

## **Human Activities, Pressures and Impacts Steering Group EGs Resolutions**

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## Working Group transferred from HAPISG

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The following expert group has been transferred to the resolutions file for Fisheries Resources Steering Group (FRSG):

- Stock Identification Methods Working Group (SIMWG)

## Resolutions approved in 2024

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### Working Group on Bycatch of Protected Species (WGBYC)

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

**2024/AT/HAPISG01**      The **Working Group on Bycatch of protected species (WGBYC)**, chaired by Lotte Kindt-Larsen, Denmark; and Ailbhe Kavanagh, Ireland; will meet in Rostock, Germany, on 23–30 September 2025 to:

- Review and summarize information submitted through the annual bycatch data call and other means for assessment of endangered, threatened and protected (ETP) species bycatch;
- Collate and review information from WGFTFB national reports and recent published documents relating to implementation and tests of ETP species bycatch mitigation measures and summarize recent and ongoing bycatch mitigation trials;
- Consider the quality of data available for use in the estimation of bycatch rates of ETP species through a Bycatch Evaluation and Assessment Matrix, BEAM, to:
  - underpin assessments on the bycatch range (minimum/maximum) as appropriate,
  - highlight data deficient situations,
  - where possible, assess population impacts;
- Continue to develop and refine the methodology to assess data poor species, for which bycatch rates and associated markers of sustainability are unavailable;
- For data deficient situations as highlighted in ToR c, propose measures necessary to obtain the required information;
- Continue, in cooperation with the ICES Data Centre to develop, improve, populate, and maintain the WGBYC and RDBES databases on ETP species bycatch monitoring and fishing effort in ICES and Mediterranean waters through formal data calls (Intersessional).

WGBYC will report by 24 October 2025 for the attention of ACOM and SCICOM.

### Supporting information

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Priority	The current activities of this Group relate 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.
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	The activities of the WG are essential to use in answering part of the European Commission annual request for advice on estimates of the annual total numbers of specimens of sensitive species taken as bycatch.
Scientific justification	Bycatch monitoring and assessment is fundamental to the work of the expert group and forms the basis to answer the recurrent advice request from the European Commission. Recent changes in legislation have resulted in prioritization of sensitive species and also impacted monitoring programs for ETP species bycatch, which both require the regular evaluation of input data and resulting bycatch assessments.  The WG also provide practical recommendations on how to improve data collection and data quality.  Intersessional work to operationalise databases allows for more efficient response to future advice requests and an audit trail for information used in the Group's reports.
Resource requirements	None beyond usual Secretariat facilities  A key part of the work from WGBYC relies on data provided by ICES and EU member countries. These data are provided to ICES in response to annual dedicated data calls.
Participants	25–30 participants
Secretariat facilities	Secretariat support with data call and meeting organization, database maintenance, and final editing of report.
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	JWGBIRD, WGFTFB, WGMME, WGEF, WGCATCH, WGTIFD, WGSFD, WGRFS, WGJCDP WGRDBESGOV, WGING, HAPISG, SCICOM
Linkages to other organizations	NAMMCO, ASCOBANS, ACCOBAMS, GFCM, OSPAR, HELCOM, RCGs, IWC, JRC.

### ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC)

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

**2024/AT/HAPISG02** The Joint ICES/NAFO Working Group on Deep-water Ecology (WGDEC), chaired by David Stirling, UK; Ana Colaço, Portugal; and Javier Murillo\*, Canada; will meet in Santander, Spain, 24–28 March 2025 to:

- a) Collate, validate and conduct a Quality Assurance/ Quality Control check of new information on the occurrence and distribution of vulnerable marine ecosystems (VMEs), VME indicator taxa and VME elements in the North Atlantic and adjacent waters, archive appropriately using the ICES VME Database, and disseminate via the Working Group report and ICES VME Data Portal.
- b) Review, validate and update new information on the occurrence and distribution of VMEs, VME indicator taxa and VME elements in the NEAFC Convention Area, including subareas of the

Regulatory Area that are closed to fishing for other purposes than VME protection, and in EU waters in relation to the EU deep-sea access regulation.

- c) Conduct a review of historical records included in ICES VME Database.
- d) Review intersessional work and identify steps (i.e. preparatory work, workshop ToRs, etc.) required to address limitations and validation of the VME Index using existing data sets of known distribution of VME, and to identify and trial approaches to improve the multicriteria weighting algorithm method (VME index).
- e) Review available information on vulnerable marine indicator species traits, in order to use those traits as vulnerability and sensitivity indicators, to induced pressures and provide a framework to produce sensitivity maps, which would include the overlap of sensitivity layers with static gear fishing pressure layers.
- f) In support of preparations for the Workshop on the Use of Predictive Habitat Models in ICES Advice 2 (WKPHM2), identify VME Predictive Habitat / Species Distribution models, experts and metadata (see WKPHM template). Engage proactively with network of experts to contribute towards use of their models/expertise during WKPHM2, and in close consultation with those preparing the WKPHM2 workshop i.e. the chairs.

WGDEC will report on ToRs a) and b) by 9 April 2025; and ToRs c)-f) by 3 June 2025 for the attention of ACOM and SCICOM.

## Supporting information

Priority	The current activities of this Group will enable ICES to respond to advice requests from a number of clients (NEAFC/EC). Consequently, these activities are considered to have a high priority.
Scientific justification	<p>ToR [a] The Joint ICES/NAFO Working Group on Deep-water Ecology undertake a range of Terms of Reference each year; the scope of these cover the entire North Atlantic, and include aspects such as ocean basin processes. Therefore, collating information on vulnerable habitats (including important benthic species and communities) across this wide geographic area (and adjacent waters) is essential. To this end, a VME data call will be run in 2024, facilitated by the ICES Data Centre. Data will be quality checked/prepared at least one month in advance of WGDEC 2025 by the ICES Data Centre and a newly formed intersessional subgroup of WGDEC. New data will be incorporated into the ICES VME database and data portal. This ToR includes any development work on the ICES VME database and data portal, as identified by WGDEC, with support from the ICES Data Centre.</p> <p>ToR [b] New information on the occurrence and distribution of VMEs, VME indicator taxa and VME elements and associated maps are required to meet the NEAFC request “to continue to provide all available new information on distribution of vulnerable habitats in the NEAFC Convention Area”. WGDEC together with WGSFD is requested to contribute towards carrying out an annual assessment of required NEAFC areas. The location of newly discovered/mapped sensitive habitats is critical to this NEAFC request. WGDEC is also requested to review and report new information on the occurrence and distribution of VMEs within EU waters in line with the EU request in 2024 to “Provide and apply a mechanism to identifying a level of change/new VME submissions that should trigger an update of the EU VME advice to ensure the VMEs conservation objective is consistently achieved” (ICES WGDEC, 2024).</p> <p>ToR [c] The VME database forms the evidence base upon which ICES basis its VME advice. Performing standard database consistency checks on the historical holdings in conjunction with the data owners will help ensure the quality of this advice.</p>

ToR [d] make recommendations and draft a request for an ICES Workshop aiming to address known limitations and validation of the VME Index using existing data sets of known distribution of VME, and to identify and trial approaches to improve the multicriteria weighting algorithm method (VME index).

ToR [e] It is now accepted that the functional traits determine an organism biological and ecological performance, i.e. its ability to grow, survive and reproduce in a given set of biotic and abiotic conditions [McGill et al, 2006; Violle et al, 2007]. The distribution of those traits among individuals defines the functional structure of a community and their response to disturbances [Mouillot et al 2013]). Literature focusing on the effects of human caused disruptions on functional diversity has accessed two main conclusions: that disturbance leads to biotic homogenization due to the higher vulnerability of specialized species (i.e. with specialized traits) and the stronger resistance of generalist (i.e. with common traits) species. This ToR aims to review available information on vulnerable marine indicator species traits, in order to use those traits as vulnerability and sensitivity indicators, to induced pressures and provide a framework to produce sensitivity maps, which would include the overlap of sensitivity layers with static gear fishing pressure layers.

ToR [f] WGMHM and WGDEC have strongly advocated for the inclusion of predictive habitat models in ICES advice related to the distribution of VMEs. In order for ICES to utilize such models in their advice an agreed set of standards is required. With recurring requests from NEAFC and the EU, regarding the best scientific advice on where VMEs are known or likely to occur, this workshop is therefore highly important.

Resource requirements	Data Centre, Secretariat support and meeting room
Participants	The workshop will likely be attended by some 15–20 experts online and physically.
Secretariat facilities	None, apart from Teams and SharePoint site provision.
Financial	No financial implications.
Linkages to advisory committees	ACOM is the parent committee and specific ToRs from WGDEC provide information for the Advice Committee to respond to specific requests from clients.
Linkages to other committees or groups	While there are currently no direct linkages to other groups, WGDEC should develop stronger links (ideally through the establishment of joint Terms of Reference) with WGSFD, WGMHM, WGDEEP, WGHIST and WGFBIT.
Linkages to other organizations	As a Joint ICES/NAFO group, the work of this group links to work being undertaken by Working Groups under the NAFO Scientific Council; specifically, WGESA.

### **Working Group on the Ecosystem Effects of Fishing Activities (WGECO)**

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

2024/AT/HAPISG03

Placeholder

### **ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors (WGBOSV)**

2024/MT/HAPISG04      The ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors (WGBOSV), chaired by Okko Outinen, Finland, will work on ToRs and generate deliverables as listed in the Table below.



	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2025	5–7 March	Maryland, USA		
Year 2026				
Year 2027			Final report by Date Month to SCICOM	

## ToR descriptors

TOR DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES	
a	Conduct strategic planning (identify and develop collaborative activities, advance and standardize methods) to advance research and address knowledge gaps by reviewing national activities and responding to new requests for scientific advice.	ICES science priority on impacts of human activities: Measure and project the effects of human activities on ecosystems and ecosystem services — to elucidate present and future states of natural and social systems.	2.1; 2.5; 4.4	3 years	Report to ICES. Respond to advice requests, as applicable.
b	Provide support for the review of the IMO Ballast Water Management Convention (2004, BWMC), currently ongoing under the Experience-Building Phase (EBP), by providing data and input on compliance monitoring, and commissioning testing of ballast water management systems, ships operating at ports with challenging water qualities, or other aspects of the EBP.	The BWMC aims to minimize the transfer of harmful aquatic organisms within ships' ballast water and sediments. To assess the Convention's implementation, the EBP is underway. In addition to gauging the logistics of the implementation, arising science needs also require attention.	2.7; 6.1; 6.4	3 years	Report to ICES and provide input to IMO through participation at relevant meetings, and correspondence groups, and a submission of a technical paper, or peer-reviewed manuscript.
c	Investigate and evaluate changes for NIS and biodiversity in a world transformed by global change, including climate changes, shipping routes, infrastructure, and socio-economic shifts.	This work will be carried out jointly with WGITMO. The ToR will contribute to the ICES/PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems (SICCME); address the Convention on Biological Diversity (CBD) Global Biodiversity Framework (GBF) and priority actions identified in the Arctic Council Arctic Invasive Alien Species (ARIAS) Strategy and Action Plan; and is relevant to the ICES high-priority action area of 'Arctic research'.	2.1; 2.5; 4.4	3 years	Report to ICES and contribution to symposium or conference, or a technical paper, or peer-reviewed manuscript.
d	Provide support for the implementation of the IMO Guidelines for the Control and Management of Ships' Biofouling (2023) through investigating and evaluating understudied aspects of	Ships' biofouling is, with ballast water, a primary shipping vector of non-native species. As management of such vectors is an effective way to reduce risks of new introductions,	2.7; 6.1; 6.4	3 years	Report to ICES and strengthen ties to IMO through correspondence group participation and/or a document

	vessel biofouling, such as risk of non-native species introductions associated with various levels of biofouling, and the release of organisms (including larval stages) and waste material from ships and recreational vessels during voyages and cleaning operations, such as in-water cleaning.	addressing biofouling issues is of high priority in non-native species management.			submission or publish a peer-reviewed manuscript.
e	Evaluate the development of DNA- and RNA-based molecular tools for surveillance and monitoring of ship-borne non-native species.	Robust monitoring efforts to detect vessel-borne non-native species introductions are critically important for protecting ecosystems, biodiversity, human health, and economies. RNA- and DNA-based molecular tools have received increased attention as complementary approaches to traditional monitoring methods and harmonizing the use of these methods warrant scrutiny.	1.6; 4.4	3 years	Report to ICES and provide input on the general applicability and harmonization of such methods to national regulators through a technical paper, peer-reviewed manuscript, or workshop.
f	Explore how to promote diversity, equity, and inclusion within the work of the group.	The work supports the vision and Strategic Plan of ICES that promotes a welcoming, diverse, inclusive, gender balanced and respectful working environment.	7.5; 7.7	3 years	Report to ICES how diversity, equity and inclusion can be improved among the work of the group and how such practices could be applied to other working groups and national institutions.

### Summary of the Work Plan

Year 1	Working on all ToRs, but with special focus on ToRs b, c and e.
Year 2	Working on all ToRs, but with special focus on ToRs a, d and f.
Year 3	Report on all ToRs.

### Supporting information

Priority	The work of the Group forms the scientific basis for the movement of non-native aquatic organisms and pathogens via ballast water and other shipping vectors. As a joint working group, it also follows and supports related work within the IMO and IOC of Unesco.
Resource requirements	National research institutions which provide the main input to this group have existed for decades, with resources provided by national governments and scientific funding agencies. The additional resources required to undertake activities in the framework of this group are negligible.
Participants	The Group is normally attended by some 30-40 members and guests, but has 90 members in total.
Secretariat facilities	Standard EG support.

Financial	No financial implications.
Linkages to ACOM and groups under ACOM	The group will serve as primary respondent to incoming advice requests on various issues related to ship-mediated introductions.
Linkages to other committees or groups	There is a very close working relationship with WGITMO and occasional linkage to WGSHP. Potential or occasional linkage with WGHABD, and WGZE.
Linkages to other organizations	Intergovernmental Oceanographic Commission (IOC) of Unesco, International Maritime Organization (IMO), North Pacific Marine Science Organization (PICES). In addition, the outcomes of the group are relevant to other national and international organizations involved in the development of regulatory policies, such as the European Union and regional sea conventions.

## Working Group on Biological Effect of Contaminants (WGBEC)

2024/MT/HAPISG05      The Working Group on Biological Effects of Contaminants (WGBEC), chaired by Hannah Anderson\*, Scotland, UK; and Michelle Giltrap\*, Ireland; will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2025	7–11 April	Dublin, Ireland		
Year 2026		Rome, Italy		
Year 2027			Final report to SCICOM	

