Human Activities, Pressures and Impacts Steering Group EGs Resolutions

Resolutions approved in 2018

Working Group on Marine Benthal and Renewable Energy Developments (WGMBRED)

2018/MA2/HAPISG01 The **Working Group on Marine Benthos and Renewable Energy Developments** (WGMBRED), chaired by Jan Vanaverbeke*, Belgium, and Joop Coolen*, 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 2019	12–15 February	Brussels, Belgium	Interim report by 30 March	
Year 2020			Interim report by DATE	
Year 2021			Final report by DATE	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Develop guidelines on standardised data collection methodologies and criteria for metadata to enable integration of benthos data of marine renewable energy devices into wider international frameworks.	WGMBRED recognises the fact that data on the benthos of marine renewable energy devices are collected and stored according to different standards, hampering in integrated analyses of the effect of such devices on the benthos on wider spatio-temporal scales. Standardisation of data collection and storage methodology will overcome this problem, facilitating joint analyses and international collaboration.	3.1	Year 1–3	Synthesis report to ICES on review of existing standards and methodologies including guidelines for setting criteria of metadata facilitating integration and analysis of marine renewable energy devices benthic data.
b	Provide an integrated example dataset based on benthos data of marine renewable energy devices from various sources	To date, data on the effect of marine renewable energy devices are scattered in national or institutional databases. This lack of integration hampers the understanding of the general effects in space and time of renewable energy devices on the marine benthos. WGMBRED will therefore provide a prototype of an integrated database (based on publicly available data) that can be used for scientific purposes by the international scientific community	2.1; 3.1	Year 1–3	Prototype database on the benthos of renewable energy devices, submitted to a database repository.
c	Review the knowledge on changes in the benthos associated with environments where marine renewable energy devices are located and relate them to the presence of these structures and the changes to other human activities (e.g. fisheries)	Earlier WGMBRED work, showed a locally increased habitat diversity in areas where renewable energy arrays are in function. This results in increased diversity of the benthos (including non-indigenous species). At the same time, many fisheries activities are excluded from these areas. As such, marine renewable energy device arrays could act as de facto conservation areas for benthos, adding to the existing network of designated Marine Protected Areas. This is	2.1; 2.2; 6.1	Year 1–3	Report to ICES on the assessment of the evidence of whether marine renewable energy device arrays can be considered as de facto marine protected areas.

		of high importance and should be taken into account during marine spatial planning processes where multiple activities within concession zones for marine renewable energy devices are being planned for.			
d	Develop the scientific basis for assessing the conservation of benthic habitats beyond the exploitation phase of marine renewable energy installations	Based in the current knowledge, WGMBRED realises that the local and regional biodiversity of the benthos may be positively affected in areas where marine renewable energy devices are exploited. This results from a combination of the provisioning of habitat, food and shelter for a number of marine organisms. These effects need to be taken into consideration in the decision making process for locating and the possible decommissioning of marine renewable energy devices sites.	6.1	Year 1–3	Manuscript to be submitted to peer-reviewed journal
e	Review and provide an empirical overview on the role of benthos associated with marine renewable energy devices in the maintenance of important ecosystem processes.	WGMBRED aims to provide the knowledge base to support the implementation of the Ecosystem Approach to Management with respect to marine renewable energy devices. This requires moving towards a process-driven understanding of how the changes to the structural and functional composition of the benthos (including non-indigenous species) associated with marine renewable energy devices) contributes to ecosystem functioning and the provisioning of ecosystem services (such as nutrient cycling and food provision via fisheries species).	2.2	Year 1–3	Manuscript submitted to a peer-reviewed scientific journal
f	In collaboration with WGMRE, provide a preliminary draft of advice on the current state and knowledge of studies into the deployment and environmental impacts of the following wet renewable energies and marine energy storage systems: wave energy (floating, coastal infrastructure), tidal stream (screws, kites), tidal flow (barrage, lagoon) and others. Advice should cover the status of wet renewable development in the OSPAR region, future prospects, potential environmental problems (sea bed habitat loss/disturbance, fish, marine mammals, birds, seascape/ public perception, and cumulative impacts), potential benefits, next steps and conclusions.	Advisory Requirements: ICES has received a special request from OSPAR to advice on the current state and knowledge of studies into the deployment and environmental impacts of wet renewable technologies and marine energy storage systems. Given its expertise, WGMBRED wil contribute to the advice with data and expertise on the benthic component of the marine realm. A subgroup will meet in ICES headquartes 15-16 January with experts from WGMRE and WGMBRED to draft a first version of the advice. The preliminary draft advice will be developed further during WGMBRED meeting and finalised during WGMRE meeting.	6.1	Year 1	Section of the report ready for WGMRE on 25 February 2019.

Summary of the Work Plan

Year 1	Begin reviews to start to address ToRs a, c, d and e; make inventory of data availability for compilation and integration for ToR b; develop and set out opinion matrix for ToR c. Contribute to advisory request from OSPAR (ToR f).
Year 2	Continue review activity to address ToRs a, c, d and e; Develop structure and populate integrated database for ToR b, further develop opinion matrix ToR c
Year 3	Finalise reviews ready for submission for ToRs a, c, d and e; make integrated database publicly available (ToR b), finalise expert opinion table ToR c;

Supporting information

Priority	The activities of the EG will lead ICES into a structural and functional understanding of how the marine benthal community of marine renewable energy devices contributes to the functioning of the marine ecosystem, and how they can act as areas where benthal biodiversity can be promoted. The objectives addressed for this group are therefore considered of high relevance in the context of ecosystem-based management of coastal areas where an increasing number or marine renewable energy devices are planned, and will be of directly use in marine spatial planning initiatives. Hence, the activities can be considered to be of very high priority.
Resource requirements	No specific resource requirements beyond the need for invited members to prepare for and resource their participation in the meeting. Additional resources are required to respond the request for advice from OSPAR. A subgroup of experts from WGMRE and WGMBRED will meet in January in Copenhagen to draft a first response to the adivice.
Participants	The Group is normally attended by 15–20 members and guests working with the effects of marine renewable energy developments on the marine benthal 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) to develop knowledge on these activities.
Secretariat facilities	None.
Financial	Additional resources covered by OSPAR special request.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages. However, some contributions could be made to under 'pressures' as part of ICES ecosystems overviews.
Linkages to other committees or groups	There is a very close working relationship with Benthos Ecology Working Group (BEWG), the Working Group on Marine Renewable Energy (WGMRE), the Working Group for Marine Planning and Coastal Zone Management (WGMPCZM) and the Working Group on Biodiversity Science (WGBIODIV).
Linkages to other organizations	OSPAR ICG-CUM

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

2018/MA2/HAPISG02 The **ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors** (WGBSOV), chaired by Lisa Drake*, USA, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2019	6-8 March	Weymouth, UK	Interim report by 20 April	
Year 2020	DATE March	TBD	Interim report by DATE	
Year 2021	DATE March	TBD	Final report by DATE	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Conduct strategic planning (identify and develop collaborative activities, advance and standardize methods, etc.) to advance research and address knowledge gaps by reviewing national activities and responding to new requests for advice.	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.	2.1; 2.5; 4.4	3 years	Report to ICES. Respond to advice requests, as applicable.
b	Evaluate test conditions, methods for collection of ballast water, or analysis of samples to inform national and/or international procedures for type approval and compliance testing of ballast water management systems.	The Convention for the Control and Management of Ships' Ballast Water and Sediments, (2004) (BWMC) aims to minimize the transfer of harmful aquatic organisms with the ballast water from ships. It is imperative that the BWMC is implemented in a scientifically valid and standardized way globally. There are science and advisory requirements related to validated methods and procedures.	2.7; 4.1	3 years	Input on the general applicability or otherwise of such conditions or methods to IMO or national regulators through meeting participation, correspondence group and/or technical paper or peer-reviewed manuscript.
c	Investigate and evaluate climate change impacts on the establishment and spread of ship-mediated nonindigenous species, particularly with respect to the Arctic.	This work will be carried out jointly with WGITMO. Contributes to SICCME and ICES high-priority action area 'Arctic research'.	2.1; 2.5; 4.4	3 years	Contribution to a peer-reviewed manuscript (with WGITMO as the lead).
d	Investigate and evaluate methods/technologies to assess risks of, to minimize extent of, and to respond to vessel biofouling to inform national and/or international policies or guidelines.	This work will be carried out jointly with WGITMO. Ships' biofouling is, with ballast water, a primary bioinvasion vector. As management of invasion vectors is the only effective way to reduce risks of new invasions, addressing biofouling issues is of high priority in bioinvasions management.	2.7; 6.1; 6.4	3 years	Strengthen ties to the IMO GloFouling partnerships through meeting participation and increased discussion of research aims; report to ICES.
e	Evaluate the development of DNA- and RNA-based molecular tools for surveillance and monitoring of ship-borne invasive species.	Considering the complexity of the taxonomic groups to which invasive species belong, the decline in taxonomic expertise, the need for robust monitoring efforts, and the need for reliable and accurate methods to assess compliance to regulations (e.g. BWMC), RNA- and DNA-based molecular tools have been proposed as complementary	1.6; 4.4	3 years	Input on the general applicability or otherwise of such methods to IMO or national regulators through meeting participation, correspondence group and/or technical paper or peer-reviewed manuscript.

	approaches to traditional methods. Although some challenges remain, these methods warrant close scrutiny.

Summary of the Work Plan

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

Supporting information

Priority	The work of the Group forms the scientific basis for essential advice related to the movement of invasive 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.
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.
Participants	The Group is normally attended by some 25-35 members and guests, but has more than 65 members in total.
Secretariat facilities	None.
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. Potential or occasional linkage with WGBIODIV, WGHABD, WGIMT, WGPME and WGZE.
Linkages to other organizations	International Oceanographic Commission (IOC), International Maritime Organization (IMO), North Pacific Marine Science Organization (PICES). In addition, the outcomes are relevant to other national and international organizations involved in the development of regulatory policies.

Working Group on Spatial Fisheries Data (WGSFD)

2018/MA2/HAPISG03 The **Working Group on Spatial Fisheries Data** (WGSFD), chaired by Roi Martinez*, UK, and Neil Campbell*, 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 2019	24–28 June	Lysekil, Sweden	Interim report by 15 August	
Year 2020			Interim report by Date	
Year 2021			Final report by Date to SCICOM	

ToRs descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Analyse current AIS datasets available to the WG, their fitness for purpose in provision of advice, and investigate possibility of inclusion of AIS data in the annual request from ICES to its member countries to provide spatial fisheries effort data to the data centre ("the ICES VMS datacall").	For advice processes for among others DG-ENV, it is required to analyse AIS data. To ensure a smooth transition to including AIS data in advice products, best practices and logistics need to be evaluated	3.2; 3.3; 3.5	Year 1-3	Section in WG report which can be forwarded to WKBEDPRES2 describing current best practice, data gaps and approaches to data handling
b	Evaluating need and possibility to move towards higher spatial resolution in the ICES VMS datacalls	Using interpolation methods, make a voluntary test datacall for a couple of countries within WGSFD on submitting data on c-squares on a 0.01 degree resolution instead of the current 0.05 degree resolution. The possibility of higher resolution fishing pressure data for merging with habitat data has been discussed during the ICES workshops WKFBI, WKBENTH, WKTRADE, and can provide input for the upcoming ICES WGFBIT and WKBEDPRES2.	3.2; 3.5	Year 1	Section of WG report detailing analysis of the change in fishing footprint when increasing to higher spatial resolution. A consideration of risks and other issues (e.g. confidentiality, credibility) in interpolating at finer scales than present should also be provided.
c	Develop spatial effort indicators for static gears	In order to estimate the effort of the passive fishing gear, other parameters (soaking time, gear length, number of hooks etc.) are needed. During the next term, WGSFD will further evaluate whether these parameters can be estimated from VMS, fleet characteristics and observer data to produce speed filters and describe typology of various fishing events for different gear categories.	3.5; 5.4; 6.1	Year 1-3	Sections in working group reports to ICES containing: i) spatial maps of fishing activity, and ii) fishing effort maps through parameterization of soak times / gear lengths / hook number.
d	Identifying potential drivers and describing spatial conflicts of fisheries in the past and future on displacement of fishing activities over various time-scales	Fisheries territories are defined by operating conditions and fish availability. Fish resources displacement due to the climate change, management measures and other human uses (MPA, marine traffic, gravel extraction, wind farms, oil rigs, seismic survey) may result in displacements when competition occurs for a given space. Through	5.4; 6.1; 6.2	3 years	Peer-reviewed paper

		the ICES datacalls on VMS and logbook data we now have the information available to estimate the spatial variability of fisheries over time. By this we will explore drivers of fisheries displacement and develop predictive models to infer potential fisheries reallocation in a conflicting event.			
e	Support to WKBEDPRES	To ensure compatibility with WKBEDPRES1 and WKBEDPRES2, WGSFD will provide guidance on using other data sets to assess the distribution and extent of physical disturbance to the seabed.	NA		WG Report section providing strategic guidance and criteria for the collection, management, quality assurance and reporting of non-fisheries spatial data.
f	WGSFD is requested to analyse and produce maps of bottom contacting fishing activity in NEAFC areas using the VMS and logbook information collected by NEAFC. These maps should be made available to WGDEC to ensure they can be combined by WGDEC with new information on distribution of vulnerable habitats.	In analysing and producing maps of fishing activity in NEAFC areas using the VMS and logbook information collected by NEAFC, WGSFD will ensure that WGDEC have the required fishing activity layers to produce a first draft advice sheet that address the annual advice request, "NEAFC requests ICES to continue to provide all available new information on distribution of vulnerable habitats in the NEAFC Convention Area and fisheries activities in and in the vicinity of such habitats, and provide advice relevant to the Regulatory Area and the above mentioned objectives." The draft NEAFC VME advice produced by WGDEC (with input from WGSFD) will be submitted for further consideration by a review group (RGVME) and advisory committee advice drafting group (ADGVME).	NA	year 1	Maps provided to WGDEC by 30 May 2019.
g	In preparation for future advice requests for electronic advice outputs at higher resolution (c-square at 0.05° x 0.05°), WGSFD will: 1) Analyse the extent of aggregated international VMS data subject to anonymity issues (≤ 3 number of vessels) 2) Discuss different procedures to preserve anonymity (gear groupings, area grouping,	To ensure vessel anonymity in electronic advice outputs at a higher resolution, aggregated international effort values of any c-squares containing three vessels or less will not be shown (see ICES VMS data call 2019). ICES Secretariat/Data centre will filter the sensitive data in the aggregated international fishing effort (3 vessels or less) and present the group with different scenarios. The agreed upon method will contain as much information as possible (spatial	3.3, 3.5	year 1	Section in the WG report which can be referred to in future advice processes.

international grouping, …) 3) Approve on a method/s that optimizes the data product while preserving the anonymity.	or as fishing effort value) while preserving the vessel anonimity.

Summary of the Work Plan

Year 1	Continuing WGSFD work from 2016–2018 on improving methods and ensuring high quality of VMS/logbook data processing from data request formats, quality checks and processing data to be implemented by the ICES data centre. Address the ToRs-Identification of best practices for the standardization of AIS VMS data/Logbook. Quality Assessment and Harmonization of the available AIS data Evaluation of the comparative advantage of integrating AIS and VMS in the calculation of indicators.
Year 2	Address ToRs with aim to provide methodological guidance in analysing VMS/Logbook/AIS data and showcase results of interest to a wider audience. Invite ICES states to provide AIS + VMS + Logbook aggregated data. Further evaluation of the comparative advantage of integrating AIS and VMS in the calculation of indicators.
Year 3	Address ToRs with aim to provide methodological guidance in analysing VMS/Logbook/AIS data and showcase results of interest to a wider audience. Extension of the AIS data submission to all countries. Quality Assessment of the AIS data provided.

