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Working Group on Socio-Economic Dimensions of Aquaculture (WGSEDA)

2020/FT/ASG01 The **Working Group on Social and Economic Dimensions of Aquaculture (WGSEDA)**, chaired by Gesche Krause, Germany and Cornelia Kreiss, 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 2021	3-7 May	Castletownbere, Ireland/Virtual	Interim report by 21 May to ASG	
Year 2022	May	Spain (TBD)	Interim report by Date Month May to ASG	
Year 2023	May	France (TBD)	Final report by Date Month May to ASG	

ToR descriptors

TOR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Identify and develop methods to determine the socio-economic effects of aquaculture	Social and cultural aspects of aquaculture production are an understudied subject. Methods of how to capture and document observations on socio-economic effects of that aquaculture development are still emerging, especially in relation to how to address these social effects across different scales and contexts of the industry. Links to Science plan topic "Sea and society".	7.1, 7.2	3 years	Summary within Report, Research paper on potential improved sustainability outcomes by regionalization of aquaculture across the value chain and across the different sustainability dimensions.

b	Identify trajectories and monitor emerging issues of socio-economic concerns of aquaculture development	Continuous TOR to identify the emerging socio-economic issues of aquaculture and related science advisory needs for maintaining the sustainability of living marine resources and the protection of the marine environment on a regular basis. Further, factors causing an aquaculture system to garner social opposition/acceptance and if these factors are shared or differ across different aquaculture systems and countries. Links to Science plan topics "Seafood production", "Emerging techniques and technologies" and "Sea and society".	4.5, 5.8, 7.1	3 years	Summary within Report, Research paper on collated case studies that capture crucial issues of social opposition/acceptance of aquaculture across ICES member states.
c	Review governance and economic interventions important for socio-economic dimensions of aquaculture and its future development	Aquaculture scenario development needs to include policies and perceptions (i.e. social drivers) and economic constraints. The latter is closely linked to governance interventions that are not always cost-effective or meaningful to boost sustainability effects of aquaculture. The review aims to make trade-off decisions more consistent and easier to perform, and to suggest more contextualised aquaculture policies and measures. Links to Science plan topics "Conservation and management science" and "Sea and Society".	6.2, 7.4	3 years	Summary within Report, Review on governance and economic interventions important for socio-economic dimensions of aquaculture.

d	Explorative cost-benefit analysis of genetic methods with emphasis on SME and conservation program broodstocks dedicated to aquaculture or natural population enhancement.	Managing genetic relationships and diversity within broodstock enables a long-term basis for both selection of improved food fish material for aquaculture production and supportive augmentation of natural populations. The loss of genetic variability due to inbreeding is detrimental for the cost-effectivity of re-stocking and it may even be impossible to retrieve variability again from the wild. While the use of genetic tools is part of day-to-day routines in large breeding companies, the lack of logistically feasible and cost-effective tools has so far prevented proper broodstock genetic management in SME's and conservation programs. This ToR is planned as a shared ToR between WGAGFA and WGSEDA and has linking points to WGs with fish stock conservation focus (e.g. WGNAS) and contributes to the Science Plan topics "Emerging techniques and technologies", "Seafood production" and "Sea and Society".	4.4., 5.5, 7.6	1 (initially appointed for 1 year, but reserving the possibility to extend further)	Explorative study on market availability for genetic breeding consultation and genotyping services, evaluating the occurring costs and contrasting these to their benefits in report form.
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Summary of the Work Plan

Year 1	Finalize research paper on potential improved sustainability outcomes by regionalization of aquaculture across the value chain and across the different sustainability dimensions (ToR a), discuss emerging issues of socio-economic concerns of aquaculture development (ToR b) and work on research paper on collated case studies that capture crucial issues of social opposition/acceptance of aquaculture across ICES member states (ToR b) as well as start working on the review on governance and economic interventions important for socio-economic dimensions of aquaculture (ToR c). Conducting an explorative cost-benefit analysis of genetic methods as described in ToR d.
Year 2	Finalize research paper on social opposition/acceptance of aquaculture (ToR b) discuss and collate emerging issues of socio-economic concerns of aquaculture development (ToR b) and continue work on the review on governance and economic interventions important for socio-economic dimensions of aquaculture (ToR c).
Year 3	Discuss emerging issues of socio-economic concerns of aquaculture development (ToR b) and finalize review paper on methods to address socio-economic dimensions of aquaculture (ToR c).

Supporting information

Priority	The current activities of this Group will lead ICES into issues related to the impacts of seafood production (aquaculture) on society focusing on economic and social aspects. 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 8-16 members and guests. During the virtual meeting in 2020, 25 members/guest attended.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and group under ACOM	ACOM, WGEIA
Linkages to other committees or groups	Through the shared ToR a close working relationship will be build up with WGAGFA. It is also very relevant to the Working Group on WGSOCIAL, WGSCENARIO, WGICZM, WGMSP.
Linkages to other organizations	

Working Group on Application of Genetics in Fisheries and Aquaculture (WGAGFA)

2020/FT/ASG02 The Working Group on the Application of Genetics in Fisheries and Aquaculture (WGAGFA), chaired by Naiara Rodriguez-Ezpeleta, 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 2021	10–14 May	Olhao, PT	Interim report by 30 June to ASG, SCICOM and ACOM	Chair: Naiara Rodríguez-Ezpeleta
Year 2022	TBD May	Sukarrieta; ES	Interim report by 30 June to ASG, SCICOM and ACOM	Chair: Naiara Rodríguez-Ezpeleta
Year 2023	TBD May	Leuven; BE	Final report by 30 June to ASG, SCICOM and ACOM	Chair: Naiara Rodríguez-Ezpeleta

