

## Working Group on the Northwest Atlantic Regional Sea (WGNARS)

2016/MA2/SSGIEA02 Working Group on Northwest Atlantic Regional Sea (WGNARS), chaired in 2016 by Sean Lucey\*, USA and Robert Gregory, 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	6-10 March	Halifax/Dartmouth, Nova Scotia, Canada	Interim report on 12 April 2017 to SSGIEA	New Canadian Chair will be appointed
Year 2018	5-9 March	Falmouth, USA	Interim report on 6 April 2018 to IEASG	
Year 2019	29 April – 3 May	Dartmouth Nova Scotia, Canada	Final report on 7 June 2019 to IEASG	New US Chair will be appointed

### ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
a	Develop the scientific support for an integrated assessment of the Northwest Atlantic region to support ecosystem approaches to science and management. Compile and provide guidance on best practices for each step of integrated ecosystem assessment.	a) Science Requirements: see below b) Advisory Requirements: none	1.3, 6.1, 6.6	3 years (2017,2018,2019)	Summary review paper of lessons learned for each step of the process in the Northwest Atlantic using results from 2019, ToRs b, c, d, e below. Brief interim progress reports to ICES (2017, 2018).
b	Adopt process for evaluating current suite of indicators and assess their ability to provide proactive management advice.	Will utilize methodology akin to gap analysis. Will update and employ indicator performance testing and risk assessment methods reviewed in 2013 for both driver and response indicators. Requires participation by scientific experts in oceanography, habitat, biology, fisheries and other biophysical system uses, and social and economic systems.	1.1, 2.4, 7.1	2 years (2017,2018)	Best practices for quantitative approach to evaluating time-series indicators and integrating qualitative information/knowledge into IEA process (2017). Documentation of knowledge gaps, prioritize using qualitative models developed in 2016 and other appropriate approaches (2018).

c	Develop process for distilling information for management use.	Will require participation by scientific experts in oceanography, habitat, biology, fisheries and other system uses, and social and economic systems.	4.3, 6.4	2 years (2017,2018)	Best practices surrounding the communications of indicator meaning, uncertainty, and results to stakeholders (2017,2018).
d	Assess system productivity under shifting oceanographic processes and improve integration into IEA products.	Will develop concept of habitat beyond a mediating component, and fully link to benefits derived from the system using semi-quantitative and qualitative models. Will reconcile place-based and process based models, and shifting drivers.	2.3, 6.6	2 years (2017,2018)	Updated qualitative models from 2016 MSE with more rigorous treatment of linkages between ecological system drivers, habitat, and benefits (2017,2018).
e	Evaluate approaches to integrating multi-spatial scale models into integrated management advice.	Will assess and develop advice from multiple models at different spatial resolution. Will expand analysis in ToR f beyond current focus on a single underlying "model" assessed through multiple qualitative software packages.	5.4, 6.6	2 years (2018,2019)	Develop suite of alternative models that can be used in MSE context (2018,2019).
f	Evaluate ecosystem trade-offs using a range of management strategy evaluation (MSE) methods.	Assess robustness of strategies to underlying assumptions. Evaluation of uncertainty surrounding models and indicators using simulation.	5.1, 7.3, 7.6	1 year (2019)	Use results of ToR b, c, d, e to investigate robustness of management strategies to different underlying assumptions in scale, system linkages, and baseline (2019).

### Summary of the Work Plan

<b>Year 1</b>	Develop process for assessing and communicating indicators, refine existing models.
<b>Year 2</b>	Develop alternative models representing marine ecological and human systems at multiple scales.
<b>Year 3</b>	Evaluate the robustness of alternative management strategies to achieve candidate operational objectives given alternate models developed.

## Supporting information

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<b>Priority</b>	A regional approach to marine science is essential to address high priority research topics in the ICES Science Plan associated with understanding ecosystem functioning, particularly climate change processes (1.1), biodiversity (1.3) and the role of coastal-zone habitat in ecosystem dynamics (1.4), as well as understanding the interactions of human activities with marine ecosystems, particularly fishing (2.1) and impacts of habitat changes (2.4). Identifying potential objectives and evaluating alternative management strategies to achieve them addresses the development of options for sustainable use of ecosystems, specifically marine living resource management tools (3.1) and operational modelling combining oceanography, ecosystem, and population processes (3.2). Work identifying candidate ecosystem-based management objectives and evaluating potential trade-offs through MSE contributes to socio-economic understanding of ecosystem goods and services and forecasting the impact of human activities (3.4). Therefore, our work plan addresses all three thematic areas in the ICES Science Plan and multiple high priorities in each.
<b>Resource requirements</b>	Components of the integrated approach, such as ocean observation systems, ecosystem surveys, development of integrated modelling approaches and management objectives are being maintained by member countries, and this programme will coordinate and synthesize existing programmes.
<b>Participants</b>	The Group is normally attended by some 25-35 members and guests. However, expertise needed for each ToR differs, so total participants over 3 years could be >50.
<b>Secretariat facilities</b>	Report preparation and dissemination.
<b>Financial</b>	No financial implications.
<b>Linkages to ACOM and groups under ACOM</b>	During the development stage there will be no direct linkages with advisory committees, but the integrated approach is expected to eventually support advice for implementing IEAs in NW Atlantic subregions and may link to future ICES IEA advice in other regions.
<b>Linkages to other committees or groups</b>	There is a close working relationship with a number of the working groups and workshops under the IEASG (e.g. the Workshop on Benchmarking Integrated Ecosystem Assessments) and other groups and workshop within ICES (e.g. the Working Group on Marine Systems).
<b>Linkages to other organizations</b>	The NAFO Working Group on Ecosystem Science and Assessment has made progress toward similar objectives and will be a resource for collaboration.