Supporting information

Priority	WGSFD work in 2013-2018 has proven that there is a demand for fine scaled spatial fisheries information. Outputs on fishing intensity from WGSFD have been requested by OSPAR and HELCOM for work on MSFD descriptor 6. Outputs can also be used for ecoregion advice as well as in descriptions of fisheries activity. WGSFD will in 2019-2021 focus on showcasing the value of the information in terms of understanding fisheries behaviour, applicability for fisheries management and advance methodology development to best analyse the spatial datasets at hand. ToRa: as physical disturbance from bottom-contacting fishing gear is likely to be a substantial contribution to the total extent of physical disturbance, particular attention is needed to define an appropriate method or methods for this type of disturbance. Two main sources of data are currently used to map the distribution and intensity of bottom-fishing activity: Vessel Monitoring System (VMS) data, which is coupled with fishing logbook data, and Automatic Identification System (AIS) data. VMS data have been used by ICES, FP7 Benthis project and others; AIS data have been used by JRC (JRC Blue Hub) and EMODnet. Building upon the evaluation of these data types (ICES WGSFD 2016), and considering the differences in data availability, resolution and outcomes of their processing, a comparative analysis in selected study areas is needed to assess their relative merits for MSFD purposes. TORa should thus compare the use of VMS and AIS data, and associated data required to determine fishing effort and type, such as fishers' logbooks, in the context of use for MSFD D6 assessments. This should include a side-by-side comparison against a number of parameters, including source of the data (who holds the raw data), availability (e.g. legal requirements, including vessels to be covered), ac-cessibility (including any costs, restrictions such as due to data sensitivity, ease of access), use (e.g. restrictions on its release), spatial coverage in European waters, temporal coverage (his-toric, and within year), resolution (spatial granularity), accuracy, technical requirements for processing (to define when vessels are physically disturbing the seabed), resources needed (e.g. technical expertise, time per unit area). The comparison should include maps showing the distribution of bottom-fishing activity from the two data sources for the same time period, indicating where the distribution overlaps and where not, with an associated quantification of this (e.g. number/proportion of grid cells per subdivision for AIS only,

	VMS only and both) and explanations for any differences. It should be noted that other electronic monitoring systems (e.g. GPS and cell-phone based systems) are being developed in some regions, for use by smaller vessels. The work should be carried out in close collaboration with EMODnet and JRC.
Resource requirements	VMS/Logbook/AIS data requested in ICES data calls
Participants	The Group is normally attended by some 20–25 members and guests.
Secretariat facilities	Assistance from ICES Data Centre in hosting VMS/logbook/AIS data as well as quality checking and implementation of methods developed by WGSFD. Possibly meeting facilities.
Financial	Resources for ICES Data Centre to host and process VMS/logbook/AIS data.
Linkages to ACOM and groups under ACOM	ACOM
Linkages to other committees or groups	WGDEC, DIG, WGBYC, WGECO, WGMHM, BEWG, WGHIST , WKBEDPRES
Linkages to other organizations	OSPAR, HELCOM

Working Group on Biological Effect of Contaminants (WGBEC)

2018/MA2/HAPISG04 The **Working Group on Biological Effects of Contaminants** (WGBEC), chaired by Juan Bellas*, Spain, and Steven Brooks*, 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 2019	11-15 March	Vigo, Spain	Interim report by 1 May	
Year 2020			Interim report by DATE	
Year 2021			Final report by DATE to SCICOM	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Review and report new developments and innovative methods to study and monitor effects of contaminants	There is a continuous development of new techniques by which to monitor effects of contaminants. The use of "old" methods needs evaluation and development. For 20 years, WGBEC has maintained a list of recommended methods for marine monitoring, ensured that there are protocols available (mainly through TIMES publications) and developed quality assurance programmes. WGBEC competence has been used to develop programmes elsewhere, e.g. the Baltic, and contributed to the development of MSFD (descriptor 8).	4.4	year 2	Annual report to ICES, TIMES manuscript
b	Review and synthesise environmental effects of natural and synthetic	Particles are critical to understand the behaviour of contaminants in marine ecosystems. Some anthropogenic activity	3.1; 3.2; 6.1	year 3	Annual report to ICES, scientific paper

	particles and evaluate their direct effects and interacting effects on marine biota	leads to increased input of particles, some of which are associated with chemicals, others providing surfaces for adsorption. Particles will also affect organisms per se. Anthropogenically derived particles include micro- and nanoplastics, nanoparticles, mining dischages and discharges from offshore drilling.			
c	Investigate and synthesise the direct and indirect effects of ocean contamination to human health	Contaminants/pollution is one of the human pressures on marine ecosystem health resulting in human health impacts. In addition to direct effects, chemical pollutants can decrease the resilience of marine ecosystems, affect sea food security production/ resources, and may ultimately contribute to a loss of biodiversity. Several analytical and biological effect methods suggested by the ICES community can be used to establish links with human health.	5.8; 6.1; 6.4	year 3	Scientific paper
d	Update and summarise national activities on effect-based monitoring, evaluate different approaches taken and identify gaps and future avenues	WGBEC members have contributed significantly to the development and implementation of effect-based monitoring programmes in European countries, as well as OSPAR and MSFD. Monitoring is being harmonised throughout Europe as a result of WFD and MSFD, but there are still differences in take-up and implementation. Through its membership, WGBEC is uniquely placed to maintain an overview of national programmes and discuss pros and cons for different approaches.	3.1; 3.2; 6.1	3 years	Annual report to ICES
e	Describe and evaluate interaction of contamination ettects with those of climate change and acidification	Contaminant exposure is not the only stressor in marine ecosystems and it is important for WGBEC to review effects of climate change and acidification-related stressors and how their presence interact with contaminant stress.	2.1; 2.2	year 3	Scientific paper
f	Review and assess effects of contaminants of emerging concern	WGBEC originally requested MCWG to inform about substances of emerging concern since they generally would appear in chemical analyses. The definition of “emerging” has been so wide and important effects have been observed in marine organisms following exposure to e.g. pesticides, so WGBEC have included the item on the work programme.	2.1; 2.2; 4.5	year 2	Annual report to ICES
g	Investigate and report effects of individual contaminants on marine communities	There is an ongoing discussion as to whether community analyses can detect effects of contaminants; they are definitely not the most sensitive in this respect. Since biodiversity, i.e. community analyses, is an important component of WFD and MSFD effect programmes, there is a clear need to develop complementary analytical methods that are specific to effects of contaminants and not influenced by other ecological factors.	2.1; 2.2; 6.1	year 2	Scientific paper

h	Review and evaluate effects of contaminants on sediment-dwelling organisms, together with critical analysis of the sensitivity of the methodologies applied	The highest concentrations of contaminants in marine ecosystems are found in sediments. The standardised toxicity tests for sediments are unfortunately not very sensitive to contaminant exposure, at least partly because the organisms that are used are those amenable to lab culture. This item was on the work programme for WGBEC 20 years ago, but there is still limited progress. New analytical techniques alongside "traditional" methods bear promise for improved methods.	2.2	year 2	Scientific paper
i	Contribute to ICES Ecosystem overviewes according to the request	Ecosystem overviews have been advanced significanly 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 has expertise, such as the biological effects of contaminants, and which are essentially relevant in marine ecosystem management and policy context.	6.5	3 years	Contribution to Ecosystem overviews according to the provided guidelines/template

Summary of the Work Plan

Year 1	Update and review national monitoring programmes.
Year 2	Review effects of contaminants, including baseline studies and risk assessment; Review effects of contaminants of emerging concern; Review the study of individual effects in community studies (scientific paper) Review effects of contaminants on sediment-dwelling organisms (scientific paper) Update ToRs a, b, c, d.
Year 3	Review effects of natural and synthetic particles (scientific paper); Review progress with concepts regarding the oceans and human health (scientific paper) Review interactions of contamination effects with those of climate change and acidification (scientific paper)

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	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a working relationship with WGMS, WGEEL and WGIBAR. It is also very relevant to the Marine Chemistry Working Group (MCWG).
Linkages to other organizations	OSPAR MIME/HASEC, HELCOM, EEA

Marine Chemistry Working Group (MCWG)

2018/MA2/HAPISG05 The **Working Group on Marine Chemistry** (MCWG), chaired by Koen Parmentier, 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 2019	4–8 March	Evora, Portugal	Interim report by 1 May	Meeting in association with WG on Marine Sediments (WGMS)
Year 2020			Interim report by DATE	Venue preferably joined with WGMS
Year 2021			Final report by DATE	Venue preferably joined with WGMS

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Assemble and synthesise new information on chemical substances of emerging concern in ICES area and beyond, including residuals in higher trophic level marine species.	Provide new data – link to WGBEC- Eco-toxicology and analytical methods – sampling, extraction, detection, issues, Quality Assurance (QA/QC). Check of EU Water Framework Directive (WFD) watch list and identify substances because of increasing international awareness. This includes toxins from algae blooms.	2.1; 4.1; 6.1	3 years	Reporting to ICES, including: - synthesizing new evidence, - identification of gaps, - emphasis on concern for monitoring, - non-target screening, especially for endocrine disruptors.
b	Develop novel monitoring strategy for compliance and screening tools.	The use of passive samplers (PS) increases, and sensors are in use e.g. in Ferrybox systems, and The EU GRACE project has generated comparison and validation data regarding in situ fluorescence detection of dissolved oil.	3.1; 3.3; 6.1	3 years	Reporting to ICES on use and development of PS (compliance monitoring in relation to Environmental Quality Standards (EQS)). Collect QA/QC and validation for in-situ sensors, (incl. oil, pH, CO_2 and nutrients) and screening methods.
c	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.	Availability of high quality proficiency testing is vital to produce reliable results.	3.1; 3.3	3 years	Reporting to ICES: - provide guidance for proficiency testing, - development of test materials for new compounds.

d	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.	OA and understanding its importance, quantification of its impact is crucial for a variety of scientific disciplines, and for ocean health. OA is a voluntary paremeter in OSPAR CEMP but developments in QC supports are required.	1.2; 2.1; 3.2; 4.1, 6.1	3 years	Reporting to ICES: - technical guidance document on sampling, sample handling and storage, - preparation of in-house reference material for testing and validation.
e	Review and analyse QUASIMEME assessment of chlorophyll data, in particular, regarding comparability of data and potential implications for existing measurement guidance.	Solve problems for data comparability that exist for decades concerning chlorophyll measurements.	1.3; 2.1	Year 1	Publication in TIMES: manuscript on chlorophyll determination methods.
f	Review emerging issues, and international and national regulations related to contaminants and biotxons in seafood.	Seafood is an important dietary source of many contamminants. Several EQS are derived from human health risks. Although this is not ideal for marine environmental monitoring, follow-up is imperative.	2.1; 5.6; 6.1; 6.3	3 years	Reporting to ICES: - reference document on food and feed regulations, - overview on biotoxins, - monitoring emerging issues with respect to contaminants in seafood.
g	Review of the evidence of of man-made structures (such as platforms, wind farms, buoys, pipelines, cables and ship wrecks) and shipping (such as exhaust gases, spills and scrubbles) on the marine environment as a source of chemical pollution.	Amount of constructions is ever increasing. Some protective compounds used are new to the marine environment. Application is directly into the marine systems and requires follow-up and identification of knowledge gaps.	2.1; 4.5; 6.1	3 years	Review manuscript
h	Summarise and synthesise relevant information from relevant ICES expert groups on the interface with MCWG: WGMS, WGBEC, WGEEL, JWGBird, WGOH, WGPME, WGML.	MCWG is active in trying to interconnect different WGs. The intention is to have joint meetings with WGMS, there is a direct link concerning dredging activities.	2.2; 2.5; 4.1	3 years	Publication in TIMES, contributing to WGMS dredge spoil report.
i	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	Follow-up on this matter is key in order to guide the development process for consistent application of environmental quality criteria in monitoring prgrammes. Follow-up on JRC list of chemicals that are being monitored by different countries.	3.2; 6.1	3 years, on a year by year basis.	Reporting to ICES: - setting EQS or Environmental Assessment Criteria (EAC) and conversion factors, - review manusript on emerging contaminants and risks involved.

	factors and other closely related issues.				
j	Collect regional-level information to determine Trophic Magnification Factor (TMF) and Trophic Level (TL)	The use of generic TMF and TL, as required by MSFD to calculate concentrations to compare with EQS_{biota} gives rise to unacceptable inflation of uncertainty.	2.1; 6.1; 6.3	3 years	Reporting to ICES: overview of region-specific TMF, TL for target organisms and determination of highest TL.
k	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 values.	1.2; 1.3; 2.1; 3.3	3 years	Reporting to ICES
l	Respond to potentially incoming advisory requests	Science or advisory requirements.	3.1; 6.1; 6.5; 6.6	3 years, on a year by year basis.	Advice products, as appropriate

Summary of the Work Plan

Year 1	Complete ToR e). Respond to requests under ToRs i), l). Progress work towards completion of the remaining ToRs.
Year 2	Respond to requests under ToRs i), l). Progress work towards completion of the remaining ToRs.
Year 3	Respond to requests under ToRs i), l). Report on the remaining ToRs.

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 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 15-20 members and guests.
Secretariat facilities	Participation using electronic means should be examined and encouraged.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	WGMS (the aim is to have joint meetings), WGBEC, WGML. OSPAR ICG-OA, from 2019 on (first meeting Jan 2019, Aberdeeen, UK) replacing the OSPAR/ICES study group on Ocean Acidification (SGOA) ICES Data Centre
Linkages to other organizations	The work of this group is closely aligned with EU working groups under the Water Framework Directive (e.g. Working Group on Chemicals) and EU expert networks with regard to contaminants under the MSFD. Specific agenda points will be directly relevant for QUASIMEME. The group provides the basis for some advice to OSPAR.

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

2018/MA2/HAPISG06 The **Working Group on the Value of coastal Habitat for Exploited Species** (WGVHES), chaired by Olivier Le Pape*, France, and David Eggleston*, USA, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2019	24–28 June	Rome, Italy	Interim report by 1 August	
Year 2020	DATE June	TBD	Interim report by 1 August	
Year 2021	DATE June	TBD	Final report by 1 August	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Review the application of the nursery habitat concept in management of exploited species and assess the need for refinement of the definition	There is a need for a quantifiable definition in science and a pragmatic definition in management	1.4; 5.2	year 1–2	Review manuscript
b	Review and report on evidence that hard bottom and biogenic habitats support commercially important species	Lack of information on the value of structured habitats; continuation of ongoing work by expanding to additional habitat types and new aspects	1.4; 5.2	1, 2, 3	Review manuscript(s) and report to ICES
c	Collate and document lessons learned on conservation of habitat for exploited species using experiences from different countries	Many countries are defining essential fish habitat and using experiences from various countries will increase efficiency and consistency of its application in management	5.2; 6.1; 6.2	1, 2, 3	Report to ICES and perspectives manuscript
d	Analyse the contribution of juvenile abundance indices in forecasting stock recruitment to better utilize available information	There is an interest to integrate juvenile abundance indices in short-term forecasts to improve advice in stock assessement.	5.2	1, 2	Manuscript

Summary of the Work Plan

Year 1	Continue the work on ToR a and begin the writing process. Finalise the review of hard-bottom habitats and continue ToR b with the inclusion of biogenic habitats and other aspects. Initiate the work on ToR c and continue the work on ToR d, following comprehensive scoping during the previous year..

Year 2	Complete the work on ToR a and continue the work on ToR b, c and d.
Year 3	Finalise the ongoing work in ToR b, c and d and identify future research priorities or management needs

Supporting information

Priority	The current activities of this EG 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. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by 10–15 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There are no obvious direct linkages.
Linkages to other organizations	There are no obvious direct linkages.

Workshop on Cumulative Effects Assessment Approaches in Management (WKCEAM)

2018/2/HAPISG07 A **Workshop on Cumulative Effects Assessment Approaches in Management** (WKCEAM), chaired by Vanessa Stelzenmüller*, Germany, Roland Cormier*, Germany, and Gerjan Piet*, the Netherlands, will meet at ICES HQ, Copenhagen, Denmark, 26–27 February 2019 to:

a) Review the differences in the factors (data, knowledge, decision-process) being considered regarding cumulative effects assessment (CEA) in relation to environmental policies, marine spatial planning (MSP) and regulatory processes;

b) Recommend scientific focus for a new CEA Working Group.

WKCEAM will report by 30 March 2019 (via HAPISG) for the attention of SCICOM.

Supporting information

Priority	The current activities of Working Group for Marine Planning and Coastal Zone Management (WGMPCZM) are focused on the understanding of cumulative pressures to inform trade-offs between the benefits and risks of human activities in MSP and reduce the pressures through spatial-temporal measures.