ToR descriptors

ToR	Description	Background	Science Plan codes	Durati on	Expected Deliverables
a	Documentation: How the rapid advances in genomics and analytical methods are revolutionising population identification in marine fish and invertebrate species	Stock identification has always been a major aspect of fisheries genetics. In the genetic context, the term “stock” means population or discrete breeding stock, and has biological reality. For populations to be accepted as the fundamental units on which assessment is based, it is essential to accurately classify these units, and ideally describe how they originated and are maintained. Until recently, population identification has been limited by the availability of sufficiently powerful molecular markers and analytical methods. Now however complete genome sequences are available for several commercial species, it is quick and economical to compile WGS for other species, and exponentially-increasing computer	2.7, 5.6, 6.1	3 years	Review paper and metrics for measures of indirect genetic impacts

power has led to a plethora of new analytical methods. The aim of this proposed TOR would be to list and describe these methods, and their actual or potential application in population identification. It would be presumed that details would be constantly updated during the next three year period, thus ultimately producing an up-to-date document for publication. Power analyses would be invoked to calculate suitable sample sizes and locus number, and relative implications of different approaches would be compared. How these population entities were formed during post glacial range expansion and are maintained, for example, by heterogeneous spawning habitat, oceanic barriers and other factors would also be investigated. Many marine species, while homing to discrete natal areas to spawn, mix at other life history stages. These stages, usually involving harvest, would be investigated using mixed stock analysis (MSA) methods, presuming that sufficiently large differences can be demonstrated between component populations. Adaptive loci, under directional selection, might be particularly useful in the latter context, but also in investigating population response to climate change.

b	To review and evaluate the potential of adaptive variation for assessing fisheries.	A growing body of evidence suggests marine species display local adaptation over moderate to fine spatial scales, and the genes and genomic regions contributing to adaptive diversity (e.g., temperature, pathogens, etc.) have been identified in a variety of marine species. Yet despite this knowledge and widespread biodiversity losses across the North Atlantic, we still lack an understanding of species responses to disturbance, such as future climate change, in many commercially, culturally, and ecologically important marine species. The overarching goal of this ToR is to evaluate the current capacity to quantify relevant adaptive diversity in marine species; and explore how this information may be utilized in predictions of future biodiversity response to change. Specifically, we will review the literature regarding the genomic basis of adaptation in marine species, and examine how genomic architecture (e.g., single loci, CNVs, and chromosomal rearrangements) influences phenotype associations and our ability to resolve relevant variation. Secondly, we will evaluate new methods that utilize genomic data to establish an evolutionary framework for understanding adaptive diversity and to predict future responses. These will include “genomic vulnerability”, a metric that quantifies the shift in genomic variation required to adapt to future change and uses machine learning to incorporate genomic descriptions of adaptive diversity, climate projections, and ecological modelling. Such approaches have the potential to identify highly vulnerable marine populations and transform science advice regarding fisheries management and marine conservation. Thirdly, we will provide recommendations for how this information could be practically integrated with existing advisory and management frameworks in the Northern Atlantic. Ultimately, this ToR will directly inform the use of genomic approaches to both quantify adaptive diversity and to predict future responses to disturbance in marine species.	1.3, 1.5, 1.7, 2.2, 2.5, 5.2, 6.1, 6.3	3 years	Review paper and recommendations on the use genomic data to predict future population responses to environmental change and disturbance.
c	To evaluate available genetic-based solutions to better	Recent estimates suggest that mesopelagic fish represent 90% of the fish biomass of the planet, which has raised interest in exploitation of this unknown ecosystem. Yet, the high estimated biomass also suggests that mesopelagic fish might play a key	1.4, 1.6	3 years	Review Paper and non-technical review topic sheet.

understand the mesopelagic ecosystem. This still pristine ecosystem before it becomes too late to take protecting actions. This ToR could be dedicated to explore and evaluate the different alternative genetic methods available that could be used for that aim such as environmental DNA samples for estimating biomass and species identification, stomach content DNA analysis for understanding trophic networks, population genomics for species connectivity and diversity as proxies for resilience, etc.

d	WGAGFA & WGS-EDA: Explorative cost-benefit analysis of genetic methods with emphasis on SME and conservation program broodstocks dedicated to aquaculture or natural population enhancement.	Managing genetic relationships and diversity within broodstock enables a long-term basis for both selection of improved food fish material for aquaculture production and supportive augmentation of natural populations. The loss of genetic variability due to inbreeding is detrimental for the cost-effectivity of re-stocking and it may even be impossible to retrieve variability again from the wild. While the use of genetic tools is part of day-to-day routines in large breeding companies, the lack of logistically feasible and cost-effective tools has so far prevented proper broodstock genetic management in SME's and conservation programs. This ToR is planned as a shared ToR between WGAGFA and WGSEDA and has linking points to WGs with fish stock conservation focus (e.g. WGNAS) and contributes to the Science Plan topics "Emerging techniques and technologies", "Seafood production" and "Conservation and management science"	4.4, 5.5, 7.6	1 (initially - Reserving the possibility to extend further)	Explorative study on market availability for genetic breeding consultation and genotyping services, evaluating the occurring costs and contrasting these to their benefits in report form.
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Summary of the Work Plan

Year 1	<p>ToR a) Review the literature, with special focus on the application of genomic data analysis to the study of population structure and connectivity in exploited (directly or indirectly) marine species (vertebrates and invertebrates).</p> <p>ToR b) Review the literature regarding the genomic basis of adaptation in marine species, and examine how genomic architecture influences phenotype associations and our ability to resolve relevant variation. We will identify approaches that build on this genomic understanding of adaptive diversity, to predict future responses of populations to disturbance.</p> <p>ToR c) Produce an overview of the mesopelagic ecosystem, identify key species and review the literature on different genetic methods available to study this ecosystem. In addition to this overview, focus will be on identifying where especially eDNA and stomach content DNA analysis are being used or could be used in the mesopelagic ecosystem. Identify the key species in the mesopelagic ecosystem with respect to the trophic network – create a simple flowchart.</p> <p>ToR d) Report on explorative study on market available genetic advices and genotyping services, evaluating the occurring costs and contrasting these to their benefits in report form. Evaluation of outcome and value of further deepening of analysis. Decision as to whether ToR will be carried on.</p>
Year 2	<p>ToR a) Identify analytical approaches used and evaluate their power and accuracy. Start drafting an "analytical framework" that will attempt at standardising the sampling/processing/ statistical approaches to be used when producing results that will feed into management measures.</p> <p>ToR b) Evaluate new methods which build on a genomic understanding of adaptive diversity, to predict future responses of marine populations to disturbance. These will include but not be limited to an examine of genomic vulnerability.</p> <p>ToR c) Continue the evaluation and identification of genetic methods as well as key species for studies of the</p>