### ToR descriptors

TOR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Review and report on new developments and innovative methods on the effects of contaminants, and review guidelines for biological effects monitoring	WGBEC has established a comprehensive list of recommended methods for measuring the effects of contaminants on the marine environment. Evaluation and development of these methods as well identifying new and innovative tools for biological effects monitoring is needed. Additionally, the group will review and update guidelines and protocols including ICES TIMES documents where necessary.	3.1, 4.4, 6.3	Year 3	Report to ICES, TIMES manuscript
b	Initiate and report on quality assurance programmes for biological effects methods, coordinated with BEQUALM	Quality assurance (QA) of biological effects methods is important in marine monitoring to ensure that the data collected are of the highest quality and comparable to other leading laboratories. The Biological Effects QUALity assurance in Monitoring (BEQUALM) is established to perform intercalibration exercises for the more commonly used biomarkers, which are performed and reported by members of the expert group.	3.1	Year 3	Report to ICES, BEQUALM report.
c	Review and evaluate both direct and indirect effects of natural and synthetic particles to marine organisms	Particles are critical to understand the behaviour of contaminants in marine ecosystems. Particles can have impacts on organisms directly as well as via interactions with chemical contaminants. Some particles can provide surfaces for adsorption and influence bioavailability of contaminants. Examples of anthropogenically derived particles include micro- and nanoplastics, nanoparticles, mining discharges and discharges from offshore drilling. WGBEC will consider new approaches for the assessment of the effects of particles. Additionally, WGBEC will continue collaboration with MCWG and WGML on the effects of plastic additives to marine life.	3.1, 3.2, 6.1	Year 3	Report to ICES, Scientific paper
d	Update and summarise national activities on effect-based monitoring,	WGBEC members have significantly contributed to the development and implementation of effect-based monitoring programmes in European	3.1, 3.2, 6.1	Year 3	Report to ICES

	evaluate approaches and identify gaps and future directions	countries. Despite attempts to harmonise monitoring strategies throughout Europe (i.e., WFD and MSFD), differences in take-up and implementation of methods and, in particular, biological effects methods, remains. Through its membership, WGBEC is ideally placed to provide an overview of the national monitoring programmes and discuss the pros and cons of different methods used, as well as to develop new directions and approaches for monitoring.			
e	Review and assess effects of contaminants of emerging concern	The definition of “emerging chemicals” has been broad and important effects have been observed in marine organisms following exposure to chemicals of emerging concern (CECs, e.g., pharmaceuticals, person care products, pesticides, plastic additives etc.). Collaborations between MCWG and WGBEC are planned, where WGBEC will review the effects of a prioritised list of CECs and consider biological effects methods that can provide insight into the modes of action of selected CECs.	3.1, 3.2, 6.1	Year 3	Report to ICES, Scientific paper
f	Effects of contaminants on biodiversity	Changes in biodiversity has been implemented in international agreements, such as the EU WFD, but the extent to which contaminants actually affect biodiversity is not clear. WGBEC has earlier reviewed effects of contaminants on marine communities, but increasing availability of new technologies such as eDNA, eRNA, proteomics and automated visual identification systems as well as ongoing research programmes suggest the time is ripe to revisit this topic. The aim of this activity is to increase our understanding of contaminant effects on both pelagic and sediment biodiversity as well as to develop a monitoring strategy.	1.8, 2.2, 4.4	Year 3	Report to ICES, Scientific papers
g	Effects of contaminants on pelagic organisms	Although the highest concentrations of contaminants in marine ecosystems are found in sediments, all inputs will initially take place in the water column. Despite earlier activity in WGBEC and beyond, there is still limited knowledge about how contaminants affect pelagic organisms and food webs in situ. Some species are used in the risk assessment of chemicals and so are very well studied. Experience from monitoring offshore effluents and recent studies on some species groups using omics techniques suggest that the topic should be revisited with an aim to increase the general scientific understanding of effects in pelagic species and develop monitoring strategies.	2.2, 2.3	Year 3	Report to ICES
h	Review and assess the effects of offshore anthropogenic activities (e.g., deep-sea mining, windfarms, oil and gas, shipping, etc.) to marine life	Deep-sea mining of nodules from the seafloor, which contain precious minerals such as lithium, scandium and cobalt has become an increasing threat to marine life. Despite Norway becoming the first country in the world to move forward with deep-sea mining on a commercial scale, little is known about the environmental impacts strip mining would have on the deep environment, particularly with the recent discovery that	2.1, 2.7, 4.5	Year 3	Report to ICES

		<p>significant amounts of oxygen are produced from these nodules. Furthermore, heightened scrutiny over the detrimental effects of offshore wind has become evident due the switch to green energy and the resulting increase in the number of wind parks in European Seas. Combined with the existing pressures of oil and gas activities, where vast quantities of production water are continuously discharged to sea, in addition to pressures from shipping and the discharge of scrubber waste. WGBEC will review these anthropogenic discharges into the offshore environment and demonstrate suitable approaches to evaluate the impacts on marine organisms.</p>		
i	Contribute to ICES Ecosystem overviews as requested by EAMSG Expert Groups	<p>Ecosystem overviews have been advanced significantly during the past years and several ICES EGs have been very active to provide input. However, there is a room for further development through adding new components on issues where ICES have expertise, such as the biological effects of contaminants, which are highly relevant in the context of marine ecosystem management and policy.</p> <p>Two of the regional ICES Ecosystem overviews (Celtic Sea and Greater North Sea ecoregions) contain specific reference to pollution and effects of contaminants, indeed in the North Sea chemical contamination is ranked as one of the top 5 pressures of concern. Contaminants have the potential to impact ecosystems at a number of levels and should be included where applicable. WGBEC will produce input for relevant areas.</p>	6.5	Year 3
				Contribution to Ecosystem overviews according to the provided guidelines/ template

### Summary of the Work Plan

Year 1	<p>Review and report on new developments and innovative methods on the effects of contaminants, and review guidelines for biological effects monitoring.</p> <p>Initiate and report on quality assurance programmes for biological effects methods, coordinated with BEQUALM.</p>
Year 2	<p>Review and evaluate both direct and indirect effects of natural and synthetic particles to marine organisms.</p> <p>Update and summarise national activities on effect-based monitoring, evaluate approaches and identify gaps and future directions.</p> <p>Review and assess effects of contaminants of emerging concern.</p> <p>Effects of contaminants on biodiversity.</p> <p>Effects of contaminants on pelagic organisms.</p>
Year 3	<p>Review and assess the effects of offshore anthropogenic activities (e.g., deep-sea mining, windfarms/oil and gas/ shipping, etc.) to marine life.</p> <p>Contribute to ICES Ecosystem overviews as requested by IE-ASG Expert groups.</p>

### Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the biological effects of contaminants in marine waters, and especially regarding activities of the Regional Seas Conventions and EU legislation. 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 20–30 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committee: or groups	There is a very close working relationship with several working groups including the MCWG and the WGML, as well as the study group, SGEFF.
Linkages to other organizations	OSPAR MIME/HASEC, HELCOM, EEA

### Working Group on the Value of coastal Habitat for Exploited Species (WGVHES)

**2024/MT/HAPISG06**      **The Working Group on the Value of coastal Habitats for Exploited Species (WGVHES)**, chaired by Rochelle Seitz\*, USA; and Karen van de Wolfshaar\*, Netherlands; will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2025	23-27 June	Hamburg, Germany		
Year 2026	June			
Year 2027	June		Final report by Date to SCICOM	

### ToR descriptors

ToR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN</a> <a href="#">CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Juvenile habitat literature database curation	Maintenance, quality assurance and publication of database to support further work.	2.3; 3.2; 4.1	3 years (ongoing)	Published (“FAIR” database), quality assured database of juvenile habitat quality articles for exploited species.

b	Review topics in habitat studies addressing juvenile habitat quality	With the extensive review on juvenile habitat methods as a starting point (see WGVHES 2024 report), the accompanying literature data base will be used for more in depth studies on specific habitats and/or technical developments to assess juvenile habitat quality for exploited species	3.2; 4.4; 5.2	3 years (ongoing)	Review paper
c	Review the role of coastal habitat restoration in supporting exploited species.	Coastal habitat restoration efforts have increased. An assessment regarding the extent that restoration successfully supports exploited species, especially in comparison to 'established habitats', is warranted.	1.3; 6.2; 6.4	3 years (ongoing)	Provide an assessment of restoration success for exploited species.
d	Lessons learned from studies on Essential Fish Habitat	Many countries are defining essential fish habitat and incorporating this concept into management with mixed success. Issues include non-standard definitions and methods for quantification, socio-political and policy challenges, uncertainties in the underlying science, and confusing communication.	1.3, 6.4, 4.4	Year 1; intersessionally. Carry-over from last term; delayed due to Covid	Perspectives paper

### Summary of the Work Plan

Year 1	Finalize ToR D. Start on ToR B and ToR C. ToR A will be a continued effort.
Year 2	Continue working on ToR A-C
Year 3	Finalize the work of ToR B-C. ToR A will be published as "FAIR" database to be added to and used by others.

### Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the importance of coastal habitat for fisheries management.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. Additional resources required to undertake additional activities in the framework of this group are negligible.



Participants	The Group is normally attended by some 10–15 members and guests, and is mixture of senior scientists, post docs and PhD students.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committee or groups	There is a very close working relationship with WGMPAS. Our work relates to the work of WKREST, WGFBIT, WGORE, WGMHM and the ICES ecoregion overviews (ecosystems, fisheries and aquaculture).
Linkages to other organizations	There are no obvious direct linkages

### Working Group on Marine Litter (WGML)

**2024/MT/HAPISG07**      **The Working Group on Marine Litter (WGML)**, chaired by Briony Silburn\*, UK; Katja Norén\*, Sweden; and Tanja Kögel\*, Norway; will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2025	5–9 May	Helgoland, Germany		
Year 2026				
Year 2027			Final report by DATE to SCICOM	

### ToR descriptors

ToR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a> (2025 version)	DURATION	EXPECTED DELIVERABLES
a	Enhancing knowledge transfer, facilitating collaboration and providing scientific input to inform ICES advice as required on marine litter.	<p>a) Improving the transfer of science to policy.</p> <p>b) Enhancing collaboration between ICES groups, especially for topics on plastic additives, contaminants, ALDFG (abandoned, lost, or discarded fishing gear).</p> <p>c) Facilitating collaboration and defining common grounds with external expert groups such as EU TGML, OSPAR, PICES, EMODnet Chemistry, AMAP etc.</p> <p>d) Providing advice upon</p>	1.1; 2.1;3.1; 6.1	3 years	<p>a) Report on the interactions WGML has had with other expert groups during the reporting period.</p> <p>b) Discussion session to report on identifying policy needs, and to explore the drafting of guidelines on litter related assessments to</p>

		requests from other groups. e) Connecting institutions and scientists for scientific updates on the advancements in monitoring activities, technologies and pollution aspects.			support policy advice. c) Discussion session to report on potential guidelines for monitoring and assessment of plastic related chemical contaminants.
b	Propose guidance for ongoing monitoring activities and quality assurance of data to support ICES data collection on marine litter.	a) Reflect on best approaches for reporting and assessment of marine litter data, including trend analysis on ICES data and an estimate of how many years it would take to validate a trend or change with respect to informing Good Environmental Status. b) Follow up on emerging topics related to plastic pollution, including identification of bio-indicators, source identification, increase understanding of risk and harms to marine habitats from, e.g. tyre wear particles, paint flakes, and nanoplastics. c) Evaluate the effectiveness of monitoring marine litter from a policy perspective. d) Development of tools to support the training of people in marine litter monitoring.	2.1; 3.1; 3.2; 3.3; 3.5	3 years	a) Report on approaches for data reporting and trend assessment related to different policy drivers (e.g. EU Directives). b) Identify specific questions and expertise required to address emerging topics related to macro-, meso-, micro- and nanoplastics. c) Develop an online training tool for seafloor litter categorisation.
c	Explore and report on innovative technologies and future monitoring activities for seafloor litter and microplastic monitoring and assessment.	a) Explore opportunities, needs and gaps in the transition from using trawl-based sample methods to digital/visual monitoring technologies, taking into account integration with other types of camera-based (visual) surveys, taking into account new detection technologies, such as the application of AI. b) Consider developing a roadmap for the monitoring and assessment of deep sea surveys and associated technologies. c) Reflect on potential added value of integrating academic and citizen science into marine litter assessments. d) Explore the pollution pressure links between the different marine litter categories and	3.1; 3.2; 3.3; 3.7; 4.1; 4.3; 4.6	3 years	a) Development of a roadmap or guideline document to facilitate the transition from trawling to digital/visual monitoring technologies, added as an annex to the ICES manual for seafloor marine litter monitoring. b) Report on the possibilities for integrating trawl-based and image-based sample data submissions.

microplastics.					
d	Support quality assurance processes for marine litter and microplastic data acquisition and assessment.	<p>a) Identify the top priorities for quality assurance of data reporting on microplastic and seafloor litter.</p> <p>b) Enhance the data flows and integration between various databases and data portal initiatives.</p> <p>c) Design and implement joint standards for more effective regional collaboration to identify, categorize and report on marine litter.</p> <p>d) Organize online sessions on marine litter data submissions to ICES in collaboration with ICES data centre.</p>	1.1; 3.1; 3.3	3 years	<p>a) Initiate early interactions for streamlining data submission within institutes, nationally and towards ICES and other data repositories, including the consideration and development of automated procedures for data transfer.</p> <p>b) Evaluation of data recording/ documentation formats with respect to QA/QC procedures, e.g. raw and missing data, and recovery tests.</p>
e	Optimisation and usability of the ICES seafloor litter category list, with focal groups.	<p>a) Improve the ICES seafloor litter category list, e.g. by better phrasing and subcategorising the different types of litter categories and to harmonize the list with the EU Joint List.</p> <p>b) Enhance internal collaboration with fisheries-related ICES working groups for ALDFG.</p> <p>c) Discuss ALDFG initiatives and establish links with other relevant international working groups involved in fisheries assessment activities.</p> <p>d) Brainstorm the potential of undertaking and coordinating a mega-litter assessment using camera-based monitoring and assessment methods and technologies.</p>	3.1;3.2	3 years	<p>a) Development of an improved ICES seafloor litter categorization list, harmonized with the Joint EU List.</p> <p>b) Review and refine the ICES manual on seafloor marine litter.</p> <p>c) Organize a discussion session and report on the potential of linking ALDFG and possible mega litter initiatives.</p>

## Summary of the Work Plan

Year 1	<ul style="list-style-type: none"> <li>• Short online meeting to present the TORs to group members.</li> <li>• Align group members with interest areas.</li> <li>• Overview of interactions with other expert groups integrated in the final report.</li> <li>• One-week meeting including a) Session on identifying policy needs, reporting to policy and exploring the possibilities for guidelines on litter related policy advice. b) Session to explore the possibilities for guidelines on monitoring and follow up on plastic chemicals. c) Explore interests and expertise on emerging topics related to macro-, meso-, micro- and nanoplastics d) Session on potential of connecting ALDFG and megalitter initiatives.</li> <li>• Initiate development of an online training tool for seafloor litter categorisation.</li> <li>• Initiate early interactions for streamlining data submission within institutes, nationally and towards ICES and other data repositories, ideally how can data be automatically transferred.</li> <li>• Reviewing and refining the ICES manual on seafloor litter and development of an improved ICES seafloor litter categorization list, harmonized with the Joint List.</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• One week meeting.</li> <li>• Report on approaches for data reporting and trend assessment and alignment to directives.</li> <li>• Development of a roadmap/guideline for moving away from trawling to digital/visual monitoring technologies, added as an annex to the ICES manual for seafloor monitoring.</li> <li>• Continue tasks started in year 1.</li> </ul>
Year 3	<ul style="list-style-type: none"> <li>• One week meeting.</li> <li>• Evaluation of data format for the ICES plastic database after implementation with focus on QA/QC (measurement uncertainty).</li> <li>• Exploring possibilities to integrate trawling and imaging data submissions.</li> <li>• Finish tasks from previous years.</li> <li>• Final report 3-year period.</li> </ul>

## Supporting information

Priority	The ICES WGML primarily focuses on two key aspects of marine litter: seafloor macrolitter and microplastics in various marine matrixes (e.g. sediment, water, biota). This is a result of the current expertise and experience of WG members, as well as the influence of the wider ICES organisation with a particular focus on fisheries surveys and the data generated therein. The current activities of multiple WGs and external representatives will lead ICES into issues related to monitoring and fundamental research of marine litter. Consequently, such monitoring and research activities are considered to have a very high priority with respect to the issue of seafloor litter and microplastics.
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	ICES Data Centre – data extractions.
Financial	No financial implications.

Linkages to ACOM and groups under ACOM	There are currently no linkages with ACOM, but the EG will be ready to address advisory requests if these are forthcoming.
Linkages to other committee or groups	There will be close working relationships with HAPISG EG. The planned work is especially relevant for MCWG, WGBEC and IBTSWG.
Linkages to other organizations	PICES, CIESM, EU, GESAMP/UN (including connections with G7, G20), RSC (regional sea conventions), OSPAR/HELCOM, AMAP, EMODnet, national governments and agencies.

## Workshop on Mitigation Measures to avoid Marine Turtle Bycatch (WKTURTLE)

**2024/WK/HAPISG08**      **Joint ICES-CIBBRiNA<sup>1</sup>-REDUCE<sup>2</sup>-MarineBeacon<sup>3</sup> Workshop on Mitigation Measures to minimise Marine Turtle Bycatch (WKTURTLE)**, chaired by Caterina Fortuna\*, Italy, will be established and will meet online, 3–5 February 2025 to:

- a) Review the evidence available on the nature and extent of interactions between marine turtles and fisheries in the Northeast Atlantic and Mediterranean Sea, together with quantifying the fisheries impact on marine turtles ([Science Plan code: 2.1](#));
- b) Review the evidence available on factors affecting the mortality rate of bycaught marine turtles, considering both direct mortality and post-release mortality, and including onboard handling ([Science Plan code: 6.1](#));
- c) Review and propose options for mitigation of marine turtle bycatch and associated mortality in European fisheries ([Science Plan code: 2.1](#))

WKTURTLE will report by 31 March 2025 for the attention of ACOM and SCICOM.

