to have safe and effective bloom control options that can minimize or prevent HAB problems. Despite great advances in our understanding of HAB dynamics and our ability to detect and quantify HABs and their toxins, however, there are only a few successful examples where HAB control approaches have been implemented on a significant scale in natural marine waters. Part | 2.1, 2.7 | Year 1,2,3 | Yr 1-3: Activities under this ToR will be to review and report on global progress on HAB control, emphasizing approaches that have moved from the laboratory to small-and large-scale field applications. This effort will work closely with the PICES HAB Section, which also has a strong interest in HAB control. |

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| | | of this disconnect between needs and solutions stems from concerns by the public, the HAB research and management community, and diverse marine stakeholders over the balance between the benefits and unintended environmental consequences. However, the societal, economic, geographic, and environmental impacts from marine HABs have increased in many areas over the last 30 years, as has the demand for | | | |
| e) | Report on new findings in the area of harmful algal bloom dynamics | The dynamics and impacts of HABs and the technologies to monitoring them are evolving rapidly. WG members report new findings on the topic of algal bloom dynamics in the ICES area. This ToR feeds into ICES Science Priorities Ecosystem science, Emerging Technologies and Techniques, Observation and Exploration. | 1.3, 3.3, 4.1 | Year 1,2,3 | Yr 1-3 A report on new findings in the area of harmful algal bloom dynamics will appear in the WGHABD sci- ence report. |
| f) | Early Warning Systems: for HAB forecasting | Early warnings of HABs are important for society,<br>e.g. for the aquaculture industry, tourism, and desalination plants. A combination of early detection of HAB organisms with models forecasting growth and advection of HABs are already in operation or in development in some ICES countries. Novel methods for observations combined with high resolution physical oceanographic models and AI-based forecasting are in development or pre- operational. | 1.1, 2.5, 4.2 | Year 1,2,3 | Yr 1. An overview of existing HAB early warning systems in the ICES region is compiled.<br>Yr 2. Focus topics:<br>1. How do we move from "nowcasts" to "forecasts"<br>2. Challenges of obtaining/incorporating industry data<br>3. Automated systems vs microscopy<br>Yr 3. Focus topic: The potential for |

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| | | | | | AI in supporting early warning systems<br>Deliverable in the form of a manuscript submitted to a scientific journal. |
| g) | HAB distribution and frequency in a changing climate | Plankton are sensitive indicators of short- and long-term change, and as such, are classed as an Essential Ocean / Climate Variable (EOV, ECV).<br>Climate change consequences stemming (but not limiting) from elevated seawater temperatures, changes in pH, salinity, nutrients and weather patterns (such as winter storms) are expected to influence plankton dynamics. There is also the potential for changes in planktonic diversity due the threat of the occurrence of non- native/invasive species.<br>This ToR will investigate and review case studies on present and potential future changes of phytoplankton abundance, diversity, and distribution in the ICES NE Atlantic Arc region with respect to climate change. | 1.1, 2.1, 2.5 | Year 1,2,3 | Yr 1: Collate regional/country timeseries data on phytoplankton diversity and abundance.<br>Yr 2: Examine trend data for HAB causative dinoflagellate species<br>Yr 3: Examine trend data for other HAB species<br>Deliverable: Summary overview document with potential case studies |
| h) | Produce protocols and guidelines for qPCR methodologies for the study and monitoring of HAB species using eDNA | The use of environmental DNA approaches are becoming routine for microbial community and species distribution studies. Work undertaken in the previous two reporting cycles have lead WGHABD to identify the qPCR method based on eDNA as the most appropriate method for HAB species ecological studies and | 1.6, 1.8, 4.4 | Year 1,2,3 | Yr 1 – Production of guidelines and proto- cols for the ICES area for qPCR methods.<br>Yr 2 – Discussion and feedback from the monitoring systems about the feasibility of the ap- plication of the proto- cols. |

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| | monitoring. WGHABD have taken a longer term view here with this ToR and see it lasting two reporting cycles. The final outcome will be agreement on common protocols and assays and on the potential of applying of qPCR in routine HAB monitoring. This has direct relvance to ICES Science priorities Ecosystem Science and Emerging Techniques and Technologies. | Yr 3 – Organisation of a practical qPCR workshop to show the chosen protocols. |

**Summary of the Work Plan**

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| Year 1 | Present national reports, new findings and update HAEDAT database with regional HAB events on annual basis. Review HAEDAT reporting forms and report to IOC with recommendations.<br>Collate and present information on identifying the interactions of HAB dynamics with environmental co-stressors on observed/reported mortalities – particularly fish caged aquaculture.<br>Production of guidelines and protocols for the ICES area for qPCR methods.<br>Collate regional/country timeseries data on phytoplankton diversity and abundance. An overview of existing HAB early warning systems in the ICES region is compiled. Review and report on global progress on HAB control/bloom mitigation |
| Year 2 | Present national reports, new findings and update HAEDAT database with regional HAB events on annual basis. Review products from HAEDAT and presentation at ICHA conference in 2025.<br>Discussion and feedback from the monitoring systems about the feasibility of the application of the qPCR protocols.<br>Define the specific mode of action of dynamic ichthyotoxic blooms on salmonid aquaculture, the major fish aquaculture group impacting socioeconomic interests in the ICES region.<br>Examine current and potential application of in-situ remote sensing platforms for HAB species detection and their accuracy when compare.<br>Examine trend data for HAB causative dinoflagellate species.<br>Review and report on global progress on HAB control/bloom mitigation.<br>Focus topics: 1.How do we move from “nowcasts” to “forecasts” 2.Challenges of obtaining/incorporating industry data 3.Automated systems vs microscopy |
| Year 3 | Present national reports, new findings and update HAEDAT database with regional HAB events on annual basis<br>Organisation of a practical qPCR workshop to sdemonstrate the selected and validated protocols. Present evidence that multifactorial environmental stressors, plausibly linked to climate change and/or anthropogenic factors, can amplify and attenuate the effects of HABs on fish mortalities and health status.<br>Examine trend data for other HAB species with the deliverable: Summary overview document with potential case studies.<br>Review and report on global progress on HAB control/bloom mitigation. |

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| | Automated systems vs microscopy - Focus topic: The potential for AI in supporting early warning systems. Deliverable in the form of a manuscript submitted to a scientific journal. |

**Supporting information**

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| 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.<br>Harmful algal blooms can negatively impact ecosystems and ecosystem services within the ICES area. ICES-IOC WGHABD are have developed a suite of ToRs that address the rising issues associates with HABs in the North Atlantic.The current activities of WGHABD address multiple science priorities within ICES. These are Ecosystem Science, Observation and Exploration, Emerging Techniques and Technologies, Seafood Production and Conservation and Management Science. In addition WGHABD is also involved with a number of global initiatives via the IOC Intergovernmental Panel for HABS and the IOC Global HAB Status Report which is placing ICES Science on a global stage. |
| 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 is normally attended by some 20–25 members and guests. |
| Secretariat facilities | None. |
| Financial | No financial implications. |
| Linkages to ACOM and group under ACOM | Output from HAEDAT and ICES Harmful Algal Event Status report will provide material for ACOM should requests for advice require consideration of impacts from HABs. |
| Linkages to other committees or groups | There is a close working relationship with all the groups within EPDSG, in particular with WG PME, WG ZE, WG ITMO and WG BOSV. During the coming reporting cycle linkages with WG PDMO and WG OH will be strengthened and relationship with the Aquaculture Steering group enhanced. |
| Linkages to other organizations | WGHABD is co-sponsored by the IOC and works closely with it under a number of HAB initiaives including Task Teams under Intergovernmental Panel on HABs and links to GlobalHAB Scientific Steering Committee |

**ICES/PICES Working Group on Small Pelagic Fish (WGSPF)**

To be submitted in Spring 2024

**Benthos Ecology Working Group (BEWG)**

To be submitted

**Joint ICES/PICES Working Group on Impacts of Climate Warming on Growth Rates and Fisheries Yields (WGGRAFY)**

To be submitted

**Working Group on Operational Oceanographic Products for Fisheries and the Environment (WGOOFE)**

To be submitted

### Workshop on marine Carbon Dioxide Removal (WKmCDR)

*Approved on the resolutions forum in April 2024*

**2024/WK/EPDSG05** A Workshop **on marine Carbon Dioxide Removal** (WKmCDR), chaired by Libby Jewett, US will be established and will meet on 16-18 October in Woods Hole, MA, USA to:

a) Review and evaluate intersection between proposed marine Carbon Dioxide Removal (CDR) and fisheries; and fisheries management; (Science Plan codes: 2.7, 7.3, 2.1);

b) Review existing and proposed national and international regulatory and permitting frame-works for marine CDR (Science Plan codes: 2.7).

c) Consider whether an ICES WG should be established

WKmCDR will report by DATE for the attention of SCICOM.

Other Workshop Steering Committee members include: Lena Bergström, Sweden; Rudi Voss, Germany; Helen Findlay, UK and Mireia Valle and Guillem Chust, Spain; Jon Hare, Paul McElhany and Gabby Kitch, US.