	mesopelagic ecosystem, including any relevant studies describing the ecosystem. Evaluate any new genetic methods for utilisation in studies of the mesopelagic ecosystem. Start to formulate review paper manuscript. ToR d) To be determined. Pending decision of year 1.
Year 3	ToR a) Complete review paper for publication and develop recommendations. ToR b) Complete a review paper for publication and develop recommendations. ToR c) Finalise and update the evaluation: identify problematic areas requiring future research as well as identify areas where novel techniques show particular promise. Finish review paper and non-technical review topic sheet. ToR d) To be determined. Pending decision of year 1 and 2.

Supporting information

Priority	The WGAGFA Terms of Reference for the reporting period 2021 to 2023 will produce information, knowledge and advice in line with the ICES Science priorities. Particularly ecosystem science, impacts of human activities, observation and exploration, emerging techniques and technologies and seafood production, as well as conservation and management will be tackled and reported upon.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources have been committed.
Participants	The Group is normally attended by some 15-25 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	Joint SCICOM/ACOM group.
Linkages to other committees or groups	There is a very close working relationship with EPDSG, EOSG and EPISG. Additionally, several EGs, particularly WGSEDA but also including WGITMO, WGBIODIV, WGBOSV.
Linkages to other organizations	European Commission; Scientific, Technical and Economic Committee for Fisheries (STECF); European Fisheries Control Agency (EFCA); GFCM; FAO; IFREMER, NOAA, DFO Canada.

Working Group on Risks assessment of Environmental Interactions of Aquaculture (WGREIA)

2020/FT/ASG03 The **Working Group on Environmental Interactions of Aquaculture (WGEIA)** will be renamed the **Working Group on Risk assessment of Environmental Interactions of Aquaculture (WGREIA)**, chaired by Ellen Sofie Grefsrud, Norway 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 2021	4-6 May	Copenhagen, Denmark	E-evaluation to SCICOM by 21 May 2021	
Year 2022	10-12 May	Coimbra, Portugal	E-evaluation to SCICOM by 26 May 2022	

Year 2023	9-11 May	Bergen, Norway	Final report by 8 July to ACOM/SCICOM
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ToR descriptors¹

TO R	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Publication of review of laws and regulatory standards for monitoring and managing environmental impacts of marine aquaculture, and the corresponding thresholds values established by ICES countries and China, and knowledge gaps and prioritized research.	This work was initiated in WGEIA (2018-2020). Here we will complete the work and publish the results in a peer-review journal.	5.6,7.4	Year 1	Peer-review publication
b	Risk assessment methods for environmental impacts of aquaculture	Building on ToRa, ToRb aims to review and compare methods and models for assessing risk of negative environmental impacts due to aquaculture production.	2.1, 5.6, 5.8	Year 1, 2 &3	Write a review publication of when and how risk assessment is used for aquaculture. TIMES publication detailing Methods for risk assessment and risk analysis for environmental impacts of aquaculture.

Summary of the Work Plan

YEAR	
Year 1	ToRa (Review of laws and regulatory standards for monitoring and prioritised research) will be reported as a peer-review paper, and ToR b (Risk assessment methods) will be initiated.
Year 2	Continue discussion on risk assessment methods aiming to make a foundation for a common understanding on best practice within risk assessment and risk analysis of environmental impact of aquaculture. Peer-review publication of when and how risk assessment is used for aquaculture
Year 3	ToRb will be reported included a TIMES publication detailing Risk assessment methods for environmental impacts of aquaculture

Supporting information

Priority	The current activities of this Group will continue to lead ICES into issues related to aquaculture including elucidating the legal structure under which the environmental interactions of aquaculture are managed in different ICES countries. Scientific work on ecosystem interactions will lay the scientific foundation for further sustainable aquaculture growth to meet or surpass legal requirements. Consequently, these activities are considered to have a high priority.
Resource requirements	Hosting of the first meeting in Copenhagen.
Participants	The Group will be established of 15-25 experts of aquaculture - environment interactions, regulators, legal expertise, risk experts and others
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and group under ACOM	This WG sets the stage for future advice products from ICES as governments need to do risk assessment of the growing aquaculture industry in Europe and North-America.
Linkages to other committees or groups	There is a very close working relationship with all the groups of the Aquaculture Steering Group. We will seek to form links with the Working Group on Socio-Economic Dimensions of Aquaculture (WGSEDA) Working Group on Pathology and Diseases of Marine Organisms (WGPDMO), Working Group on Application of Genetics in Fisheries and Mariculture (WGAGFM), Working Group on Scenario Planning on Aquaculture (WGSPAQ), and Working Group on Ecological Carrying Capacity (WGECCA)
Linkages to other organizations	National regulatory authorities in ICES countries and China, EU, FAO.

Workshop on the manual for genetic sampling from fisheries products in the NAFO area (WKGenMan)

2020/WK/ASG04 **The Workshop on the manual for genetic sampling from fisheries products in the NAFO area (WKGenMan)**, in response to the EU-DGMARE request for ICES advice on the International **Manual** of Procedures ([IMP](#)), an EU proposal to the Standing Committee of International Control (STACTIC) of the Northwest Atlantic Fisheries Organisation (NAFO) to guide the collection of samples from fisheries products for **genetic** analysis, chaired by Jann Martinsohn (Italy) and Naiara Rodriguez-Ezpeleta (Spain), will work by correspondence until 12 January 2021 to address the request to review the IMP and to specifically:

- a) Review the adequacy of the approach proposed in IMP for collection of genetic material for sampling of fish on board of vessels for species identification;
- b) Evaluate feasibility and recommend a method for sample preservation that will be effective at maintaining sample integrity in the NAFO Regulatory Area fisheries, where at least 7 days are needed from sample collection to delivery at a laboratory facility;
- c) Review the adequacy of procedures for sample material collection, preservation and transfer to laboratory;
- d) Review the adequacy of the genetic technique advocated in the IMP, provided that it should produce unequivocal evidence about species identification/misidentification; and,
- e) Produce a report detailing the review of IMP and conclusions of WKGenMan on the basis of the ToRs a-d; and,

To carry out this work, WKGenMan, a Core Group of members from the ICES Working Group on Application of Genetics in Fisheries and Aquaculture (WGAGFA), including an invited expert from NAFO, will work by correspondence. WKGenMan will report by 12 January for the attention of the ASG, ACOM and SCICOM.