Scientific justification	Current cumulative effects assessment (CEA) approaches are considered as key to sound policymaking and planning in governance and management. While the need for CEAs is widely accepted, their actual implementation in marine planning and management processes is yet to be seen. Cumulative effects are the result of the activities of multiple drivers that exert pressures on ecosystem components their functions (Figure 1). In concept, the ICES workshops WKRASM and WKPASM highlighted the need to understand the effectiveness of management measures implemented to reduce the pressures generated by human activities. In a follow-up workshop WKBCNS, the methods to parameterize and quantify estimates of pressures loads after the implementation of specific management measures has been develoepd. Conservation management strategies (e.g. spatial management restricting human uses) can, up to a point, protect ecosystem components and/or functions from cumulative effects of human activities. Hence the collective pressures generated by human activities are managed by regulatory frameworks implemented e.g. for specific sectorial activities or regulatory marine spatial plannig (MSP) processes. On one hand side the challenge of using current CEA approaches in such regulatory or spatial planning context is in determining the level of pressure generated by each individual sector operating in an area that are contributing to the effects identified by the assessment in order to deliver on e.g regulatory or Blue growth targets. From an environmental policy perspective CEAs should aid to prevent tipping points in pressure-state relationships to saveguard or restore ecosystem health. The proposed workshop will review in detail the differences in CEA approaches in relation to different information needs in governance, management, regulators MSP and regulatory decision-making. The aim is not not only to provide the means to improve the usability and uptake of current cumulative effects assessments approaches, but also to identify future research directions in CEA science.
Resource requirements	The research programmes of the participants would provide the main input for this workshop. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The workshop would expect 10–15 participants.
Secretariat facilities	None.
Financial	No financial implications.
Linkage to the ICES Science Plan	ToR a): 6.2; 2.2; 6.1 ToR b): NA
Linkages to advisory committee	There are no obvious direct linkages with the advisory committees.
Linkages to other committees or groups	This workshop has linkages other ICES workshops on sea bed abrasion (WKBENTH, WKTRADE, WKBEDPRES etc.) as well as HAPISG EGs.
Linkages to other organizations	The workshop topic is linked to OSPAR Intersessional correspondence group on cumulative impacts (ICG-EcoC) and the UK Marine Monitoring and Assessment Strategy Pressures Group.

Working Group on Multispecies Assessment Methods (WGSAM)

2018/MA2/HAPISG08 The **Working Group on Multispecies Assessment Methods** (WGSAM), chaired by Sarah Gaichas, USA, and Alexander Kempf, Germany, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2019	14–18 October	Rome, Italy	Interim report by 1 December	
Year 2020			Interim report by DATE	
Year 2021			Final report by DATE	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	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.
b	Update of key-runs (standardized model runs updated with recent data) of multispecies and eco-system models for different ICES regions	The key runs provide information on natural mortality for inclusion in various single species assessments	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	Establish and apply methods to assess the skill of multispecies models intended for operational advice	This work is aimed at assessing the performance of models intended for strategic or tactical management advice.	5.1; 6.1; 6.3	Establish methods 2019, apply 2020-2021	Manuscript for methods, report on success of methods for different examples.
d	Evaluate methods for generating advice by comparing and/or combining multiple models	This work is aimed at addressing structural uncertainty in advice arising from multiple models, as applied for example management questions	5.1; 6.1; 6.3	3 years	Report on methods for comparing models and for constructing model ensembles.
e	Management Strategy Evaluation (MSE) methods and applications for mutispecies and ecosystem advice, including evaluating management procedures and estimating biological reference points	Adapting existing multispecies/ecosystem models for MSE (operating models, assessment models), visualizing tradeoffs and uncertainty for managers and stakeholders	5.3; 6.1; 6.3	3 years	Review of MSE modeling approaches. Review of visualization methods. Review of applications throughought the ICES area with lessons learned.

Summary of the Work Plan

Year 1	All ToRs, Key run Baltic, multiple models
Year 2	All ToRs, Key Run North Sea SMS (maybe others)
Year 3	All ToRs, Key Run US Northeast Shelf, multiple models

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 MSY Approach. The activities will provide information (e.g., natural mortality estimates, performance of indicators) and tools (e.g., multi-model ensembles, keyrun models) valuable for the implementation of an integrated advice in several North Atlantic ecosystems. 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	Approx 20. Expertise in ecosystem, modelling and fish stock assessment from across the whole ICES region.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	ACOM, most assessment Expert Groups
Linkages to other committees or groups	WGMIXFISH, WGDIM, WGBIFS, IBTSWG, WGECO, WGINOSE, WGIAB, WGNARS, WGIPEM.
Linkages to other organizations	None

Working Group on Bycatch of Protected Species (WGBYC)

2018/2/ **The Working Group on Bycatch of Protected Species,** chaired by Kelly Macleod, UK and Sara Königson, Sweden, will meet in Faro, Portugal, 5–8 March 2019 to:

a) Review and summarize annual national reports submitted to the European Commission under Regulation 812/2004 and other published documents to collate bycatch rates and estimates in EU waters and wider North Atlantic;

b) Collate and review information from national Regulation 812/2004 reports and elsewhere in the North Atlantic relating to the implementation of bycatch mitigation measures and ongoing bycatch mitigation trials and compile recent results on protected species bycatch mitigation;

c) Evaluate the range of (minimum/maximum) impacts of bycatch on protected species populations where possible, furthering the bycatch risk approach to assess likely conservation level threats and prioritize areas where additional monitoring is needed;

d) Continue to develop, improve and coordinate with other ICES WGs on methods for bycatch monitoring, research and assessment within the context of European legislation (e.g. MSFD) and regional conventions (e.g. OSPAR) (intersessional);

e) Continue to coordinate and support among WGBYC members research proposals/projects and funding opportunities in support of researching protected species bycatch mitigation;

f) Continue, in cooperation with the ICES Data Centre, to develop, improve, populate through formal Data Call, and maintain the database on bycatch monitoring and relevant fishing effort in European waters. (Intersessional).

WGBYC will report by 8 April 2019 to the attention of the Advisory Committee.

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

Supporting Information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem affects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Scientific justification	a–b) This is essential to use in answering part of the European Commission MoU request to "provide any new information regarding the impact of fisher-ies on marine mammals, seabirds..."; c) ICES Member Countries are required to reduce levels of bycatch under several pieces of legislation; the response to this ToR will help meet that aim; d) Bycatch monitoring and assessment is fundamental to the work of the group; in light of significant changes in legislation that will impact monitoring programs for PETS any improvements in coordination and methods will help the group and other workers in this field; e) Improving scientific understanding how target and non-target catches interact with commercial fishing gear is fundamental to developing effective mitigation measures to reduce bycatch on vulnerable species; f) An operating database allows for more efficient response to future advice requests and an audit trail for information used in the Group's reports; remaining intersessional ToR's all aim to increase effeciency of WGBYC's tasks in providing advice to various groups; g) The European Commission has decided not to amend Res. 812/2004 and to integrate monitoring of protected and endangered species into the new DCF (DC-MAP). It is essential to cooperate with the scientists who design observer schemes and protocols for the monitoring of catch and discards;
Resource requirements	None beyond usual Secretariat facilities
Participants	15–25
Secretariat facilities	Secretariat support with meeting organization and final editing of report
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	JWGBIRD, WGFTFB, WGMME, WGSE, WGEF, WGCATCH, WGMIXFISH, WGSFD, WGNSSK, SCICOM
Linkages to other organizations	NAMMCO, ASCOBANS, ACCOBAMS, GFCM, EC, IWC

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

2018/2/ The Joint ICES/NAFO Working Group on Deep-water Ecology (WGDEC), chaired by Laura Robson*, UK, will meet 3–7 June 2019 in Mallorca, Spain to:

a) Collate new information on the distribution of vulnerable habitats as well as important benthic species and communities 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) Provide all available new information on the distribution of vulnerable habitats (VMEs) in the NEAFC Convention Area. Using the most recent NEAFC spatial layers of fishing activity analysed by WGSFD, produce a first draft of the annual NEAFC VME advise for further consideration by a review group (RGVME) and advisory committees advice drafting group (ADGVME). In addition, provide new information on location of habitats sensitive to particular fishing activities (i.e. vulnerable marine ecosystems, VMEs) within EU waters; and produce a first draft of the annual EU VME advise for further consideration by a review group (RGVME) and advisory committees advice drafting group (ADGVME).

   This information 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" as well as part of the European Commission MoU request to "provide any new information regarding the impact of fisheries on sensitive habitats". The location of newly discovered/mapped sensitive habitats is critical to these requests.

   Produce a first draft of the both the annual ICES NEAFC and EU VME advice for further consideration by a review group (RGVME) and advisory committees advice drafting group (ADGVME).
   In producing the draft NEAFC advice, fishing activity layers by WGSFD should be combined to produce a first draft advice sheet that address the annual advice request, "*NEAFC requests ICES to continue to provide all available new information on distribution of vulnerable habitats in the NEAFC Convention Area and fisheries activities in and in the vicinity of such habitats, and provide advice relevant to the Regulatory Area and the above mentioned objectives*." In producing the draft EU advice on "*information on location of habitats sensitive to particular fishing activities (i.e. vulnerable marine ecosystems, VMEs) within EU waters*"

c) Continue reviewing how to best define Good Environmental Status (GES) for deep-sea habitats. In particular, continuing a review on spatial and temporal scales and progress with indicator development for the deep sea;

d) Considering work undertaken at WGDEC 2012 to examine NEAFC encounter thresholds as well as criteria used by other RFMOs (such as South Pacific Regional Fisheries Management Organization - SPRFMO) to trigger "move-on " rules, review current and propose revised thresholds appropriate to each VME indicator type considered in the WGDEC VME weighting algorithm.

The deadline for ToR b is June 21, 2019 (for submission to review by RGVME)

WGDEC will report by July 5 to the attention of the ACOM Committee.

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

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	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 firt quarter of 2019, facilitated by the ICES Data Centre. Data will be quality checked/prepared one month in advance of WGDEC 2019. New data will be incorporated into the ICES VME Database and ICES VME 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. ToR [b] This information 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" as well as part of the European Commission MoU request to "provide any new information regarding the impact of fisheries on sensitive habitats". The location of newly discovered/mapped sensitive habitats is critical to these requests. ToR [c] Understanding, defining, and measuring Good Environmental Status is a core concept of the EU Marine Strategy Framework Directive. Work was started on GES at WGDEC 2017 and further work on deep-sea ecosystems is still required. In particular, this ToR will focus on continuing the review of progress made to date with deep-sea spatial and temporal scale definition and indicator development – the focus of a number of European funded projects. ToR [d] Currently, the VME abundance thresholds used within the VME weighting algorithm are based on the NEAFC VME encounter thresholds for corals (30 kg) and half the encounter threshold for sponges (200 kg). These thresholds were based on work undertaken in WGDEC 2012/2013, and were selected during the early deveopmental stages of the weighting algorithm. However, they only specifically examined cold water corals and deep-sea sponge aggregations. Since this time, new information on the life histories and vulnerability/sensitivies of other VME are available, and should be considered in order to develop specific and appropriate thresholds for each VME indicator. As part of this ToR, work undertaken developing VME encounter thresholds for NEAFC in 2012/2013 will be considered alongside work undertaken by other RFMO on criteria, such as the SPRFMO.
Resource requirements	Some support will be required from the ICES Secretariat
Participants	The Group is normally attended by some 15–20 members and guests.
Secretariat facilities	None, apart from WebEx 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 and WGDEEP.
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)

2018/2/ The **Working Group on the Ecosystem Effects of Fishing Activities** (WGECO), chaired by Jeremy Collie, US and Stefan Ragnarsson, Iceland, will meet in Copenhagen 9–16 April 2019 to:

a) Investigate the ecological consequences of stock rebuilding, with particular emphasis on benthivorous fish and invertebrates.
   i) Make first-order estimates of predation pressure on benthos;
   ii) Examine evidence of food limitation and density-dependent growth;
   iii) Compare the footprints of trawling to the footprints of predation pressure on benthos.

b) Use empirical data and available multispecies models to examine how the degree of fisheries balance relates to ecosystem status.
   i) Compare the length composition of total catch (landings and discards) to the length composition in the survey for one region (e.g. Irish Sea);
   ii) Use multispecies models (developed by WGSAM) to identify targets for ecological indicators of state (i.e. status) that relate to an acceptable risk of species diversity loss; and
   iii) Use output of multispecies models to investigate how proposed management strategies affect fisheries balance.

c) Review the knowledge of spatial distribution indicators for fish and benthos.
   i) Make recommendations on which indicators to develop, considering both how useful/important these are, and also simplicity of use and clarity of communication;
   ii) Test several candidate spatial distribution indicators; and
   iii) Scope and evaluate methods to integrate indicators.

d) Conduct a "reality check" and horizon scanning survey within WGECO. The aim is to develop a consensus view of the major emerging issues in relation to fisheries and ecosystems, and on which WGECO could focus future work. WGECO members will provide a list of emerging issues (horizon scanning), that would benefit from scrutiny by WGECO. This list will be collated and used as material for a plenary discussion, and with the aim of producing a perspectives paper in the ICES JMS or Fish and Fisheries.

e) This year, WGBYC evaluated the list of species to be monitored under protection programmes in the Union or under international obligations (COMMISSION IMPLEMENTING DECISION (EU) 2016/1251) to determine which of the bony fish species are considered sensitive bycatch and hence relevant for the work of WGBYC. This list will be included in the fisheries overviews. WGECO is requested to compare the resulting list to sensitive species identified using methods reviewed previously in WGECO and to comment on any discrepancies.

WGECO will report by 30 April for the attention of the Advisory Committee.

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

Supporting Information

Priority	The current activities of this Group will enable ICES to respond to advice requests from member countries. Consequently these activities are considered to have a very high priority.

	It will also lead ICES into issues related to the ecosystem affects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Scientific justification	Term of Reference a) Many stocks are rebuilding and will likely have higher abundance and biomass than we have seen in recent times. This in turn will likely have effects through trophic interactions both up and down the foodweb. At ICES, WGECO and WGSAM have been tasked previously with similar ToRs. WGECO will investigate the potential consequences of stock recovery of benthivorous fish and invertebrates, their ensuing risks for fish stock management and the use of MSFD indicators. It is hypothesized that a large increase in benthivorous fish will have an impact on benthic productivity and biodiversity. This ToR requires data on the spatial distribution of benthivorous predators, their prey consumption rates and diet composition. It also requires data on the abundance and production of benthic faunal. This ToR links to ToR c. Term of Reference b) Identifying thresholds and limits for ecosystem indicators remains a central challenge for ecosystem based fisheries management. This ToR will examine if MSY targets implemented in the current management regime will lead to acceptable ecosystem status. This ToR aims to identify reference levels for a range of ecosystem indicators with the use of size-based models. This proposed ToR links to WGSAM. Term of Reference c) WGECO has traditionally had a leading role in developing and testing indicators, and their use for provision of advice. The work of this ToR facilitates operationalization of these indicators, by identifying data sources, refining, evaluating their strengths and weaknesses and gaps in indicator availability. Indicators that are evaluated to be promising will be tested. Term of Reference d) The ICES strategic plan will end in 2018. This initiative is to allow WGECO to contribute strongly to the development of future ICES strategy. We intend to seek input across the national and disciplinary range of WGECO members, many of whom are operating at a high level in the field and in the home institutes. We aim to publish this as a perspective paper in one of the key journals, and this will be available to inform future progress for this important and centrally positioned Expert Group.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by some 20–25 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	There are no current direct linkages with the advisory committees.
Linkages to other committees or groups	There is a very close working relationship with the groups of the Fisheries Technology Committee, WGBIRD, BEWG, WGBIODIV and WGSAM.
Linkages to other organizations	OSPAR, HELCOM

ICES/NAFO/NAMMCO Working Group on Harp and Hooded Seals (WGHARP)

2017/2/ The ICES/NAFO/NAMMCO **Working Group on Harp and Hooded Seals** (WGHARP), chaired by Mike Hammil, Canada, will meet at the Institute for Marine Research, Tromsø, Norway, 2–6 September 2019.

a. Address the special request from Norway on the management of harp and hooded seal stocks in the Northeast Atlantic by assessing the status and harvest potential of the harp seal stocks in the Greenland Sea and the White Sea/Barents Sea, and of the hooded seal stock in the Greenland Sea. ICES should also assess the impact on the harp seal stocks in the Greenland Sea and the White Sea/Barents Sea of an annual harvest of:

    i) current harvest levels;

    ii) sustainable catches (defined as the fixed annual catches that stabilizes the future 1+ population);

    iii) catches that would reduce the population over a 15-year period in such a manner that it would remain above a level of 70% of the maximum population size, determined from population modeling, with 80% probability.

b. Evaluate new model developments and comparisons with the old assessment model;

c. Review results of new surveys for harp seals in the White Sea and southeastern portion of Barents Sea;

d. Review results from the biological samples obtained from the harp seals.