**Supporting information**

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| Priority | The workshop proposed by this Group will enable ICES members to better understand the ecosystem-based fisheries management implications of proposed marine Carbon Dioxide<br>Removal projects and technologies and determine whether an ICES working group is warranted. |
| Scientific justification | In order to meet the climate targets established through the UNFCCC Paris Climate Accord, carbon dioxide must be actively removed from the atmosphere in addition to implementing<br>robust renewable energy targets. There is an active global effort to explore how to harness the ocean to do this in addition to direct air capture, afforestation and other land based approaches. The United States recetly released an Ocean Climate Action Plan and stood up a marine CDR interagency task force to explore options. How the implementation of mCDR projects at scale will intersect or conflict with fisheries management is an open question which this workshop will consider. |
| Resource requirements | Investment in marine CDR research is underway although funding for a workshop is needed. NOAA is able to host the workshop at its facilities in Woods Hole, MA. |
| Participants | Likely up to 50 participants – including researchers, industry representatives and fisheries managers from national governments. |
| Secretariat facilities | None. |
| Financial | No financial implications. |
| Linkages to advisory committees | There are no obvious direct linkages with the advisory committees. |
| Linkages to other committees or groups | ICES WGs to be approached about intersections include: Aquaculture, Benthos Ecology, Fisheries Resources, Marine Chemistry, Deepwater Ecology, Marine Planning and Coastal Zone Management, and Phytoplankton and Microbial Ecology, ICES-PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems, Ecosystem Effects of Fishing Activities, Climate Change Considerations in Marine Spatial Planning. |

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| Linkages to other organizations | NGO – Ocean Visions; NOAA Ocean Acidification Program (where US government funding for marine CDR is being governed), Ocean Carbon and Biogeochemistry Program at Woods Hole Oceanographic Institute, AGU/EGU, related Ocean Decade programs including the Global Ocean Negative Carbon Emissions (Global-Once) Program. |

## Resolutions approved in 2022

### Working Group on Integrated Morphological and Molecular Taxonomy (WGIMT)

**2022/FT/EPDSG02** The **Working Group on Integrated Morphological and Molecular Taxonomy (WGIMT),** chaired by Dafne Eerkes-Medrano*, UK and Aitor Albaina*, Spain, 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 | 31 March | Naples, Italy | Interim e-evaluation | Incoming chairs: Dafne Eerkes-Medrano, UK and Aitor Albaina, Spain. |
| Year 2024 | 9 February | Plymouth, UK | Interim e-evaluation | |
| Year 2025 | March | TBD | Final report to SCICOM | |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Evaluate the potential of integrated approaches for understanding marine plankton communities | Molecular methods are widely used for rapid assessment of species diversity, and can contribute to improving our understanding of the impacts of climate change and anthropogenic effects on marine ecosystems. There is a need for inter-comparison of results to understand the impact of using different genetic markers that will allow a broader taxonomic coverage and are complementary. | 1.6; 1.7; 4.4 | 3 years | 1. A report which identifies the limitations of different methods and genetic markers for zooplankton taxa (year 3)<br><br>2. A review which examines studies in pelagic ecology that effectively use integrative methods - (year 3) |

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|---|---|---|---|---|
| b | Demonstrate the advantages of using integrated methods in long-term monitoring of plankton communities | The use of integrative methods offers complementarity and a broader assessment of zooplankton diversity and community structure. Morphology alone cannot cover the whole diversity spectrum and has its known limitations (e.g. laborious, challenge for cryptic species or partial specimens). Nonetheless it offers other essential levels of detail that complement and confirm taxonomic assessments derived from optical or molecular approaches. Metabarcoding as well as eDNA metabarcoding has been used effectively for marine biodiversity assessments and more so often for biomonitoring purposes. Particular advantages of metabarcoding techniques are being relatively cheap and quick in obtaining results, with eDNA metabarcoding furthermore also being non-invasive. | 1.6; 1.7; 4.4 | 3 years | 1. A list of invasive species that are detected within zooplankton communities by using integrated methods (year 2)<br><br>2. A report which compares data generated using current classical time-series monitoring vs. information from metabarcoding with a specific focus on meroplankton (year 3) |
| c | Initiate and support provision of standards, training materials, taxonomy workshops and data resources in collaboration with other WGs | The WGIMT Resource Portal provides informational overviews and links to relevant literature and web pages, with a special focus on the use of molecular technologies (and morphological verification) for the integrative taxonomy of zooplankton. Taxonomy workshops are effective in engaging target audiences and ensuring trained technicians and researchers for applications in fisheries and ecosystem management. Co-sponsored workshops and meetings with other EGs will increase impact and likelihood of adoption of integrated methods for advisory applications. | 1.6; 1.8 | 3 years | 1. Expansion of the WGIMT North Atlantic barcoding Atlas (in collaboration with WGPME) (year 3)<br><br>2. Ensure provision of training materials (year 1-3)<br><br>3. Design and organize integrative taxonomy workshops (year 1-3)<br><br>4. Continue development and enhancement of the WGIMT Resource Portal (year 1-3) |

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| d | Continue to demonstrate leadership in promoting and encouraging use of integrative taxonomic approaches for assessment of marine pelagic biodiversity | Integrative taxonomy is a developing field; uses and applications for fisheries and ecosystem management should be explained in high-visibility settings in ICES and other organisations through special sessions at scientific conferences. It is important to maintain a strong foundation and visibility in primary research literature in order to validate metagenetic approaches for analysis of zooplankton diversity. Publication in peer-reviewed scientific journals will demonstrate validity of data, protocols, and results, and allow dissemination and new applications in ecosystem management. | 1.6; 1.7; 1.8 | 3 years | 1. Organize & promote special sessions at national and international conferences: e.g. ICES ASC; ASLO/TOS Ocean Sciences Meetings, Zooplankton Production Symposium (year 1-3)<br><br>2. Publish peer-reviewed scientific papers on topics central to the WGIMT mission, including papers on population connectivity and phylogeography of key species in different ecosystems and the integration of metabarcoding in time-series analysis (year 1-3) |

**Summary of the Work Plan**

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|---|---|
| Year 1 | Progress and reporting on all ToRs. Identification of limitations of different molecular methods and genetic markers for zooplankton taxa. Assembling list of invasive species that are detected within zooplankton communities by using integrated methods (ToRs a, b) |
| Year 2 | Progress and reporting on all ToRs. Update of WGIMT barcode atlas and database in collaboration with WGPME. Carry out collaborative activities with other SCICOM EGs to promote integrative taxonomy and publish peer reviewed scientific articles on topics central to the WGIMT mission (ToRs c, d). |
| Year 3 | Progress and reporting on all ToRs. Recommend, encourage, and enable use of integrated morphological and molecular taxonomic analysis of zooplankton in integrated ecosystem assessments in ICES area seas. Complete a review which examines complementary studies in pelagic ecology that effectively use integrative methods (ToRs a, b, c, d). |

**Supporting information**

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| Priority | The activities of WGIMT will assist ICES and its expert groups with issues related to the development, dissemination and application of taxonomic knowledge and skills in support of Integrated Ecosystem Understanding. Accurate identification of species and characterization of species-level diversity are and will remain foundations of integrated ecosystem assessments of function and state. Integrated taxonomic approaches – including morphological, molecular, optical, and other – may enhance and accelerate progress toward rapid, automatable, and near real-time identification of species for fisheries and integrated ecosystem assessments; detecting the impacts of climate change on species diversity, distribution, abundance; and understanding alterations in food web structure and function, and associated biogeochemical cycles. The availability of and need for new technology and techniques in taxonomic analysis make WGIMT's goals and activities important and high priority |
| Resource requirements | Participation in annual meetings will in the future be challenged due to the changes in working conditions since the COVID-19 pandemic and funding. Hybrid meetings will be the preferred meeting format and technical support by the ICES Secretariat might be requested |
| Participants | This Expert Group now includes 63 members from 20 countries, and has a balanced representation among experts in morphological and molecular taxonomic approaches covering a good range of taxonomic groups and ICES geographic regions. The group's annual meeting had to move to online meetings in 2020-2022 due to the pandemic situation and was attended by 22-27 members. New members are welcome and early career researchers are encouraged to participate. In the upcoming year, WGIMT will actively seek to include early career scientists by providing the opportunity to introduce their research during the annual meeting |
| 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 | WGIMT arose as a Study Group from the WGZE in response to perceived need, meeting in association with WGZE during 2012 and 2013. WGIMT will remain in close partnership with WGZE, WGPME, and WGEUROBUS, as well as SCOR WG 157, while promoting and supporting integrated morphological and molecular taxonomy science for the benefit of the ICES science and advisory communities as a whole. Outcomes of the work will also address topics related to e.g., WGITMO (HAPISG) |
| Linkages to other organizations | The work of this group relates to and is connected to a diversity of other projects and organisations, e.g. SCOR WG157 MetaZooGene, BONUS BIO-C3 project, NOAA COPEPOD and COPEPODITE, GOBI, and others. |