### Supporting information

Priority	<p>The workshop will review our current understanding on sea turtle bycatch and associated mortality. It will contribute to the ICES Roadmap for Bycatch on Endangered, Threatened, and Protected (ETP) Species and support the work of ICES WGBYC, addressing a gap in the expert matter expertise in marine turtles, as noted in the Roadmap as a short-term priority.</p> <p>The work is relevant to the provision of ICES advice on ETP species bycatch, covering a taxon which is not specifically addressed by current ICES groups and thus with critical linkages to WGBYC.</p>
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<sup>1</sup> <https://cibbrina.eu/>

<sup>2</sup> <https://www.ciimar.up.pt/projects/reduce/>

<sup>3</sup> <https://marinebeacon.eu/>

Scientific justification	<p>Sea turtle bycatch is a recognised issue in the Mediterranean and some parts of the Northeast Atlantic (e.g. Macaronesia) but knowledge and monitoring gaps limit the extent to which the impact of this bycatch in the populations can be assessed and managed.</p> <p>ToR C encompasses the main tasks of the workshop and aims to review and synthesise information on the success of current mitigation approaches in a range of different métiers (e.g. bottom and pelagic trawls, set nets, longlines, and surrounding nets) as well as reviewing available alternatives. Note that this will include methods to reduce bycatch and to reduce direct and post-release mortality in bycaught turtles.</p> <p>ToRs A and B provide necessary context for discussions of mitigation and it is suggested that these reviews are undertaken prior to the workshop, including a summary based on WGBYC records, and the results briefly summarised at the workshop. Particular issues include methods for estimating spatial and seasonal variation in bycatch rate, the current reporting of turtle bycatch, and understanding and quantifying the survival rate of bycaught turtles in different fishing gears.</p>
Resource requirements	It is expected that several large ongoing EU projects on ETP species bycatch will support and facilitate expert attendance to the Workshop.
Participants	The Workshop is expected to attract appr. 25 participants. The intent is to gather relevant expertise from all relevant stakeholder sectors, e.g. science, policy, fishing industry, NGOs. The chairs of WGBYC, or a designated representative of the WGBYC, will be invited to participate in the workshop.
Secretariat facilities	None besides Teams and SharePoint access and assistance with report production.
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	WGBYC, WGING, OSPAR
Linkages to other organizations	The work of this group is closely aligned with that of several large EU projects (e.g. CIBBRiNA, REDUCE, MarineBeacon).

## Workshop on Nature Restoration and Recovery (WKREST)

**2024/WK/HAPISG09**      **Workshop on Nature Restoration and Recovery (WKREST)**, chaired by Ellen Kenchington\*, Canada; Daniël van Denderen\*, Denmark; and Jan Hiddink\*, UK; will meet at the ICES HQ, Copenhagen, Denmark & online, 3–7 March 2025 (3 days, TBC) to:

- a) Summarise available methods (including strengths and weaknesses) to model predictions of recovery times of marine habitats and species, the parameters and data required to apply these methods, and describe additional evidence needs to predict the effects of management measures intended to achieve restoration. The workshop will engage as wide as possible representation of ecosystem components i.e. fish, marine mammals, benthos, birds, etc. as well as considering “ecosystems” as a whole such as trophic interactions (i.e. eutrophication in the Baltic and Black Sea).
- b) Summarise available methods to monitor and assess the rate of recovery of marine habitats and species, the resources required to apply these methods, the scales of implementation and their statistical power to detect recovery on defined timescales. Identify additional evidence needs to guide effective monitoring and assessment of the effects of management measures intended to achieve restoration.
- c) Review and report on available methods to quantify habitat connectivity, and to monitor and assess changes in connectivity, with a focus on benthic species and habitats of the continental shelves and deep-sea. Report on the implications of habitat

connectivity for recovery rates and restoration, and priority evidence needs.

- d) Report on the ways in which existing data streams/ calls and methods adopted by the ICES Data Center and expert groups may contribute to meeting evidence needs and priorities identified in ToR a-d.
- e) Summarise available and proposed measures and potential threats to achieving the active restoration of marine habitats, their state of development (e.g. from experimental to large-scale trials and applications), relative benefits and costs, and effectiveness. Identify additional evidence needs to evaluate the costs and benefits of active restoration.
- f) Review the current use of ecological restoration objectives in marine management and policy and identify the set targets.

The WKREST will report by 31 March 2025 for the attention of ACOM and SCICOM.

Priority	<p>High, a range of policy drivers focus on restoration of species, habitats and ecosystem functions and yet the science basis to inform implementation and the monitoring of the effects of these policies is fragmented. This WK will bring together a diversity of experts to provide the insights needed to establish a WG on restoration ecology and define a workplan that advances ICES capacity to provide expertise, science and advice of relevance to the monitoring and assessment of restoration/recovery and policy implementation and monitoring.</p> <p>Relevant policy drivers include Kunming-Montreal Global biodiversity framework (2022) (Targets 2 and 10), Regulation (EU) on Nature Restoration (2024) (Article 5), and UNGA Resolutions 77/118 (2022) and 78/68 (2023). The development of an evidence-base on modelling and measurement of recovery also has wider relevance for methods being developed to support science and advice related to the Marine Strategy Framework Directive (2008) and associated national and international regulations and policies.</p>
Scientific justification	<p>The overall justification for the WK is to develop and highlight ICES expertise and engagement in an area of growing policy relevance, building a cross-disciplinary team of scientists with interests in restoration ecology (and potentially increasing their opportunities to access research funding), and providing a basis to support future advice requests linked to policies such as UNGA Resolutions and the EU Nature Restoration Regulation.</p> <p>ToR [a] and ToR [b] provide essential insight into how the science community will advance prediction and measurement of rates of recovery of habitats and species. The workshop will engage as wide as possible representation of ecosystem components i.e. fish, marine mammals, benthos, birds, etc. as well as considering “ecosystems” as a whole such as trophic interactions (i.e. eutrophication in the Baltic and Black Sea). This will meet evidence needs of direct relevance to policy commitments to ‘nature restoration’ as well as providing new understanding of the community and population dynamics of habitats and species. Relevant ICES Science Plan codes 2.2, 2.3, 6.2, 6.3, 6.4.</p> <p>ToR [c] provides scientific insight into links between species and their environment. Such insight is needed to inform policies such as the EU Nature Restoration Regulation and UNGA resolutions related to Vulnerable Marine Ecosystems (VME) that in 2022 and 2023 highlight ‘associated and dependent species’ alongside the VME habitat. Relevant ICES Science Plan code 6.2.</p> <p>ToR [d] provides a basis for strengthening the evidence base related to habitat connectivity, an essential ecological process and a factor influencing recovery and restoration potential (source and sink dynamics). Connectivity is mentioned explicitly as a management consideration in UNGA resolutions related to VME and the Kunming-Montreal Biodiversity Framework and the EU Nature Restoration Regulation.</p>

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Relevant ICES Science Plan codes 1.4, 2.3 and 6.2.

ToR [e] is intended to help the ICES community work in an efficient way, by identifying and responding to links between emerging needs for science related to recovery/ restoration and existing science and advice on related topics. Relevant ICES Science Plan code 3.2.

ToR [f] relates to an area of science that is not actively developed in the ICES community at present. The WK provides an opportunity to consider the pros and cons of active restoration, given interest in the policy arena and some ongoing trials internationally, and to identify the extent to which the ICES community may contribute.

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Resource requirements	Negligible beyond standard Secretariat support
Participants	Technical Workshop with researchers and RSCs investigators.  If requests to attend exceed the meeting space available ICES reserves the right to refuse participants. Choices will be based on the experts' relevant qualifications for the Workshop. Participants join the workshop at national expense.
Secretariat facilities	Secretariat support and meeting room.
Financial	No financial implications
Linkages to advisory committees	SCICOM, ACOM.
Linkages to other committee or groups	WGFBIT, WGDEC, WGMBRED, WGMHM, WGECO, WGMPAS, WGVHES
Linkages to other organizations	EC, OSPAR, HELCOM, NEAFC, FAO.

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## Working Group on Multispecies Assessment Methods (WGSAM)

2024/MT/HAPISG10      **The Working Group on Multispecies Assessment Methods**  
(WGSAM), chaired by Nis Sand Jacobsen\*, Denmark; and Michael Thomson\*, 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 2025	6–10 October	ICES HQ, Copenhagen, Denmark	Reports on keyrun reviews to be provided after each review is complete	
Year 2026	October		Reports on any keyrun reviews that are completed	
Year 2027	October		Final report by 15 November to SCICOM	

### ToR descriptors

TO R	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Regional updates: Review further progress and deliver key updates on multispecies modelling and ecosystem data analysis contributing to modeling throughout the ICES region.	This ToR acts to increase the speed of communication of new results across the ICES area.	5.1; 5.2; 6.1	3 years	Report on further progress and key updates.  Review and collaborate with appropriate EGs to revise sections on “species interactions” in the Fisheries Overviews.
b	Key-runs: Parametrisation of multispecies and ecosystem key-run models for different ICES regions. This includes standard update (limited to inclusion of recent data), extensive update (incl. new data and processes), and new key-runs.	Key-runs are models checked against high quality criteria, which are developed to contribute to a variety of operational objectives as part of the ICES advice, i.e. provide information on natural mortality for inclusion in single species assessments, estimates of multispecies reference points, large operating ecosystem models for MSE, etc.	5.1; 5.2; 6.1	3 years	Report on output of multispecies models including stock biomass and numbers and natural mortalities for use by single species assessment groups and external users.
c	Skill assessment: Establish benchmarking methods to assess the performance of multispecies models	This work is aimed at assessing the performance of models intended for strategic or tactical management advice. Evaluation will	5.1; 6.1; 6.3	3 years	Report on technical requirements for cross-models standardisation and comparison.  Manuscript(s) on performance assessment

	intended for operational advice.	require work towards standardisation for cross-model comparison. This ToR will also deal with evaluation of methods for fitting to data, model calibration, diagnostics, and data treatment in the context of multispecies modelling.			of wide array of multispecies models based on a large simulation study.
d	Multi-model advice: Evaluate methods for generating advice by comparing and/or combining multiple models.	This work is aimed at addressing structural uncertainty in advice by reviewing methods for multi-model inference and multispecies applications	5.1; 6.1; 6.3	3 years	Report on methods for comparing models and for constructing model ensembles. Update and refine software implementing ensemble models. Report on case examples from both simulation testing and real studies.
e	MSE: Evaluate methods and applications for multispecies and ecosystem advice, including evaluation of management procedures under the uncertainties of environmental change.	This ToR uses multispecies and ecosystem approaches to understand the resistance and resilience of ecosystems to human activities under the uncertainties of environmental change. Through the use of simulations, management strategies and harvest control rules can be evaluated for robustness to uncertainties related to species interactions, changing climate, and ocean uses.	2.5; 5.2; 6.1	3 years	Review methods to evaluate populations and ecosystem resilience. Review of methods for management strategy evaluation which incorporate the effects and uncertainties of climate change.
f	Reference points: Define, calculate and adjust multi-species reference points considering interactions between species.	This ToR will look into biological reference points in a multispecies context. This includes multispecies reference points and single-species reference points applied	1.4; 5.1; 5.3; 6.3	3 years	Report on methods for multispecies effects on reference points.

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in multispecies approaches, as well as exploring the feasibility of single-species reference points when accounting for species interactions.

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### Summary of the Work Plan

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Year 1	All ToRs
Year 2	All ToRs, update keyrun North Sea
Year 3	All ToRs

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### 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 under multiple sources of uncertainties incl. climate change. The activities will provide information (e.g., natural mortality estimates, performance of indicators, multispecies reference points) and tools (e.g., multi-model ensembles, keyrun models) valuable for the implementation of an integrated advice and the application of a precautionary approach in several North Atlantic ecosystems. Consequently, these activities are considered to have a 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. Expertise in ecosystem dynamics, trophic interactions, modelling and fish stock assessment from across the whole ICES region.
Secretariat facilities	Standard EG support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	ACOM, FRSG and assessment Expert Groups.
Linkages to other committees or groups	WGMIXFISH, WGBIFS, IBTSWG, WGECO, all EAMSG groups, WKCLIMAD.
Linkages to other organizations	None

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## Working Group on Marine Protected Areas and other Spatial Conservation Measures (WGMPAS)

2024/MT/HAPISG11      The Working Group on Marine Protected Areas and other Spatial Conservation Measures (WGMPAS), chaired by Ryan Stanley, Canada; Joachim Claudet, France; and Emma Sheehan, 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 2025	22–26 September	Halifax, Nova Scotia		
Year 2026	Fall 2026	Azores, Portugal,		
Year 2027	Fall 2027	tbd	Final report by DATE to SCICOM	

### ToR descriptors

TOR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Explore and develop approaches for the effective evaluation and quantification of potential biodiversity benefits arising from various types of MPAs and potential OECMs.	Considering the evolving nature of international policies on marine conservation targets and tools, there is a pressing need to offer guidance to shape future conservation initiatives. Leveraging the diverse expertise within this working group, we aim to pinpoint policy-related topics that necessitate further clarification, advice, or research. Our discussions will focus on opportunities to enhance conservation efforts, identify obstacles at various levels (such as MPA design, governance, policy, implementation) that currently impede effective conservation, and propose strategic recommendations to surmount these challenges.	6.1,6.5	3 year	Expected Deliverables - Manuscripts addressing the challenges outlined in the Terms of Reference (ToR-a): <ol style="list-style-type: none"> <li>1. A manuscript detailing considerations for potential OECMs.</li> <li>2. A manuscript assessing the effectiveness of offshore MPAs.</li> <li>3. A manuscript detailing key opportunities to enhance the effectiveness of MPAs.</li> <li>4. Additional manuscripts focusing on the evaluation and quantification of potential biodiversity benefits.</li> </ol>

b	Coordinate and develop assessment methods to evaluate the potential consequences and trade-offs between various human activities and the biodiversity benefits derived from MPAs.	To understand how MPAs and OECMs integrate within the wider seascape, and on how synergies and/or trade-offs can arise when accounting for (i) multiple and often competing, fishing and other human activities, and  (ii) the competition for space between fisheries and other ocean uses (e.g., offshore wind farms and aquaculture).	6.6	3 year	Manuscripts addressing the challenges outlined in the Terms of Reference (ToR-b):  1. Manuscripts introducing a novel framework to optimize protection levels within multi-zone MPAs, aiming to effectively achieve conservation objectives while maximizing potential human use benefits, such as fisheries, across various scales. 2. A manuscript employing a case study to apply the prioritization framework to a national network of MPAs.
c	Developing approaches to strengthen coherence and climate-resiliency of MPA networks at national and transboundary scales.	While the conceptual ecological basis for designing spatial conservation networks is well-established, encompassing representative, connected, and resilient elements, there are substantial gaps in translating these concepts into practical design. These gaps include considerations of climate change stressors and the need for adaptive planning and management, particularly at transboundary and basin scales. The design and scope of reporting and monitoring programs must be optimized and adaptive to ensure effectiveness in regional and global biodiversity conservation initiatives, such as the implementation of Global Biodiversity Framework Targets at the domestic level, both in the present and in the face of a changing future.	6.3, 6.6	3 year	Manuscripts addressing the challenges outlined in the Terms of Reference (ToR-c):  1. Evaluation of current knowledge shortfalls or gaps that might limit the assessment of potential climate change impacts, such as uncertainty in oceanographic models and/or climate projections. 2. An assessment of how projected climate change could impact MPAs and the effectiveness of MPA networks. 3. Recommendations on how to best design and implement climate-resilient spatial conservation networks.