WGHARP will report by 30 of September 2019 for the attention of the ACOM.

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

Supporting Information

Priority:	High priority as a tool for the assessment and management of harp and hooded seals in the North Atlantic Ocean. WGHARP works on requests for advice from member countries through ACOM, NAFO Scientific Council and/or NAMMCO Council.
Scientific justification:	A number of North Atlantic nations currently harvest harp and hooded seal stocks and there is a need for a relatively neutral forum for developing scientific advice on sustainable harvests of these stocks, including recognition of the need for a precautionary approach to management of seal populations. The WGHARP provides this forum using quantitative techniques necessary for development of sound catch advice and including ICES, NAFO and NAMMCO member state scientific experts in pinniped biology; members represent all harvesting nations as well as nations without seal harvests. ToR a) is a request from Norway to ICES.
Resource requirements:	None beyond the contributions from member states
Participants:	The Group is normally attended by some 10-15 members and invited experts.
Secretariat facilities	SharePoint site
Financial:	None
Linkages to advisory committees:	WGHARP reports to ACOM, NAFO Scientific Council and NAMMCO Scientific Committee.

Linkages to other committees or groups:	HAPISG, EPDSG, WGMME
Linkages to other organizations:	NOAA/NMFS, Joint Norwegian-Russian Fisheries Committee. The work of this group is closely aligned with harp and hooded seal research and management programs conducted by the governments of Canada, Greenland, Norway, Russia, and the United States.

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

2018/MA2/HAPISG09 The **Working Group on Cumulative Effects Assessment Approaches in Management (WGCEAM)**, chaired by Vanessa Stelzenmüller, Germany, Roland Cormier, Germany, and Gerjan Piet, the Netherlands, will be established 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 2019	28 October – 1 November	ICES HQ, Copenhagen, Denmark		
Year 2020	TBD October	TBC		
Year 2021	TBD October	TBC	Report by DATE to SCICOM	

ToR descriptors

ToR	Description	Background	Science plan codes	Duration	Expected Deliverables
a	Develop a cumulative effects assessment (CEA) framework suited to guide science advice on the development and implementation of ecosystem-based management	While the need for CEAs is widely accepted, their actual implementation in marine planning and management processes is yet to be seen. A common framework requires a review of the differences in the factors (data, knowledge, decision-process) being considered regarding cumulative effects assessment (CEA) in relation to environmental policies, an ecosystem approach to marine spatial planning (MSP) and regulatory processes. The framework should clearly outline: a) Science Requirements b) Advisory Requirements c) Requirements from other EGs	6.1, 6.2, 6.6,	Year 1	CEA framework suited to guide science advice on the development and implementation of ecosystem-based management.
b	Demonstrate the application of the CEA framework in one or more regional case studies	To advance the development of a generic CEA methodology and identify real research gaps one or more case studies will be used as a proof of concept. The	6.1,6.2	Years 2	Scientific paper describing the application of the CEA framework in one or more regional

		initial focus should be on the North Sea and a Canadian bioregion where the CEA is conducted with the available knowledge base..			case studies.
c	Produce generic guidance on data and knowledge needs for CEA's including: using qualitative and quantitative data, accommodating uncertainty, identifying information gaps based on the application of the framework in the above case studies	The application of the framework in case studies allows to i) indicate useful tool(s) for each step, ii) show the indicative datasets and types of data required in carrying out a CEA, iii) develop straight forward visualization tools for pressures, and iv) demonstrate end products and engage with potential clients. The latter point is essential to scope the potential usefulness of CEAs as part of ecosystem advice provided by ICES	6.1, 6.2,	Year 3	Generic guidance on data and knowledge needs for CEA's.
d	Liaise with other fora or expert groups both within ICES (i.e. Secretariat, Data Centre or expert groups) as well as outside ICES (e.g. OSPAR, EEA, HELCOM, JPI Oceans, CEAF, DFO, TC, ECCC) to work towards and consolidate a common CEA framework	The consolidation of a common CEA framework requires a continous collaborationa and exchange of expertise with other groups and fora working on CEAs	6.2, 6.4, 6.5	Year1-Year 3 (ongoing)	Consolidated common CEA framework.

Summary of the Work Plan

Year 1	During the first year the linkages to other groups working on CEAs have to be identified and established. The main goal is the development of a common and consolidated CEA framework allowing to implement CEA in different settings regarding data, knowledge, and decision-processes.
Year 2	In the second year the work will focus on the application of the CEA framework in case study areas. The North Sea and a Canadian bioregion will be the first case studies since data availbility and relevant scientific knowledge is most advanced.
Year 3	Emphasis will be on the provision of guidance on data and knowledge needs when applying the common framwork. This guidance will lead into a final recommendation on the usefulness of CEAs as part of ecosystem advice provided by ICES.

Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem effects of all marine human activities including fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.

Participants	The Group is normally attended by some 20–25 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a very close working relationship with all the groups under HAPISG. It is also very relevant to WGINOSE.
Linkages to other organizations	There are strong linkages to the OSPAR and HELCOM work on CEAs.

Workshop on Tradeoffs Scenarios between the Impact on Seafloor Habitats and Provisions of catch/value (WKTRADE2)

2018/2/HAPISG10 An ICES **Workshop on Tradeoffs Scenarios between the Impact on Seafloor Habitats and Provisions of catch/value** (WKTRADE2), chaired by François Bastardie, Denmark, and Jochen Depestele, Belgium, will meet at ICES Headquarters, Copenhagen, Denmark, 4–6 September 2019 to:

a) Describe the practical steps that should be considered to (better) determine the economic costs and benefits associated with bottom fishing (fisheries revenue) at fine spatial scale (preferably at the c-square resolution: 0.05° x 0.05°); (Science Plan codes: 6.6, 6.4, 3.5);

b) Demonstrate the applicability of a set of approaches to estimate fisheries revenue at local, habitat and regional scales and for different metiers (given the present data availability and cross-regional applicability, i.e. to demonstrate what can be used in WGFBIT in 2019 and 2020 to describe trade-offs); (Science Plan codes: 6.6, 6.4, 5.4);

c) Establish ways to assess effort reduction scenarios (as proposed by ICES WGFBIT) with special attention to:

1. Spatial effort displacement (e.g. redistribution effects on benthic seafloor indicators, catch rates and fisheries revenue)
2. Effort allocation among activities (e.g. redistribution among gear types with various selectivity and impact on the seafloor, and various operating costs).
3. Ecosystem effects (accounting for (in)direct effects of effort reduction and displacement on benthic habitats and food webs).

(Science Plan codes: 7.3, 6.6, 6.4)

d) Explore how to (better) incorporate social factors associated with fisheries, given the different management scenarios (e.g. redistribution effects on fishing harbor communities); (Science Plan codes: 7.6, 7.1).

Prior to the workshop, the Chairs will prepare material to address the ToRs. This group will also ensure the completion of the workshop report, and operational TAF (Transparent Assessment Framework) products for WGFBIT consideration.

ICES WKTRADE2 will report by 27 September 2019 for the attention of ACOM and SCICOM.

Supporting information

Priority	High, in response to the stepwise process of delivering guidance on sea-floor integrity for the Marine Strategy Framework Directive (MSFD). The workshop outputs will feed into ICES WGFBIT and the ongoing efforts to provide guidance on potential trade-off in the operational implementation of the MSFD.

Scientific justification	Methods for assessing seafloor impact from bottom-contacting fishing gears have been developed within ICES (ICES 2017, 2019). From an EBFM (ecosystem based fisheries management) perspective, these methods can also be used to inform managers about the interlinkages, and therefore trade-offs, between benthic impacts and the landings or revenue of the fisheries. However, an actual cost (and benefit) associated with fishing in specific locations is difficult to estimate, because it differs by metier and by other factors such as a vessel's homeport, vessel characteristics, etc. ICES WKTRADE2 will advise on best practices to better reflect bio-economic cost and benefit trade-offs, and, to outline progression towards potential management options (e.g. scenarios that focus on the reduction of benthic impacts). These suggestions will consider both generic applications (to all EU ecoregions), as well as more detailed regionally specific applications. ICES WKTRADE2 will use state of the art modelling approaches of key dynamics and parameters. Beyond methodological developments towards a robust fishery-benthic impact trade-off assessment, we envision the products of this WK to supplement the WGFBIT trade-off outcomes with an assessment grounded on economic and social factors. As part of the WK, effort redistribution scenarios will inform where the redistribution of fishing activity will likely occur under different effort reduction scenarios proposed as test cases by ICES WGFBIT (see below). These outputs will provide information on the scale of fisheries economic and benthic impact tradeoffs. The Greater North Sea, Baltic Sea, or Celtic Sea ecoregions are suggested as first case study areas given the wealth of data and approaches already available in these regions. It is proposed that timing of WKTRADE2 is such that it ensures that assessment outcomes resulting from the tested scenarios are available to WGFBIT (October 2019). Effort reduction scenarios The impact assessment framework developed within ICES WGFBIT for MSFD-D6 is an overall assessment of benthic status supplemented by the exploration of alternative management options to improve GES by ecoregion or national jurisdictions. In the current draft advice produced by ICES WGFBIT, selected scenarios are explored in order to reduce the footprint of human activities and establish trade-offs between impact and economic revenue. All these scenarios apply a 10% reduction in effort, but in 5 different ways: Reduce the effort of each metier in each spatial cell by 10% Close c-squares to fisheries, starting at the lowest effort c-squares, until 10% of effort has been removed Identical to 2. but where effort of each metier, rather than total effort, is reduced by 10% Identical to 2. but where effort in each habitat, rather than total effort, is reduced by 10% Identical to 2. but where effort in each EEZ, rather than total effort, is reduced by 10% The first variant represents the simplest translation of a management measure into a pressure change. It is somewhat naive, but serves as a good comparison nonetheless. Variants 2 to 4 represent different priorities and strategies in management implementation. In variant 2. the emphasis is on maximally increasing the unfished area while minimizing the loss of core fishing grounds. Variant 3. is identical but includes an 'equal loss' principle across metiers – the reduction in fishing effort is required for each metier. Variant 4. captures an important element of the

	MSFD, the goal of reaching good environmental status in each habitat. Variant 5, rather than representing a specific policy priority, is used to study the effect of national, rather than regional, implementation of the example management measure. These scenarios by construction are likely to lead to a better status in areas where the effort is being reduced, while leading to some revenue loss affecting the fisheries from the cut in fishing opportunities imposed by the scenarios. Because in the present specifications the tested scenarios lead to such predicable outcomes, the WGBIT trade-off analysis would therefore gain at being refined to supplement the draft advice with more socioeconomic grounds. In reality, fishing effort may very well be redirected to the surroundings or to some other areas more remotely located. On the biological side, this will likely change the currently overly optimistic net gain on seafloor status expected from a fishing effort reduction if some displaced effort further deplete some other areas and ecosystem components, potentially vulnerable habitats, or previously unfished areas, or redirecting toward essential fish habitats. Ways to avoid such transfer should be considered. On the economic side, reducing the fishing opportunities will likely exacerbate the technical interactions among fisheries. This is because among others, fish movement, seasonal patterns, mutually exclusive gears, and regulations make the fish stocks differently available and accessible in time and space to different types of fishing, also constrained by how mobile the fishing vessels are. The current ICES WGFBIT draft advice gain/loss estimates will benefit from an understanding of how the human activities will redistribute in response to management and from the inclusion of fishery economic evaluation down to the actual fisheries and specific cost structures impacted by the scenarios. We know from our long experience of fisheries dynamics and fisheries behaviour, bio-economic modelling and model development (as listed in ICES WGECON or EU STECF Bio-economic modelling) that specific approaches are needed to capture the feed-back mechanisms in the system (such as, fisheries dynamics, technical interactions and fishery responses to changes in resource situations and management). Some proposed relevant models: DISPLACE, Honeycomb, STRATHE2E, etc.
Resource requirements	ICES Data Centre and secretariat support.
Participants	Workshop with researchers and RSCs investigators. In particular ICES working group experts from: ICES WGFBIT, ICES WGMARS, and ICES WGECON. Industry representatives will also be invited to provide input. 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	Data Centre, Secretariat support and meeting room
Financial	None
Linkages to advisory committees	Direct link to ACOM and SCICOM.
Linkages to other committees or groups	Links to WGSFD, WGFBIT, WGECON, WGSOCIAL
Linkages to other organizations	Links to OSPAR, HELCOM, Barcelona Convention, Bucharest Convention

Working Group on Shipping Impacts in the Marine Environment (WGSHIP)

2018/MA2/HAPISG11 A **Working Group on Shipping Impacts in the Marine Environment** (WGSHIP), chaired by Cathryn Murray*, Canada, and Co-chair (tbc), will be established 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 2019	25-27 November	ICES HQ, Copenhagen, Denmark		
Year 2020				
Year 2021			Final report by Date	

ToR descriptors

ToR	Description	Background	Science plan codes	Duration	Expected Deliverables
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.	2.1; 2.5;	2 years	Report to ICES. Respond to advice requests, as applicable.
b	Review availability of data on the intensity, geographical scope and trends in current and future global shipping activity, including those in the Arctic and in/near marine protected areas.	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, especially in areas of enhanced protection. The Arctic is one such area but there are a number of other productive sea areas where the shipping intensity has increased to an extent where impacts on the environment are becoming obvious.	2.1; 2.4; 2.7	2 years	Technical paper or peer-reviewed manuscript.
c	Review and evaluate methods to assess the risk of shipping on the marine environment, including estimates of accident probabilities and cumulative effects.	Cumulative effects assessment is needed to address the sheer volume and frequency of vessel movements, the interaction and summation of multiple impact pathways, and	2.1; 2.2; 6.1	3 years	Input on the general applicability or otherwise of such methods to IMO or national regulators through meeting participation,

		effects which overlap spatially and manifest through time.			correspondence group and/or technical paper or peer-reviewed manuscript.
d	Review and identify possible mitigation strategies for decreasing noise (from shipping) in general and specifically in sensitive areas.	The impact of noise has been the topic of discussion at the Environment Committee (IMO) for years. In parallel quite a lot of research has been carried out and it is time to summarize the knowledge and recommend action and further research.	2.1; 2.7; 6.1		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 impact types.	Vessel activities can have transboundary impacts and successful mitigation efforts require coordination and collaboration between trade partners. Methods for holistic management are urgently needed to balance the benefits of industry with environmental impacts.	6.1; 6.2	3 years	ICES Viewpoint

Summary of the Work Plan

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

Supporting information

Priority	The work of the Group forms the scientific basis for advancing knowledge related to the impacts of shipping on the environment. It is anticipated that advisory requests could soon be received concerning shipping impacts, thus it is high priority to establish a Group to address any new requests.
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.
Participants	The Group has had expressions of interest from more than 30 members.
Secretariat facilities	Standard secretarial support.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Development of ICES Viewpoint in collaboration with ACOM
Linkages to other committees or groups	Potential linkages with WGBOSV, WGITMO, WGSFD, WGMHM, WGMPCZM, IEASG

Linkages to other organizations	Potential linkages with Arctic Council, the Baltic Marine Environment Protection Commission (HELCOM), European Maritime Safety, Agency (EMSA), International Maritime Organization (IMO), National Oceanic and Atmospheric Administration (NOAA), 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.