## Working Group on Cephalopod Biology and Life History (WGCEPH)

**2022/FT/EPDSG03** The **Working Group on Cephalopod Fisheries and Life History *(WGCEPH)***, chaired by i) Daniel Oesterwind, Germany, ii) Catalina Perales-Raya, Spain*, iii) Vladimir V. Laptikhovsky*, UK 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 | 3-7 July | Instituto de Investigaciones Marinas, Vigo, Spain | Interim e-evaluation | Change in chairs:<br>Outgoing: Ana Moreno (Portugal) and Graham Pierce (Spain)<br>Incoming: Catalina Perales-Raya (Spain) and Vladimir V. Laptikhovsky (UK) |
| Year 2024 | 18-21 June | Lowestoft, United Kingdom | Interim e-evaluation | |
| Year 2025 | tbc | tbc | Final report by Date Month to EPDSG | |

### ToR descriptors

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Report on cephalopod stock status including fishery and survey trends: update, quality check and analyse relevant data (landings, directed effort, discards and survey catches). | Our aim is to provide an overview of the current status of fishery-relevant cephalopod stocks in the ICES areas, along with trends in abundance/biomass derived from various surveys. | 5.1, 5.2, 6.1 | 3 years | Cephalopod stock status reports (Annual) |

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| b | Review new and existing assessment methods for use with cephalopod fisheries and within the MSFD. Test and adapt (if available) these methods for use with cephalopod fisheries and within the Marine Strategy Framework Directive (MSFD), using data of European cephalopods (e.g. EU-Data Collection Framework, ICES coordinated fishery surveys). | Cephalopods are important ecosystem components but in the European large-scale fishery, fishing is essentially unregulated and a routine assessment does not exist for most species. Furthermore, most Member States have not included cephalopods within their MSFD status report. Both illustrate the current gap in management and assessment. The goal is advancing the assessment of European cephalopods | 5.1, 5.2, 6.1 | 3 years | Report on advances in cephalopod stock assessment (Annual) |
| c | Review/update advances in knowledge of life history and ecology, identifying research priorities with the focus on cephalopod assessment methods and relevant information, including the availability of necessary data within European waters. | Cephalopods show short life-cycles as well as high variation individual life history and population abundance; understanding this variation is essential to underpin assessment and management. | 1.7, 5.2 | 3 years | Report on relevant new knowledge and research priorities of cephalopod life-history and ecology (Y3) |
| d | Update best practice for routine biological data collection | It is recognized that the current standard data collection is insufficient to understand population dynamics, and to support fishery characterization and routine assessment. The sampling strategy needs to be optimized and the sampling intensity adapted to meet the needs, considering the time and budget constraints. | 1.7, 3.2, 5.2 | 3 years | Review of biological sampling data from European programs, and identification of shortcomings (Y2). Analysis and guidelines of best practices for sampling strategy optimization (Y2); Updated data collection recommendations (Y3) |

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| e | Review, develop and recommend tools for cephalopod species identification (ID) including image data collection. | Cephalopod species identification in fishery and survey catches remains inconsistent and incomplete. To improve species identification, simple guides need to be developed in all regions for 'easy to use' by fishers, fishery officers, inspectors, buyers, and scientists undertaking sampling. Since there is an existing effort to collect images for the regional identification guides, we could build on this effort to develop an image library that could be used to train and improve the accuracy of Artificial Intelligence and Machine Learning (AI/ML)Apps. | 1.6, 3.2, 5.2 | 3 years | List of new/revised scientific ID guides (Annual); Simple regional ID guides for fishers (Y1); Image data management (data and metadata standards, archiving, access, dissemination) recommendations (Y2); Image data processing using AI/ML Apps recommendations (Y3). |
| f | Better understand the socio and economic dimensions, markets and value chains of cephalopod fisheries and explore the potential to foster transformative changes. | The European Union is one of the most important markets for cephalopod fisheries in the world. However, socioeconomic information, essential for effective management of these resources, is scarce. Plus, cephalopods value chains are global and more information is needed on markets and value chains of cephalopods. | 5.8, 7.2 | 3 years | Paper on sustainability of the octopus value chain in the Algarve (Y1); Paper on protocol for integrated value chain analysis for cephalopod fisheries (Y2); Paper Falkland Islands Argentine shortfin squid ecopath (Y2); Octopus markets and seafood traceability (Y3). |
| g | Develop simple climate envelope models of cephalopod species, explore distribution shifts with climate change and long-term climate projections to aid fisheries management of cephalopods in a changing climate. | Despite high phenotypic plasticity, cephalopod distribution is limited by extremes of temperature, salinity, dissolved oxygen, etc. and it is reported that climate change has led, and will lead to, range shifts. The management community is looking for tools and decision support to manage fisheries in changing conditions and species distribution predictive modelling will be useful in this regard. | 1.3, 1.5, 2.5 | 3 years | Paper on climate envelopes models and predicting range shifts for at least one cephalopod taxon (Y3) |

**Summary of the Work Plan**

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| Year 1 | Cephalopod stock status reports, including advances in stock assessment, Simple regional ID guides for fishers, Paper on sustainability of the octopus value chain in the Algarve |
| Year 2 | Cephalopod stock status reports, including advances in stock assessment, Review of biological sampling data from European programs, and identification of shortcomings, Analysis and guidelines of best practices for sampling strategy optimization; Image data management (data and metadata standards, archiving, access, dissemination) recommendations, Paper on protocol for integrated value chain analysis for cephalopod fisheries, Paper Falkland Islands Argentine shortfin squid ecopath |
| Year 3 | Cephalopod stock status reports, including advances in stock assessment, Report on relevant new knowledge and research priorities of cephalopod life-history and ecology, , Image data processing using AI/ML Apps recommendations, Octopus markets and seafood traceability, Paper on climate envelopes models and predicting range shifts for at least one cephalopod taxon |

**Supporting information**

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| Priority | The current activities of this Group will inform ICES about the status of cephalopod stocks and fisheries at a time when fishing pressure is increasing. Cephalopods are not covered by the EU Common Fisheries Policy but there is a need to identify sustainability issues and to be in a position to recommend management actions, should the need arise. Furthermore, the planned preliminary assessment of different stocks can support the MSFD reporting in several member countries. These activities are believed to have a very high priority.<br>ToRs a-g are envisaged as standing ToRs. ToRs a and b are fundamental for the advancing of stock assessment of European cephalopods and will involve a Data Call. ToR a will also review stock definition, since past preliminary assessments have been based on arbitrary spatial units and there is a need to define more appropriate management units. ToR c provides a review of recent advances in knowledge of cephalopod biology and ecology; improved understanding of life history plasticity, ecological roles and the high year to year variation in abundance remains a priority. ToR d continues efforts to facilitate better routine data collection of cephalopods. ToR e provides new tools to improve species identification. ToR f aims to ensure that social and economic sustainability of cephalopod fisheries are better undeerstood, a key requirement for integrated ecosystem assessment. ToR g addresses effects of ocean warming on cephalopod distribution. |
| Resource requirements | As noted in several previous reports, participation in WGCEPH is limited by availability of funding, especially as many members and potential members are staff of institutions which have no access to "national funds" for attendance at ICES meetings. Although there are no specific resource requirements, funding to assist wider participation would be beneficial. |
| Participants | Meetings of the Group are normally attended by around 15 members and chair-invited, with wider participation via videoconferencing and e-mail. |
| Secretariat facilities | None. |
| Financial | No specific financial implications (but see "resource requirements"). |
| Linkages to ACOM and groups under ACOM | The results of WGCEPH are potentially relevant for advice in the case that formal assessment and management are introduced for any of these species. . |

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| Linkages to other committees or groups | Possible links with ICES groups working on predators of cephalopod (e.g. WGBIE, WGCS, WGMME).<br>WGCEPH would like to encourage improved data collection on cephalopods during trawl surveys. It will make available (e.g. to IBTSWG) detailed diagrams and protocols for identifying cephalopods and collecting biological parameters during the scientific surveys.<br>WGCEPH will provide information to SCICOM and its satellite committees as required to respond to requests for advice/information from NEAFC and EC DG Fish. |
| Linkages to other organizations | WGCEPH maintains links with ongoing European and national research projects and with the Cephalopod International Advisory Council. |

## Working Group on the Biology and Life History of Crabs (WGCRAB)

**2022/FT/EPDSG04** - The **Working Group on the Biology and Life History of Crabs** (WGCRAB), chaired by Ann Merete Hjelset*, Norway, will work on ToRs and generate deliverables as listed in the yable below.

| | Meeting dates | Venue | Reporting details | Comments (change in Chair, etc.) |
|---|---|---|---|---|
| Year 2023 | 7–9 November 2023 | Bangor, Wales, UK (hybrid) | Interim e-evaluation | Outgoing chair: Carlos Mesquita, United Kingdom<br>Incoming new chair: Ann Merete Hjelset, Norway |
| Year 2024 | 5-7 November | Weymouth, UK | Interim e-evaluation | |
| Year 2025 | TBD | TBD | Final report by Date Month to SCICOM | |