## Summary of the Work Plan

Year 1	<ul style="list-style-type: none"> <li>• Annual WGMPAS meeting to discuss and progress WG activities ToR A-C.</li> <li>• WG activities Progress report through E-evaluation report.</li> <li>• Intersessional progress on ToRs A-C.</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>• Annual WGMPAS meeting to discuss and progress WG activities ToR A-C.</li> <li>• WG activities Progress report through E-evaluation report.</li> <li>• Intersessional progress on ToRs A-C.</li> </ul>
Year 3	<ul style="list-style-type: none"> <li>• Annual WGMPAS meeting to discuss and progress WG activities ToR A-C.</li> <li>• WG activities Progress report through E-evaluation report.</li> <li>• Intersessional progress on ToRs A-C.</li> <li>• Submit Final report.</li> </ul>

## Supporting information

Priority	<p>The current activities will lead ICES into shaping issues and the provision of evidence related to spatial-based approaches for biodiversity conservation (i.e., MPAs). There is an urgent need to assess and enhance the effectiveness of current MPA measures and approaches at the ecosystem level to ensure they are able to meet policy objectives over the long-term in an optimal way – this is particularly needed in light of the increasing usage and development of marine space.</p> <p>The WGMPAs ToR are closely aligned with the ICES Science Plan and aim to report their outcomes directly to ICES in their final report as well as contribute to ecosystem overviews and the ICES Annual Science Conference as required and where possible. The proposed work of the ICES WGMPAs on the design and evaluation of MPAs is considered to be timely given national and international conservation commitments.</p>
Resource requirements	Resources attached to national programmes individually related to these ToRs, provide the basis for support in-kind for the work of the group.
Participants	The Group is expected to be attended by some 20–25 members and guests. Participation includes experts from ICES member countries and also from countries with similar scientific expertise.
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	<p>We anticipate that there will be a close working relationship with working groups that focus on WKTRADE3, WGSOCIAL, WGECON, WGCEAM, WGBESEO, WGMPCZM, WGSFD, WGMHM, WGFBIT, WGOWDF, WGORE, WGMBRED.</p> <p>Specific synergies will be explored with groups working on benthic biodiversity including WGBIODIV and BEWG.</p>

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Linkages to other organizations

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UNEP-WCMC, NEAFC, NAFO, OSPAR, HELCOM, IUCN, FOS, UN-CBD

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## Workshop to scope for Harmonized Regional Monitoring Schemes to Assess the Impact of Offshore Wind Farms on Fish, Pelagic and Benthic Communities and Ecosystem Functions (WKOMO)

2024/WK/HAPISG12

A Workshop to scope for Harmonized Regional Monitoring Schemes to

**Assess the Impact of Offshore Wind Farms on Fish, Pelagic and Benthic Communities and Ecosystem Functions (WKOMO)**, chaired by Steven Degraer, Belgium; and Vanessa Stelzenmüller, Germany; will be established and will meet at ICES HQ, Copenhagen, Denmark, 26–28 May 2025 to:

- a) Describe implemented and planned offshore wind monitoring and research programs at various scales (local, national, regional) across ICES regions ([Science Plan codes: 3.2, 3.3,3.4,3.5, 4.4](#));
  - i) Review of national monitoring and research activities that address the impact of offshore wind farms on fish populations, communities and key ecosystem functions (e.g. production).
  - ii) Brief description of allocation of responsibilities and funding sources.
- b) Produce an overview of the assessed indicators (ecosystem functioning, single species, biodiversity, etc) ([Science Plan codes: 2.7, 3.1, 3.2,3.3,3.4,6.27.4](#));
  - i) Categorise the indicators, monitoring and research approaches and collected data to identify synergies and gaps of prevailing activities identified under ToR a;
  - ii) Document any known national or local impact thresholds or reference levels being used to assess ecological effects.
- c) Summarise research and monitoring activities in and around offshore wind areas by habitat type and regional sea;
  - i) Mapping of activities and categories and overlay analysis with different habitat types (as identified by the group).
- d) Identify and recommend steps towards harmonised monitoring and research activities to inform the ICES Strategy to assess the impacts of OREs and the effectiveness of mitigation measures (Science Plan codes : 2.7, 3.2, 3.4,3.6,4.5, 5.1, 7.3 ).

Scoping for follow-up workshop with national authorities to explore the potential for coordinated regional monitoring activities.

WKOMO will report by 15 July 2025 for the attention of ACOM and SCICOM.

### Supporting information

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Priority	ORE Roadmap published in January 2024 identifies goals, objectives, and priority actions for the development of ORE science in ICES. This workshop addresses multiple goals and objectives in the roadmap with a particular focus on Priority Action 4 for 2024/ 2025: the assessment of OMRE developments on fishery and ecosystem observation surveys, fisheries management advice, and recurrent ICES advice. This workshop was identified as a recommendation to ICES from WGOWDF 2024 annual meeting.
Scientific justification	There is an urgent need to understand the impact of OWF on fish, pelagic and benthic communities and key ecosystem functions at national and regional scales to inform the respective management advice requirements. The lack of data and harmonised monitoring efforts are the main reasons why such effects can not be described even in

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	areas where OWFs have been implemented for more than a decade. As highlighted in the ORE Roadmap, ICES needs to develop a strategy to address the impacts of OWF at various scales to allow for further actions to mitigate, for instance impacts of area closures on long-term scientific surveys and the resulting scientific advice to support fisheries and ecosystem management. Many ICES member countries are experiencing large-scale offshore renewable energy development and will require a better understanding of how monitoring activities could be effectively harmonised.
Resource requirements	None
Participants	<ul style="list-style-type: none"> <li>• SCICOM Country representatives</li> <li>• Survey Working Groups representatives</li> <li>• HAPISG; ORE Working Groups, e.g. WGOWDF</li> <li>• EO Steering Group; relevant Working Groups</li> <li>• Members of planning groups with ORE/MPA/ spatial planning knowledge</li> <li>• Members of the WGMBRED and WGFBIT</li> </ul>
Secretariat facilities	ICES HQ as venue and support
Financial	No financial implications.
Linkages to advisory committees	The loss of and changes to survey areas and the loss of extraction of animals will have considerable impact on the future of fisheries and ecosystem advice.
Linkages to other committees or groups	This workshop straddles already different committees and groups, such as EOSG, HAPISG, as well as FRSG and HUDISG.
Linkages to other organizations	The work should be closely linked with the work of ORE and MPA managers and specialists.

## Workshop to Compile Evidence on the Impacts of Offshore Renewable Energy on Fisheries and Marine Ecosystems (WKCOMPORE)

**2024/WK/HAPISG13** A Workshop to Compile Evidence on the Impacts of Offshore Renewable Energy on Fisheries and Marine Ecosystems (WKCOMPORE), chaired by Andreas Kannen, Germany; Jan Vanaverbeke, Belgium; and Katell Hamon, Netherlands; will be established and will meet at ICES HQ, Copenhagen, Denmark, 3–7 February 2025.

WKCOMPORE will use the outputs of the ICES ORE Part One, Part Two and Part Three groups<sup>1</sup> as the primary sources of material to address the following:

- a) To review, summarise and compile evidence on the impacts of offshore renewable energy (ORE) on fisheries and marine ecosystems<sup>2</sup> to address the following topics (Science Plan codes: 2.1, 2.2, 2.7, 7.3):
  - i. The data and resources available for the analysis of the economic and social impacts of ORE developments on the fisheries sector, and on that basis:
    - i. Summarise the known and projected economic and social impacts of existing and planned offshore renewable developments (on fisheries, at métier and fleet levels). Potential trade-offs between negative economic impacts on fisheries and positive economic impacts of the ORE sector should be considered;
    - ii. Summarise the sources of information available, methods that may be applied, and further data and information required, to address the economic and social impacts of ORE on fishers;



- ii. The known ecological impacts of ORE developments and their intensity (severe, medium, limited, unknown) on main commercial fish species for the areas listed above and at population levels (positive and negative impacts) looking at the different phases of ORE development (survey, construction, operation, decommissioning). A specific case study on the effects on recruitment of western Baltic herring and of the effects on harbour porpoises should be developed;
  - iii. How changes on hydrodynamic conditions produced by ORE may change the food availability to filter-feeders and influence phytoplankton primary production;
  - iv. The ways artificial structures could influence the colonization of new areas by species, both indigenous and non-indigenous species. Based on data available for other structures (e.g. oil & gas), and from other locations (e.g. US);
  - v. The ways in which pelagic species (especially commercial fish species) may react to dynamic cables suspended in the water column (floating wind);
  - vi. Recommendations for next steps to define methodologies to model cumulative impacts of offshore wind on commercial fisheries (temporary, permanent) and the possibility to adopt mitigation measures;
  - vii. Options for mitigation measures, good practices, and spatial planning for ORE developments and their strengths, weaknesses, implications and uncertainties. Priorities for research and monitoring related to these options.
- b) To ensure, in the compilation to evidence described in ToR ‘a’, that the level of detail presented, data used, approaches taken, treatment of knowledge gaps and uncertainty, conclusions drawn, and references to evidence are, as far as possible, consistent.
- c) To identify and report on recommendations and future work required to help address areas of uncertainty, data quality/ availability and the implementation of ORE applicable assessment methods.

<sup>1</sup> The ‘Part’ groups developed expert reviews and analyses of the impacts of offshore renewable energy on fisheries and marine ecosystems in 2024 and 2025. The Part One group addressed ToR ‘a’ i, the Part Two group addressed ToR ‘a’ vi & vii, and the Part Three group addressed ToR ‘a’ ii, iii, iv, and v.

<sup>2</sup> With a focus on the Celtic Sea, Greater North Sea and Baltic Sea ecoregions.

WKCOMPORE will report by 14 April 2025 for the attention of ACOM and SCICOM.

#### Supporting information

Priority	High, in response to a special request from DGMARE on the impacts of offshore renewable energy on fisheries and marine ecosystems.
Scientific justification	Rapid and large-scale offshore ORE development is underway. The ICES ORE Roadmap highlights the necessity to engage in assessing the fisheries and ecosystem impacts of ORE developments. The compilation and review of data and information and methods required to respond to the special request from DGMARE will advance ICES capacity to advance the science prioritised in the ICES ORE Roadmap and to identify priorities for ORE research.
Resource requirements	Secretariat support.

Participants	<p>Scientific leadership will be provided by the leads of the Part One, Part Two and Part Three groups as well as many members of existing Expert Groups who have been contributing to the Part groups. Expected participation is 20-25 experts. Participants join the workshop at national expense.</p> <p>If the number of requests to participate exceeds the meeting space available ICES reserves the right to refuse participants. Choices will be based on previous engagement with the Part One, Two and Three groups, and the experts' relevant qualifications for the Workshop</p>
Secretariat facilities	Secretariat support and meeting room [breakout rooms TBC].
Financial	Partial funded by a special advice request from DGMARE.
Linkages to advisory committees	ACOM and SCICOM.
Linkages to other committees or groups	HAPISG, HUDISG, IEASG, WGECON, WGSOCIAL, WGOWDF, WGMBRED, WGOORE, WGMPAS, WGSFD, WGCEAM, WGMPCZM
Linkages to other organizations	EC, GNSBI

### Methods Working Group (MGWG)

**2024/MT/HAPISG14** The **Methods Working Group (MGWG)**, chaired by Andrea Havron, USA; and Anders Nielsen, 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 2025	17–21 November	Seattle, USA		
Year 2026				
Year 2027			Final report by DATE to SCICOM	

### ToR descriptors

ToR	Description	Background	<a href="#">Science Plan Codes</a>	Duration	Expected Deliverables
a	Evaluate technical details of stock assessment models.	At typical EG meetings (benchmark and assessment) there is often insufficient time and expertise to evaluate the inner workings of the applied models. The focus is on input and output (black box). This ToR addresses the need for a forum where model developers "open the	5.1,5.4	3years	Report on details examined. and why they are important. Knowledge sharing among experts.

		box" in front of fellow model developers. The goal is to find better solutions and avoid accumulating unfortunate hidden ad-hoc "fixes".			
b	Share new techniques for use in stock assessment.	Increased awareness of new techniques (e.g. modelling software or statistical innovations) can be enormously beneficial and improve efficiency for model developers. This ToR promotes such sharing across EG's and regions and can serve as early notification of techniques that may become useful or problematic to a number of EGs.	5.1; 5.4	3 years	Report on techniques examined with pros and cons of each for specific situations. Scientific publications when possible.
c	Validate new methods.		5.1; 5.4	3 years	Report on steps taken to validate each method examined and any caveats. Write clear conclusions in report (e.g. as: "method X is a valid alternative when ..."). Scientific publications when possible.
d	Identify the need for ICES training courses.	Identify if new courses are to be proposed for the ICES training program based on new tools or methods presented at the WGMG		3 years	Report the need in the WGMG report and pass suggestion to the training group
e	Maintain and update living reference document describing the set of stock assessment model diagnostics that should routinely be	ACOM requested this ToR previously. This will further develop the document and keep it current.	5.1	3 years	The document itself

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reported by assessment working groups and benchmarks.

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### Supporting information

Priority	Single-species stock assessment methods, for estimating stock size and harvest rate, are a well-defined topic of central importance for managing fisheries worldwide. This Group's activities will ensure ICES's visibility in the international arena in the field of fish stock assessments. Consequently, these activities are considered to have a very high priority.
Resource requirements	The research programs that provide this group's main input are already underway, and resources are already committed. The additional resources required to undertake additional activities in the framework of this group are 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 group under ACOM	Direct linkage to all assessment EGs. EGs under Fisheries Resources Steering Group (FRSG).
Linkages to other committees or groups	ICES Training Group and SCICOM
Linkages to other organizations	CAPAM, ICCAT, WFC, NOAA, and the FIMS project.

### Working Group on Marine Benthos and Renewable Energy Developments (WGMBRED)

**2024/MT/HAPISG15**      The Working Group on Marine Benthos and Renewable Energy Developments (WGMBRED), chaired by Jolien Buyse\*, Belgium; and Ninon Mavraki\*, the Netherlands; will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2025	17–21 November	Ostend, Belgium		
Year 2026				
Year 2027			Final report by 15 December to SCICOM	

### ToR descriptors

ToR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Identify opportunities for cross-cutting links and communication between ICES groups in relation to the renewable energy and marine ecosystems to	ICES recognises that fast emerging ORE developments require the streamlining of ICES science through the implementation of the ICES ORE Roadmap. The Roadmap identifies WGMBRED as one of the	6.6	3 years	Contributions to implementation of ORE Roadmap through active participation in relevant initiatives

	support the implementation of the ICES ORE Roadmap.	core groups involved in the implementation of the Roadmap. This ToR enables WGMBRED to liaise with relevant ICES Working Groups, arrange participation in advice processes and seek interaction with relevant international initiatives.			
b	Review the interaction between pressures related to ORE energy emissions and benthic communities.	There is increasing evidence that multiple forms of energy emissions from ORE installations affect several groups of receptive species. The information is, however, scattered and generally based on targeted experiments and therefore difficult to integrate and apply at scale. This ToR will structure the information to identify benthic species groups that are affected by multiple pressures related to energy emissions.	2.1, 2.2, 2.7	3 years	Report on interactions between different pressures associated with energy emissions and functional benthic groups.
c	To provide insights on the scientific developments of marine benthic knowledge with direct relevance to decommissioning of renewable energy installations.	Evidence has demonstrated that arrays of marine renewable energy installations affect structural and functional aspects of the marine environment, over local and regional scales. These effects largely stem from organisms colonising the structures in large densities. Decisions on full or partial decommissioning result in modifications to the ecology and the environment, with repercussions for higher trophic levels.	2.1, 2.2, 6.1	3 years	Critically review, update and synthesise detailed information on decommissioning ORE installations. Year 3 to develop a theme session, covering key aspects and knowledge.
d	Review the existing knowledge on the effects of offshore floating structures on benthos.	Floating renewable energy structures (e.g. floating wind, solar energy, tidal, etc.) are becoming more common in the generation of renewable energy. These introduce a specific range of pressures to the marine environment and can impact benthic ecosystems differently than fixed structures.  Following the Dannheim <i>et al.</i> (2020, ICES JMS) paper approach, knowledge on direct and indirect impacts of floating structures on benthos / marine environment will be reviewed and if pertinent, this methodology will be considered. Cause-effect relationships that drive those impacts and knowledge	2.2, 2.7, 4.5	3 years	Report on cause-effect relationships and supporting evidence from literature on the effects of floating ORE installations on benthic marine ecosystems.

		gaps will be identified.			
e	Continued expansion of the joint BISAR database with case study on non-indigenous species.	<p>WGMBRED has developed an integrated database on benthic species present at sites of artificial structures that is used for scientific purposes by the international scientific community. The database is named BISAR (Biodiversity Information of benthic Species at ARtificial structures). It is recognised that the database can be expanded with new data from countries with current and emerging offshore renewable industries and monitoring programmes, facilitating further understanding of the spatial and temporal effects of renewable energy devices on the marine benthos on an international scale.</p> <p>A case study on non-indigenous species on artificial structures with application of BISAR data will be developed. For this purpose, BISAR will be extended with information on non-indigenous / indigenous status per species per ecoregion. This will allow statistical analysis of occurrence patterns of non-indigenous species on artificial structures.</p>	1.4, 3.1, 4.2	3 years	<p>Updated BISAR dataset available online.</p> <p>Report on non-indigenous species present at sites of artificial structures.</p>
f	Review the science of Nature Inclusive Designs of ORE installations and their interactions with marine benthos.	<p>Nature Inclusive Designs (NIDs) for ORE developments is a new concept being advanced by industry, eNGOs, and governments across ICES sea basins to address a wide variety of policy, social, and ecological aims. There is currently a lack of common definitions of what NIDs constitute as well as measures of their effectiveness. In addition, the objectives of NIDs approaches often focus on biodiversity objectives without necessarily considering initiatives to improve ecological functions. We aim to address this and establish a comprehensive definition of an effective NID, which not only enhances biodiversity but also considers the ecological functioning of benthic species and communities. We shall review</p>	2.2, 2.7, 4.5, 6.1	3 years	<p>Publication, Theme session. A comprehensive definition of NID and report on NID designs and their effectiveness.</p>

		existing NIDs and evaluate their effectiveness based on this definition. Given the growing interest in NIDs, there are several parallel initiatives relevant to this ToR. We aim to engage with these initiatives through a theme session to address the current lack of common definitions and to promote knowledge sharing and collaboration.			
g	Strategic collaboration to support and update (including specific tools in line with the ICES FEISA framework) the likely consequences and trade-offs between various offshore renewables and the biodiversity benefits derived from MPAs.	To understand how MPAs and OECMs integrate within the wider seascape, and on how synergies and/or trade-offs can arise when accounting for (i) multiple and often competing, fishing and other human activities, and (ii) the competition for space between fisheries and other ocean uses (e.g. offshore wind farms and aquaculture).	2.2, 2.7, 6.6	3 years	To update and review dedicated information in collaboration with other relevant WGs (e.g. WGMFAS, WGMPCZM).  In year 3: to critically review improvements and the relevant literature. The compilation of an opinion document will provide further recommendations on offshore renewables and MPAs.
h	Review the existing process-based models required to address cause-effect relationships related to benthos and offshore renewable energy developments (ORE), and document their data dependencies	WGMBRED believes process-based modelling approaches have the potential to <i>i)</i> upscale insights in cause-effect relationships for benthos in an ORE context to larger geographical/temporal scales, <i>ii)</i> integrate such insights within wider ecosystem frameworks and <i>iii)</i> evaluate managerial and environmental scenarios. Yet, both current data availability and formatting may contain gaps when used as inputs to the models. Furthermore, some relevant models might not be specifically formulated to address questions related to ORE. So, identify those gaps and initiate discussion on how to fill these gaps leveraged by the expertise of this working group and interactions with WGOWDF, WGOORE and WGIPEM is a first step towards a systematic understanding of the effects of ORE on benthos within the wider	3.5, 4.2	3 years	Report on recommendations to enhance the reusability of ORE monitoring datasets within modelling efforts to assess ORE impacts on marine ecosystems and services.  Contribution to goal 3 of the ICES ORE Roadmap, i.e. developing a strategy towards enhancing the suitability and effectiveness of the suite of modelling tools used for assessing the impact of offshore renewable energy.

