Working Group on Ecological Carrying Capacity in Aquaculture (WGECCA)

2018/MA2/ASG07 A **Working Group on Ecological Carrying Capacity in Aquaculture (WGECCA)**, chaired by Jeff Fisher, Ireland, 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	By correspondence	Interim report by 26 June	**Additional Chair in 2020**: Carrie Byron, United States
Year 2021	TBD	TBD	Final report by XXXX	

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, explore those which provide enhanced ecosystem services (nutrient/carbon	Integrated Mult-Trophic Aquaculture (IMTA), both as an aquaculture production method and as a means to consider the use of different trophic componants in an	5.5, 5.6, 5.8	Year 1	Prioritized list of research to elucidate knowledge gaps as part of WGECCA's annual reports in 2019

	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.	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 carring 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.			
c	Develop international guidelines on loads and combinations of loads (indicators) from aquaculture and its possible remediation.	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 loads that could/should be considered, and how—recognizing that the answers to these scenarios will vary by the spatial scale of analysis, and in different geographic areas. In any given area at any given time, there will be a balance between	5.5, 5.6, 2.1	Year 2	Deliver final report in 2020 as part of annual WGECCA report.

		different loads present, but often one being dominating.			
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 estimations in a multi-trophic landscape.	An analysis of current monitoring practices used by ICES member states would help to reveal geographic trends in environmental concerns related to local aquaculture activities. This analysis would indicate if monitoring objectives are consistent and would help to 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.
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 initalised.

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 an groups 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 committe 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 oth organizations	OSPAR, NASCO, EAFP, EFARO, EATiP, FAO, EU (EUMAP regulation), NOAA, DFO