### ToR descriptors

| ToR | Description | Background | Science plan codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| | This should capture the objectives of the ToR | Provide very brief justification, e.g. advisory need, links to Science Plan and other WGs. | Use codes *(max 3 per ToR)* | 1, 2 or 3 years | Specify what is to be provided, when and to whom |
| a | Compile data on landings, discards, bycatch, effort and catch per unit effort (CPUE) to provide standardised CPUE, size frequency and re-search survey data for the important crab and lobster fisheries in the ICES area, At-lantic Canada and Green-land. | Crab and lobster fisheries are economically important for many coastal populations in Europe and Canada, particularly where fin fish stocks declined. It is important to collate these data at a national level to ensure stock assessments can be carried out. | 3.2<br>3.5<br>4.1 | 3 years | Landings, discards, bycatch, effort and catch data on listed species from each country. Data will be collated and included in the WG report and may be submitted to the ICES Data Centre. |
| b | The EG will collate stock as-sessment data for areas where the information is available. The working | The data available and management measures applied for crab and lobster fisheries | 5.1<br>5.3<br>5.4 | 3 years | Report on evaluation of assessement methods. WG report |

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| | group will review methodologies to develop suitable standardized reference points for the management of the different stocks. Explore and apply common assessment methods for crab and lobster stocks using available data including length distributions and abundance indices. | vary greatly. Many stocks are data limited and their status remains uncertain. Thus, developing robust assessment methods for many fisheries is required. Consideration will be given on how to adapt the currently available and commonly used fish assessment frameworks to crustacean stocks given their biological and gear specificities. The WG will consider to use a corporative framework of experts to review the assessment work of group members. | | | chapter. |
| c | Review the impact of environmental and ecological drivers on important crab and lobster stocks within the ICES area, Atlantic Canada and West Greenland;<br>Consider the introduction and spread of non-native crustacean species and their impact on fisheries. | Crabs and lobsters, as many other species are impacted by environmental paramaters. In the actual situation of climate change, WGCRAB will investigate potential effects on reproduction, recruitment, growth, biomass trends and stock distribution. Crabs represent some of the major examples for invasive species in the marine environment, often with substantial impacts on ecosystems and other fish stocks. Work on this topic suggests a collaboration opportunity with ICES WGITMO. | 2.1<br>2.2 | 3 years | Highlight important issues to be considered for research on climate change impacts on important crab stocks.<br>WG report chapter. |
| d | Review the quality of biological parameters used in stock assessments and carry out work to estimate accurate stock-specific parameters for the crustacean species considered by the WG. | Biological parameters used for crustaceans are frequently based in old studies and not specific for each stock.<br>Biological paramaters are important for stock assessments and improved data will lead to more reliable outputs. | 5.1<br>5.2 | 3 years | Update knowledge on important biological parameters used in asessments (WG report). |
| e | Review research and genereate new knowledge on vital crab and lobster population biology, genetics and stock structure. | Refine stock structure for those areas where data is available to improve current stock unit definition of crab and lobster stocks. | 1.7<br>1.8<br>5.2 | 3 years | Any updates or new knowledge will be outputted into the WG report summary tables. |

**Summary of the Work Plan**

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| Year 1 | Annual standard outputs for a and b. Continue analysis for c and d. |
| Year 2 | Annual standard outputs for a and b. Continue analysis for c and d. |

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|---|---|
| Year 3 | Annual standard outputs for a and b. Complete report on analysis, research and report incuding all work for ToRs c and d. |

**Supporting information**

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| Priority | High. In Canada as in Europe, crab and lobster fisheries are among the most valuable and the livelihoods of many coastal communities are highly dependent of crustacean stocks. Morevover, available data vary depending on the country and are often limited, as such, work on fisheries monitoring and assessment methods should be continued, particularly in those member countries where existing fishing data allow for establishing or developing stock assessments. The aim is to ensure statistically sound assessments of important crab and lobter stocks in order to provide suitable conditions to develop good management practices and stability of all dependent fleets.<br>The activity of the group is therefore considered to be of high priority, in particular if its activity can move towards resource assessment while maintaining a broader perspective on biological research. In recent years the group has moved towards exploring new stock assessment methods for crustaceans and may move towards an advisory role in the future. |
| Resource requirements | The research programmes which provide the main input to this group are underway, and resources are committed. The additional resources required to undertake activities in the framework of this group is not expected to be significant. |
| Participants | The WG is normally attended by 20–25 members and guests. Meetings are expected to be run in hybrid format. |
| Secretariat facilities | None. |
| Financial | No financial implications. |
| Linkages to ACOM and groups under ACOM | None |
| Linkages to other committees or groups | None |
| Linkages to other organizations | None |

## Resolutions approved in 2021/2022

### Scallop Assessment Working Group (WGScallop)

**2022/FT/EPDSG01** The **Scallop Assessment Working Group (WGScallop)**, chaired by Lynda Blackadder, Scotland, United Kingdom and Isobel Bloor, United Kingdom 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 | 3-7 October | Iceland | E-evaluation and interm report by November 2022 | Lynda Blackadder |
| Year 2023 | 9-13 October | Tromso, Norway | E-evaluation and interm report by November 2023 | New co-chair-Isobel Bloor |
| Year 2024 | 8-10 October | TBD, France | Final report by November 2024 | Co-chair expected |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Compile and present data on scallop fisheries in ICES areas II, IV, V, VI and VII by collating available fishery statistics. | The WG established a data call but will address known issues and improve and streamline the process. Data reporting, presentation and options for long term storage will be reviewed. | 5.1 | 3 years | Include updated figures and tables in annual WG reports. Upload scripts to GitHub. Report on possible database options. |
| b | Review and identify stock assessment methods for scallop species. Consider available data (at stock level) for stock assessment input indices and/or for review of stock trends. | The WG has made considerable progress to develop stock assessment methodologies for scallop species and this work should continue. Links have been established with WGNSSK to further consider SPiCT for scallop stock assessment, and with WGOOFE. | 5.1,6.3 | 3 years | Report on stock assessments methodologies and results for all stock areas and consider reference points. Formalise the checking process for stocks. Establish working relationships with WGNSSK and WGOOFE. |
| c | Review and report on current scallop surveys and share expertise, knowledge and technical advances. | Surveys continue to be important for data collection for scallop stocks and sharing knowledge on methodology and advances in technology is important as electronic monitoring and camera systems become more common. | 1.5, 4.4, 5.4 | 3 years | Dredge efficiency review paper (link with ToR f). Scientific staff exchange on surveys. Report on EM and collaborate with WGSFD. |
| d | Continue to refine stock structure using best available information on genetics and larval dispersal and improve current mapping of scallop stocks. Establish links with WGOOFE to collaborate on specific work areas. | Undertsanding the biological stock area to determine if the assessment areas are apropriate. A number of new members have recently joined the WG and it is hoped the PhD projects can support this ToR. | 1.4, 1.8 | 3 years | Report on PhD progress. Maps for each of the scallop stock areas. |

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| e | Review current biological parameters and any gear modification, technological advances, including electronic monitoring (EM) for scallop fisheries. | Several biological parameters are important for analytical assessments. Differences in growth rates will be examined in detail. The group are reviewing dredge efficiency. | 5.1, 5.2 | 3 years | Dredge efficiency review paper (link to ToR d). Report on growth studies. |
| f | Compare age reading methodologies and develop common practices and determine precision and bias of scallop age reading data derived from different readers. | Most institutes rely on aging methods and so this work is still important to continue. | 4.4, 5.1 | 3 years | Attend WKSA. ICES TIMES document on aging methodologies. |
| g | Identify, list and collate all available data for queen scallops and agree on appropriate stock assessment areas. Share knowledge, draft a review paper and attempt stock assessments where possible. | The WG would like to focus more attention on this species. A subgroup will be formed to lead on this. Data are already collected through the data call and surveys. | 5.1, 6.3 | 3 years | Report on progress. Draft a review paper. Create maps of stock areas. |

**Summary of the Work Plan**

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| **YEAR 1** | Linked to ToR;<br>a) Refine data call, highlight and address issues.<br>b) Continue to explore index standardization and stock assessment methodologies including surplus production model for scallop stocks (and establish closer links with other assessment WGs (WGNSSK)<br>c) Apply a SPiCT model for the Isle of Man, using survey and CPUE (VMS/logbook) indices standardized with VAST. Continue to explore other alternative models and establish communications with WGOOFE.<br>d) Continue to report and share knowledge on surveys and plan for scientific staff exchange.<br>f) Dredge efficiency review paper<br>h) Form subgroup for queen scallop work<br>Establish links with WGNSSK, WGSFD and WGOOFE with regular communications |
| Year 2 | Linked to ToR;<br>a) Data call - streamline and document checking process (upload scripts to GitHub)<br>b) Review scallop ICES stock categories and discuss possible reference points (following ICES guidelines from WKREF2)<br>c) Incorporate other spatial areas and environmental variables from the Irish Sea (collaborative work with WGOOFE)<br>d) Undertake scientific staff exchange on scallop surveys.<br>g) TIMES document on aging methodologies in collaboration with WKSA |

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| Year 3 | Linked to ToR;<br>a) Data call – need to consider long term storage options (central database/RDB)<br>b) Set up a more formal checking and review process for stock assessments<br>c) Produce Viewpoint and Management Strategy Evaluation of Irish Sea scallops.<br>d) Report on electronic monitoring (EM) for scallop fisheries and collaborate with WGSFD to produce mapping products.<br>h) Queen scallop review paper |