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marine ecosystem (as such contributing to Goal 3 of the ICES ORE Roadmap).

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### Summary of the Work Plan

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Year 1	<ul style="list-style-type: none"> <li>• ToRs a) and e) will be approached as "small (lower priority) ToRs", where 1 - 2 hours per meeting will be provided to the ToR leads to present their goals and progress.</li> <li>• Each WG meeting will last 5 days to focus on 6 main (higher priority) ToRs (b, c, d, f, and g)</li> <li>• ToR leads will decide if any intersessional work is required to deliver each ToR</li> </ul> <p>Literature compilation for all ToRs.</p> <p>a Active communication with ICES ORE and WGOWDF. Active participation in WKCOMPORE and ICES SR ORE activities.</p> <p>b Updated (from previous ToR) compilation and review of existing knowledge on energy emission types and potential pressures relating to benthic species/habitat.</p> <p>c Compilation and synthesis of key findings to inform and support decision-making processes.</p> <p>d Identification of the different floating devices and the pressures related to the benthos. Selection of relevant literature.</p> <p>e Data call and ingestion of new data. NIS inventory of current BISAR dataset.</p> <p>f Conduct a thorough review of existing NIDs to understand their current definitions and measures of effectiveness. Develop a comprehensive definition of what constitutes effective NIDs.</p> <p>g To generate a summary document with relevant updates in connection to ORE and MPAs, in collaboration with other relevant WGs (e.g. WGMPAs).</p> <p>h Literature review on current usage</p>
Year 2	<p>Structural review of compiled literature for all ToRs</p> <p>a Interaction with chairs of WGOORE and WGOWDF to ensure complementarity between WG activities and processes related to the implementation of the ICES ORE Roadmap.</p> <p>b Critically review, synthesise and update the relevant groups and advisory requests with these sources of information. Draft a theme set for ICES SCICOM consideration.</p> <p>c Continue from year 1.</p> <p>d Reviewing literature and identify cause-effect relationships driving the impacts.</p> <p>e Data call and ingestion of new data. Continued NIS inventory of current BISAR dataset.</p> <p>f Engage with stakeholders and researchers (e.g. through a theme session) to discuss and refine the comprehensive definition of NIDs. Evaluate the effectiveness of existing NIDs based on the established definition.</p> <p>g To revisit and critically review the relevant updates in connection to ORE and MPAs.</p> <p>h Polls/surveys on gap analysis.</p>

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Year 3	<p>Finalise reviews and produce reports/manuscripts for all ToRs</p> <p>a Interaction with chairs of WGORE and WGOWDF to ensure complementarity between WG activities and processes related to the implementation of the ICES ORE Roadmap.</p> <p>b Final report on interactions between different pressures associated with energy emissions and functional benthic species groups.</p> <p>c Host a Theme session at the ICES ASC (or elsewhere), if appropriate.</p> <p>d Link existing evidence to the cause-effect relationships, identify knowledge gaps and report</p> <p>e Data call and ingestion of new data. Data exploration &amp; analysis</p> <p>f Final report outlining the agreed comprehensive definition of effective NIDs, and presenting the results of the evaluation of the effectiveness of existing NIDs based on this definition.</p> <p>g To review and compile critical information, to inform an opinion document to deliver recommendations on collocation of offshore renewables and MPAs.</p> <p>h Analysis/Reporting</p>
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### Supporting information

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Priority	The fast pace and development of renewable energy (e.g. fixed and floating) has moved to the top priority for scientists, advisors and regulators. Therefore, it is important to continue to inform and keep an up-to-date level over scientific, data and technological advances. The proposed activities of this Working Group will contribute to ICES into new knowledge, advice and data to support further understanding in the field of ORE. Therefore, the proposed activities will constitute a very high priority.
Resource requirements	Standard EG meeting support.
Participants	The Group is typically attended by 20–30 members and chair-invited scientists, working with the effects of marine renewable energy developments (e.g. fixed and floating devices) on the marine benthic communities (i.e. algae, invertebrates, and demersal fish). Participation from current ICES member countries and also from countries where marine renewable energy developments have started recently (Spain, Portugal, Italy) to develop knowledge on these activities.
Secretariat facilities	Standard EG support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There is a link to ORE SR1.
Linkages to other committee or groups	There is a very close working relationship with Benthos Ecology Working Group (BEWG), the Working Group on Offshore Renewable Energy (WGORE), Working Group on Marine Protected Areas (WGMPAS and the Working Group on Offshore Wind Development and Fisheries (WGOWFD) ICES Cumulative Effects Assessments and Management Working Group (WGCEAM) and Working Group on Marine Planning and Coastal Zone Management (WGMP CZM).
Linkages to other organizations	There is a link to DG MARE OSPAR COBAM, OSPAR CEA.

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### Workshop on the Use of Predictive Habitat Models in ICES Advice 2 (WKPHM2)

**2024/WK/HAPISG16**      Second Workshop on the Use of Predictive Habitat Models in ICES Advice (WKPHM2), chaired by Kerry Howell, UK; and Chris Rooper, Canada; will meet at ICES HQ, Copenhagen, Denmark, 12–16 May 2025 to:

- a) Consider and report on the actual and potential use of PHMs in ICES advice. Define a number of case studies demonstrating different approaches on how these models can add to, refine and/ or provide an alternative to methods for defining areas where VME are likely to occur.
- b) Review and refine the criteria derived by WKPHM and updated by WGMHM, highlighting criteria which, if not met, would constitute a fundamental flaw in model use in defined circumstances (e.g. application to different spatial scales). Also consider, where applicable, PHMs that account for the impacts of fishing activity on VME.
- c) Update and expand on WGMHM's existing table of PHMs, focusing on models associated to the case studies selected in a). Describe their attributes (e.g. resolution and spatial extent of the model domain), the extent to which they meet the criteria identified in 'b', and the types of data products/ and outputs they can generate to support VME advice.
- d) Develop and present a weight of evidence framework for the application of PHMs in ICES advice on areas where VME are known or likely to occur at a range of spatial scales – this should consider, and take account of, the possibility of integrating multiple model outputs (where appropriate) and predict the likelihood of occurrence of VMEs at varying levels of confidence.
- e) Consider the potential implications of climate change and ocean acidification on VME with regards to the usefulness of PHM. The report should include suggestions on how PHMs can be used in current and future ICES advice to identify areas, based on scientific information, where deep-water species and vulnerable marine ecosystems are more resilient to the impacts of climate change, and how ICES can advise on measures to increase resilience.

A core group of experts (two WK Chairs, José Manuel, Julian Burgos, Javier Murillo Perez) with the support of vice chairs from ACOM (Simon Jennings), SCICOM (Andrew Kenny) and ICES secretariat will prepare material and help run the workshop. WKPHM2 will report by 6 June 2025 for the attention of the ACOM and SCICOM Committees.

### Supporting information

Priority	WGMHM and WGDEC have strongly advocated for the inclusion of predictive habitat models in ICES advice related to the distribution of VMEs. In order for ICES to utilize such models in their advice an agreed set of standards is required. With recurring requests from NEAFC and the EU, regarding the best scientific advice on where VMEs are known or likely to occur, this workshop is of a high priority.
Scientific justification	<p>ToR [a] In close consultation with the ICES secretariat and ACOM vice chairs and SCICOM Steering Group chairs, propose approaches to incorporate the output of PHMs into the ICES advice on VMEs. WGMHM considers three possible uses of PHMs:</p> <ol style="list-style-type: none"> <li>a) to modify/refine VME polygons in areas where high-resolution models are available;</li> <li>b) to define “areas of presence” that could replace the VME elements in the scenarios that use them, and c) to complement or replace other sources of evidence (e.g. the VME Index) in large areas of the advice region. Tor [a] will define a set of case studies to demonstrate these uses, assessing the models and recommending the stage at which the inclusion of PHMs outputs should be considered within the VME benchmarked method.</li> </ol> <p>ToR [b] will review and if necessary refine the criteria derived by WKPHM and updated by WGMHM considering the actual and potential use of PHMs in ICES</p>

advice.

ToR [c] will identify recently published PHMs, focusing on those associated with the case studies defined in [a], applying the criteria defined in [b]. Via the extended networks of WGDEC and WHMHM, proactive identify PHM developers to contribute and attend WKPHM2. These developers will review the models. Preparation and evaluation of PHMs by WKPHM2 can consider methods such as e.g. the Delphi approach or IDEA protocol (Hemming et al., 2018).

ToR [d] will develop a Weight of Evidence (WoE) framework to combine the output of one or multiple PHMs with observations to estimate the likelihood of occurrence of VMEs and inform the ICES advice on VMEs. WoE, a type of Bayesian inference, is a flexible approach that is adaptable to various types of SDMs and observational data, accommodating differing scales, methodologies, and ecological contexts. WoE can also include expert judgement in data-poor areas.

ToR [e] Review and suggest PHMs use in the context of climate change and ocean acidification should consider management needs (e.g. identified below by UNGA, NEAFC and other RFMP) to ensure WKPHM2 suggest operational methods that ICES can directly (or in 2-3 years with further defined developments) use in its VME advice.

Resource requirements	Data Centre, Secretariat support and meeting room
Participants	The workshop will likely be attended by some 15–20 experts online and physically.
Secretariat facilities	Online connection and SharePoint site provision
Financial	No financial implications.
Linkages to advisory committees	ACOM and SCICOM are the both parent committee, the work will provide information for the Advice Committee to respond to specific requests from clients.
Linkages to other committees or groups	There is a very close working relationship with WGSFD and WGFBIT. Data products will be used in a benchmarking process for the inclusion of models in future ICES advice on VME to the EU and NEAFC
Linkages to other organizations	FAO, NEAFC, NAFO, EC, EMODnet.

### Working Group on Shipping Impacts in the Marine Environment (WGSHP)

**2024/MT/HAPISG17**      **The Working Group on Shipping Impacts in the Marine Environment** (WGSHP), chaired by Ida-Maja Hassellöv, Sweden; Katja Broeg\*, Germany; and Andreas Gondikas\*, Greece; will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details
Year 2025	6-8 May	Hamburg, Germany	
Year 2026			
Year 2027			

## ToR descriptors

TOR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN</a>	YEAR	EXPECTED DELIVERABLES
			<a href="#">CODES</a> (2025 version)		
a	Conduct strategic planning through review of national research on shipping interactions with the environment and report on priorities, knowledge gaps and opportunities for further collaboration.	ICES strategic plan Goal 2: understand the relationship between the impact of human activities (e.g., shipping) and marine ecosystems to estimate pressures and impacts and develop science-based sustainable pathways.	Codes: 2.1, 2.2	2025-2027	Report to ICES. Respond to advice requests, as applicable.
b	Review methods and assessment approaches to represent environmental shipping pressures at regional and global scales.	The distribution and intensity of commercial shipping is increasing and there is a growing need to assess and mitigate the impacts of vessel activities on the marine environment.	Codes: 2.1, 2.2, 2.7	2025-2027	Technical paper or ICES Viewpoint + background document or peer-reviewed manuscript.
c	Develop a framework to represent the impacts of shipping on the marine environment, which can be used to guide shipping assessment science on the development and implementation of ecosystem-based management.	A framework of the many shipping pressures and effects is needed to structure assessments and communicate the full suite of shipping-related pressures.	Codes: 2.1, 2.2, 2.6, 6.1	2025-2027	Technical report on framework to include shipping in ICES Ecosystem Overviews
d	Identify current and emerging shipping pressures, review state of knowledge and explore possible mitigation strategies for decreasing impacts.	While regulation of air emissions from shipping has gradually been strengthened, the corresponding impacts on the marine environment have received less attention. The environmental impacts of shipping noise and the use of scrubbers have been the topic of recent discussion at the Environment Committee (IMO).	Codes: 2.1, 2.7, 6.1	2025-2027	Input on the general applicability or otherwise of such strategies to IMO or national regulators through meeting participation, correspondence group and/or technical paper or peer-reviewed manuscript.
e	Review and identify methods for holistic management of shipping impacts, considering possible trade-offs across	Vessel activities can have transboundary impacts and successful mitigation efforts require coordination and	Codes: 6.1, 6.2, 6.3	2025	Peer-reviewed manuscript on tradeoffs and synergies associated with management of

impact types.	collaboration between trade partners. Methods for holistic management are urgently needed to balance the benefits of industry with environmental impacts.	shipping pressures.
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### Supporting information

Priority	<p>The work of the Group forms the scientific basis for advancing knowledge related to the impacts of shipping on the environment. As ICES and advice requestors are striving for more holistic ecosystem based management, the need for metrics and greater understanding of impacts of shipping on the marine environment is growing.</p> <p>The WGSHP ToRs are aligned with the ICES Science Plan and aim to report their outcomes directly to ICES in their final report, as well as contribute to Ecosystems Overviews and ICES Annual Science Conference, where relevant. Thus, the activities of WGSHP can be considered to be of high priority.</p>
Resource requirements	The research programmes which provide the main input to this group are already underway, with resources provided by national governments and scientific funding agencies. The additional resources required to undertake activities in the framework of this group are negligible.
Linkages to ICES committees or groups	There has been a close working relationship with MCWG/WGMS and WGBOSV. Potential or occasional linkages with WGCEAM, WGSFD, WGMHM, WGMPCZM, WGBEC and WGBESEO.
Linkages to other organizations	Occasional linkage with the Arctic Council PAME Shipping Expert Group and potential linkages with the Baltic Marine Environment Protection Commission (HELCOM), European Maritime Safety Agency (EMSA), International Maritime Organization (IMO), North Pacific Marine Science Organization (PICES), OSPAR Commission and UNEP Oceans and Seas Program. In addition, the outcomes are relevant to other national and international organizations involved in the development of regulatory policies.

### Workshop on Cumulative Impact Assessments (WKCIA)

**2024/WK/HAPISG18 A Workshop on Cumulative Impact Assessments (WKCIA)**, chaired by Gerjan Piet, Netherlands; and Henn Ojaveer, Estonia; will work on ToRs and generate deliverables as listed in the Table below, thus providing the basis of advice requested by the Netherland Ministry of Infrastructure and Water Management on behalf of the Greater North Sea Basin Initiative (GNSBI).