EGs DISSOLVED in 2018

2017/2/HAPISG05	Workshop on Vulnerabilities and Risks to Culturally Significant Areas (WKVCSA)
2017/2/HAPISG05	Workshop on Co-existence and Synergies in Marine Spatial Planning (WKCSMP)

Resolutions approved in 2017

Working Group on Marine Sediment (WGMS)

2017/MA2/HAPISG01 The **Working Group on Marine Sediments with respect to pollution** (WGMS), chaired by Claire Mason*, UK, and Maria Belzunce, 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 2018	5–9 March	San Pedro del Pinatar, Murcia, Spain	Interim report by 1 June	
Year 2019	4–8 March	Évora, Portugal	Interim report by 1 May	Change in Chairs Outgoing: Craig Robinson, UK Incoming: Claire Mason, UK
Year 2020			Final report by Date	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
A	Respond to potential requests for advice as required.		2.1; 2.2	3 years	Advice
B	Dredging activities 1) Review the regulated substances and thresholds used in management of dredging activities	A major source of contaminants in marine sediments, the substances considered, their thresholds and management approaches are different in each country.	2.1; 6.1	3 years	Review document & recommendation, if required
	2) Review and recommend monitoring approaches to disposal sites		2.1; 3.1; 6.4	3 years	Review document & recommendation, if required
C	Sediment Quality Guidelines Review recent publications that may contain data to refine existing sediment assessment criteria	More data may be available to refine existing BACs / EACs; there are no existing criteria for some prioirity substances (e.g. PBDEs) for use in MSFD / OSPAR status assesments.	2.1; 3.2; 6.1	3 years	Annual updates and final report.
D	Plastic litter: To assess the relevance and the potential risk impact of (micro-) plastics in sediments and follow up of outcomes of other expert groups	(Micro-)plastics are included in MSFD Descriptor 10, are of emerging concern and can be a vector for contaminant transfer to sediments, or from sediments to biota	2.1; 2.2; 2.5	3 years	Annual updates and final report.
E	Emerging issues 1. To review and inform on the occurrence of substances of emerging concern in sediments,	Sediments are a sink for many of these pollutants, but may also be a source.	2.1; 4.5	3 years	Annual updates and final report.

	including platinum group and rare earth elements, as well as organic contaminants 2. To consider other forms of pollution, e.g. microbiological		2.1; 2.2		
F	Impact of renewable energy devices To explore the potential risk impact in terms of inputs (corrosion, anti-corrosion agents…) and release of contaminants due to sediment scouring	Changes in hydrodynamics may release sediment-bound contaminants; there may be inputs of contaminants during installation, operation and decommissioning. This is under active research by a member of the group.	2.1; 2.2; 2.7	3 years	Report (with recommendations, as appropriate)
G	Passive sampling				
	1) To publish guidelines on passive sampling of sediments	Documents are in advanced drafts and will be completed	2.3; 3.3; 4.4; 6.1	1 year	Two ICES TIMES papers
	2) To publish a review on passive sampling techniques	A review document is at an advanced stage of drafting and will be completed	2.3; 3.3; 4.4; 6.1	1 year	Cooperative Research Report
	3) Review and update on developments	Passive sampling is an advancing area of research that could improve on existing monitoring techniques	2.3; 3.3; 4.4; 6.1	3 years	Annual updates and final report.
	4) continue to develop a database to provide information of use in developing assessment criteria for passive sampling techniques		2.3; 2.5; 3.2; 6.1	3 years	Dataset and advice to OSPAR on progress

Summary of the Work Plan

Year 1	Completion of the different draft documents on Passive Sampling (PS) and submission as two ICES TIMES papers (Guidelines on PS in sedimens) and one Cooperative Research Report on the techniques for passive sampling of marine sedments. Progress work towards completion of the remaining ToRs
Year 2	Progress work towards completion of the remaining ToRs
Year 3	Final Report

Supporting information

Priority	This Group handles key issues regarding monitoring and assessment of contaminants in sediments. The current activities of this Group will lead ICES into issues related to the understanding of the relationship between human activties and marine ecosystems (estimation of pressure and impact, …). 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 10-15 members and guests.

Secretariat facilities	The normal secretarial support to an ICES Expert Group is required.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There are close working relationships with Marine Chemistry Working Group (MCWG) and Working Group on Biological Effects of Contaminants (WGBEC); some members of WGMS are also members of these. The work of WGMS is also relevant to the Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT) and to the OSPAR Intersessional Correspondence Group on Marine Litter (ICG ML).
Linkages to other organizations	OSPAR, HELCOM, MEDPOL, EU/JRC Expert Network on Contaminants.

Working Group on Marine Habitat Mapping (WGMHM)

2017/MA2/HAPISG02 The **Working Group on Marine Habitat Mapping** (WGMHM), chaired by James Strong, 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 2018	22-24 May	Hamburg, Germany	Interim report by 1 August	
Year 2019	3-7 June	Palma de Mallorca, Spain	Interim report by 1 August	Meeting in association with WGDEC
Year 2020			Final report by DATE	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
A	Report on progress in international mapping programmes (including OSPAR and HELCOM Conventions, EMODnet, EC and EEA initiatives, CHARM, Mesh-Atlantic and other projects).	Capturing the presence and work of large international mapping projects is importance because (i) the WGMHM report becomes a useful 'state of the art' summary of marine habitat mapping activity, (ii) the presentations from these projects helps spread best-practice, standardisation and collaborative working within the group, and (iii) other presentations highlight relevant mapping work that may benefit the large international programmes.	3.4	3 years	Annual updates and final report
B	Review and synthesise key results from national habitat mapping during the preceding year, as well as new on-going and planned projects focusing on particular issues of relevance to the rest of the meeting. Provide National Status Report updates in	The current extent of marine habitat mapping and modelling means that maps are meeting at international boundaries. It is important that maps are joined internationally and in a standardised manner. This requires an understanding of the extent and distribution of habitat mapping within nation states. Equally, WGMHM are often interested in specific habitats and wish to be kept informed of	3.4	3 years	Annual updates and final report. Submission of of survey metatdata to ICES Data Center

	geographic format in the ICES webGIS.	specific mapping exercises on these habitats, e.g. deepwater habitats or cold water corals. The reporting of national mapping is also the primary mechanism for encouraging WG members to submit survey metadata files to the various data archiving centres. The National Progress reports also states whether member countries have purchased significant survey items, such as ships, AUVs and sonars. This provides a good opportunity for others to identify useful resources for international colloboration.			
C	Summarise recent advances in marine habitat mapping and modelling techniques, including field work methodology, and data analysis and interpretation.	This ToR provides the main avenue for mappers to coomunicate new or improved techniques to the other scientists present (and captured in the report). As such, this ToR is essential for spreading best practice and developing new methods.	3.3	3 years	Annual updates and final report. The 2018 intersessional work will be directed towards producing our first marine habitat mapping best practice document (1–2 methodological topics only)
D	Review practise about the use of habitat maps, for example mapping for the MSFD, marine spatial planning, and management of MPAs; and assess the ability to use habitat maps for monitoring of the environment.	To encourage the diversification of the WGMHM, the group also consider how marine habitat maps are used for scientific and management purposes. Members of the group are often the creators of these maps and have important insights into how the maps can be used. Equally, it gives marine managers an opportunity to suggest how maps are best presented to support clarity and value for management purposes.	6.2	3 years	Annual updates and final report. The WGMHM also made a substantial contribution to the ICES Special Request Advice 'EU request for guidance on how pressure maps of fishing intensity contribute to an assessment of the state of seabed habitats' Published 4 July 2016
E	The identification of sources of information (e.g. bathymetry, oceanography, fisheries or socio-economic) that can be used for the production and enrichment of marine habitat maps.	Many of the remotely sensed and modelled outputs that are of value to marine habitat mappers is available online. Although much of this information is centralised in large data archives, other information remains dispersed on the web. This ToR seeks to collate the important data soueces that are of value for marine habitat mapping into one database.	3.2	Year 1	An annually updated database listing important data sources suitable for marine habitat mapping
F	Identify and advance theoretical aspects of habitat mapping (e.g. landscape ecology, supply-side ecology, implications of scale etc.).	This ToR is to provide an opportunity for EG members to address the theoretical aspects of marine habitat mapping. As a science in its infancy, it is important that underpinning concepts are challenged and re-evaluated.	4.1	Years 1 and 2	Important presentations and discusses summarised in annual reports. Scientific publication assessing the

	influence of classification schemes on marine habitat mapping (to be submitted in md December 2017 to ICES Journal of Marine Science)

Summary of the Work Plan

Year 1	Draft and finalise the "Recommended Operating Guidelines for Assessing and Communicating Confidence in Marine Habitat Mapping
Year 2	Conduct a joint meeting with the working group on deep-water ecology (WGDEC) and collaborate a significant joint output, e.g., geo-spatial modeling of the distribution of Atlantic Vulnerable Marine Ecosystems".
Year 3	Annual reporting for remaining ToRs and comissioning of new intersessional papers and database.

Supporting information

Priority	These ToRs are essential for maintaining the WG as a focused and relavent group for marine habitat mapping. The ToRs also contribute to the disemination of innovative ideas and best practice. This in turn improves the quality and quantity of marine habitat maps.
Resource requirements	The only resouces required will be the occassional use of ICES HQ meeting rooms.
Participants	The Group is normally attended by some 10 - 15 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a very close working relationship with Working Groups on Benthic Ecology, Deep-Water Ecology, Marine Planning and Coastal Zone Management and Spatial Fisheries Data.
Linkages to other organizations	EMODnet bathymetry and EMODnet seabed habitats.

Working Group on Methods for Estimating Discard Survival (WGMEDS)

2017/MA2/HAPISG03 A **Working Group on Methods for Estimating Discard Survival** (WGMEDS), chaired by Tom Catchpole, UK, and Sebastian Uhlmann, Belgium, will be established 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 2017	27 Nov-1 Dec	Olhão, Portugal	Interim report by 1 February 2018	
Year 2018	29 Oct-2 Nov	Mundaka, Spain	Interim report by 1 February 2019	

Year 2019	4–8 November (tbc)	Dublin, Ireland	Final report by 1 February 2020

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Review and update guidance on 'Methods to Estimate Discard Survival' based on further theoretical and practical developments to assess discard survival levels.	a) Science Requirements b) The European Commission requested an EG develop Methods for Estimating Discard Survival to address the need for guidance on methods.	2.7; 3.1; 4.1; 6.4	3 years	Report on developments in methods and amendments or corrections required on the ICES CRR on Methods to Estimate Discard Survival, February 2020
b	Based on meta-analysis of discard survival data and practical studies, investigate variables influencing survival probabilities, with a view to increase survival through modified fishing practices.	a) Science requirements	2.1; 6.1; 6.4	2 years	Peer reviewed paper, February 2019
c	Review ongoing monitoring requirements and methods and recommend amendments that generate data which inform on the survival probabilities of released marine organisms	a) Science Requirements Promote i) the development of methods for assessing the vitality of animals released from commercial and recreational fisheries; including the validation of vitality assessment as proxy estimates of discard survival and assessing the utility of stakeholder self-sampling; and ii) advice on effective sample sizes to estimate discard survival within confidence limits at fisheries scales.	1.6; 2.7; 3.1; 6.1	2 years	Report, February 2019
d	Application of discard survival estimates in fisheries management. Being proactive in engaging with other EGs to share new knowledge on discard survival.	a) Science Requirements b) Advisory Requirements The primary use for survival estimates has been in gaining exemption from the Landing Obligation. There are many other applications for this evidence relevant to stock assessments, ecosystem	2.7; 5.1; 5.4	2 years	Report describing and detailing new evidence on discard survival, February 2020

	models, and fishing gear technology, and more broadly improving catch welfare.

Summary of the Work Plan

Year 1	Working on all ToRs, but with special focus on ToR B, and identifying points of collaboration with other WGs (ToR D).
Year 2	Working on all ToRs, but with special focus on ToR C.
Year 3	Working on all ToRs, but with renewed focus on ToR A and ToR D.

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 20–25 members and guests.
Secretariat facilities	SharePoint site.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	The work of this group will enable the collection of standardised discard survival data for a number of European fisheries, and therefore will provide supporting information for the advisory groups.
Linkages to other committees or groups	The activities of this group will be coordinated by SCICOM, through HAPISG. It will work closely with WGFTFB and WGRFS, and will develop links with other WGs and advisory groups utilising data from discard survival assessments.
Linkages to other organizations	The outputs from this group will be of interest to various Regional Advisory Councils, as well as institutes and organisations conducting discard survival assessments in support of the Landing Obligation of the new EU Common Fisheries Policy and relevant institutes in USA, Australia and elsewhere.

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

2017/MA2/HAPISG04 A **Working Group on Fisheries Benthic Impact and Trade-offs (WGFBIT)**, chaired by Tobias van Kooten, Netherlands; Ole Ritzau Eigaard, Denmark; and Gert van Hoey, Belgium, will be established 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 2018	12–16 November	ICES HQ, Copenhagen, Denmark	Interim report by 14 December	
Year 2019	7–11 October (tbc)	Ancona, Italy (tbc)	Interim report by 1 December	

Year 2020	November	TBC	Final report by December

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Building from 2017 ICES work (WKTRADE, WKBENTH, and WKSTAKE) produce a framework for MSFD D6/D1 assessment related to bottom abrasion of fishing activity at the regional / subregional scale and identify key ecological processes input requirements.	Provide a worked example on how science can operationalize EBM (ecosystem based management) and contribute towards IEAs (intergrated ecosystem assessment) as ICES advice products. Links (avoiding overlaps) will be established with key experts also attending WGECO, WGDEC, WGSFD, BEWG, WGMHM, WGIMM, WGMBRED, and WGMPCZM	2.1; 2.4; 2.7	Year 1, reviewed in year 3	A worked example with guidng principles, that can be reviewed by ACOM leadership and SCICOM chair/SSGs for feedback. Specific action points, to ensure year 2 assessments can be conduccted by appropriate sub region for the N. Sea, Celtic, Baltic and Barrents Seas
b	Apply the framework to make a regional assessment for the North Sea, Celtic, Baltic and Barents Seas	EU MSFD D6/D1 assessment and providing management options that can be applied also by non-EU ICES countries.	2.7; 6.3	Year 2	Regional assessments of the impact of bottom abrasing fisheries

Summary of the Work Plan

Year 1	For an EU MSFD D6/D1 assessment related to bottom abrasion of fishing activity at the regional / subregional scale identify key ecological processes required as input. Priortity should be given to decide on a quantitative framework based on on biological processes, and to improve the parameterisation of framework components. The framework should allow for an overall assessment of benthic status and for the exploration of alternative management options to improve GES. Worked-out examples (and findings from WKTRADE 2017) should be used to ensure that a framework for addressing the above is established. The framework should be generic enough that it allows cross regional comparison and specific enough that it addresses regional-specific trade-offs (i.e. incorporating other pressures than fisheries). The framework should take into account complementarity to the ICES Fisheries Overviews (FOs) and Ecosystems Overviews (EOs), and provide input to overviews. The group will work between sessions to ensure required information is worked up to conduct assesments using the suggested framework (in preperation for year 2 meeting and advisory products).
Year 2	Using the framework, produce aassessment (draft advice) for the Celtic Seas, Greater North Sea, Barents Sea and Baltic Sea by subregion. Consider how other ecoregions can be incorporated (e.g. Mediterranean, Black Sea, Bay of Biscay and Iberian Coast). Assessments should be conducted using the guiding principles of TAF (transparent assessment framework).
Year 3	Update advice from previous year, and produce new (draft) assessments for 3 other ecoregions (and associated sub-regions). Review framework produced in year 1, and produce technical guidelines for "a standard" ICES advice product for MSFD D6/D1 and alternative management options to improve GES. Technical guidelines for the assesment will be produced to support TAF (transparent assessment framework).

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 envisoned that future funding will be availble 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 20–25 members and guests.
Secretariat facilities	Meeting room facilities, as well as Assisting Sectrariat help, Data Centre support, and Professional Officer shadowing and attendance of working group meeting.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Advice products and working groups (e.g. WGECO 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 Workings Groups WGECO, WGDEC, WGSFD, BEWG, WGMHM, WGIMM, WGMBRED, 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

Background to establishing a new ICES working group:

ICES now plays a central role as a facilitator for the setting of methodological standards for assessing EU's MSFD D1 habitat/D6 benthic, as well as in providing further guidance to Member States (MS) for the setting of threshold values to operationalize indicators.