Supporting information

Priority	High, in response to a specific request from the EU Commission to ICES to prepare a review and advice on the International Manual of Procedures (IMP). The advice should provide the scientific knowledge basis to assess the IMP based on the ToRs above.
Scientific justification	<p>The IMP is an EU proposal to the Standing Committee of International Control (STACTIC) of the Northwest Atlantic Fisheries Organisation (NAFO) with the objective of guiding fishing inspectors in carrying out their assignments, particularly the assignments directly derived from implementation of Article 35 of the NAFO Control and Enforcement Measures (CEM). The NAFO CEM includes provisions for DNA analysis in an effort to develop a solid approach to combat issues related with species misidentification.</p> <p>The IMP is a tool to operationalise the use of genetics in combating fish fraud and IUU fishing in the NAFO Regulatory Area (NRA), notably by providing the guidance and setting the rules for the collection of samples of fishing products by any fishing Inspectors of NAFO contracting Parties operating in the NRA.</p> <p>The IMP should encompass (1) genetic tools and techniques and (2) techniques and approaches for the collection of genetic material that, at present, provide the most accurate results and represent the best practices on the matter. The IMP should be a tool that is validated and endorsed by the ICES scientific community.</p>
Resource requirements	ICES Secretariat support and Advisory process
Participants	The Core Group is expected to comprise 5-6 members and an expert familiar with sampling in the NAFO regulatory area. Other members of WGAGFA will be consulted.
Secretariat facilities	Secretariat support, web conferences.
Financial	Covered by DG MARE special requests to ICES
Linkages to advisory committees	ACOM
Linkages to other committees or groups	WGAGFA, SCICOM, ASG
Linkages to other organizations	EU DG MARE, NAFO

Workshop on the Norwegian Sea Aquaculture Overview (WKNORAO)

2021/WK/ASG05 Workshop on the Norwegian Sea Aquaculture Overview (WKNORAO) chaired by Terje Svåsand*, Norway, and Henn Ojaveer*, ICES, will be established and will meet online during 23-25 March 2021 to:

- a) Review and discuss the data and information collected for the Norwegian Sea ecoregion aquaculture overview, identify the gaps and agree next steps to complete the draft overview;
- b) In collaboration with the ICES Data Centre, collate an overview of datasets and resources for the aquaculture overview in line with the FAIR data principles. This overview should categorize each of the resources with regards to availability, appropriateness, access rights, data format, accessibility, and other categories, as required; and

- c) Produce a workshop report detailing the conclusions of ToRs a and b. This report will serve as the foundation for the Norwegian Sea aquaculture overview.

WKNORAO will report by 30 of April for the attention of the ACOM.

Supporting information

Priority	<p>Aquaculture is a high-priority topic for ICES. ICES work on aquaculture is part of a wider portfolio of work that seeks to advance and share scientific understanding of marine ecosystems and the services they provide, and to use this knowledge to generate state-of-the-art advice for meeting conservation, management, and sustainability goals.</p> <p>The ICES Strategic Plan states: 'We will regularly publish, update, and disseminate overviews on the state of fisheries, aquaculture, and ecosystems in the ICES region, drawing as appropriate on analyses of human activities, pressures, and impacts, and incorporating social, cultural, and economic information.'</p>
Scientific justification	<p>The process of establishing ICES Aquaculture Overviews (AOs) was initiated in 2019, with i) forming a core group consisting of representatives from ACOM leadership, SCICOM and Secretariat, and ii) agreeing on the directions and procedure of further work of the core group. Objectives and contents of AOs was agreed by ACOM, including the first ecoregion for which the AO will be published (Norwegian Sea), together with the steps in the process and time-line. One of the steps was to arrange a workshop in spring 2021.</p>
Resource requirements	<p>The lead author of the Norwegian Sea AO (Terje Svasand) has already established an expert team and started the work. This will serve as the main input for the meeting.</p>
Participants	<p>The WK will be attended by experts contributing to the Norwegian Sea AO, as well as other interested scientists from the ASG and lead authors for Faroes and Celtic Seas AOs.</p>
Secretariat facilities	<p>Setting up webex calls.</p>
Financial	<p>No financial implications.</p>
Linkages to advisory committees	<p>Direct link to ACOM.</p>
Linkages to other committees or groups	<p>ASG, WGAGFA, WGECCA, WGOOA, WGPDMO, WGREIA, WGSEDA, WGSPA, WGEEL, WGSOCIAL, WGECON, SICCME, SIHD</p>
Linkages to other organizations	<p>DGMARE</p>

Resolutions approved in 2018

Working Group on Open Ocean Aquaculture (WGOOA)

2018/MA2/ASG06 A Working Group on Open Ocean Aquaculture (WGOOA), chaired by Bela H. Buck, Germany, 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	20 - 22 March	Copenhagen	Interim report by 1 July	Constitutive/scoping meeting
Year 2020	26-27 May	Online meeting	Interim report by 7 June	
Year 2021	7 & 14 June	Online meeting	Final report by 29 July	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Identify and develop descriptions and guidelines for various types of open ocean aquaculture systems and their characteristics needed to develop an eco-system approach for sustainable management of open ocean aquaculture including methods for assessing potential and interactions and synergies between open ocean aquaculture operations and wider socio-ecological-system (SES).	The aim of this ToR is to support authorities and/or agents who work at the interface between decision-making, research and business, helping investors and agencies understand, structure and articulate types of open ocean aquaculture including where these types of aquaculture interact with legal or cultural values associated with the environment is needed to understand where and what types of offshore aquaculture are appropriate in various ICES regions.	5.7 – 5.8	Yr 1 & 2. 2019, 2020	To be reported on as a review paper.
b	Identify risk and mitigation measures for potential interactions between open ocean aquaculture operations and structures and protected species, such as marine mammals and turtles.	The aim of this ToR is to calculate risks of entanglement of whales, seals and turtles by offshore aquaculture structures and identify structural (engineering) and management methods to reduce potential negative impacts. Mitigation	5.7 – 5.8	Yr 1 & 2. 2019, 2020	Organise and conduct a workshop to develop as an ICES Viewpoint.