	Meeting dates	Venue	Reporting details
Year 2025	6–9 May	ICES HQ, Copenhagen, Denmark	Draft report by 30 June to Review Group Final report by 5 November to HAPISG

## ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	YEAR	EXPECTED DELIVERABLES
a	Provide an overview of relevant cumulative impacts assessments (including those used within OSPAR, NSEC, ICES, relevant European research projects and national approaches) aimed at an applied setting and informing management decisions	ToR [a] will summarise the findings of the November 2024 WGCEAM scoping workshop with regard to different approaches to ecological cumulative impacts assessments (CIA) in applied settings, identifying viable approaches in the Greater North Sea and Celtic Seas	Code 2.2, 2.6	2025	Report to be provided by 5 November to HAPISG
b	Define common principles for cumulative impacts assessments in relation to the expected applications and the types of management decisions that need to be informed on the Greater North Sea Basin level. Identify criteria for the evaluation of the available cumulative impacts assessments	ToR [b] will expand on the November 2024 WGCEAM scoping workshop to define the common principles for ecological CIA. WKCIA will identify a set of criteria for the evaluation of CIA approaches such that the appropriateness of different tools for particular applications can be determined	2.6, 5.1, 6.1	2025	Report to be provided by 05 November to HAPISG
c	Provide recommendations for the application of the most suitable tool(s) for cumulative impact assessments on, at least, the Greater North Sea and Celtic Seas with the aim to answer the key questions conducted by the GNSBI WT-CIA (see appendix). Include a process to further develop the required knowledge base with the aim to:  i) Identify the main anthropogenic threats that compromise the achievement of good environmental status (GES),  ii) Evaluate planning scenarios of offshore wind and other human activities,  iii) Inform maritime spatial planning (MSP) decision-making on a sea basin level	ToR [c] will apply the criteria from ToR [b] to provide recommendations for the most suitable tool(s) for likely applications in the area. It will propose a process to develop the necessary scientific such that CIA can be applied to address key policy and MSP objectives	5.1, 6.1	2025	Report to be provided by 05 November to HAPISG

## Supporting information

Priority	High, in response to a joint request from the Netherlands
Resource requirements	Negligible beyond standard Secretariat support
Linkages to ICES committees or groups	There are close linkages to HAPISG in particular WGCEAM. Further close linkages to WGIPEM WGOORE, WGOWDF, WGMBRED and to EAMSG. ToR [c] has linkages to WGMPCZM
Linkages to other organizations	GNSBI, OSPAR, NSEC

## Annex 1 - Key questions sought to be responded to by CIA

The overarching questions on what GNSBI will do with results of CIA and on resourcing are questions on governance level. Draft as received in August 2024.

### Policy level

1. What are generic cumulative impacts of all activities (priorities) on all (priorities) ecosystem components (species/indicators) specified for species/indicators and human activities?
2. What are cumulative impacts specified in a spatial way for ecosystem components?
3. Related to 1 and 2; What are the relative contributions to the cumulative impacts of different activities and associated pressures in any area? So that we can manage activities as needed. By intensity of activity and /or by area.
4. Can we uphold the threshold levels of OSPAR /MSFD and N2000 obligations on protection of species?
5. Can we produce results on questions above on a short notice (Quick scan) and related; how to simplify without losing too much information?

### Scope

#### Statements

1. Spatial scope: regional seas as defined by OSPAR; II The Greater North sea and III The Celtic Seas but include local impacts if pressures are exerted on a sea basin level
2. Forward looking, to run scenarios (2030-2040-2050) but consider a relevant baseline?
3. Existing measures should be included in assessments

#### Questions

4. Consider including climate change impacts in scenarios (based on internal discussion in OSPAR and ICES)
5. Potential measures can be included (after careful considerations on each of the potential measure) in scenarios
6. Land based sources should be included in the assessment but consider how to include measures.

#### Uncertainties

1. What are levels of uncertainties in results and how to present this in plain language?
2. What are knowledge gaps and inviting for (management) proposals on how to “close” them?

#### Input

1. What do we have on the shelf that we could use right now (when considering the 2025 quick scan)?
2. Learn from others (Symphony-Baltic Sea).
3. To be able to present results in a plain language and appealing to responsible bodies/policy levels means including this in project architecture (in an early stage) using expertise of the science policy interface.
4. Forward looking temporal scope also asks for considerations on inclusion of life cycles (potential) affected species and life cycle of pressures at the marine environment of included human activities.

#### Output

1. Results to be presented in a language that is appealing for policy makers/public.
2. Identify ecological hot spots/cold spots by presenting maps on spatial distribution of pressures and overlap with ecosystem components.
3. Address responsible bodies in presenting the results and give perspectives to act.
4. Align planning of CIA on a sea basin level with QSR and MSFD planning. Alignment with MSP temporal planning is an ambition

#### **Working Group on Spatial Fisheries Data (WGSFD)**

2024/MT/HAPISGxx

To be submitted after the meeting in autumn 2024

#### **Working Group on Cumulative Effects Assessment Approaches in Management (WGCEAM)**

2024/MT/HAPISGxx

To be confirmed.



## Resolutions approved in 2023

### Working Group on Offshore Renewable Energy (WGORE)

2023/MT/HAPISG04 The **Working Group on Offshore Renewable Energy (WGORE)**, chaired by Daniel Wood, UK; and Bob Rumes, Belgium; will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2024	9 September (ASC 2024)	Gateshead, UK		
Year 2025				
Year 2026			Final report by DATE to SCICOM	

### ToR descriptors

TOR DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED
				DELIVERABLES
a Cumulative Effects Assessment of offshore wind, wave, and tidal farms in the ICES area.	<p>a) Assess cumulative environmental effects of ORE at ecosystem and regional scales applying state of the art assessment methodologies.</p> <p>b) Individual countries are largely focused on their ORE developments with regulatory systems only set up to deal with internal assessment but not cross border. The work would provide an ecosystem approach for dealing with cross border discussions between member states.</p> <p>c) Link up with WGCEAM</p>	2.1, 2.2, 2.4,	3 years	Peer-reviewed journal paper(s)
b Review of the use and environmental effects of chemicals in offshore wind, wave, and tidal farms.	<p>a) There is growing evidence that large quantities of chemicals and metals are being used in offshore renewables. The goal is to identify the chemical groups being used, quantify the usage and the environmental risk.</p> <p>b) Chemical contaminants can impact all levels of receptor in the ecosystem. The widespread distribution of ORE means contaminants can have an impact across a very wide area. Understanding a new source of contaminants is key to effective management.</p> <p>c) Continued collaboration with the Marine Chemistry Working Group (MCWG) and the Working Group on Marine Benthic and Renewable Energy Developments (WGMRED).</p>	2.1, 2.4, 2.6	3 years	Peer-reviewed journal paper

c	Review and report on (re)emerging environmental issues for offshore wind, wave, and tidal renewable energy technologies.	<p>a) Offshore wind farms are now a well-established feature. Wave and tidal devices are being deployed in an increasing number of areas. New issues such as bat collision risk and the use of chemicals are emerging. Other pressures such as Electro Magnetic Fields (EMF) are re-emerging with the development of floating offshore wind.</p> <p>b) Issues often emerge because of individual interest within a member state. This work will allow transfer of knowledge across and beyond ICES member states.</p> <p>c) Link up with work from WKTBMIMP, WGOWDF and associated groups.</p>	2.1, 2.7, 4.5	3 years	Short report with WG final report. (Possible journal paper if sufficient content)
d	Review on effectiveness and transferability of management measures to reduce, mitigate or compensate damage of the natural environment.	<p>a) In the ICES area various measures are applied to reduce the environmental impact of ORE development. Robust validation of their effectiveness is rare and may not be transferable to other project locations. Here we leverage the existing community of practice to evaluate which measures were shown to be effective and how broadly they can be applied.</p> <p>b) Following the mitigation hierarchy, management measures here include Reduction, Mitigation and Compensatory measures of damage to the natural environment (avoidance will not be considered as this falls under planning).</p> <p>c) Link with WKOMRE. Consult with relevant WG's on knowledge of effectiveness.</p>	2.7, 6.1, 6.2	3 years	Peer-reviewed journal paper
e	Evaluate and report on the environmental effects of emerging marine renewable energy technologies and devices.	<p>a) There is a growing number of new technologies being trialled to extract energy from the marine environment. These include floating solar farms, Ocean Thermal Energy Conversion (OTEC) and Pressure Retarded Osmosis (PRO). There is a need to understand what the environmental effects/impacts of these devices could be, and to identify research gaps.</p> <p>b) Regulators and advisors require prior information on new devices so that they can firstly prepare for licensing deployment and secondly to prepare research funding for emerging issues.</p> <p>c) Ad-hoc requests if required to other WG. Particularly WGMBRED.</p>	2.1, 2.7	3 years	Peer reviewed journal paper.

## Summary of the Work Plan

Year 1	ToR A. Finalize paper identifying the steps needed to move towards a cumulative environmental effects of ORE at ecosystem and regional scales. Select methodology for assessment.
	ToR B. Refine scope of work, define data sources and chapter structure for reporting. Contact ICES WG Marine Chemistry to confirm workload split. Analyse the data and begin draft report.
	ToR C. Review status on known and newly emerging environmental issues. Define chapter structure for reporting.
	ToR D. Identify management measures to be included in the review. Organize technical workshop on how to assess effectiveness. Define chapter structure for reporting.
	ToR E. Address reviewer comments and finalise paper.
Year 2	ToR A. Apply identified methodology. Link up with WGCEAM to help define the parameters.
	ToR B. Finalise analysis and complete reporting. Identify remaining knowledge gaps and concerns.
	ToR C. Finalise analysis and complete reporting.
	ToR D. Analyse and draft paper. Disseminate first results.
	ToR E. Annual update of developments
Year 3	ToR A. Finalise analysis and complete reporting.
	ToR B. Report on remaining knowledge gaps
	ToR C. Update report on (re)emerging environmental issues for offshore wind, wave, and tidal renewable energy technologies with input from group members and input from WKTBIMP, WGOWDF and associated groups.
	ToR D. Update and finalise paper
	ToR E. Annual update of developments

## Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem effects of fisheries, especially with regard to the application of the Precautionary Approach and the implementation of the ICES Roadmap on offshore renewable energy. 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	None. Possible support with workshop under ToR D.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are currently no obvious direct linkages.
Linkages to other committee or groups	There is a very close working relationship with MCWG, WGMBRED, WGCEAM and WGOWDF.
Linkages to other organizations	None currently

## Working Group on Marine Habitat Mapping (WGMHM)

**2023/MT/HAPISG05** The Working Group on Marine Habitat Mapping (WGMHM), chaired by Julian Burgos, Iceland; and Jose Manuel González Irusta, 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 2024	4–8 November	ICES HQ, Copenhagen, Denmark		
Year 2025	3–7 November	Belfast, Northern Ireland, UK		
Year 2026			Final report by DATE to SCICOM	

### ToR descriptors

TOR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Review recent advances in marine habitat mapping and modelling, including field work methodology, data analysis, interpretation and dissemination, mapping in new areas, and where possible new theoretical approaches and social science techniques.	This ToR provides the main avenue for mappers to communicate new or improved techniques to the other scientists present. As such, this ToR is essential for spreading best practice and developing new methods.	1.5, 4.1	Years 1–3	Meeting reports
b	Discuss current and potential application of habitat maps for the monitoring and management of marine ecosystems.	Members of the group are often the creators of these maps and have important insights into how the maps can be used for scientific and management purposes.	3.4, 6.1, 6.2	Years 1–3	Meeting reports. Scientific publication.
c	Identify caveats and limitations of Predictive Habitat Models that limit their use in direct management.	Predictive Habitat Models can provide useful outputs, but their use in management is limited. This ToR aims to identify factors that limit the adoption of model output into management, potentially supported by suggestions from external marine managers.	1.5, 6.1, 6.2	Years 1–3	Meeting reports
d	Propose methodologies and solutions to address the limitations identified in ToR c (e.g. improving communication to	To stimulate the use of outputs from Predictive Habitat Models for management purposes, this ToR will identify and develop solutions to address limitations to their use.	1.5, 6.1, 6.2	Years 1–3	Meeting reports

	managers and other stakeholders, better representation of uncertainty).	This could involve, for example, integrating fishers knowledge (using social science methods) to help develop more effective spatial fishery management measures in the future.			
e	Develop guidelines to integrate multiple sources of spatial information on the distribution of habitats to produce maps representing the best available evidence.	Habitat maps are produced at different spatial resolutions, based on different types of data, and producing output of varying uncertainty. More than one map may be available for a particular site. Methods need to be developed to combine multiple sources of spatial information, reflecting the weight of evidence for the presence of habitats in a particular area.	1.5, 3.2, 4.3	Years 1–3	Meeting reports. Scientific publication.

### Summary of the Work Plan

Year 1	Cover ToRs A-E.
Year 2	Cover ToRs A-E. Support a second 'Workshop on the Use of Predictive Habitat Models' (WKPHM2) to be held jointly with the Working Group on Deep-Water Ecology (WGDEC).
Year 3	Cover ToRs A-E.

### Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem effects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by some 10–15 members and guests.
Secretariat facilities	Standard support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Linkage to WGDEC (advice legacy group).
Linkages to other committees or groups	There is a very close working relationship with WGDEC. It is also very relevant to BEWG, WGECON and WGSOCIAL.
Linkages to other organizations	

### Working Group on Fisheries Benthic Impact and Trade-offs (WGFBIT)

**2023/MT/HAPISG06**      The **Working Group on Fisheries Benthic Impact and Trade-offs (WGFBIT)**, chaired by Jan Geert Hiddink, UK; Marija Sciberras, UK; and Tommaso Russo, 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 2024	18–22 November	Nantes, France		
Year 2025	17–21 November	Rome, Italy		
Year 2026			Final report by DATE to SCICOM	

### ToR descriptors

TOR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	<b>Regional assessments.</b> Apply and improve the seafloor assessment framework developed by WGFBIT to produce standardized sub- regional assessments of seabed state for the North, Celtic, Baltic, Arctic (Icelandic, Norwegian Barents sea), Mediterranean Seas and the Bay of Biscay and the Iberian Coast, in shallow waters (<200) and deep-sea areas (200-800m), and explore methods to set thresholds between good and degraded seabed state.	EU MSFD D6/D1 requires the assessment of the impact of physical disturbance on seabed habitats. Such methods are also needed by non-EU ICES countries. Seabed state assessments will be able to inform management decisions on how to achieve good environmental state at regional scales.	1.9, 2.1, 2.4, 6.3	3 years	Year 1: A draft Europe-wide set of regional assessments of the impact of towed bottom fisheries using standardized methodologies.  Year 2 & Year 3: Further extension of the assessments into deeper waters for the regions where this is missing, and into regions where assessments have not been completed before.
b	<b>Trade-offs between benthic impacts and fisheries values and landings</b> Evaluate impacts of different management scenarios, including MPAs	DGENV activity and especially the implementation of the MSFD require the preliminary evaluation of different spatial scenarios which, in turn, should be based on the spatial assessment of both impacts and economic indicators (landing value, costs, gross value added). The combined analysis of potential environmental benefits and related economic impacts on the fleets will allow to identify the best scenarios to achieve sustainability.	2.7, 5.4, 6.2, 6.4	3 years	Year 1: A series (not necessarily complete for all European seas) of state-of-the-art regional spatial assessments of the impact of towed bottom fisheries and of the related economic indicators (landing values, Gross Value Added, Costs).  Year 2 & Year 3: Further extension of the assessments to all

					the European Seas. Consolidation and standardisation of methodologies for: 1) trade-off analysis; 2) estimation of possible consequences of spatial closures (displacement and its consequences on impacts and economic indicators)
					Research paper(s)
c	<b>Knowledge exchange with other regional assessment methods.</b> Keep informed about development of other methods for the regional assessment of bottom trawling impacts in a two-way knowledge exchange of the WGFBIT seafloor assessment framework with other assessment methods for benthic habitats under relevant EU directives (e.g. TGSeabed, NAFO).	The WGFBIT seafloor assessment framework (based on assessing the relative benthic state) is not the only way to assess benthic impacts from physical disturbance. Other methods are being developed in parallel. Therefore, alignment with other methods needs to be explored and compare the consistency of outputs.		3 years	
d	<b>Ecosystem functioning.</b> Examine the effect of trawling using functional traits as proxies for predicting ecosystem functioning responses to fishing pressure.  Develop methodology to predict changes in species composition following trawling to estimate changes in community known to affect ecosystem functioning.	EU MSFD D6 on seafloor integrity requires the assessment of the impact of physical disturbance on seabed habitats state and function.	1.3, 1.9, 2.3	3 years	Research paper(s)

## Summary of the Work Plan

### ToR a) REGIONAL ASSESSMENTS

EU MSFD D6/D1 requires the assessment of the impact of physical disturbance on seabed habitats. Such methods are also needed by non-EU ICES countries. Seabed state assessments will be able to inform management decisions on how to achieve good environmental state at regional scales.

We will apply and improve the seafloor assessment framework developed by WGFBIT to produce standardized (sub-) regional assessments of seabed state for the North, Celtic, Baltic, Arctic (Icelandic, Norwegian Barents sea), Mediterranean

Seas and the Bay of Biscay and the Iberian Coast, in shallow waters (<200) and deep-sea areas (200-800m), and explore methods to set thresholds between good and degraded seabed state

## **ToR b) TRADE-OFFS BETWEEN BENTHIC IMPACTS AND FISHERIES VALUES AND LANDINGS**

DGENV-MSFD set a series of targets in terms of seafloor protection. The achievement of these objectives must, however, in a *sensu*-FAO vision of sustainability, harmonise the reduction of environmental impacts with the safeguarding (as far as possible) of economic performance and the consequent social impacts.