The underlying basis for the recent ICES advice provided to EU (DG-ENV) has come from work that started in 2016 (WKFBI, 2016) and 2017 (WKBENTH, WKSTAKE and WKTRADE). These workshops have involved several ICES working group experts (WGSFD, BEWG, WGMHM, WGDEC), experts working closely with RSCs (HELCOM and OSPAR), as well as experts from European funded projects (BENTHIS). Given the success of these workshops, it has been the wish of expert particpipants to carry on this collaborative work by establishing a new ICES working group, WGFBIT (working group on fisheries benthic impact and trade-offs).

Given the foreseen increase in ICES advisory work with regard to EU's MSFD D1 habitat/D6 benthic and given the recent international scientific advances, establishing a group would ensure continuity and avoiding having to establish each year an *ad hoc* group. Such a group with targeted 3 year TORs would attract participation/collaboration from WGECO, WGDEC, WGSFD, BEWG, MHWG, WGIMM, WGMBRED, WGMPCZM members. In addition to advisory products (D6/D1 MSFD), scientific collaboration and research papers would ensure a stronger basis for working group reports and ICES advice. Such a group would also allow for participation by key experts also involved in RSCs, STCEF, JRC work – and encourage access to data.

Envisioned work on standardised methodolgies and critreria

Parameterization of a sensitivity model for different habitats and ecoregions, will require targeted studies on benthic community longevity composition and habitat relationship. Emphasis: other regions than the N Sea, broad range of environmental conditions (grain size, depth, salinity, bed shear stress, etc.), also include epifauna (at present box/grab sampling of infauna).

Targeted studies and modelling to incorporate regional scale heterogeneity: including habitat heterogeneity, as well as heterogeneity in successional state relative to connectivity (i.e. oceanography or distance between source and sink populations, in a multi species context).

Despite ICES 2017 advice, there is still no agreed upon method to determine where status is *"good"* in relation to fishing pressure. There is also limited ecological basis for setting good environmental status (GES) threshold

levels for habitats that may span across different spatial scales, across an interconnected seafloor. If non-linear relationships exist between pressure and state of a habitat at a specific scale, the inflection point in these relationships (i.e. when a significant change in the relationship occurs) could be used to help define thresholds. However, at the current time, such thresholds have not been identified. The spatial heterogeneity in *'good status'* locations across a region may also affect recovery rates (e.g. habitat fragmentation, relative to dispersal and connectivity across the seabed).

ICES also noted in the 2017 advice that the outcome of the impact assessment (fraction of habitat unimpacted / fraction of habitat at a certain state) is dependent on the assessment method used and the spatial resolution of the fishing pressure data layer (now 0.05 x 0.05 degrees). A change in spatial resolution will result in an overall change in the assessed habitat state. This means that the setting of threshold values is method dependent.

Some of the tasks that WGFBIT would contribute towards in the next years 2018-2020 will ensure that ICES can continue to play a pivotal role in fully operationalizing an assessment of D6/D1. Some of the key milestones will include:

1) *TAF framework* – underlying assessment methods need to be understandable, transparent and accessible (TAF, link). This requires work to clean code used to run assessments and the production of a technical guidance document that describes the indicators for assessing pressure and impact on the seafloor from mobile bottom-contacting fishing, based on their ability to produce impact estimates on a continuous scale that can be used in trade-off evaluations.
2) *Benchmarking process* – the proposed pressure and impact indicators need to be reviewed and evaluated in an open workshop in terms of their MSFD assessment suitability. This needs to be done in dialogue with RSC with agreed upon guiding principles against which the benchmarking process can be run.
3) *GES thresholds* – As part of a complete technical guideline document for the operationalization of the indicators, threshold values will need to be specified. This will require scientific input in order to operationalize 1) quality thresholds for benthic impact, and 2) spatial extent of habitat that should achieve those values. Using available methods, the workshop will explore safe biological limits of impact that can be used to explore spatial up-scaling and down-scaling of GES thresholds.
4) *RSCs acceptance* – there needs to be dialogue with those management bodies and member country experts that are "end-users" of the indictors. This is an iterative process and may require training.
5) *Ecoregion calibration – targeted project and/or working group work will need to re-calibrate the proposed impact indicators in terms of regional specific conditions.*

Working Group on Marine Litter (WGML)

2017/MA2/HAPISG08 The **Working Group on Marine Litter** (WGML), chaired by Thomas Maes, UK; Francois Galgani, France; and Andy Booth, Norway, will work on ToRs and generate deliverables as listed in the Table below.

Remark: 5-day meeting = 2 x 2.5 days split between seafloor litter and microplastic ToRs

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2018	23–27 April	ICES HQ, Copenhagen, Denmark	Interim report by 31 May	
Year 2019	21–24 October	Paris, France		
Year 2020	DATE	tbc	Final report by DATE to SCICOM	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Respond to requests for external and internal advice (e.g. EU, Regional Seas Conventions, ICES Data Centre/Secretariat) as required	Science or advisory requirements.	2.1; 3.1; 6.1	Y1-3	Advice and review document as required
b	Review and report on developments in MSFD, other EU directives and international frameworks regarding marine litter	Follow-up on future needs is key to constructively guiding and supporting the development process for monitoring, threshold development and impact assessment.	6.3;	Y1-3	Annual reporting
c	Review and propose guidance for seafloor litter and microplastic monitoring and assessment to support expected ICES data needs based on the review in ToR a	The aim is to provide guidance in solving problems for sampling, data comparability and ICES data submissions.	3.1; 3.2; 3.5;	Y1-3	Annual reporting consisting of guidelines and review of Standard Operating Procedures (SOP), scientific publication
d	Propose a possible strategy or road map for ICES to follow with respect to seafloor litter and microplastic research and monitoring	Required for standardisation of monitoring and subsequent assessments	3.1; 3.2; 6.3;	Y3	Seafloor litter monitoring and research strategy for attention of SCICOM, scientific publication
e	Interact with exisiting bodies, projects and organisations e.g. OSPAR, HELCOM, GESAMP, JPI Oceans to develop and report on international developments in marine litter research and monitoring	To avoid duplication of effort and improve international coordination and communication	4.1; 6.3	Y1-3	Annual reporting
f	Report new developments in quality assurance in marine litter monitoring in Europe, and provide information on other proficiency testing schemes with relevance to WGML.	Availability of high quality proficiency testing is vital to produce reliable results.	4.1; 6.3	Y1-3	Annual reporting, guidance for proficiency testing, ICES Cooperative Research Report (CRR) or Techniques in Marine Environmental Sciences (TIMES)

Summary of the Work Plan

Year 1	Respond to requests under ToR a, e & f Begin review paper to start to address ToRs c & d; Gather information on network of experts for topic to address ToR b, c & e Develop and set out matrix of knowledge gaps for remaining ToRs; Progress work towards completion of the remaining ToRs It will be important to revise current practices and activities in relation to seafloor litter and microplastic monitoring and assessment to take stock of different approaches in the light of international requirements and to make future recommendations for ICES e.g. sampling methods, protocol updates, monitoring programme guidelines, analytical methods, assessment methods, gear comparisons, data statistical power of monitoring programmes and QA/QC Produce Interim Report
Year 2	Respond to requests under ToR a Progress work towards completion of the remaining ToRs Continue review paper activity to address ToRs c & d Further develop matrix of knowledge gaps in relation to national and international knowledge and produce network map and advise documents as required Produce Interim Report
Year 3	Respond to requests under ToR a Finalise review papers ready for submission for ToRs c and d; finalise matrices and interpret output to address other ToRs Produce Final Report

Supporting information

Priority	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 MPs.
Resource requirements	The research programmes which provide the main input to this group are already underway (e.g. CleanAtlantic, Baseman, WeatherMIC, …) and national/EU resources are already committed. The ICES Data Centre has already invested in the setup of a database for seafloor litter (DATRAS) and microplastics (DOME). The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The group is predicted to attract 20–25 members and guests. The group will focus on two main topics (seafloor litter/microplastics) and a 5 day meeting could be split equally to allow participants to attend all or half of the meeting depending on their interests and expertise.
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 committees or groups	There will be close working relationships with HAPISG EG. The planned work is especially relevant to MCWG, WGMS, WGBEC and WGIBTS.
Linkages to other organizations	PICES, CIESM, EU, JPI Oceans, GESAMP, UN, RSC, G7, G20, …

Workshop on Integrating Historical Data into modern stock assessment (WKIHSD) - cancelled

CANCELLED / To be revised

2017/2/HAPISG07 The **Workshop on Integrating Historical Data into modern stock assessment** (WKIHSD), chaired by TBC, will meet in Lysekil, Sweden, DATE (to be confirmed) 2019 to:

a) Explore and apply different methods in order to incorporate historical data into modern stock assessment;

a) Explore the advantage to use longer time-series into stock assessment, to understand better the potential use of historical data and for estimating biomass reference points

WKIHSD will report by DATE (tbc) 2019 (via HAPISG) for the attention of SCICOM.

Supporting information

Priority	Stock Assessment is currently the primary tool used to inform management, evaluate the status of fisheries resources, and develop management measures. Many stock assessments tend to use very short time series, without considering older data. This workshop aims to help elucidate the potential benefits of including historical data in stock assessment, as well as promote the integration of different disciplines within and outside ICES.
Scientific justification	Term of Reference a) Historical data can be very diverse. In some cases they are quite extensive and could be readily used in current stock assessment models or advice. However, in other cases, data are scarce, intermittent, and can lack information such as spatial coverage, size or catch at age, and effort. Therefore, even though the importance of these data is undeniable, it is still challenging to include them in stock assessment or other types of fishery management. It is therefore important to explore different methods for incorporating these data into current stock assessment with the help of experts or modellers. Historical ecologists and/or historians are also critical, for understanding how these data were collected and can be used, , and the management actions and/or historical events (e.g. wars) that would potentially affect landing time series. Term of Reference b) Including historical data into stock assessment could be very useful in particular to to estimate reference points, explore changes in stock productivity and growth, understand better the current status of the stocks and even develop stock assessment for data poor species. During the workshop, a number of stock assessments will be updated with historical data in order to understand the benefits of including those data in terms of increased knowledge, to be used to tailor more efficient management measures.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed.
Participants	Expected attendance 10 scientists
Secretariat facilities	None.
Financial	No financial implications.
Linkage to the ICES Science Plan	ToR a): 3.5; 4.3 ToR b): 2.1; 5.2; 6.1
Linkages to advisory committees	There are no obvious direct linkages with the advisory committees.
Linkages to other committees or groups	ACOM Expert Groups. In particular, the Working Group on Ecosystem Effects of Fishing Activities (WGECO) and stock assessment working groups in general.
Linkages to other organizations	The work of this group is closely aligned with similar work in FAO and global Oceans Past Initiative (OPI) network.

Working Group on Economics (WGECON)

2017/MA2/HAPISG09 A **Working Group on Economics** (WGECON), chaired by Hazel Curtis, UK, Rasmus Nielsen, Denmark, and Olivier Thebaud, France, will be established 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 2018	11–15 June	ICES HQ, Copenhagen, Denmark	Interim report by 25 August	
Year 2019	11-14 June	Paris, France	Interim report by 20 August	
Year 2020			Final report by Date	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	To map the current work and identify future needs for economic science in ICES, giving consideration to useful connections to international marine/ fisheries economics organisations such as IIFET, NAAFE and EAFE.	This is mostly scoping exercise within ICES, but also ensures coordination of activities with other international bodies and links to the wider scoping work in the Strategic Initiative for the Human Dimension (SIHD).	6.3; 6.4; 7.3	Years 1, 2	Annual reporting
b	To identify and report on economic data gaps that point to priorities for longer-term data collection, research, institutional needs, and researcher training in all ICES member countries; and where possible propose systems to collect missing data.	To aid prioritisation of data collection to enable quantitative analyses and estimates of economic issues for ecosystem overviews and future advice requests. The ToR also links to ICES Data Centre.	3.1; 3.2; 4.2	Years 1, 2	Annual reporting
c	To define and report on the information flow needed to provide trade-off analysis of fishing impacts and ecosystem services	To develop a system to support potential future advice requests and development of ecosystem overviews	5.3; 6.1; 7.6	Years 2, 3	Annual reporting
d	To assess and report on the economic significance of commercial fishing for selected coastal regions in the ICES area	To support future potential advice requests and development of ecosystem overviews	6.6; 7.1; 7.2	Years 2, 3	Annual reporting, potentially also scientific manuscript

Summary of the Work Plan

Year 1	Start mapping the current work and identify future needs for economic science in ICES (ToR

	a) and identifying economic data gaps (ToR b). Briefly brainstorm and discuss ideas on how to address and organise work under the remaining ToRs in year 2. Ensure establishing close connections with other relevant groups within and outside ICES. Producing Interim Report.
Year 2	Progress work towards completion of ToR a) and ToR b). Start work on defining the information flow needed to provide trade-off analysis (ToRc) and assessing the ecocomic significance of commercial fishing (ToR d). Producing Interim Report.
Year 3	Finalise ToR c and ToR d, incl. the manuscript. Discuss and plan strategies and concrete steps for future work. Produce Final Report.

Supporting information

Priority	Nations are concerned about fish stocks and marine ecosystems not least because they can contribute to human wellbeing; therefore, these natural resources have an economic value. The economic dimension should be an integral part of marine science and scientific advice regarding the use and conservation of marine resources. Demand for science and advice to address economic considerations is increasing, but ICES does not engage many economists or address economic issues in many member countries in its existing work. The efforts of the Strategic Initiative on the Human Dimension (SIHD) with ICES have served to raise the profile of economics in the last few years, but, with a few exceptions, SIHD efforts are not comprehensively supported and informed by the work of the ICES EG. Further, none of the existing EG that address economic issues are focusing on the development of economic metrics and core economic analyses that are demanded in parts of the ICES network (e.g. further development of ecosystem overviews) and, in some cases, by clients for ICES advice. The need to expand the engagement of ICES in economics was also reflected in the outcomes of many recent meetings, especially the "Understanding marine socio-ecological systems" (MSEAS) Conference which ICES co-sponsored in Brest in 2016. Others drivers include high level aspirations for Blue Growth in European countries and globally, the interest in managing fisheries for Maximum Economic Yield and a desire to understand economic consequences of human-induced changes in the sea (WGHIST). There is also recognition in ICES, and from our clients, that it would be desirable to add economic metrics to ICES ecosystem overviews and better recognise people and their livelihoods as part of the ecosystem. Further, in the longer term, ICES growing engagement in aquaculture science will likely lead to overviews of aquaculture activity that will also require economic inputs.
Resource requirements	The group will rely on ongoing international and national research projects with active involvement of WGECON members.
Participants	This is a new Group, expected to be attended by some 20–25 participants.
Secretariat facilities	None.
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 committees or groups	The subject area of this EG has close linkage with at least the following ICES groups: WGMIXFISH, WGSEDA,WGIMM, WGRMES, WGNARS, WGHIST and the Strategic Initiative SIHD.
Linkages to other organizations	International Institute of Fisheries Economics and Trade (IIFET), North American Association, of Fisheries Economists (NAAFE), European Association of Fisheries Economists (EAFE), EU Scientific, Technical and Economic Committee for Fisheries (STECF), Food and Agriculture Organisation of the United Nations (FAO)

Working Group on the History of Fish and Fisheries (WGHIST)

2017/MA2/HAPISG10 The **Working Group on the History of Fish and Fisheries** (WGHIST), chaired by Ruth Thurstan, UK, and Emily Klein, USA, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2018	4–7 September	Brest, France	Interim report by 1 December	
Year 2019	17–20 June	Penryn, UK		
Year 2020	early Sept	ICES HQ, Copenhagen, Denmark (TBC)	Final report by 1 December	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Collection and assembly of metadata on marine social-ecological systems through time, and further development of data products and best practices that encourage the use of these resources.	Data from WGHIST supports the development of tools for marine living resource management and provides data to the global community via the ICES Data Centre. In addition, WGHIST can work with ICES Data Centre to identify opportunities for promoting and facilitating access to and the digitization of historical and archival resources housed by other institutions. WGHIST can also develop guidelines for the use of and best practise in using long-term/historical data in research and management.	4.1; 6.1; 7.7	All years	Digital products, such as indexing WGHIST metadata on the ICES Spatial Facility. Guidelines on best practice within ICES and beyond when using and/or applying historical data to contemporary advice and/or management.
b	Review outcomes of WKIHSD meeting and peer-reviewed research from the historical ecology community, and from these consider preparing brief overviews of key historical information for submission to ICES Ecosystem and/or Fisheries Overviews.	ICES Overviews present an opportunity to increase the visibility of available historical data via brief summaries that include key aspects of specific ecoregions/fisheries (e.g., historical pressures, year of commencement of significant fishing activity, historical landings, historical distribution of fishing/other activities compared to today). WGHIST proposes to submit information, based upon the outcomes of WKIHSD and peer-reviewed research from the historical ecology community, on a number of ecoregions and/or fisheries in a form similar to 'Trends in Non-Indigenous Species', for	5.4; 6.6; 7.7	All years	Overview text, suitable for inclusion in ICES Overviews (in a comparable format to Trends in Non-Indigenous Species), on key historical activities and data available on ecoregions and/or fisheries.

		consideration for inclusion in ICES Overviews.			
c	Evaluate changes in marine ecological and social-ecological systems through time via cross-disciplinary collaboration, and demonstrate the importance of this knowledge for contemporary science and management.	The interdisciplinary nature of WGHIST, with expertise in marine ecology, fisheries biology, historical ecology, palaeoecology, social and environmental history, offers a unique forum for conducting research into marine social-ecological systems and the scale, direction and drivers of social-ecological change through time.	2.2; 5.4; 7.7	All years, culminating in year 3	Submission of (1) manuscript reviewing the development of major fishing technologies through time, and the ecological, social and/or cultural changes facilitated by these innovations; and/or (2) manuscript on the benefits and challenges of cross-disciplinary collaborative work.
d	Continue to use non-traditional data sources and approaches for advancing our knowledge of change and dynamics in marine ecological and social-ecological systems through time.	Several members of WGHIST work with unconventional resources and approaches, and are well versed in using interdisciplinary methods to extract non-traditional data and interpret trends over long (decadal to centennial) periods of time.	1.9, 4.1, 7.7	All years, culminating in year 3	Submission of manuscript or alternative (WGHIST report) on non-traditional methods, approaches (e.g. empirical dynamic modelling, time series analysis), their outcomes and application (e.g., data poor fisheries).