		can be of technical (e.g. system design), ecosystem, environment and/or management nature.		
c	Collate existing information relevant for open ocean aquaculture on a regional sea-basin system to identify site-specific opportunities for different types of open ocean aquaculture in the ICES area.	Using information from ToR a and b, this ToR will help to identify space in the ICES region that will support various types and combinations of offshore aquaculture from an oceanographic and environmental point of view. This ToR will develop a framework to evaluate potential which can be used in different basins. This evaluation will also articulate knowledge gaps, and be designed to provide data that can be inputs to economic impact and optimization models.	5.7 – 5.8	Yr 2-3. 2020-2021 To be reported on as a position paper.
d	Collect and summarize data on large scale open ocean aquaculture.	New systems for large scale offshore aquaculture are now coming on line in Norway and Asia. How these perform environmentally, structurally and economically needs to be documented and evaluated to identify and articulate the potential of these new large systems to significantly increase seafood production globally.	5.7 – 5.8	Yr 1-3. 2020-2021 Annual reports with a position paper in year 3.
f	Describe the effect of OOA related to ecosystem services, carbon footprint, artificial (seasonal) ecosystems (the crop), carrying capacity, and MPAs.	OOA interact with its surrounding ecosystem being influential in supporting ecosystem services, beyond the production of aquatic products by providing provisioning, regulating, habitat, supporting, and cultural services. As the provision of these services will vary over time, season and location interacting with the biotic and abiotic parameters benefits and effects may vary.		Yr 3

Summary of the Work Plan

Year 1	Focus on ToR a and d. Develop descriptions of different types of offshore aquaculture including new large-scale fish systems. Organize workshop for ToR b.
Year 2	Publish review paper from ToR a and turn over Viewpoint from ToR b for external review. Develop framework to analyze basins and apply to a test case. Draft paper.
Year 3	Publish papers on framework for basin development and analysis of large-scale systems.

Supporting information

Priority	Offshore aquaculture has the potential to be highly appropriate to the ICES region and become a significant producer of sustainable seafood. As a new sector, the time for development in accordance with the ICES vision is now. In addition, this is a time of great change and evolution in this field to large scale systems which could fundamentally alter where our seafood comes from and create increased demand for advice.
Resource requirements	There is limited current work in this area in ICES and parts of the ToR are to evaluate the requirements. It is envisaged that an international project will be developed by the working group which could consider how to cooperate on currently funded national research but may need to develop and seek resources to work on specific case study scenarios.
Participants	Scientists and engineers will be key to this working group, with contributions from oceanographers, economists, GIS specialists and marine mammal/turtle experts.
Secretariat facilities	None.
Financial	No financial implications envisaged for ICES.
Linkages to ACOM and group under ACOM	This project sets the stage for future advice products from ICES as governments need to manage open ocean aquaculture development. The whale and turtle issue are already a management need.
Linkages to other committees or groups	There is a close working relationship with all the groups of the Aquaculture Steering Group. We will seek to form links with the Working Group on Socio-Economic Dimensions of Aquaculture (WGSEDA) Working Group on Pathology and Diseases of Marine Organisms (WGPDMO), Working Group on Application of Genetics in Fisheries and Mariculture (WGAGFM), Working Group on Environmental Interactions of Aquaculture (WGEIA), Working Group on Scenario Planning in Aquaculture (WGSPA) and Working Group on Ecological Carrying Capacity in Aquaculture (WGECCA). There are also likely linkages to other groups not listed.
Linkages to other organizations	EFARO, EATiP, DGMARE, AORA, EAS (European Aquaculture Society), WAS, NOAA, DFO. Industry – aquaculture businesses and producer groups, marine management organizations.

Working Group on Ecological Carrying Capacity in Aquaculture (WGECCA)

2018/MA2/ASG07 A Working Group on Ecological Carrying Capacity in Aquaculture (WGECCA), chaired by Dror Angel, Israel*, and Carrie Byron, United States, 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	9-11 April	ICES HQ, Copenhagen, Denmark	Interim report by 1 August	
Year 2020	27-29 May	Online meeting	Interim report by 26 June	Additional Chair in 2020: Carrie Byron, United States
Year 2021	26, 28 April, 3 May	Online meeting	Final report by 21 June	Change in chair: <u>Incoming chair:</u> Dror Angel, Israel <u>Outgoing chair:</u> Jeffrey Fisher, Ireland

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Review existing and developing methodologies for predicting and assessing the carrying capacity of the ecosystems at different geographic scales and strategies for environmental sustainability of aquaculture.	Building on work carried out by WGAQUA on benthic impacts on soft bottoms, it was appreciated that a review on drivers of ecological impacts, habitat sensitivity and current assessment methodologies is required. It will also be important to define the different carrying capacities approached (i.e., carrying capacities for what? Single species, multiple species, ecosystem based?), as well as to define which indicators can be used to assess these. Models may need to be created, or existing models applied, to balance different loads in any given system, and the working group will attempt to resolve and rationalize how such loads should be balanced.	5.5, 5.6	year 1	Review paper
b	Considering diverse aquaculture production methodologies, including IMTA,	Integrated Mult-Trophic Aquaculture (IMTA), both as an aquaculture production method and as	5.5, 5.6, 5.8	Year 1	Prioritized list of research to elucidate knowledge gaps as