To complete this route, therefore, it is essential to have high-resolution spatial assessments of both impacts and economic indicators (landing value, costs, gross value added). These assessments can then be used to identify the best scenarios as combination of spatial closures and other ancillary measures (e.g. effort reduction, improved selectivity, temporal ban, etc.).

At present, the Fishery-Dependent Information Data call represents the most comprehensive source of information for this kind of assessment, but its spatial resolution is too coarse and, consequently, there remains a need for linking of available VMS, STECF FDI and AER economic data to estimate landings and economic performance indicators of each fishery.

We will apply and improve the approaches developed by WKTRADE to consolidate the methodologies and information bases needed for a more homogeneous and complete coverage of European seas.

At the same time, we will explore different approaches to integrate the consequences of different protection scenarios in terms of effort re-distribution (displacement).

## **ToR c) KNOWLEDGE EXCHANGE WITH OTHER REGIONAL ASSESSMENT METHODS**

The WGFBIT seafloor assessment framework (based on assessing the relative benthic state) is not the only way to assess benthic impacts from physical disturbance. Other methods are being developed in parallel. Therefore, alignment with other methods needs to be explored and compare the consistency of outputs. We will keep informed about development of other methods for the regional assessment of bottom trawling impacts in a two-way knowledge exchange of the WGFBIT seafloor assessment framework with other assessment methods for benthic habitats under relevant EU directives (e.g. TGSeabed, NAFO).

## **ToR d) ECOSYSTEM FUNCTIONING**

By depleting fauna and changing the species composition, bottom fishing can result in alterations in the functional effect traits (sediment mixing, bioirrigation, and habitat creation and maintenance) of a community, which in turn may have broad implications for the overall ecosystem performance. The goal of ToR d is to explore whether ecosystem functioning can be incorporated more explicitly in to the WGFBIT seafloor assessment methodology.

The current PD method utilized in the WGFBIT assessment method combines information on total benthic biomass with the relative abundance of different longevity classes to estimate the relative impact of different types of fishing on the seabed.

The working assumption of this method is that high community biomass will coincide with communities where the body size distribution, age structure as well as numbers of the benthic fauna are close to natural, and thus a community where its ecosystem functioning is less likely to be impaired by trawling. A caveat of this, however, is that total community biomass does not necessarily reflect changes in species and functional trait composition which play a key role in regulating ecosystem functions. Hence, when exploring bottom trawling impact on the benthos, changes in species functional composition may prevail on changes in total biomass. Functional traits have often been advocated as proxies for predicting ecosystem functioning responses to anthropogenic perturbations.

In ToR d we aim to:

[1] determine the relationship between macrofauna and ecosystem functioning (ecosystem engineering, sediment biogeochemistry) and examine how this is influenced by trawling. Macrofaunal parameters such as total biomass, sediment



mixing potential, bioirrigation potential, and species functional traits are considered. A combination of multivariate and univariate analyses is undertaken (a) to examine influence of trawling on effect trait composition, (b) to relate traits to biogeochemical state (e.g. organic matter and chlorophyll-a concentrations) and flux (e.g. oxygen flux) variables, and (c) to examine trawling influence on this relationship,

[2] develop a method to predict changes in species composition due to trawling (following principles of PD model used in FBIT) to estimate changes in bioturbation potential of a community known to affect ecosystem functioning. A modelling approach (logistic-growth model) is undertaken. Results from this model can be linked to a biogeochemical model such as OMEXDIA to estimate changes in the biogeochemical nature of the sediment due to sediment erosion, mixing or deposition as a result of trawling.

Year 1	a, b, c, d
Year 2	a, b, c, d
Year 3	a, b, c, d

### Supporting information

Priority	The 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	Experts that provide the main input to this group have been involved in successful EU funded projects (BENTHIS). It is envisioned that future funding will be available and that this ICES working group experts can also provide an international platform to establish a consortium. This would allow to commit future resources to the group's work.
Participants	The Group is normally attended by some 30 members and guests.
Secretariat facilities	Standard EG support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Advice products and working groups (e.g. WGEKO and WGDEC).
Linkages to other committees or groups	There is a very close working relationship with all the groups under the Ecosystem Pressures and Impacts Steering Group. It is also very relevant to the Working Groups WGEKO, WGDEC, WGSFD, BEWG, WGMHM, WGIMM, WGMRED, WGMPCZM.
Linkages to other organizations	EU (DG-ENV, DG-MARE), RSCs (Baltic's HELCOM, North Atlantic's OSPAR, Mediterranean's Barcelona Convention and Black Sea's Bucharest Convention), JRC, STCEF.

## Resolutions approved in 2022

### Working Group on Introduction and Transfers of Marine Organisms (WGITMO)

2022/FT/HAPISG04 The Working Group on Introductions and Transfers of Marine Organisms (WGITMO), chaired by João Canning-Clode, Portugal, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2023	6–8 March	Athens, Greece		Meeting in association with WGBOSV
Year 2024	6–8 March	Seville, Spain		Meeting in association with WGBOSV
Year 2025	3–5 March	Maryland, USA	Final report by 30 April to SCICOM	

### ToR descriptors

TOR	DESCRIPTION	BACKGROUND	<a href="#">SCIENCE PLAN CODES</a>	DURATION	EXPECTED DELIVERABLES
a	Advance research, develop collaborations and address surveillance and knowledge gaps in issues related to the introduction and transfer of marine organisms, through annual reviews of national/international activities and responding to advice requests	Data, information and knowledge collated and synthesised ensures timely update of AquaNIS as well as national and international databases as appropriate. This information will be used as an underlying information source for other ToRs, responding to incoming advice requests as well as organising collaboration with other international science organisations (e.g. PICES, CIESM, HELCOM).	2.1, 2.4, 3.3	3 years	Annual reports to ICES. Further develop and advance AquaNIS database, and populate it with new data. Respond to incoming advice requests as requested.
b	Evaluate the impact climate change may have on the introduction and spread of non-indigenous marine organisms, including Arctic environments.	Contributes to SICCOME and ICES high-priority action areas 'Arctic research'.	2.5, 2.2, 3.6	3 years	Primary publication on the Arctic environment and the spread of nonindigenous species.
c	Investigate biofouling as	Biofouling has been	2.7, 2.1, 6.4	3 years	Input on the general

	<p>a vector for the introduction and transfer of aquatic organisms on vessels and artificial hard structures, their pressure and impact on the ecosystem with a comparison of prevention or selective mitigation methodologies.</p>	<p>increasing recognized as an important vector in the introduction and transfer of aquatic organisms. Elements of this work will be carried out jointly with WGBOSV as a comparison vector in invasion pathways. Biofouling is an increasing concern for aquaculture, energy installations, and coastal development as stressors on coastal environments. Issues include (1) the regular cleaning process and how to avoid unintentional dropping scraped off material during in-water cleaning activities, (2) can uncontrolled robots conduct regular cleaning or is always a remote controller needed?</p>			<p>applicability of preventive measures and selective mitigation technologies through a technical paper or manuscript submitted to a peer reviewed scientific journal also addressing the issues described under "Background". In preparation of this paper input from Australia and New Zealand is sought as key players in this filed with long-lasting experience.</p>
d	<p>Expand knowledge base and develop further the use of decision-support tools to communicate to decision-makers and stakeholders, non-indigenous species risks and impacts in marine and transitional waters.</p>	<p>The aim is to develop further and apply more widely risk-screening tools (i.e. AS-ISK and CMIST) to permit their comparison and cross-calibration of screening outcomes in order to enhance their accuracy for identifying aquatic invaders and knowledge gaps, under both current and future climate conditions, so to inform legislation-related policy and management decisions in Europe (Regulations on the use of aliens in aquaculture, 2007, and managing IAS, 2014; also EU Directives, MSFD, WFD) and North America (e.g. watch-lists in Canada). This may be particularly useful for</p>	2.2, 2.7, 6.1	3 years	<p>At least one manuscript to be submitted to a peer - reviewed scientific journal.</p>

		risk assessments and early warning systems.			
e	Evaluate the development and utilization of DNA- and RNA-based molecular approaches to provide science-based tools for strategic planning, policy development, and operational processes regarding non-native species and biological invasions (including detection and monitoring, reconstruction of patterns and vectors of introduction and spread, assessment of establishment and impact risk, and application for invasive species control)	Molecular (DNA -based and RNA -based) approaches have been increasingly used in the past decade to uncover cryptic introduced species, understand underlying processes of population establishment and spread, and detect novel introductions and monitor existing ones. Recent innovations have increased the power of these approaches to understand invasion risk and offer possibilities for novel biotechnological solutions for control or eradication of invasive populations. With the advent of recent technologies, it is timely to assess and evaluate their potential applications as well as their limitations, including for early warning systems. This is a shared ToR with WGBOSV.	2.5, 1.6, 4.4	3 years	Input on the effective utilization of these methods for international and national policies and regulations. Specifically: 1) Development of guidance on future implementation of molecular tools, based on outcome of workshop to be held jointly with the International Conference on Marine Bioinvasions in 2023. 2) Peer-reviewed manuscript providing update on the state of the science and the integration of molecular methods in management contexts. 3) Summary from WGITMO/WBOSV members of existing projects employing molecular tools, specific needs of member states that might be addressed with these tools, and status of incorporation into formal decision-making and management.
f	Investigate the role of human-produced marine debris as a vector and facilitator for the introduction and spread of non-indigenous species (NIS). Advance research and identify knowledge gaps on marine debris-NIS interactions	The accumulation of debris in the ocean is severely affecting ocean and coastal ecosystems, as its ingestion and entanglement directly impacts marine organisms. Furthermore, recent research indicates that marine debris is both a growing vector for the introduction of non-indigenous species (NIS), with transoceanic rafting already likely to intensify species invasions worldwide and a potential facilitator of marine diseases. Develop collaborations with other working groups	2.5, 2.6, 2.1	3 years	At least one peer-review article on NIS introduced on marine debris with an emphasis on European waters;  Draft protocol on opportunistic sampling NIS on marine debris; Develop an online database of NIS present in marine debris

		(HELCOM-TGML; OSPAR ICG-ML, ICES- WGML, MSFD-ML; PICES; CIESM)			
g	Investigate best practices to minimize the role of aquaculture as a vector for the introduction and transfer of non-indigenous aquatic organisms. This would include both non-indigenous species targeted for aquaculture and hitchhikers (biofouling and interstitial, parasites and pathogens). Impacts of non-indigenous species on aquaculture and on ecosystems will be addressed	Aquaculture has been recognized as an important vector in the introduction and transfer of aquatic organisms. ENSARS provided some baseline information on aquaculture risk analysis, including development and global testing of ENSARS' derivative, the AS-ISK. There are important social and economic impacts (positive and negative) of introductions related to aquaculture. Linkages with aquaculture working groups, and WGPDMO will be sought as well as a close collaboration with WGECON.	2.1, 2.2, 5.6	3 years	Input on the general applicability of preventive measures (good practice codes) and selective mitigation technologies through technical guidance and/or a review paper. A joint submission of manuscripts to a peer-reviewed scientific journal.

### Summary of the Work Plan

Year 1	Work on all ToRs with special focus on e, f, g
Year 2	Work on all ToRs with special focus on b, c, f, g
Year 3	Report on all ToRs

### Supporting information

Priority	The work of the Group forms the scientific basis for essential advice related to the introduction and transfer of marine organisms, particularly non-indigenous species. 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 resources required to undertake additional activities in the framework of this group are negligible
Participants	The Group is normally attended by some 40-50 members and guests.
Secretariat facilities	Standard EG support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	The group will serve as primary respondents to incoming advice requests on various issues relating to introduction and transfer of marine organisms, including nonindigenous species

Linkages to other committees or groups	There is a very close working relationship with the Working Group on Ballast Water and Other Ship Vectors (WGBOSV). In addition to relevance to the Working Group on Harmful Algal Bloom Dynamics (WGHABD), Biodiversity Science (WGBIODIV), and aquaculture focused working groups. WGITMO also contributes to EO concerning NIS issues and impacts. Anticipate building linkages with the Working Group on Integrated Morphological and Molecular Techniques (WGIMT) and Working Group on Marine Litter (WGML) during the next three years under these ToRs. Potential linkages with WGECON, WGPDMO.
Linkages to other organizations	ICES, CIESM, IMO, HELCOM, OSPAR

### Working Group on Offshore Wind Development and Fisheries (WGOWDF)

#### 2022/FT/HAPISG06 The Working Group on Offshore Wind Development and Fisheries

(WGOWDF), chaired by Andrew Lipsky, USA; Andrew Gill, UK; and Edward Willsted, 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	10-13 July	Bridlington, UK		
Year 2024	3-6 June	New Bedford, Massachusetts, USA		<b>Change in chair:</b> <u>Outgoing:</u> Antje Gimpel, Germany <u>Incoming:</u> Edward Willsted, UK
Year 2025	2-5 June	Madrid, Spain	Final report by 31 August to SCICOM	

#### ToR descriptors

TO R	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Review and report on fishing industry interactions with offshore wind developments, define and determine effects on fishing operations and communities.	<i>ToR A continued and developed further from 2020-2022.</i> We will identify case studies to demonstrate effects on fishing communities; assess the potential of fishing community compensation and mitigation as well as adaptation and co-existence in practice. We further want to review and develop methods to assess fishery changes due to offshore wind.	2.2, 2.7, 6.6, 7.3	3 years	Review paper; Case Studies
b	Develop and report on methodologies to assess and mitigate impacts of offshore wind energy on fishery data collections,	<i>ToR B - continued from 2020-2022.</i> We will review tools and report out on solutions to measure and address effects and impacts of fisheries, conservation, and wind energy interactions on fisheries independent and	2.2, 2.3, 2.7, 3.2, 3.3	3 years	Method development papers; Case Studies

	including fisheries independent surveys and fisheries dependent data.	dependent data collections. With this ToR we aim to advance sampling methods such as the use of wind infrastructure as observation platforms or nodes for observation platforms (power supply for automated survey vehicles, use of fiber cables to send data to land). Develop and report on methods to measure fisheries changes due to offshore wind (link to ToR C).			
c	Assess the effects of habitat alteration by offshore wind developments on fisheries resources.	<i>ToR C continued and adapted</i>  This ToR will focus on the effects of fixed and floating devices. Here we will examine population level effects and impacts as well as ecosystem effects and impacts. We further focus on oceanographic wind and ocean wake effects on fish habitats. In addition, we will consider trophic effects including lower trophic level production in OWF areas (and methods to determine) and multi-stressor effects on fish populations as well as climate change considerations.	2.2, 2.4, 2.7, 6.6	3 years	Review paper
d	Review gaps and identify opportunities for cross-cutting links and communication between ICES groups in relation to renewable energy and marine ecosystems and sustainability.	The focus is on cross-cutting links and communication. We will focus on communication database on fisheries and OWF interactions and the tracking /capturing where changes are happening as a result of OWF-fisheries. This includes transboundary issues, OWF with restoration and social issues (link to WGMPCZM; Scallops – WGScallop) and survey interactions with WKUSER2 outputs. We will coordinate with WGSOCIAL and WGECON to support their OWF research survey to identify existing and ongoing OWF-fisheries research (link to ToR a). Another focus is liaison with Spatial Fisheries Data WG using OWF as case study (WGSF) and the continuation of working together with WGs MBRED and ORE. Other topics include assisting in future ICES ORE strategies/workshops and to determine if any WGs are active in relation to: <ul style="list-style-type: none"> <li>• Shifting fisheries species distributions relating to climate change?</li> <li>• Fisheries tools adaptation - WGFTFB - Fish Technology and Fish behaviour</li> </ul>	6.6	Year 3	Report to ICES  Recommendations of additional studies linked to other WGs

e	Evaluating and addressing the impact of strategic plan-level development of OWFs within a region on fishery operations and communities.	The ToR looks at the bigger picture of evaluating and addressing cumulative impacts of OWF activities on fishery operations and communities at the scale of regional or national management and policy (i.e. the lessons learned). The topic sits alongside the more detailed consideration of interactions at OWF level (which is more a focus of ToR a, b and c). As part of the ToR we would evaluate look at what OWF expansion plans mean at a regional/national level for fisheries, including the socioeconomic consequences of privatization of marine space. This will assist in the determination of why the more specific outputs of ToR a, b and c impacts on the policy and planning objectives that decision makers are working towards. It would increase the potential impact of WGOWDF work, as it will be placed in context of the wider policy picture and showing why the WG research matters at scale and will draw on the wide range of membership in the WG. The ToR would use a systems thinking approach to assist with strategic level thinking within WGOWDF such as strategic compensation.	2.7, 6.4, 7.6	3 years	Systems framework paper/report
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### Summary of the Work Plan

Year 1	The WG will meet and exchange ideas on the ToRs. The WG will then develop a plan as to how to address each ToR in the 3-year time frame. The content of papers will be planned and worked on during Year 1, at the workshop and intersessionally. The WG Chairs will continue to regularly interact with the Chairs of WGMBRED and WGOORE to ensure activities are complementary.
Year 2	The WG will make progress on all deliverables and will plan the WG workshops to achieve this. The WG Chairs will interact with the Chairs of WGMBRED and WGOORE to ensure activities are complementary.
Year 3	The WG will complete the ToR papers and submit them for publication. The WG will also discuss next steps for the WG. The WG will complete a review of ICES expertise related to renewable energy and marine ecosystems and sustainability working with WGMBRED and WGOORE. A report will be produced for ICES.