**Supporting information**

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|---|---|
| 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 resource required to undertake additional activities in the framework of this group is negligible. |
| Participants | The Group is normally attended by 25–30 members and guests. |
| Secretariat facilities | None. |
| Financial | No financial implications. |
| Linkages to ACOM and groups under ACOM | There are no obvious direct linkages as this WG does not currently provide advice but we have discussed the possibility of developing a Viewpoint in cooperation with ACOM leadership for the work we are progressing for an Irish Sea stock assessment for king scallops. |
| Linkages to other committees or groups | There is a very close working relationship with WKSA, and we have provisionally agreed to work with members of WGOOFE, WGSFD and WGNSSK. Communication links have been established and the chair will seek to formalise agreements. |
| Linkages to other organizations | None |

**OSPAR/HELCOM/ ICES/Working group on Seabirds (JWGBIRD)**

*Only experts appointed by national Delegates or appointed in consultation with the national Delegates of the expert's country can attend this Expert Group.*

**2021/OT/EPDSG02** JWGBIRD 3-year workplan can be found here:

*https://www.ices.dk/about-ICES/Documents/Resolutions/Science%20EG%20ToRs/EPDSG/2021/JWG-BIRD%20ToRs%202021%E2%80%932023.pdf*

**Working Group on Biodiversity Science (WGBIODIV)**

**2021/FT/EPDSG03** The **Working Group on Biodiversity Science** (WGBIODIV), chaired by Murray Thompson, UK, and Ute Jacob, 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 2022 | 7–10 June | Oldenburg, Germany | Interim e-evaluation | |
| Year 2023 | 24–28 April | Ifremer Centre de Nantes, France | Interim e-evaluation | |
| Year 2024 | 15-19 April | Oldenburg, Germany | Final report by Date to SCICOM | |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Using complementary measures to provide a multidimensional perspective of biodiversity change. | Efforts to manage and conserve marine biodiversity depend on our ability to understand the mechanisms that affect ecosystem stability at a range of spatial scales, including sufficiently large scales that meet international strategies and directives (e.g. OSPAR, MSFD). The approach to understanding ecosystems using complementary indices which afford a multidimensional perspective of biodiversity change (e.g., trait and taxonomic diversity in their alpha, beta and gamma forms) provides a way to examine stability and variability at multiple scales (Wang and Loreau 2014; Thompson et al 2020). For instance, both variability in species diversity and spatial heterogeneity play important roles in maintaining resource availability via so called 'Portfolio Effects' (Thorson et al. 2018). To our knowledge, however, such patterns in biodiversity across assemblages have not been considered in this context. This ToR (a) will: assess multidimensional biodiversity patterns across assemblages (1.2); make predictions of ecosystem structure and function in space and time relevant for management and service provision, e.g. in designated areas where there is currently limited information (i.e. spatial ToR) and in future under varying climate scenarios (1.3). | 1.1 | 3 years | Provide a framework and data on how to link ecosystem services directly to marine biodiversity. |
| | | | 1.2; 1.3 | 3 years | Production of peer reviewed paper and/ or conference paper. Evidence for ecosystem management and policy, e.g. maps showing biodiversity patterns in space and change over time delivered through WG report. |

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| b | Thresholds responses of marine biota and ecosystem structure:<br>identify areas where marine biodiversity is particularly at risk. | Robust information on the spatial distribution of biota and anthropogenic drivers of change are critical to direct conservation efforts (2.1).<br><br>Identifying where along anthropogenic pressure gradients notable ecosystem shifts take place will help to inform meaningful and cost-effective interventions. Such thresholds were recently demonstrated for the benthos (Couce et al. 2020) illustrating levels of trawling, for example, at which faunal communities undergo significant change, with consequent effects on ecosystem functioning.<br><br>ToR (b) will: identify where diversity, ecosystem function (e.g. production and consumption) and ecosystem services (e.g. carbon storage) are particularly at risk, e.g. where thresholds for several pressure gradients coincide and where policy intervention may thus be particularly effective (2.2, 2.3). | 2.1<br><br>2.2<br><br>2.3 | 3 years<br><br>3 years<br><br>3 years | Literature review of threshold responses across realms, habitats, ecosystem components (do biodiversity thresholds exist?)<br><br>Compile relevant data sets across ecosystem components (benthic invertebrates, plankton, fish, elasmobranchs, mammals)<br><br>Production of peer reviewed paper and/ or conference paper. Evidence for ecosystem management and policy, e.g. maps showing areas where marine biodiversity is particularly at risk delivered through WG report. |
| c | Examine the efficacy of spatial protection measures to conserve and protect biodiversity and meet wider aims (ecosystem function and services). | The United Nations Sustainable Development Goal 'to 'Conserve and sustainably use the oceans, seas and marine resources' requires governments to assess and mitigate our impact on marine ecosystems.<br><br>We can manage our pressures through limiting their 'footprint' (spatial protection) and also the level of pressure (e.g. limiting fisheries catches). Understanding which management measures will be most effective requires us to assess, quantify and predict the trajectory of ecological recovery resulting from spatial protection measures. ToR (c) will use data on faunal distribution, spatial protection measures and heterogeneous (e.g. fishing) and large-scale pressures (e.g. warming) identified in ToRs a, b. ToR (c) will establish status, trends and threats (i.e. pressures) for species and habitats of interest (3.1); establish the wider effects of spatial protection measures on biodiversity in light of primary and cumulative pressures (e.g. as identified in ToRs a, b; 3.2); establish | 3.1; 3.2; 3.3 | 3 years | Production of peer reviewed paper and/ or conference paper. Evidence for ecosystem management and policy, e.g. biodiversity status, trends and threats (inc. cumulative pressures and evolving energy infrastructure) in areas of interest, delivered through WG report. |

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| | the effects of man-made structures on biodiversity (EcoStar, FuECoMMS, DREAMS; 3.3). |

**Summary of the Work Plan**

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|---|---|
| Year 1 | Work on all ToRs |
| Year 2 | Work on all ToRs, Publications |
| Year 3 | Work on all ToRs, Publications |

**Supporting information**

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|---|---|
| Priority | The current activities of this group will lead ICES into issues related to the integrated ecosystem assessments and the implementation of the ecosystem approach to marine management. 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 is normally attended by ca. 20 members and guests. |
| Secretariat facilities | Standard EG support |
| Financial | No financial implications. |
| Linkages to ACOM and group under ACOM | There is a linkage to the Integrated Ecosystem assessments Steering Group (IEASG). The results of WGBIODIV are important to WGECO and may be of relevance for IEA groups. |
| Linkages to other committees or groups | The outcomes of WGBIODIV will be important to the ICES high prority work area 'Marine Strategy Framework Directive (MSFD)'.<br>Linkages to JWGBIRD and WGMME exist. |
| Linkages to other organizations | OSPAR, HELCOM, European Commission |

### Working Group on Phytoplankton and Microbial Ecology (WGPME)

**2021/FT/EPDSG04** The **Working Group on Phytoplankton and Microbial Ecology** (WGPME), chaired by Rowena Stern, UK and Nicole Poulton, 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 2022 | 13–14 June, 2022 | Online meeting | | |
| Year 2023 | 20-23 March | ICES HQ, Copenhagen, Denmark | | |
| Year 2024 | 13–17 May | ICES HQ, Copenhagen, Denmark | Final report by DATE to SCICOM | |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Generate improved knowledge of small food web components that are poorly monitored/assessed | There is a lack of consideration of smaller phytoplankton in monitoring and assessment studies which make up majority of plankton diversity and in some areas biomass. With the advent of flow cytometry, genetics and imaging, small phytoplankton datasets have been collected over a reasonable time series to be useful in ecological studies but many are not available/accessible to the general scientific community. To assist in the use of smaller phytoplankton for ocean studies, we will collate smaller phytoplankton data sources into a database available on WGPME and GLOMICON based on a questionnaire to engage other users. | 1.3 | 3 years | To deliver data on smaller phytoplankton to GLOMICON for improved research access to pico/nano-phytoplankton datasets. Based on the quality/quantity of data collated, we will assess if a synthesis paper could be written. |
| b | Update on Explore the use of indicators for Knowledge Exchange | Many WGPME members are involved in developing phytoplankton/microbial indicators but at regional levels that can differ in approach and in many cases. This an ongoing process and there are few opportunities to compare approaches or results. Therefore, this ToR continues from the previous term but the aim changed to an ongoing knowledge exchange activity to guide members new to developing indicators for their region. | 1.3; 4.1; 4.4 | ongoing | The group will review and evaluate available science dealing with indicator development as needed. Annual national updates on the topic will be requested from EG members and summary into ICES reports. |
| c | Conduct an integrated analysis of phytoplankton and microbial plankton responses to global warming. | Understand consequences of long-term changes e.g. in phenology and body size for foodweb functioning and associated eco-system services. This is a continuation of ToR d from the previous term that was delayed due to member change and COVID but still considered an important output. | 1.3; 2.5 | 3 years | A research paper on picoplankton to be written. |
| d | Produce a cooperative joint METABASE informed product in collaboration with WGIMT and WGZE | To produce a more user-friendly guide on trends in phytoplankton and zooplankton from METABASE on WGPME/WGZE website (e.g., https://wgpme.net/metabase), ex- | 1.3; 1.9 | ongoing to review every 3 years | Cooperative Phytoplankton/ Zooplankton report or paper |