	<p>explore those which provide enhanced ecosystem services (nutrient/carbon management, habitat value, etc) and/or may impact carrying capacity for aquaculture. Conduct an analysis of the effect on carrying capacity at the basin-scale, where trophic level interactions of different species occupying the same marine area may impact carrying capacity for aquaculture. WGECCA, through international cooperation and the shared experiences of its members will focus on prioritizing thematic areas that would be highly beneficial to address in future research.</p>	<p>a means to consider the use of different trophic components in an ecosystem as mitigation, or to provide enhanced ecosystem services (nutrient/carbon management, habitat value, etc.) is high on the agenda in several aquaculture producing countries. Analysis of the effect on carrying capacity from Basin Scale Integrated Multi-Tropic Aquaculture (BSIMTA), where trophic level interactions of different single species trophic level industries produce different trophic level products yet occupy the same marine area is needed. WG ECCA, through international cooperation and the shared experiences of its members, will focus on prioritizing thematic areas that would be highly beneficial to address in future research.</p>	<p>part of WGECCA's annual reports in 2019</p>
<p>c</p>	<p>Summarize international guidelines on indicators and combinations of (indicators) used in aquaculture management and their relation to carrying capacity in an area with its existing activities.</p>	<p>The concept of carrying capacity is a measure to describe how a high biological load of single or multiple species may affect production of the cultured species and/or other species using the same habitat. It must be calculated within a specific spatial area—either locally or regionally, and uncertainty of measurement can be greatly affected by the spatial area to which the calculations are applied. WGECCA will need to define the different types of indicators that could/should be considered, and how—recognizing that the answers to these scenarios will vary by the spatial</p>	<p>5.5, 5.6, 2.1 Year 2 Deliver final report in 2020 as part of annual WGECCA report.</p>

	scale of analysis, and in different geographic areas. In any given area at any given time, there will be a balance between different indicators present..			
d	Analyse and describe current monitoring practises related to environmental concerns. Review mass balance and other modelling of nutrient flow between multi trophic levels (farmed and wild) and in circular systems to consider how such modeling can be applied to carrying capacity in a trophic landscape.	An analysis of current monitoring practices used by ICES member states would help to reveal trends in environmental concerns related to local aquaculture activities. This analysis would indicate if such monitoring objectives are consistent and would help identify any commonality in the setting of regulatory thresholds for managing environmental status and impacts. Similarly, models, where applied for consideration of environmental concern, energy transfer, etc., should be analyzed for their accuracy and their value as decision support tools.	5.5, 5.6, 3.2 Year 2 & 3	Deliver progress report in 2020 and final report in 2021 as part of the WGECCA annual report
e	Review status and potential for low-trophic aquaculture.	A substantial increase in sustainable marine aquaculture production may be enhanced by further development of low trophic level aquaculture. WGECA aims to evaluate this potential in the shared waters of ICES member states including sea urchins, bivalve shellfish, macro algae, polychaetes. Opportunities and constraints by regional sea will be the focus of the analyses.	5.5, 5.8 Years 2&3	Deliver progress report in 2020 and final report in 2021 as part of the WGECCA annual report

Summary of the Work Plan

Year 1	One term of reference a) review existing and developing methods for assessing carrying capacity and will be finalised and b) Recommendations for prioritized research to elucidate knowledge gaps in use of IMTA and other mitigating practises will be initialised.
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Year 2	Term of reference b) and c) Development of international guidelines on loads and combinations of loads (indicators) will be finalised and terms of reference d) monitoring practises and e) low trophic aquaculture will be initialised.
Year 3	Term of reference d) and e) will be finalised and the final report will be submitted. The opportunity to produce a Viewpoints document pulling together multiple ToR's will be evaluated.

Supporting information

Priority	The activities of this Group will continue to lead ICES into the key scientific issues related to aquaculture – ecological carrying capacity including lower trophic aquaculture, use of aquaculture to enhance ecosystem services and so on, with a main focus to lay the scientific foundations for further sustainable aquaculture growth. The subject of ecological carrying capacity, and how to address it appropriately, has become fundamental to permitting decisions. Permitting decisions affect the potential for aquaculture to realize its potential in member states waters where ICES operates. ICES, and the expert working group framework it has developed, is particularly well poised to develop the international best practices for considering ecological carrying capacity in aquaculture permitting and its relationship to spatial planning. Such guidelines are needed if the sustainable aquaculture goals identified by respective ICES Member States are to be realized. Consequently, the activities of WGECCA are considered to have a high priority.
Resource requirements	Meeting logistics
Participants	The Group is normally attended by approximately 10 -20 members and guests.
Secretariat facilities	Meeting rooms at the Secretariat will be required
Financial	No financial implications envisaged for ICES.
Linkages to ACOM and group under ACOM	Viewpoint document will establish an example of the types of advice countries will need to manage aquaculture to maximize ecosystem services and growth targets sustainably. Outputs may also have direct implications for governments working on nutrient and/or carbon trading systems. Habitat creation and nutrient management will have positive implications for wild capture fisheries.
Linkages to other committee or groups	There is a very close working relationship with all the groups of the Aquaculture Steering Group. We will seek to form links with the Working Group on Socio-Economic Dimensions of Aquaculture (WGSEDA) Working Group on Pathology and Diseases of Marine Organisms (WGPDMO), Working Group on Application of Genetics in Fisheries and Mariculture (WGAGFM), Working Group on Environmental Interactions of Aquaculture (WGEIA), and the Working Group on Scenario Planning on Aquaculture (WGSPAQ). It is also very relevant to the Working Groups, WGHABD, WGITMO, and WG Benthic Ecology.
Linkages to other organization	OSPAR, NASCO, EAFP, EFARO, EATiP, FAO, EU (EUMAP regulation), NOAA, DFO

Working Group on Scenario Planning on Aquaculture (WGSPA)