Summary of the Work Plan

Year 1	In Year 1, WGHIST will work with the ICES Data Centre to explore the opportunities for developing data products that encourage use of and enhance the visibility of historical and long-term data (ToR a). Work on the proposed manuscripts (ToRs c, d) will also commence during the Year 1 meeting, as will identification of historical data/literature for the ecosystem overviews (ToR b). Potential areas of interest already identified by WGHIST members for ToRs c and d include: quantifying changes in ecosystem services over time, detailing fishing technology change and cumulative impacts upon fishing efficiency, and invoking cross-disciplinary knowledge to expand our understanding of linked social-ecological system change through time. Post-meeting work will involve soliciting contributions from the wider WGHIST membership list and continued development of manuscripts. WGHIST will also support WKIHSD with data resources and expertise (ToR a). The WGHIST 2018 meeting will also re-establish links with the ICES SIHD and other WG with expertise relevant to WGHIST aims, through invitation of SIHD and WG Chairs to the WGHIST meeting, whether in person or remotely, and by the WGHIST Chairs remaining in communication with SIHD and other WG throughout the year. These efforts aim to strengthen cross-disciplinary ties and enhance communication and learning among ICES WGs. Links with external groups (e.g. Oceans Past Initiative) will also be maintained to enhance interdisciplinary learning and collaboration.
Year 2 and 3	In years 2 and 3 WGHIST will continue to develop digital tools for historical metadata, explore opportunities for improving the accessibility of historical data for use by the scientific community, and develop protocols for best practise when using historical data, potentially in collaboration with the ICES Data Centre and other WGs. While these tools will be finalised in year 3, it is our hope that progress will be ongoing throughout years 1 and 2, including the provision of digital updates to the ICES community during this time. If so, this will afford WGHIST members and the wider ICES community multiple opportunities to make use of these tools and feedback to the Chairs and Data

Centre on these tools, thus enabling the tools to be improved over this iteration.

Years 2 and 3 will also see progress on the proposed manuscripts and ecosystem overviews, and the WGHIST chairs will work to maintain and enhance connections with SIHD and other relevant WG, as above. Year 2 will forward manuscript and guidelines in our ToRs, which will be circulated among WGHIST members in between the metings. This circulation may include scientists and practitioners with targeted expertise outside WGHIST. In both years, specific research from WGHIST will be used to expand this work. Deliverables will then be completed in Year 3.

Supporting information

Priority	The value of historical marine ecology for evaluating current ecosystem health and providing appropriate baselines is now well published. In addition, understanding social-ecological system change has great potential for greater appreciation of both the system resilience and how they may change in the future. **Scientific Scope:** WGHIST 2018-2020 will focus on operationalizing historical data for current scientific questions and management needs. In particular, this iteration of WGHIST will emphasize increasing the visibility and accessibility of historical data to ICES and the wider scientific community, and conducting interdisciplinary research that improves our understanding of social-ecological change through time and the impacts these changes have had, and continue to have, upon fisheries provision.
Resource requirements	WGHIST will continue consultation with ICES Data Centre staff. Future Data Centre staff attendance will be an asset to WGHIST, but if this cannot be achieved in person, remote connections worked well during the previous iteration and will be leveraged. WGHIST co-chairs will also be contacting SIHD chairs to discuss their interest and ability to attend future meetings, again either in person or remotely. Any assistance ICES can provide for supporting remote access to meetings is greatly appreciated.
Participants	WGHIST predicts attendance of 8-15 group members and guests each year. These will include ecologists, historians, social scientists, economists, policy experts, data analysts working in or connected to historical marine ecology. In addition, we will invite guests in contemporary management and policy, and in the social sciences, who may participate remotely.
Secretariat facilities	None in 2018 or 2019. Meeting rooms and ability for participants to access the meeting at ICES HQ remotely in 2020.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	WGHIST will actively seek out connections within ACOM for the application of historical ecology work into scientific advice (e.g. stock baselines, change through time, context for IEAs, etc).
Linkages to other committees or groups	Direct support of WKIHSD. Potential links to ACOM, EPDSG, HAPISG, IEASG, SIHD as well as WGBIODIV, WGBFAS, WGECO, WGMARS, WGMIXFISH, WGRMES, WGSAM, DIG and WGSEDA, depending on interest and availability of committee and group members to join in person or remotely.
Linkages to other organizations	There is interest for the European Commission in regards to MSFD baseline development as well as Integrated Ecosystem Assessments. Participants in the Oceans Past Initiative (OPI) will also be interested in our work and outcomes, and WGHIST will promote connections with this group. Finally, WGHIST has an international participation beyond ICES member countries, including Australia, South Africa, and Italy.

Resolutions approved in 2016

Methods Working Group (MGWG)

2016/MA2/SSGEPI01 The **Methods Working Group** (MGWG), chaired by Arni Magnusson, ICES Secretariat, and Christopher Legault*, USA, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2017	13–17 November	Woods Hole, USA	Interim report by 10 December	
Year 2018	10–14 September	Ispra, Italy	Interim report by 1 November	
Year 2019	23–27 September	Seattle, USA	Final report by 15 November to SCICOM	**Incominig Co-Chair**: Christopher Legault, USA

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Development of new assessment models	The focus will be on single-species stock assessment models (incl. biomass models and age-structured models fitted to age and/or length data, as well as tag recoveries) estimating stock size and harvest rate.	5.1; 5.4	3 years	At least one mansucript submitted to a peer-reviewed scientific journal
b	Improving existing assessment models	The focus will be on single-species stock assessment models (incl. biomass models and age-structured models fitted to age and/or length data, as well as tag recoveries) estimating stock size and harvest rate.	5.1; 5.4	3 years	At least one mansucript submitted to a peer-reviewed scientific journal
c	Organise a collection of datasets	The datasets will be used to address ToR d: Test performance of existing and new models	5.1; 5.4; 6.1	2 years	Web data server
d	Test performance of existing and new models.	Building on the methods and recommendations from SISAM and WCSAM, the ability of methods to accurately determine stock status and appropriate catch projections will be evaluated	5.1; 5.4	3 years	At least one mansucript submitted to a peer-reviewed scientific journal

e	Develop, improve and test assessment-related techniques	Under this ToR, statistical and computational methods other than population dynamics models will be dealt with.	5.1; 5.4	3 years	At least one manuscript to be submitted a peer-reviewed scientific journal

Summary of the Work Plan

Year 1	Prepare for the first meeting, invite people, and organize a discussion on topics of interest. Form sub-groups, identify topics and tentative manuscript titles.
Year 2	Continue working on all ToRs. Finalise ToR c)
Year 3	Finalise manuscripts. Reporting to parent organisations. Plan for continuation of the EG.

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 around the world. The activities of this Group will ensure visibility of ICES 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 programmes which provide the main input to this group are already underway. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	Stock assessment experts from all over the world would be invited to participate, especially those who are involved in cutting-edge stock assessment research. The Group is expected to attract around 20–25 participants.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	No direct linkages.
Linkages to other committees or groups	SISAM
Linkages to other organizations	ICCAT, WFC, other RFMOs to be included in GAMe

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

2016/MA2/SSGEPI02 The **Working Group on Introduction and Transfer of Marine Organisms** (WGITMO), chaired by Cynthia McKenzie, Canada, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2017	13-15 March	Woods Hole, MA, USA	Interim report by 15 April	
Year 2018	7–9 March	Madeira, Portugal	Interim report by 15 April	
Year 2019	4–6 March	Weymouth, UK	Final report by 1 May to SCICOM	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Advance reseach, develop collaborations and address surveyllance and knowledge gaps in issue related to the introduction and transfer of marine organsims, through annual reviews of national/ international activities and responding to advice requests.	Data, information and knowledge collated and synthesised ensures timely update of AquaNIS. This information will be used as an underlying information source for other ToR's, responding to incoming advice requests as well as organising collaboration with other international science organisations (e.g. PICES and CIESM).	2.1; 2.4; 3.3	3 years	Annual resports 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, incl. in Arctic environments.	This work will be carried out jointly with WGBOSV. Contributes to SICCME 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 non-indigenous species.
c	Investigate biofouling as 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.	Biofouling has been 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 (WGAQUA), energy installations, and coastal development as stressors on coastal environments.	2.7; 2.1; 6.4	3 years	Input on the general applicability of preventive measures and selective mitigation technologies through technical paper or manuscript submitted to peer-reviewed scientific journal.
d	Advance knowledge base to further develope indicators to evaluate the status and impacs of non-indigenous species in marine environments.	The aim is to develop wider knowledge-base to more effectively address several legislative acts related to introductions of non-native species, such as EU IAS Regulation and EU MSFD (D2). Specifically, WGITMO aims to improve/develop metrics and critically evualuate the underlying uncertainties.	2.2; 2.7; 6.1	3 years	At least one manuscript to be submitted to a peer-reviewed scientific journal.
e	Evaluate the development and utilization of DNA- and RNA-based molecular tools for early detection and monitoring of non-native species.	There are potentially several benefits for molecular approaches in support of surveillance programmes for non native species, however, this does not mean that such approaches are free from limitations and biases. Although further improvements are needed, these DNA-based approaches are promising, and already effective for active surveillance of specific/targeted	2.5; 1.6; 4.4	year 3	Input on the effective utilization of these methods for international and national regulators through meeting participation, correspondence group and/or technical paper.

		species for which the above mentioned limitations had been overcome. Effective use of these new tools will be evaluated for detection of non-native species.			
f	**Completed** - Contribute regional text (~ 150 words and 1-2 graphs in each case) to new ecosystem overviews for (i) Iceland, (ii) Norwegian Seas, (iii) Azorean ecoregion and (iv) the Oceanic north-east Atlantic ecoregion in relation to the rate of discovery of invasive species where information is available.	Advisory request	2.1; 6.5	year 1	WGITMO will work intersessionally to deliver the first two ecosystem overviews (i and ii) by the end of 2016 and during 2017 for the ecosystem overviews (iii and iv) for the attention of ACOM.

Summary of the Work Plan

Year 1	Working on all ToRs, but with special focus on b, c, and d
Year 2	Working on all ToRs, but with special focus on a, c, and e
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 resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by some 25–35 members and guests.
Secretariat facilities	None.
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.
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 'sectorial' expert groups, such as Biodiversity Science (WGBIODIV), Aquaculture (WGAQUA), Harmful Algae Bloom Dynamics (WGHABD), WGITMO also contributes to Integrated Ecosystem Assessments EG's.
Linkages to other organizations	PICES and CIESM

Working Group on Marine Renewable Energy (WGMRE)

2016/MA2/SSGEPI03 The **Working Group on Marine Renewable Energy** (WGMRE), chaired by Marijke Warnas*, NL, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2017	11–13 April	Lisbon, Portugal	Interim report by 30 June	
Year 2018	16–18 April	Runde, Norway	Interim report by 1 June	
Year 2019	26–28 February	Ostend, Belgium	Final report by 15 April to SCICOM	**Change of Chair**: Outgoing: Finlay Bennet, UK Incoming: Marijke Warnas, NL

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Summarize and analyze the state of development of the marine renewable energy sector, covering offshore wind energy, in-stream tidal energy, wave energy and tidal barrages, updated on an ongoing basis, and including 'horizon scanning' to identify future issues for marine environmental management.	• Science Requirements: the marine renewable energy sector is rapidly emerging as a new user of marine space. There is a need for up-to-date, information on developments and on current research activities to determine potential interactions with ecosystems and other sea users. • Advisory Requirements: Advice to OSPAR and other customers requires access to latest research outcomes and experience of developments in this emerging science area. • Requirements from other EGs: marine renewable energy developments will impact or interact with topics considered by other EGs, for example marine mammals, seabirds, benthos.	2.1; 2.7; 4.5	Ongoing	National reports, on marine renewable energy developments and associated research, updated and extended annually. The product will be developed into a manuscript to be submitted to a peer-reviewed scientific journal.
b	Report on developments in consenting procedures for marine renewable energy.	As for ToR a) above.	2.1; 2.7; 4.5	Ongoing	As for ToR a) above.
c	Review the development of decision-support and management tools for planning and regulation of marine renewable energy developments, considering the relevance to new technology, cumulative effects and the application of risk-based ecosystem approaches to management.	As for ToR a) above	2.1; 2.7; 4.5	Ongoing	As for ToR a) above..
d	Identify monitoring priorities associated with potential mechanisms of effects that are assumed within cumulative assessment frameworks, and how monitoring is	As for ToR a) above.	2.1; 2.7; 4.5	Ongoing	As for ToR a) above.

	integrated into the development of decision-support tools and regulatory requirements. Report on development and standardisation of post-consent monitoring methods that promote efficient use of resources within ICES community and can provide robust results at single MRE locations and through use of meta-analysis approaches at multiple locations.				
e	Foster strong collaborative working relationships with other ICES Expert Groups, ensuring integration across topic areas and identifying priority issues and science applications based on regulatory and planning needs in relation to marine renewable energy.	As for ToR a) above.	2.1; 2.7; 4.5	Ongoing	As for ToR a) above.
f	Provide preliminary draft of advice on the current state and knowledge of studies into the deployment and environmental impacts of the following wet renewable energies and marine energy storage systems: wave energy (floating, coastal infrastructure), tidal stream (screws, kites), tidal flow (barrage, lagoon) and others. Advice should cover the status of wet renewable development in the OSPAR region, future prospects, potential environmental problems (sea bed habitat loss/disturbance, fish, marine mammals, birds, seascape/ public perception, and cumulative impacts), potential benefits, next steps and conclusions.	Advisory Requirements: ICES has received a special request from OSPAR to advice on the current state and knowledge of studies into the deployment and environmental impacts of wet renewable technologies and marine energy storage systems. A subgroup will meet at ICES headquartes 15-16 January with experts from WGMBRED and WGMRE and draft a preliminary version of the advice. The preliminary draft advice will be further developed during WGMBRED (12-15 February 2019) meeting and finalised during WGMRE meeting.	6.1	Year 3	Report to ICES according to the advisory request

Summary of the Work Plan

Year 1	- Provide annual report against ToRs, revising format as necessary - Invite chairs and members of other EGs to participate in the WG meeting and identify cross-cutting issues; reviewing relevant material in other EG reports - Report on the development of tools and approaches that can be used to align Policy with Evidence in a manner that promotes risk-based decision making when addressing societal trade-offs between the upscaling of marine renewable energy with impacts to wildlife populations, habitats and ecosystem services - Report on research priorities and approaches to study design and standardisation of monitoring in order to meet the needs of risk-based decision making in an efficient and robust manner - Draft manuscript for publication in a peer reviewed journal based on the output of multi-annual ToRs - Collaborations with other EGs (mainly via video-conferecning) - Review multi-annual ToRs for years 2 and 3 and adjust as appropriate
Year 2	- Provide updates to annual report against ToRs - Submit manuscript to a peer reviewed journal - Review multi-annual ToRs for year 3 and adjust as appropriate
Year 3	- Provide updates to annual report against ToRs - Undertake outstanding work to ensure anuscript is accepted by peer reviewed journal e.g. addressing peer reviewers' comments - Deliver advisory product according to ToR f.