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| | | tracting key trends in phytoplankton and zooplankton assessing their relevance and to write a short research paper or short report depending on the findings. | | | |
| e | To create a WGIMT/WGPME/WGZE marine flora and fauna planktonic molecular database | North Atlantic barcoding Atlas with WGIMT and WGZE to produce a geographic guide of genetically-acquired plankton taxa aimed at non-genetic specialists. To hold a joint session with WGHABD and other EGs to discuss molecular tools for different ecological questions and relevance for policy. | 1.7 | 3 years | Incorporation of phytoplankton DNA barcoding taxa into barcoding Atlas (https://wgimt.net/atlas) Proposal of a special joint ASC 2023 session as knowledge exchange. |
| f | To create a mapping tool to report new and rare taxa observations in the North Atlantic. | First Records database will be developed for new species sightings. New sightings often indicate habitat change. We will develop a web-based interactive geographic tool to improve validation across multiple monitoring stations and for ecological synthesis. The new sightings will be recorded continuously and reviewed every three years to write a paper or provide information to other ICES expert groups. | 3.3; 4.1 | ongoing review every 3 years | A template database populated by content on WGPME and/ or other sites |

**Summary of the Work Plan**

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|---|---|
| Year 1 | Data gathering for input into online databases for ToR a, ToR e, ToR f, ToR g. |
| Year 2 | Review data and decide on which papers to write or a short report for ToR e, |
| Year 3 | Review 3 years of data for ToR a, ToR e, ToR g |

**Supporting information**

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|---|---|
| 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 in the framework of this group is negligible. |
| Participants | The Group is normally attended by some 20–25 members and guests. |
| Secretariat facilities | Standard EG support. |
| Financial | No financial implications. |
| Linkages to ACOM and groups under ACOM | There are no obvious direct linkages. |
| Linkages to other committees or groups | There is a very close working relationship with WGZE. It is also very relevant to WGHABD and WGIMT. |

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| Linkages to other organizations | R. Stern is also a member of SCOR Metazoogene and member of WGIMT, other members beloing to WGHABD and IOC. Other information assists in exchange of indicator development that feeds back to relevant national science advisory organisations e.g. HELCOM or OSPAR. |

**Working Group on Crangon fisheries and life history (WGCRAN)**

**2021/FT/EPDSG05** The **Working Group on *Crangon* fisheries and life history** (WGCRAN), chaired by Kim Hünerlage, Germany, and Eva Maria Pederson, 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 2022 | 21–23 June | Bremerhaven, Germany | Interim e-evaluation | |
| Year 2023 | 13–16 June | Oostende, Belgium | Interim e-evaluation | |
| Year 2024 | 18–20 June | Lyngby, Denmark | Final report by August 2024 to SCICOM | |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Data collection of the status of the *Crangon* stock. | Report and evaluate population status indicators like recent landings and effort trends in the brown shrimp fisheries. Generate a standardized lpue time-series and provide a detailed description of the process of collecting the dataseries effort, landings & lpue for WGCRAN. | 1.1; 2.1 | year 1,2,3 | A time-series analysis of the standardized stock indicators will be delivered by all WGCRAN members within the annual report(s) |
| b | Compilation of Logbook information & VMS analysis | To combine VMS, landings and effort data to develop a spatial indicator of shrimp distribution based on LPUE and to monitor regional distribution and regional shifts in fishing effort. | 2.1; 2.4; 3.5; 5.4 | year 1,2,3 | Results will be presented in the annual report(s) |
| c | Development of decision-support tools for brown shrimp harvesting | To develop and evaluate brown shrimp-specific management decision- | 2.1; 2.2; 5.1; 5.4 6.1 | year 1,2,3 | Results will be presented in technical reports, |

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| | | support tools to evaluate strategies on how to sustainably and efficiently harvest the brown shrimp stock. | | | summarized in a peer-reviewed paper and included in the annual report(s) |
| d | Assessment of brown shrimp bycatch | Review the status and results of research on bycatch timeseries and consider the implications for management. Evaluate methods and procedures used on board for collecting data on bycatch. Gather, compile and evaluate information on the onboard and ashore sieving fractions and processes and new national bycatch/discards data from e.g. DCF. | 3.1; 3.2 | year 1,2,3 | Results as well as updates on the development of sampling procedures will be presented in the annual report(s) |
| e | Analysis of spatio-temporal trends of survey based stock indicators | Analysis of German, Belgian and Dutch scientific survey data to assess spatio-temporal trends of survey based stock indicators (e.g. biomass, length distribution, mortality); Ground-truthing of VMS derived lpue estimates. | 3.1; 3.2 | year 1,2,3 | Results will be presented in the annual report(s) |
| f | Overview of Legislation, Law and Management | Information on national legislation, laws and management concerning the brown shrimp fisheries in the whole North Sea will be synthesised (e.g. Natura 2000, MSC process, landing obligation,...). | 7.1 | year 1,2,3 | An overview and update of relevant information on legislation, law and management will be included in the annual report(s) |
| g | Overview of ongoing research | Present and review ongoing brown shrimp research in the ICES area (impact studies, development of fishing gears, life cycle studies...) aiming at supporting international collaboration as well as evaluating management implications. | 6.1 | year 1,2,3 | The summaries of updates on ongoing research will be included in the annual report(s) |

**Summary of the Work Plan**

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|---|---|
| Year 1 | Stock status indicators will be updated and harmonized between countries (ToR a).<br>German and Dutch survey data will be analysed and reported, Belgian data will be included in the analyses (ToR e).<br>Data used for the compilation of manuscripts in support of ToR b and c will be made available.<br>Information and updates on national legislation, laws and management concerning the brown shrimp fisheries will be summarized (ToR d and f).<br>New information generated from ToR g will be reported. |
| Year 2 | Stock status indicators will be updated and harmonized between countries (ToR a).<br>German, Belgian and Dutch survey data will be analysed and reported (ToR e).<br>Data used for the compilation of manuscripts in support of ToR b and c will be made available.<br>Information and updates on national legislation, laws and management concerning the brown shrimp fisheries will be summarized (ToR d and f).<br>New information generated from ToR g will be reported. |
| Year 3 | Stock status indicators will be udated and harmonized between countries (ToR a) as well as German, Belgian and Dutch survey data will be analysed and reported (ToR e).<br>Data used for the compilation of manuscripts in support of ToR b and c will be made available.<br>Information and updates on national legislation, laws and management concerning the brown shrimp fisheries will be summarized (ToR d and f).<br>New information generated from ToR g will be reported. |

**Supporting information**

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| Priority | *Crangon* fisheries are economically important with landings value ranking this species among the top three species caught from the North Sea. The priority of WGCRAN is to understand the interactions between the brown shrimp population (structure and abundance) and human behaviour (mainly fishing effort), the environment, and the ecosystem. One important aspect is and will be the monitoring, investigation and development of population status indices. WGCRAN is the only expert group to evaluate the Brown Shrimp Fisheries Management Plan which was developed by the industry in the course of the MSC certification. |
| Resource requirements | The research programmes that 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 is normally attended by some 10 members and guests. |
| Secretariat facilities | Standard EG support. |
| Financial | No financial implications. |
| Linkages to ACOM and groups under ACOM | WGCRAN aims at a permanent linkage with ACOM after year 2 when sound and proven stock indicators and tools to evaluate management strategies have been developed (ToR a, b, c). |
| Linkages to other committees or groups | There is a linkage to WGBEAM through the international scientific surveys (DFS & DYFS). WGINOSE by providing data for the integrated assessment. WGSAM as the SMS key runs will be used to estimate natural mortality of brown shrimp. Members of WGCRAN are also members in these groups. |
| Linkages to other organizations | CWSS = Common Wadden Sea Secretariat; TMAP = Trilateral Monitoring and Assessment Programme; RCM – NSEA |

**Working Group entitled "Towards a EURopean OBservatory of the non-indigenous calanoid copepod Pseudodiaptomus marinUS" (WGEUROBUS)**

**2021/FT/EPDSG07** The **Working Group entitled "Towards a EURopean OBservatory of the non-indigenous calanoid copepod Pseudodiaptomus marinUS" (WGEUROBUS)**, chaired by Marianne Wootton, United Kingdom, and Marco Uttieri, 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 2022 | 27 October | Online | Interim e-evaluation | |
| Year 2023 | 24 – 25 October | Split, Croatia | Interim e-evaluation | |
| Year 2024 | October TBD | Copenhagen, Denmark (tbc) | Final report by 15 December to SCICOM | |