2018/MA2/ASG01 A Working Group on Scenario Planning on Aquaculture (WGSPA), chaired by Ben Halpern, USA, 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	8–10 November	ICES HQ, Copenhagen, Denmark	Interim report by 1 March	Seminar/ scoping meeting
Year 2019	7-8 September	Gothenburg, Sweden	Interim report by 30 November	
Year 2020	15-16 October	By correspondence	Interim report by 13 November	
Year 2021			Final report by Date	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	A review of the application of Scenario planning for aquaculture, Identification of knowledge gaps and recommendations for research	There is a need to determine the state of the art in scenario planning and how this has been applied in aquaculture. It can be done through an exhaustive literature revision including “grey” material and the results of previous aquaculture scenarios. In addition to reviewing the use and application of scenario planning in other areas. The review will include the identification of knowledge needs and priorities in this new area and develop a coherent proposal for research and funding.	5.5, 6.1, 7.1	Yr 1 & 2. (2018, 2019)	To be reported on as a review.
b	Develop Scenario plan for one region in the ICES area (potentially the same region as chosen for the first atlas)	Encourage the development of one international project on scenario planning to complement the work under ToR a. Will require planning in yr 2 from the position paper, identification of potential resourcing and proposal development.	5.5, 6.1, 7.1	Yr 3-4 (2020-2021)	To be reported scenario planning for aquaculture.
c	Integration of Scenario planning and Atlas approaches to one product capable of communicating the environmental, economic and social options of marine	Encourage the development of one international project building on the products and techniques developed in ToR a, b and c to an example of a complete science-based analysis of the potential and consequences of marine	5.5, 5.7, 7.6	Yr 3-4 (2020-2021)	2020 – Submit proposal for Viewpoint to SCICOM/ACOM 2021 - Publish paper for focus region.

aquaculture development in one region in the ICES area.	aquaculture development for one region in the ICES area .
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Summary of the Work Plan

Year 1	Hold a seminar as part of the first Working Group meeting to establish this area of science and identify additional experts to join the WG.
Year 2	Develop an outline for an Atlas of marine aquaculture potential for one region in the ICES area. Provide a review and position paper on Scenario Planning in aquaculture together with knowledge gaps and recommendations for research.
Year 3	Further ToR to be developed out of the position paper. To include a scenario to be chosen in yr 2. Expand and improve Atlas to an operational level for one example region in the ICES area .
Year 4	Integrate two approaches. International cooperation through a research project on aquaculture potential analysis. Publish paper for focal region.

Supporting information

Priority	<p>There is a high priority for scientifically informed planning for marine aquaculture. This has been successfully applied in other areas by the use of scenario planning where potential multiple future scenarios are possible that provide uncertainty regarding the stability of policies or conditions and where adaptation is likely to be required and yet unpredictable. Information from multiple points of view (economic, environmental, social, geographical, oceanographical and so on) that is both general and specific to a place is needed for planning to be meaningful. There are now some marine spatial analysis approaches that allow potential to be analyzed for specific locations (see Kapetsky et al 2013, Gentry et al 2017 and Lester et al 2018) e.g. not only what could happen, but where, what inputs would be needed and what outputs could be expected. While there has been some application of scenario planning and spatial analysis in aquaculture this has yet to be evaluated in scientific terms and applied in a consistent way. For example, scenario planning has been used in evaluating investment opportunities and predicting returns on investment but not in a particularly robust way. It is proposed that the working group develop the methodologies for spatial analysis and scenario planning for Aquaculture in the ICES area that enables:</p> <ol style="list-style-type: none"> 1. Researchers to develop realistic options for industry development and to evaluate the impact of different policies. 2. Future Experts Groups to further develop tools to evaluate resilience to environmental change, diseases and parasites, resource needs, implications of management decisions and so on focused on a specific geography. 2. Governments and populations from a variety of jurisdictions to understand the implications and options of marine aquaculture development in their areas. 4. Industry and local populations to have a description of the production potential in a format that will allow meaningful economic impact modelling for a specific jurisdiction. <p>This is not about predicting the future but evaluating what different future scenarios mean, trade-offs among scenarios and for example, how scenarios interact with the different policies, changes and demands likely to happen in the future, within a realistic place-based context.</p>
Resource requirements	<p>There is limited current work in this area and part of the ToR are to evaluate the requirements. It is envisaged that an international project will be developed by the working group which could consider how to cooperate on currently funded research but more likely need to develop and seek resources to work on specific scenarios.</p>

	Modelling and GIS capacity could be limiting and it will be important to engage other relevant ICES experts in this area and bring together the knowledge and technical expertise.
Participants	This is a new group and expected attendance is 15-20 members.
Secretariat facilities	Standard secretarial support. Meeting room at ICES HQ.
Financial	No financial implications envisaged for ICES.
Linkages to ACOM and group under ACOM	This project sets the stage for future advice products from ICES as governments need to manage aquaculture development based upon knowledge of the economic and social benefits and risks.
Linkages to other committees or groups	There is a very close working relationship with all the groups of the Aquaculture Steering Group. We will seek to form links with the Working Group on Socio-Economic Dimensions of Aquaculture (WGSEDA) Working Group on Pathology and Diseases of Marine Organisms (WGPDMO), Working Group on Application of Genetics in Fisheries and Aquaculture (WGAGFA) and proposed Working Groups on Environmental Interactions of Aquaculture (WGEIA) and Ecological Carrying Capacity in Aquaculture (WGECCA).
Linkages to other organizations	EFARO, EATiP, Industry – aquaculture businesses and producer organisations, marine management organisations, EAS (European Aquaculture Society), WAS, NOAA, DFO.