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### Supporting information



Priority	Offshore wind energy development continues in Europe and is beginning in earnest in North America. Sustainable fisheries are critical to global food security and renewable energy is critical to energy security and climate change mitigation. Coexistence requires an understanding of the interactions between offshore wind energy development and fishing. This understanding can be used to foster the exchange of information, collaboration in addressing science questions, and support decision-making. Consequently, these activities are considered to have a very high priority across the ICES area especially as wind energy development continues.
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 around 30–40 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 all the groups HAPISG, in particular WGMPCZM, WGM BRED, WGO RE and WGSFD. It is also very relevant to the EOSG.
Linkages to other organizations	There are linkages to fishing organizations and wind developers in the USA and similar linkages in Europe, including wider links to licencing/permitting authorities and other relevant stakeholders.

### Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT)

2022/FT/HAPISG08 The **Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT)**, chaired by Keith Cooper, 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	18–20 April	ICES HQ, Copenhagen, Denmark		
Year 2024	16–18 April	Ostend, Belgium		
Year 2025	22–24 April	Madrid, Spain	Final report by 30 May to SCICOM	

### ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
A	Review data on marine extraction activities and provide a summary on marine extraction for the OSPAR region to OSPAR	a) OSPAR requirements b) Advisory requirements	2.1, 6.1, 6.4	Year 1, 2, 3	Annual extracted amounts and areas (including spatial data) added to the Dashboard (see ToR C) and included in e-evaluation and Final Reports.
B	Review of developments in	Developments allow countries to	2.1, 6.1, 6.4	Year 3	Chapter in Final Report and/or

	marine sediment resource mapping, legal regime and policy, environmental impact assessment, research and monitoring.	optimize their policy and management approach relating to marine aggregate extraction. A review of recent developments (2003 to present) will be used to update the ICES Guidelines for the management of marine sediment extraction (see <a href="https://doi.org/10.17895/ices.pub.5398">https://doi.org/10.17895/ices.pub.5398</a> )			inclusion in the Dashboard (see ToR C)
C	Further development of the WGEXT Dashboard ( <a href="https://rconnect.cefas.co.uk/connect/#/apps/26/access">https://rconnect.cefas.co.uk/connect/#/apps/26/access</a> ) and underlying database to improve transparency and access to aggregates data.	This ToR is designed to improve accessibility to data concerning marine aggregate extraction (e.g. area and quantities involved, research findings, management approaches). This will be achieved through: <ul style="list-style-type: none"> <li>i) Identify and acquire missing data (spatial, quantities and qualifiers)</li> <li>ii) Analyse data to identify trends (e.g. proportion of material used for beach replenishment through time)</li> <li>iii) Investigate potential for AIS (Automatic Identification Systems) to provide a consistent approach to showing location and intensity of aggregate dredging across all ICES member countries. Work will include consideration of how Electronic Monitoring System (EMS) data can be used to help train a machine learning algorithm to differentiate between vessel transit and dredging.</li> <li>iv) Compile bibliography of marine aggregates related research and guidance.</li> <li>v) Compare approaches taken by different countries to the management of marine aggregate dredging (informed by ToR A2).</li> <li>vi) Explore with the ICES secretariat and data centre how to make the dashboard available (i.e. ensuring compliance with developing ICES guidelines).</li> </ul>	2.1, 2.4, 3.5, 3.6, 4.1, 4.2, 4.3, 6.1, 6.2, 6.3, 6.4, 6.5	Year 1, 2, 3	<ul style="list-style-type: none"> <li>i) Fill in data gaps</li> <li>ii) New 'Analysis' tab including results narrative</li> <li>iii) Chapter in Final WG Report. Potentially integrate AIS data within the tool, either as a feed from other initiatives (e.g. UNEP/GRID-Geneva), or as a result of direct development by WGEXT.</li> <li>iv) Add new 'Bibliography' tab to the dashboard. Include search function by topic/country/ location.</li> <li>v) Add new 'Approaches to Management' tab to allow for comparison between countries (results presented as a matrix).</li> <li>vi) Dashboard hosted by ICES Data Center?</li> </ul>
D	Consider implications of the expansion of offshore marine renewables (e.g. wind farms and cables) for aggregate dredging.	The expansion of offshore renewables has the potential to steralise sand and gravel resources, through placement of infrastructure (e.g. monopiles, cables) that prevent access to sand and gravel resources. Under this ToR we	2.1, 6.1 6.4	Year 1, 2, 3	Chapter in Final Report

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will examine the issues involved and make recommendations for addressing them.

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### Summary of the Work Plan

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Year 1: A, B, C, D

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Year 2: A, B, C, D

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Year 3: A, B, C, D

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### Supporting information

Priority	The activities of WGEXT will lead into issues related to the effects on the ecosystem of marine sediment extraction. Sediment extraction is increasing in some countries and rather stable in others. This human activity is connected to several descriptors in the EU MSFD. The report of WGEXT and the ICES Guidelines are used in the management of extraction in the member countries. The dashboard provides much greater visibility of marine aggregates sector, and provides easy access to data for use in other wider ecosystem assessments. Consequently, the activities of WGEXT are considered to have a high priority.
Resource requirements	The activities of WGEXT are focussed on the use of existing research programmes (e.g. EIA monitoring) and data on marine extraction and management. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Annual Meeting of WGEXT is normally attended by some 12-20 members and guests. Besides that several members contribute by correspondence.
Secretariat facilities	Standard EG support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	ACOM
Linkages to other committees or groups	There is a direct linkage to the ICES Data Centre and a working relationship with WGs in SCICOM (e.g. for ToR C: WGMPCZM, WGOWDF, WGSFD, WGCEAM and WGORE) and OSPAR who are involved in use of AIS, cumulative effects and spatial planning.
Linkages to other organizations	Data on marine extraction are delivered to OSPAR.

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## Resolutions approved in 2021

### Marine Chemistry Working Group (MCWG)

**2021/FT/HAPISG08** The *Marine Chemistry Working Group (MCWG)* will merge with the *Working Group on Marine Sediments with respect to pollution (WGMS)*, will retain the name **Marine Chemistry Working Group (MCWG)**, chaired by Koen Parmentier, Belgium; Claire Mason, United Kingdom; and Maria Jesus Belzunce-Segarra, Spain; and will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2023	6–10 March	Ghent, Belgium		
Year 2024	15–19 April	Nantes, France		
Year 2025	31 March – 4 April	San Sebastian, Spain	Final report by 15 May to SCICOM	

### ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
A	Assemble and synthesise new information on chemical substances of emerging concern (CECs) in ICES area and beyond, for pharmaceuticals and per- and polyfluoroalkyl substances (PFAS); platinum group and rare earth elements. Consider residuals of CECs in higher trophic level marine species (ToR K). Evaluate/risk assess CECs using toxicological data (with WGBEC) in development of EQSs.	Previously information on CECs has been collated. This valuable dataset can be turned into a widely accessible database, with enormous potential to aid understanding of future monitoring requirements for the marine environment.	2.1; 4.1; 4.5; 6.1	year 2-3	Publication, CECs database with ICES data centre, Final report to ICES.
B	Assess the relevance and the potential chemical, physical and biological risk impact of microplastics (additives for plastics) to the marine environment.	Migration, release, fate and environmental im-pact including biological effects of plastics additives, (contained in all plastic products for improving polymer properties) is a major concern Leaching, sorption and effects of inorganic as well as organic additives linked to plastics as an environmental source are to be determined. Further research of the different characteristics of microplastics compared to	2.1; 4.1; 4.5; 6.1	year 2-3	ICES Viewpoint publication (in consultation with ACOM leadership)  Final report to ICES

		natural particles will help future monitoring and assessments.			
C	Encourage application of passive sampling as a novel monitoring strategy for compliance and screening tools.	<p>Passive sampling (PS) is proven as a useful monitoring tool. Review and update developments including working with regulators to utilise passive sampling for monitoring of contaminants especially in harbour water bodies (linking to ToR J), for temporal trend monitoring and in general for using passive samplers in the context of WFD compliance checking.</p> <p>Initially, plan to evaluate methods to rate PS against other matrices (biota, sediments, water) and how to use these for converting EQSs between matrices and will involve ICES data centre).</p> <p>Continuing to build evidence for use of passive sampling as a method to help understanding trophic magnification in the marine environment.</p>	2.3; 2.5; 3.1; 3.2; 3.3;4.4; 6.1	years 2-3	TIMES guidelines for passive sampling of organics in sediments, CRR review on passive sampling techniques, Database to provide information of use in developing assessment criteria for passive sampling techniques, Final report to ICES.
D	Report new developments in QUASIMEME (Quality Assurance of Information on Marine Environmental Monitoring) and provide information on other proficiency testing schemes with relevance to MCWG.	QUASIMEME and other proficiency testing schemes provide high quality proficiency testing to ensure reliable results and confidence in monitoring assessments.	3.1; 3.3	3 years	Reporting to ICES, provide guidance for proficiency testing, development of test materials for new compounds. Final report to ICES.
E	Review and report of availability of new data, analytical methods, and QA/QC on Ocean Acidification (OA) in coastal/shelf seas and establish link with eutrophication. Review methods for determining carbon stock assessments in sediments.	<p>OA and understanding its importance, quantification of its impact in relation to climate change is crucial for a variety of scientific disciplines, and for ocean health. OA is a voluntary parameter in OSPAR CEMP but developments in QC support are required.</p> <p>Reviewing information on how carbon data is used to determine carbon stock in marine sediments and its role as a measure of blue carbon.</p>	1.2; 2.1; 3.2; 4.1, 6.1	years 2-3	TIMES guidelines, Final report to ICES.
F	Update and summarise on recent advances in nutrient analysis technique and observed nutrients trends in the marine environment.	Eutrophication reductive measures need to be followed; recent improves in techniques allow better QA for low concentrations. Determining potential influence of SPM and humic substances on nutrient analysis.	1.3; 2.1	years 2-3	Final report to ICES.
G	Review and analyse QUASIMEME assessment of chlorophyll data, in particular, regarding comparability of data and potential implications for existing measurement guidance.	Finalise guidance drafted to solve problems for chlorophyll measurement data comparability.	1.2; 1.3; 2.1; 3.3	year 1	TIMES guidelines, Final report to ICES.

H	Review emerging issues, and international and national regulations related to contaminants and biotoxins in seafood.	Seafood is an important dietary source of both essential additives and contaminants. Several EQS are derived for human health risks. Finalise review paper on contaminants and toxins in seafood and algae, based on data collected from 19 out of 20 ICES countries. The publication will focus on national and regional difference in legislation, focused on (1) contaminants in seafood, (2) contaminants in algae and (3) toxins.	2.1; 5.6; 6.1; 6.3	years 1-2	Publication, Final report to ICES.
I	Review chemical (for example, corrosion, anti-corrosion agents, etc.) and physical (for example, sediment scouring) evidence of impacts caused by man-made structures (such as platforms, wind farms, buoys, pipelines, cables and shipwrecks) and shipping (such as exhaust gases, spills and scrubbers) on the marine environment.	Human pressures caused by use of the seabed (for construction, resource extraction) and shipping activity is ever increasing. Some protective compounds used are new to the marine environment, as well as development of new technologies (scrubbers, etc). These applications often constitute direct input into the marine systems and require follow-up and identification of knowledge gaps. Specifically for offshore windfarms, continued review of chemicals and different legislation between countries, (in cooperation with WGMRE); research on shipwrecks and their impact on the marine environment including contamination by oil (PAHs), explosives (TNT), metals, impact by fishing, identification of the present microbiome and its impact on biodegradation; use of scrubbers working with WGSHP; collecting information on monitoring of munition dumping sites (influence of TNT and other products); and deep-sea mining.	2.1; 2.2; 2.7; 4.5; 6.1	years 2-3	Publications, contributions to joint WG reports, Final report to ICES.
J	Review and report developments in international legislative acts (incl. Marine Strategy Framework Directive (MSFD) and WFD), in particular regarding emerging and high-priority hazardous substances and associated EQS values, conversion factors and other related issues. Development of sediment quality guidelines including their use as action levels for management of dredging activities, and monitoring approaches used for disposal site assessment.	Review legislation for consistent application of environmental quality criteria in monitoring programmes. Focus on dredge material assessment, based on chemical action level thresholds including ecotox testing; management approaches vary between different countries. Comparison of contaminant thresholds is useful to improve understanding of benefits/disadvantages. Derivation of sediment quality guidelines. The use of ecotox testing and derivation of EQSs (and SedNet Sediment Quality) to include mixtures, and how Action Level 2 thresholds are derived and how biological effects are assessed as part of disposal site assessments with WGBEC; use of passive sampling in dredge material assessment, including effects on water quality caused by resuspension of and dredge disposal site monitoring (see ToR C); use of modelling to determine regional thresholds.	2.1; 2.2; 2.5; 4.1	year 2-3	Publications, Final report to ICES.
K	Collect regional-level information to determine	The use of generic TMF and TL, as required by MSFD to calculate concentrations to	2.1; 3.1; 3.2;	3 years	Support OSPAR PCBs

	Trophic Magnification Factor (TMF) and Trophic Level (TL) b	compare with EQS <sub>biota</sub> gives rise to unacceptable inflation of uncertainty. Work with WGEEL, JWGBIRD, WGMME to determine how this issue is best resolved. Review stable isotope measurements and how these link with passive sampling (C); and provide inputs to Ecosystem Overviews (J).	6.1; 6.4		trend and status in marine mammals indicator development; Final report to ICES.
L	Contribute to ICES Ecosystem Overviews as requested by EAMSG Expert Groups and respond to potential advice requests as passed from ACOM.	Ecosystem overview has advanced significantly during the past years and EGs should provide input to help improve marine ecosystem management.	2.1; 6.1; 6.3; 6.5	3 years	Ecosystem Overview input as required. Response to advice requests as required.

### Summary of the Work Plan

	Refine ToRs. Respond to requests.
Year 1	Progress work towards completion of the remaining ToRs.
Year 2	Progress work towards completion of the remaining ToRs.
Year 3	Complete work towards completion of the remaining ToRs and produce final report.

### Supporting information

Priority	This group maintains an overview of key issues in relation to marine chemistry, both with regard to chemical oceanography and contaminants. MCWG provides input across the field of marine chemistry, which underpins the advice given by ICES, and also supports the work of national and international collaborative monitoring programmes, e.g. within OSPAR.
Resource requirements	The research programmes which provide the main input to this group are ongoing, and resources committed. The resources required to undertake additional activities in the framework of this group is negligible.
Participants	There are usually between 20 and 30 participants but last year ~50 participants contributed due mainly to the meeting being more accessible (virtual). Important to keep virtual element to meetings going forward.
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	WGBEC, WGML, WGSHP, WGORE, WGEEL, JWGBIRD, WGMME ICES Data Centre
Linkages to other organizations	NORMAN, QUASIMEME, SedNet, OSPAR, HELCOM, MEDPOL, BSC, EPA, EFSA, JRC, etc.

## EGs DISSOLVED in 2024

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WKWIND	Workshop to develop guidelines on how to approach the ecological, economic and social trade-offs between offshore renewable energy developments (wind farms) and fisheries
WKD6ASSES	Workshop to update and assess trade-offs between the impact of fisheries on seafloor habitats and their landings and economic performance
WKOUTVME	Workshop on the Occurrence of VMEs (Vulnerable Marine Ecosystems) and Fishing Activities in EU waters of the Outermost Regions
WKSUP	Workshop on SUPporting the EU Action Plan to restore marine ecosystems; harbour porpoise in the Baltic proper
WKVMESTA T	Workshop on status of vulnerable marine ecosystems in the NEAFC Regulatory Area for 5-year review