Supporting information

Priority	Current activities of this Group will enable ICES to respond an advice request from OSPAR and will lead ICES into issues related to the ecosystem effects of marine renewable energy, especially with regard to the application of the Precautionary Approach in the context of risk-based decision making and the need to reduce scientific uncertainty associated with the impacts of new and established marine renewable technologies. Consequently, these activities are considered to have a high priority.
Resource requirements	The research programmes which provide the source material for this group already exist or are underway, and resources are already committed. Additional resources are required to respond the request for advice from OSPAR. A subgroup of experts from WGMRE and WGMBRED will meet in Januaty in Copenhagen to draft a first response to the adivice.
Participants	The Group is normally attended by approximately 12 members and guests.
Secretariat facilities	None.
Financial	Additional resources covered by OSPAR special request.
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 WGMBRED, WGMME and a range of other WGs who consider the impacts of marine renewable energy within their ToRs.
Linkages to other organizations	OSPAR

Working Group on Marine Planning and Coastal Zone Management (WGMPCZM)

2016/MA2/SSGEPI04 The **Working Group on Marine Planning and Coastal Zone Management (WGMPCZM)**, chaired by Matthew Gubbins, UK, and Andrea Morf, Sweden, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2017	3–7 April	Barcelona, Spain	Interim report by 20 May	
Year 2018	23–27 April	ICES HQ, Copenhagen, Denmark	Interim report by 1 June	
Year 2019	8–12 April	Galway, Irealnd	Final report by 20 May to SCICOM	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Assess key issues arising in the development of marine plans across the ICES area and make recommendations on the role of science to address these	a) Receive updates on the issues arising in ICES countries marine plans b) Special emphasis on issues related to cross-border / trans-national planning and land-sea interactions (LSI) c) Receive assessments from country reports on the use of science (natural, social, economic) data, information and advice in the plan development process d) This term of reference provides the context for the whole work of the WG	2.1; 6.2; 6.3	Years 1, 2, 3	Y2: Manuscript on the role of science in MSP, based on the experiences of member countries. Y3: A review of key issues as a chapter of the Final WG report.
b	Develop cumulative impact assessment techniques for pressures resulting human activities on the marine environment in the context of marine planning	a) Continued need for Cumulative Effect Assessment in marine planning OSPAR b) Bayesian Network meta-model for cumulative pressures c) Futher develop management measures assessment techniques d) Linkages with the UNECE standards initiative related to Goals 14 of the UN Sustainable Development Goals	2.2; 4.3; 6.1	Years 1, 2, 3	Y1: Follow up from WKPASM activities. Y2: Workshops to identify data needs and approaches to cumulative impact assessments of new sectors/pressures and marine vulnerabilities in marine planning Y3: A handbook on Bayesian network and bow tie analysis tools for cumulative effects analysis Y3: Manuscript on the meta-models of pressure and their management measures.
c	Address marine planning skills and capacity shortages by working with the ICES secretariat to develop and deliver training materials / course as required. Act as scientific steering group for	a) Builds on the ICES training course developed in 2014 b) Steers the direction of development of role play / serious gaming, accounting for the above assessments of training needs.	6.3; 6.4; 7.4	Years 1 , 2, 3	Y1: A revised MSP training course outline made available to the secretariat. Y3: A review of the experiences gained through the application of the MSP Challenge serious

	the MSP Challenge serious game.					game and related products, probably as a chapter in the Final WG report.
d	Review approaches to plan evaluation and monitoring	a) b)	Builds on inputs collated under ToR a , CRR 327 and existing international frameworks Assesses these for commonality and identify gaps	6.2; 6.3; 6.4	Years 1, 2, 3	Y3: Manuscript on approaches to plan evaluation and monitoring
e	Develop approaches to account for culturally significant areas in marine planning	a) b) c) d)	Builds on work by WGMPCZM to develop an approach to identify culturally significant areas in the sea Takes a vulnerability and risk assessment approach, thus building on work under ToR b Takes examples from member countries provided under ToR a Makes recommendations on approaches to be adopted	3.6; 7.3; 7.7	Years 1, 2	Y1: Workshop to develop a vulnerability and risk assessment approach for culturally significant areas Y2: Manual (CRR, already approved in 2015) for applying the vulnerability and risk assessment approach in marine planning
f	Coexistence and synergies in MSP: Develop approaches for evaluating benefits.	a) b) c) d)	Builds on the workshop "Conflicts and Coexistence in MSP", expanding this approach towards a more specific consideration of synergies Develops approaches for analysis and evaluation of benefits Using case studies from member countries provided under ToR a	2.7; 7.4	Years 2, 3	Y2: Workshop to develop a classification system for coexistence and synergies in MSP and develop approaches for evaluating the benefits of synergies in MSP Y3: Manuscript on synergies in marine planning and evaluation of their benefits.
g	Work with the ICES data centre to develop, for the purposes of marine planning, aspects of the spatial data facility to improve functionality and content	a) b) c)	Builds on work to define data needs of MSP and review of ICES data holdings Recommends functionality to improve the accessibility and utility of existing data holdings for marine planning Provides guidance on new data types and sources to enhance existing catalogue	2.1; 4.2	Years 1, 2, 3	Y1: Specification of a "marine planning" Application (story map) in the ICES spatial facility. Y2: A compilation of existing external data sources hosting data for marine planning as potential sources of data feeds (year 1) A prioritised list of data gaps for MSP with particular reference to international / transboundary data. Y3: The development of an ICES "marine planning" Application in the ICES spatial facility.

Summary of the Work Plan

Year 1	• Follow up on activities from WKPASM (reporting, workshop and model development) ToR b • A revised MSP training course outline made available to the ICES secretariat ToR C • Workshop to develop a vulnerability and risk assessment approach for culturally significant areas • Specification of "marine planning" thematic data portal ToR E • A compilation of existing external data sources hosting data for marine planning was potential sources of data feeds ToR G
Year 2	• Produce a paper on the role of science in MSP based on experiences of member countries ToR A • Run a workshop to identify data needs and approaches to cumulative impact assessments of new sectors/pressures and marine vulnerabilities in marine planning ToR B • Produce a manual for applying the vulnerability and risk assessment approach in marine planning ToR B • Run a workshop to develop a classification system for coexistence and synergies in MSP and develop approaches for evaluating the benefits of synergies in MSP ToR F • A prioritised list of data gaps for MSP with particular reference to international / transboundary data ToR G
Year 3	• Produce a review of key issues in marine planning experienced by ICES member countries and lessons learned ToR A • Prepare a handbook on Bayesian network and bow tie analysis tools for cumulative effects analysis ToR B • Produce a primary paper on meta-models of pressures and their management measures ToR B • A review of the experiences gained through the application of the MSP Challenge serious game and related products ToR C • Produce a review paper on approaches to plan evaluation and monitoring ToR D • A review paper on synergies in marine planning and evaluation of their benefits. ToR F • The development of an ICES "marine planning" thematic portal ToR G

Supporting information

Priority	All ICES member countries are currently responding to drivers for the indroduction of marine planning and many are facing common challenges to succesful implementation. The groups terms of reference address some of these key challenges and will provide an overview of status, tools, manuals, training products, analysis of processes and data sources to assist with implementation.
Resource requirements	Group members have undertaken to complete the planned work programme from their own institute's resourcing. No additional resources are expected to be required, other than the current level of secretariat support to WG meetings and workshops.
Participants	The Group is normally attended by some 10-20 members and guests.
Secretariat facilities	Web conferencing, publications assistance (CRRs), attendence of data centre staff to some meetings as required. Requirement under ToR G for staff of the Data Centre to assist in creation of a new "marine planning" application (story map) by year 3.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	Group members are well connected across a variety of ACOM and SCICOM working groups. Links to SIHD, interaction with WGINOSE, ICES Data Centre.
Linkages to other organizations	EU MSP Expert Group, OSPAR ICG MSP, HELCOM-VASAB (common members and sharing ToRs for coordination purposes, past joint workshops / training events).

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

2016/MA2/SSGEPI05 The **Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem** (WGEXT), chaired by Ad Stolk, 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 2017	24–27 April	London, UK	Interim report by 30 June	
Year 2018	16–19 April	Copenhagen, Denmark	Interim report by 1 June	
Year 2019	6–9 May	Lisbon, Portugal	Final report by 15 June to SCICOM	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
A1	Review data on marine extraction activities. Provide a summary of data on marine sediment extraction for the OSPAR region to OSPAR.	a) OSPAR Requirements b) Advisory Requirements c) Inform other countries to optimize their policy and management	2.1; 6.4	yearly	Annual extracted volumes and areas as a chapter in all Interim and Final Reports
A2	Review of development in marine resource mapping, legal regime and policy, environmental impact assessment, research and monitoring and the use of the ICES Guidelines on Marine Aggregate Extraction.	a) Advisory Requirements b) Inform other countries to optimize their policy and management	2.1; 6.4	Year 3	chapter in Final Report
B	Create an ICES aggregate database comprising all aggregate related data, including scientific research, EIA, licensing and monitoring data.	a) Advisory Requirements b) Inform other countries to optimize their policy and management c) Cooperation with other WG's d) Link to ICES database	2.1; 6.4	Year 1,2,3	Year 1: review and validation historical data Year 2: finalise template for approval ICES Data Centre Year 3: template to ICES countires
C	Incorporate MSFD into WGEXT	a) Advisory Requirements b) Inform other countries to optimize their policy and management c) Tuning WGEXT and ICES guidelines with EU guidelines	2.4; 6.4	Year 2 and 3	Year 2and 3: participation in ICES workshops on MSFD D6 Year 3: review of ICES Guidelines on Marine Aggregate Extraction

D	Ensure outputs of the WGEXT are accessible by publishing as a group and creating a webpage on the ICES website.	a) Inform other countries to optimize their policy and management b) Contribute to the visibility and impact of ICES	2.1	Years 2,3	Year 2: submitting review manuscript on MSFD to a peer-reviewed journal Year 3: submitting manuscript on intensity of extraction to a peer-reviewed journal
E	Discuss the mitigation that takes place across ICES countries and where lessons can be learned or recommendations taken forward	a) Advisory Requirements b) Inform other countries to optimize their policy and management	2.4; 2.7; 6.4	Year 2 and 3	Year 2: specific inventory on mitigation in ICES countries Year 3: evaluation and assessment of mitigation measures
F	Study the implications of the growing interest in deep sea mining for the WGEXT (legislation, environmental, geological)	a) Initiate the incorporation of this coming issue within ICES b) Inform other countries to optimize their policy and management	2.1; 6.4	Year 1,3	Year 1: inventory of marine mineral mining by ICES countries Year 1: poll to ICES countries concerning policy and legislation on dep sea mining Year 3: report on the assessment of outcome of inventories
I	Cumulative assessment guidance and framework for assessment should be developed.	Contribute and working together with possible other ICES and OSPAR WG's that are involved in this subject	2.2	Year 1,3	Year 1: contacting OSPAR and ICES working groups on the incorporation of marine sediment extraction in cumulative assessments Year 3: finalise the definition of quantification of dredging intensity Year 3: report on examples and a general methodology to incorporate marine sediment extraction in Cumulative Impact Assesments
K	Impacts of marine aggregate extraction on fish and fisheries	Contribute and working together with possible other ICES WG's that are involved in this subject	2.7	Year 2,3	Year 2: report on the inventory of policy of ICES countries Year 3: review of research
L	Implications of Marine Spatial Planning on marine sediment extraction	a) Advisory Requirements b) Inform other countries to optimize their policy and management	2.7; 6.4	Year 2,3,	Year 2: report on the inventory of ICES countries policy development Year 3: review report on the incorporation of

	marine sediment extraction in Marine Spatial Planning in ICES member countries

Summary of the Work Plan

Year 1	A1, B, F, I
Year 2	A1, B, C, D, E, K, L
Year 3	A1, A2, B, C, D, E,F, I, K, L

Supporting information

Priority	The current activities of WGEXT will lead ICES into issues related to the ecosystem effects of marine aggregate extraction. Aggregate extraction is increasing in some countries and rather stable in others. This activity is connected to several Descriptors in the EU MSFD. The Report of WGEXT and the Guidelines are used in the management of this activity in the member countries. Consequently, these activities are considered to have a high priority.
Resource requirements	Notice that the activities of WGEXT are focussed on the use of existing research programmes (e.g. EIA monitoring) and data on extraction and management. The additional resource required to undertake additional activities in the framework of this group is negligible
Participants	The Group is normally attended by some 12–20 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There is a potentially working relationship with all the groups of SCICOM. The coming years a cooperation with other WG's is planned on the subjects of cumulation of effects, create and use a database and the effects on fisheries. On deep sea mining there is cooperation with WGMS.
Linkages to other organizations	Data on marine extraction are delivered to OSPAR

Stock Identification Methods Working Group (SIMWG)

2016/MA2/SSGEPI06 The **Stock Identification Methods Working Group** (SIMWG), chaired by Lisa Kerr, USA, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2017	By correspondence	By correspondence	Interim report by 1 August	
Year 2018	7-8 August	Portland, USA	Interim report by 27 August	
Year 2019	By correspondence	By correspondence	Final report by DATE	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Review recent advances in stock identification methods	a) Tracks best practices in stock ID b) Promotes new technologies c) Relevant to all ICES species	1.4; 1.7; 5.2	3 years (and continued)	EG report
b	Provide technical reviews and expert opinions on matters of stock identification, as requested by specific Working Groups and SCICOM	a) Contributes to understanding of structure and connectivity of fish populations/stocks b) Highly relevant to assessment and management	5.1; 5.2; 5.4	3 years (and continued)	EG report and updated table of species reviews
c	Review and report on advances in mixed stock analysis, and assess their potential role in improving precision of stock assessment	a) Relevant to resolving mixed stock composition issues in assessment and management	5.1; 5.2; 5.4	3 years	EG report and contribution to ICES ASC; manuscript submitted to a peer-reviewed scientific journal'

Summary of the Work Plan

Year 1	Address terms of reference through work by correspondence in 2017
Year 2	Organise a physical meeting for summer 2018
Year 3	Address terms of reference through work at an in-person meeting for SIMWG for summer 2019

Supporting information

Priority	Understanding stock structure is a fundamental requirement before any assessment or modelling on a stock level can be contemplated. SIMWG liaises with ICES expert groups and working groups on stock identification issues and continues to review new methods as they develop
Resource requirements	SharePoint website and clear feedback from expert groups, SCICOM and SSGEPI is pivotal for the efficacy of SIMWG.
Participants	The Group is normally attended by some 10–15 members and guests.
Secretariat facilities	Access to SharePoint to all members and Chair-nominated guests.
Financial	None
Linkages to ACOM and groups under ACOM	ACOM
Linkages to other committees or groups	SIMWG has recently worked closely with a range of ICES working groups including WGWIDE, WGBIE, WGHANSA, and NWWG; benchmark workshops including WKPLE and WKHAD, and advice drafting groups such as ADGDEEP, and in previous years SIWMG connected with many more ICES groups to fulfill requests.
Linkages to other organizations	There are no obvious direct linkages, beyond the SIMWG members' affiliation and commitment to their own employers.