**ToR descriptors**

| ToR | Description | Background | Science Plan Codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | Compile and analyse data on the geographical distribution, seasonal patterns and interannual variations of *Pseudodiaptomus marinus* in European waters. | Since its first record in 2007 in the Adriatic Sea, the non-indigenous calanoid copepod *P. marinus* has spread in numerous areas of European seas, and it is now present in the eastern Atlantic coasts, the southern North Sea, the Mediterranean Sea and the Black Sea. The spreading process is still ongoing, and shows the great ability of this non-indigenous species to adapt to environments characterised by wide temperature and salinity ranges. The ToR will continue the activities carried out in the previous term, focusing on the monitoring of the introduction and settlement, and also on the comparative analysis of the temporal patterns in different sites. | 1.3; 1.9 | Years 1-3 | One published peer-reviewed publication (tentative title: "Comparison of seasonal patterns of *Pseudodiaptomus marinus* in coastal and estuarine systems in southern Europe") and one manuscript to be submitted by the end of the ToR (tentative title: "Interannual variation of *Pseudodiaptomus marinus* in European coastal waters")One presentation at a conference |
| b | Identification of key | Several biological, | 1.7 | Years 1-3 | One manuscript to be |

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| | ecological, biological and behavioural traits of *Pseudodiaptomus marinus*. | ecological and behavioural traits seem to confer *P. marinus* specific abilities by which adapting to a wide gamut of environmental conditions. Such plasticity may likely represent the key to success of *P. marinus*, explaining its introduction and settlement in diversified sites. The ToR will investigate the key traits of this NIS, providing cues to understand its spreading but also its potential use in applied research, for example as feed for fish larvae or as model organism in ecotoxicology studies. | | | submitted by the end of ToR (tentative title: "Invasive ecology concepts explained by *Pseudodiaptomus marinus*").<br>One presentation at a conference |
| c | Molecular and morphological identification of *Pseudodiaptomus marinus* occurring in different environments in European waters. | The molecular characterisation of *P. marinus* specimens from different sites can shed light into the possible presence of different ecophenotypes, as well as on their phylogeographical distribution. The ToR will delve into these aspects by coordinating and promoting the comparison of results obtained by using different primers. The ToR will also perform morphometric analysis of specimens from different sites to depict potential site-dependent phenologies or morphological variability. | 4.4 | Years 1.3 | Two manuscripts to be submitted by the end of ToR (titles to be defined)<br>One presentation at a conference<br>Population of repository established at Stazione Zoologica Anton Dohrn during the 2019-2021 term |
| d | Establishing trophic position and interactions of *Pseudodiaptomus marinus*. | Trophic interactions are key determinants of population abundance and dynamics, the structure and persistence of communities, and the rate and sustainability of ecosystem processes. In non-indigenous species, these interactions can cause substantial ecological impacts on the | 1.8, 4.4 | Years 1-3 | One manuscript to be submitted by the end of ToR (title to be defined)<br>One presentation at a conference |

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| | native food webs, yet are largely unexplored. ToR d aims at understanding the trophic position and potential impacts of *Pseudodiaptomus marinus* on food webs in European waters using stable isotope analysis and DNA metabarcoding (by sequencing 16S rRNA and 18S rRNA genes using host-blocking primers to identify prokaryote and eukaryote potential prey present in *P. marinus* guts). |

**Summary of the Work Plan**

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|---|---|
| Year 1 | The WG will continue the activities already initiated during the first three-year term, and will set the basis for the activities proposed for the new ToR d. |
| Year 2 | The WG will focus on the implementation of the ToR activities, in particular those necessitating exchange of data between the members. |
| Year 3 | The WG will concentrate on the completion of the tasks and on the production of manuscripts. |

**Supporting information**

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| Priority | The outcomes collected during the first three-year term demonstrated the interest of studying *P. marinus*, as its spreading is continuing at a fast pace but the long-term effects of its introduction in new systems is still unknown. In addition, the species is a candidate for massive cultivation and as a model organism for ecotoxicology studies. The connections established by WG members have created a collaborative network, stimulating the sharing of ideas and data. |
| Resource requirements | The research programmes which provide the main input to this group are already underway and resources are already committed. No ICES resources are required. |
| Participants | The Group is normally attended by some 20–25 members and guests. |
| Secretariat facilities | Standard WG support. |
| Financial | No financial implications. |
| Linkages to ACOM and groups under ACOM | The activities of the WG can provide information about the invasiveness of this NIS, its means of introduction and optimal sampling strategies. This may be important to ACOM to provide indications by which optimising the monitoring strategies for NIS, as for example within the MSFD. |
| Linkages to other committees or groups | The WG has established connections with WGIMT and WGZE, both under EPDSG, with whom the WG shares scientific interests and methodologies. Recently, still within EPDSG, new connections are being established with WGOOFE and BEWG. Linkages with other WGs belonging to other SG are envisaged. |
| Linkages to other organizations | The work of this group is potentially aligned with similar work by the Intergovernmental Oceanographic Commission of UNESCO (IOC) and the International Maritime Organization (IMO). |

## Resolutions approved in 2019

### Working Group on Small Pelagic Fish (WGSPF)

**2019/FT/EPDSG05** A Joint **ICES/ PICES Working Group on Small Pelagic Fish** (WGSPF), chaired by Myron Peck, Germany (ICES), Ignacio Catalan, Spain (ICES), Ryan Rykaczewski, USA (PICES), and Akinori Takasuka, Japan (PICES) will work on ToRs and generate deliverables as listed in the Table below.

| | Meeting dates | Venue | Reporting details | Comments (change in Chair, etc.) |
|---|---|---|---|---|
| Year 2020 | 9-12 March | Copenhagen, Denmark | Final report by TBD | Inter-sessional meeting, funding mechanisms being explored. Location dependent on success of funding raising efforts. |
| Year 2020 | 22-30 October | Online meeting | | (PICES AM) |
| Year 2021 | 10, 13-14 September | Online meeting | | (ICES ASC) |
| Year 2021 | 18-29 October | Online meeting | | (PICES AM) |
| Year 2022 | Spring | TBA | | Synthesis writing workshop planned (depending on successful funding applications) |
| Year 2022 | September | TBA | | (ICES ASC) |
| Year 2022 | October | TBA | | (PICES AM) |
| Year 2022 | Late November | Lisbon, Portugal | | SPF Symposium |
| Year 2023 | February 2024 (dates TBD) | Mexico | | A final meeting has been moved to February 2024 in Mexico. This is out of ICES reporting period and will be covered using other sources. A new group will be outlined there, including a change in Chairs. |

**ToR descriptors**

| ToR | Description | Background | Science plan codes | Duration | Expected Deliverables |
|---|---|---|---|---|---|
| a | To review recent progress on understanding how various drivers (environmental and/or anthropogenic) impact the population dynamics of SPF in different ecosystems and whether | a) Science Requirements | 1.2, 1.3, 2.2 | 4 years | Review paper(s) within peer-reviewed journal |

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| | and how potential drivers shift with changes in ecosystem state. | | | | |
| b | Create a networking environment for international and multidisciplinary collaboration to foster the establishment of similar study frameworks and comparative analyses of SPF across different social–ecological systems, based on updated time series data sets of climate indices, environmental factors and fisheries biology as well as ecophysiological information (feeding, growth and survival). | a) Science Requirements | 1.9, 5.2 | 4 years | Meeting reports submitted to ICES and PICES, Perspective Paper(s) submitted to peer-reviewed journal(s) |
| c | Identify, prioritize and conduct research most needed to advance our knowledge and capacity to predict the population dynamics of SPF at both short (seasonal to inter-annual) and long (decadal to centennial) time scales. | a) Science Requirements | 1.3, 7.6 | 4 years | Meeting reports submitted to ICES and PICES, Perspective Paper(s) submitted to peer-reviewed journal(s) |
| d | Recommend strategies of marine ecosystem monitoring and fisheries management of SPF which will contribute to sustainable ecosystem-based fisheries management, through biophysical, ecosystem and/or socio–economical models. | a) Science Requirements | 2.5, 3.1, 4.1 | 4 years | Meeting reports submitted to ICES and PICES, Perspective Paper(s) submitted to peer-reviewed journal(s) |
| e | Propose topic sessions at PICES Annual Meetings and ICES Annual Science Conferences focused on advances in SPF science and to organize a joint ICES/PICES symposium on SPF at regular intervals (e.g., once every 4 years) leading to the publication of findings in special issues of primary journals. | a) Science Requirements | NA | 4 years | Joint ICES-PICES theme sessions.<br><br>An International ICES-PICES SPF symposium (follow-up to March 2017 Victoria meeting)<br><br>Special issue(s) in peer-reviewed journal(s) |

**Summary of the Work Plan**

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|---|---|
| Year 1 | Initial meeting will take place in Spring 2020 of members from both ICES and PICES communities including a broader array of scientists from non-ICES and PICES regions (e.g. Humboldt EBUS, Mediterranean Sea). The ToRs will be discussed. Emphasis will be on summarizing ongoing work in various regions and scoping of joint research activities such as comparative analyses to be conducted by participants. A resolution for an international symposium on small pelagic fish will be submitted to ICES prior to the kick-off meeting.<br>Two additional meetings will take place at the ICES ASC and PICES AM. |
| Year 2 | An international Symposium will be convened (tentatively in late November / early December in Barcelona, Spain) immediately followed by a writing workshop to start producing synthesis articles stemming from activities in Year 1 and outcomes of the SPF symposium. The group will also meet at the ICES ASC and PICES AM. |
| Year 3 | Meetings will take place at the ICES ASC and PICES AM. Final reporting of this first, 3-year phase of this group will be prepared. It is anticipated that a resolution will be submitted to extend the life-time of this joint group beyond this first, three-year phase. The final symposium called "Small Pelagic Fish: new Frontiers in Sustainable Management" was successfully held in Lisbon in November 2022. https://meetings.pices.int/meetings/international/2022/pelagic/history |
| Year 4 | Preparation of manuscripts has been the main activity during this year, as well as the compilation of the special volumes in Marine Ecology Progress Series and Canadian journal of Fisheries and Aquatic Sciences. Both volumes stem from the November 2022 SPF symposium held in Lisbon. Plans exist for the extention of the international group, but a formal meeting for that had to be extended to February 2024. This meeting will take place in la Paz, México. Where the 2026 SPF symposium is planned. |