Working Group on Pathology and Diseases of Marine Organisms (WGPDMO)

2018/MA2/ASG03 The Working Group on Pathology and Diseases of Marine Organisms (WGPDMO), chaired by Ryan Carnegie, 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	5–9 February	Copenhagen, Denmark	Interim report by 1 April	
Year 2020	4-7 February	Reykjavik, Iceland	Interim report by 17 February	
Year 2021	2-3 March	Online meeting	Final report by 1 April to ACOM and SCICOM	Election of new chair

ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN CODES	DURATION	EXPECTED DELIVERABLES
a	Summarize new and emerging disease trends in wild and cultured fish, molluscs and crustaceans based on national reports	New disease conditions and trends in diseases of wild and cultured marine organisms will be reviewed. This is an annual, ongoing ToR for WGPDMO and will provide information for ToRs b-i	5.6	3 years	Summary in annual reports
b	Deliver leaflets on pathology and diseases of marine organisms	A number of ICES publications currently in preparation will be reviewed by WGPDMO. This is an ongoing, annual ToR	5.6	3 Years	Publication in ICES Identification Leaflets for Diseases and

c	Synthesize information on the spread and impact of <i>Bonamia ostreae</i> in flat oysters in the ICES area	<i>Bonamia ostreae</i> is a major pathogen of European flat oysters that has expanded its range in recent years. The present distribution, recent trends in parasite prevalence and infection intensity, and the effectiveness of contemporary management strategies will be summarized, with perspective on the related species <i>Bonamia exitiosa</i> , recently documented in oysters from some ICES member countries. This is a continuing ToR from the previous cycle	2.1, 5.6	2 Years	Publication in the peer-reviewed literature
d	Summarise the role of <i>Vibrio</i> pathogens contributing to mortalities in shellfish aquaculture and to seafood-associated disease risks in humans	<i>Vibrio</i> bacteria have long been associated with larval production problems in shellfish hatcheries, but the potential impacts of vibriosis in sub-market and market-sized Pacific oysters in European production areas has become an important emerging concern. Likewise, concern about <i>Vibrio</i> risks to human consumers has also grown. This ToR will synthesize the current knowledge on <i>Vibrio</i> highlight critical gaps in our understanding of these species. This is a continuing ToR from the previous cycle	2.1, 5.6, 5.8	3 Years	Peer-reviewed journal article
e	Synthesize perspective on complex gill disease (CGD) in salmon and identify strategies for mitigation	Complex gill disease (CGD) is an emergent, economically important health issue that limits productivity in salmon aquaculture. CGD is believed to results from a complex interaction of environmental, host and infectious factors. The performance and survival of affected fish is influenced by the severity of the gill lesions. Environmental factors associated with CGD include exposure to harmful algae, jellyfish, low dissolved oxygen and elevated water temperatures. Relevant infectious agents include Atlantic salmon paramyxovirus, salmonid gill poxvirus, <i>Candidatus Piscichlamydia salmonis</i> and the microsporidian <i>Desmozoon lepeophtherii</i> . This ToR will describe the causes and consequences of	5.6, 6.1	3 Years	Peer-reviewed journal article

		CGD in salmon aquaculture in ICES member countries and identify mitigation strategies in the context of climate change			
f	Integrate perspective on emerging health issues affecting wild salmon populations of Baltic member countries	National reporting in recent years has revealed an array of disease concerns in Baltic salmon populations, with elevated mortality being widely reported. Determining similarities and differences in patterns of disease and mortality and gaining insight into potential aetiological factors is urgent for effective management of salmon health in the region. This ToR will involve coordination among representatives of member countries around the Baltic to consolidate information concerning Baltic salmon health problems and identify strategies for better understanding and mitigating them	5.6, 6.1	3 Years	Peer-reviewed journal article
g	Identify strategies to prevent further spread of ostreid herpesvirus OsHV-1 within the ICES region and mitigate impacts where it occurs	The emergence of 'microvar' variants of the ostreid herpesvirus OsHV-1, which have caused significant Pacific oyster mortality from Europe to Australia and New Zealand, is the most significant mollusc disease development in decades. Preventing further spread of these pathogens and mitigating damage in affected areas are twin challenges of OsHV-1 management today. This ToR will aim to identify strategies to prevent OsHV-1 microvariant dispersal to North American member countries, presently free of the microvars, and to maintain commercial production should an epizootic emerge. It will also more broadly consider the OsHV-1 microvar emergence as a case study in response to emerging viral and bacterial pathogens, to identify general strategies for future responses and potential pitfalls with regard to their application	5.6, 6.1	3 Years	ICES Journal of Marine Science article
h	Complete assessment and refine application of the Fish Disease Index (FDI)	Results of assessment of the FDI will be reviewed, and data harmonisation and quality assurance will be addressed as refined guidelines are produced for FDI application	5.6	3 Years	Publication in final WGPDMO report

i	Provide expert knowledge and management advice on fish and shellfish diseases, if requested, and related data to the ICES Data Centre	This is an annual ToR in compliance with a requests from the ICES Data Centre	5.6, 6.1	3 Years	Ad hoc reports
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Summary of the Work Plan

Year 1	Three terms of reference (a, b and i) are annual tasks and form a core part of WGPDMO activities. New fish and shellfish disease leaflets will also be prepared under ToR b in each of the three years. A working draft concerning <i>Bonamia ostreae</i> in flat oysters (ToR c) will be developed, and work will commence on synthesis related to <i>Vibrio</i> pathogens in shellfish, complex gill disease in salmon, Baltic salmon health, and OsHV-1 in oysters (ToRs d-g). Results of the Fish Disease Index assessment will be reviewed (ToR h).
Year 2	A final draft manuscript on <i>B. ostreae</i> (ToR c) will be produced and discussed. A Workshop on Emerging Mollusc Pathogens (WKEMOP) including OsHV-1 (ToR g) will be conducted with a draft report produced for discussion. Terms of reference d-f will be developed as working draft manuscripts.
Year 3	Final draft reports on <i>B. ostreae</i> (ToR c), <i>Vibrio</i> pathogens (ToR d), complex gill disease (ToR e), Baltic salmon health (ToR f), OsHV-1 and emerging mollusc pathogens (ToR g), and the Fish Disease Index (ToR h) will be produced and discussed.

Supporting information

Priority	The current activities of this Group will provide key perspective on disease impacts on fisheries and aquaculture, and on potential avenues for mitigation to promote sustainable industries. It will lead ICES into new areas of consideration with regard to aquaculture-environment interactions. 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	ACOM/ SCICOM group
Linkages to other committees or groups	There are clear linkages to the groups of ASG, WGSEDA and WGAGFA, that we will seek to develop.
Linkages to other organizations	OSPAR, HELCOM, EAFF, OIE