**Supporting information**

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| Priority | Small pelagic fish (SPF) account for more than 30% by weight of the total landings of marine capture fisheries around the world. They also play an important role in the transfer of energy through mid-trophic levels in marine ecosystems and are key resources for the world's growing aquaculture industry. The oscillations in the populations of SPF are dramatic and cyclical in response to climate variability on multi-decadal time scales. However, mechanisms linking climate variability to population dynamics are still unresolved. Hence, there are many challenges to sustainable use of SPF production. As the population dynamics of SPF display basin-scale teleconnections, synthetic and multidisciplinary studies are required to understand the processes and mechanisms to build predictive capacity.<br><br>International collaboration on SPF research was spearheaded by the GLOBEC Regional Program on Small Pelagic Fish and Climate Change (SPACC), launched in 1994 with a workshop in La Paz, Mexico. The SPACC program aimed to understand and predict climate-induced population dynamics of SPF in relation to physical and biological processes and included several major themes: long-term changes in ecosystems, retrospective analyses, comparative population dynamics, reproductive habitat dynamics, and economic implications of climate variability. The SPACC program culminated in 2010 with the publication of its review book. Since then, no international program specific to SPF has been launched, even though SPACC-II visions have been discussed (e.g., Alheit (2010) and van der Lingen et al. (2010)). In the following decade, there has been substantial scientific progress made in several ecosystems: different hypotheses of mechanisms of population dynamics of SPF have been proposed, data |

from long-term monitoring and stock-assessment efforts have accumulated, numerical modelling approaches have progressed, and technologies such as genome analysis have rapidly developed. ICES and PICES co-sponsored a symposium on "Forage fish interactions: Creating the tools for ecosystem-based management of marine resources" (Nantes, France, November 12–14, 2012) leading to publication of 12 articles in the ICES Journal of Marine Science (Peck et al., 2014). The need for a platform to organize intensive international collaboration was re-confirmed during the PICES/ICES Symposium on "Drivers of dynamics of small pelagic fish resources" (Victoria, BC, Canada, March 6–11, 2017). This symposium led to special issues in Deep-Sea Research Part II (Alheit et al., 2019; 15 articles) and Marine Ecology Progress Series (Alheit and Peck, 2019; 22 articles). The platform for international collaboration will allow the marine science community to more rapidly address challenging goals such as to:

1. Perform a synthesis of mechanisms linking climate variability to population dynamics of SPF among different ecosystems to reconcile various recruitment hypotheses;

2. Gain an holistic, ecosystem-level view of the causes and consequences of fluctuations in SPF populations such as how different factors (physical forcing, trophodynamics, and fishing pressure) interact to control the dynamics of populations;

3. Unite various fields (climate science, oceanography, plankton and fish ecology, quantitative fisheries stock assessment, sociology and economics) to build interdisciplinary approaches to examine SPF in social–ecological systems;

4. Incorporate new monitoring (e.g., environmental DNA) and modelling (e.g., end-to-end) technologies to better understand and manage pelagic ecosystems;

5. Provide projections of the effects of climate change on the distribution and productivity of SPF;

6. Propose strategies to safeguard marine ecosystem services stemming from SPF including conservation concerns related to SPF and their predators.

Because small pelagic fish (SPF) are highly valued by society and exhibit variability associated with changes in climate forcing, ecosystem structure, and fishing pressure, efforts to understand their dynamics require an integration of knowledge across oceanographic disciplines. Human society cannot expect to prepare a plan for sustainable development of the oceans unless we can improve our understanding of the largest component of ocean fisheries—the small pelagic fish. Consideration of the dynamics of these species, their sensitivity to exploitation and climate change, and the implications of such changes for the human populations that they support is essential to promote ocean sustainability and guide adaptation. The activities of the proposed joint working group will contribute primarily to the first three of the six goals identified in the PICES Strategic Plan (https://meetings.pices.int/About/PICES-Strategic-Plan-Oct-2016.pdf): (1) Foster collaboration among scientists within PICES and with other multinational organizations; (2) Understand the status and trends, vulnerability, and resilience of marine ecosystems; and (3) Understand and quantify how marine ecosystems respond to natural forcing and human activities (Goals 2 and 3 are similar to the two research themes in the PICES integrative scientific program on Forecasting and Understanding, Trends, Uncertainty and Responses of North Pacific Marine Ecosystems (FUTURE)). The activities of the joint working group also align with at least five of the seven ICES science priorities set in the ICES Strategic Plan (https://issuu.com/icesdk/docs/ices_stategic_plan_2019_web), including: (1) Ecosystem science, (2) Impacts of human activities, (3) Observation and exploration, (4) Seafood production and (5) Conservation and management science.

The activitiesof this joint WG are considered to have a very high priority for both ICES and PICES.

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| | References:<br>Alheit, J. (2010) SPACC continues under ICES wings. GLOBEC International Newsletter, 16(1): 24.<br>van der Lingen, C.D., Lluch-Cota, S., Checkley, D., Bernal, M., Herzka, S., and Takasuka, A. (2010) SPACC II Planning Meeting 24-26 February 2010, La Paz, Mexico. GLOBEC International Newsletter, 16(1): 25–26.<br>Alheit, J., Rykaczewski, R.R., Sundby, S., and Di Lorenzo, E. (2019) Drivers of dynamics of small pelagic fish resources: environmental control of long-term changes. Deep Sea Research II (special issue), 159: 1–3<br>Alheit, J. and Peck M.A. (2019) Drivers of dynamics of small pelagic fish resources: biology, management and human factors. Marine Ecology Progress Series (special issue), 617/618: 1–6.<br>Peck, M.A., Neuenfeldt, S., Essington, T.E., Trenkel, V.M., Takasuka, A., Gislason, H., Dickey-Collas, M., Andersen, K.H., Ravn-Jonsen, L., Vestergaard, N., Kvamsdal, S.F., Gårdmark, A., Link, J., and Rice, J.C. (2014) Forage Fish Interactions: A symposium on "Creating the tools for ecosystem-based management of marine resources". ICES Journal of Marine Science (special issue), 71: 1–4. |
| Resource requirements | Some resources to support travel of key group members to PICES Annual Science Conferences will be requested (see below). |
| Participants | The group is expected to attract between 25 to 35 members and guests with broad coverage of ecosystems within and outside ICES and PICES regions. |
| Secretariat facilities | The group will request meeting rooms / times associated with the ICES ASC. This will require some assistance from members of the secretariat organizing those events. Similar requests will be made of the PICES secretariat. |
| Financial | Funds will be requested to support travel of key participants to the PICES ASC. |
| Linkages to ACOM and groups under ACOM | The group will identify how environmental drivers influence the productivity of SPF within ICES areas. This information will be useful to ACOM. |
| Linkages to other committees or groups | It is anticipated that very close working relationships will be created with other groups within the Ecosystems, Processes and Dynamics Steering Group such as those working on predators (e.g. JWGBIRD) and prey (WGZE) of SPF. Similarly, the work conducted will be useful to food web modelling (e.g. WKEWIEA) and to state-of-the-art biophysical modelling (e.g. WGIPEM) within SG Integrated Ecosystem Assessments. |
| Linkages to other organizations | Joint partnership between ICES and PICES: the proposal is simultaneously submitted to PICES;<br>FAO General Fisheries Commission for the Mediterranean (GFCM; http://www.fao.org/gfcm): Working Group on Stock Assessment of Small Pelagic Species;<br>North Pacific Fisheries Commission (NPFC; https://www.npfc.int/): Technical Working Group on Pacific Saury Stock Assessment (TWG PSSA) and Technical Working Group on Chub Mackerel Stock Assessment (TWG CMSA);<br>UN Decade of the Oceans: The mandate of this joint ICES/PICES activity is relevant to the objectives of the UN Decade of Ocean Science for Sustainable Development and UN Strategic Development Goals (*e.g.*, SDG 14, Life Below Water). |

## EGs dissolved in 2023

| Res. Code | EG Name | Chairs |
|---|---|---|
| 2020/WK/EPDSG06 | Workshop on Scallop Aging 2 (WKSA2) | Karen Vanstaen, UK; and Charlotte Reeves, UK |
| 2020/FT/EPDSG07 | ICES/PICES Working Group on Ocean Negative Carbon Emission (WGONCE) | Louis Legendre, France (ICES), Carol Robinson, UK (ICES) and Nianzhi Jiao, China (PICES), Douglas Wallace, Canada (PICES) |