

## Working Group on Seasonal-to-Decadal Prediction of Marine Ecosystems (WGS2D)

2016/MA2/SSGEPD01 The Working Group on Seasonal-to-Decadal Prediction of Marine Ecosystems (WGS2D), chaired by Mark R. Payne, Denmark, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	REPORTING DETAILS	COMMENTS (CHANGE IN CHAIR, ETC.)
Year 2017	12–16 June	ICES HQ, Copenhagen, Denmark	Interim report by 1 August	
Year 2018	27–31 August	ICES HQ, Copenhagen, Denmark	Interim report by 15 October	
Year 2019	TBD	TBD	Final report by August to SCICOM	Joint workshop with PICES SG-CEP

### ToR descriptors

ToR	Description	Background	Science Plan topics addressed	Duration	Expected Deliverables
a	Identify case studies	Predictable biological variables that are potentially useful to end-users will be identified by i) Surveying the current needs within the ICES community for ecological forecast products for direct use in planning and advice; and ii) Reviewing the state of knowledge about links between the physical environment and biological response variables	EPD 1, 3, 4, 6, 7,8 EPI 15 IEA 22, IEOM 25, 28	Year 1-2	Set of identified case studies. Review paper
b	Review methods for assessing predictability	Methods to evaluate the confidence level associated with ecological forecast products using both qualitative and quantitative metrics will be reviewed and where necessary, developed	EPI 15, IEA 22	Year 1-2	Review paper
c	Assess predictability of selected case studies	The predictability of the selected case studies identified in ToR a) will be assessed using the tools identified in ToR b)	EPD 4, EPI 15 IEA 22 IEOM 27, 28	Year 2-3	Report describing the results of the analyses.
d	Develop protocols for operational delivery of ecological forecast products	Protocols for the operational delivery of ecological forecast products to end-users in the wider ICES community will include open-source code for processing data and generating predictions, and standardized formats for communicating the scientific basis,	EPI 15 IEOM 31	Year 1-3	Template for “Forecast sheet”, similar to ICES Advice sheet; Report describing protocols for operationalisation

		skill and uncertainties associated with the prediction			
e	Delivery of forecast products	Case studies that demonstrate an acceptable degree of predictive skill in ToR c) will be converted to operational products following ToR d)	All of the above	Year 3	Operational forecasts of biological variables delivered to endusers
f	Joint activities with PICES SG-CEP	Outline a future research programme and coordinate joint workshop with the PICES Study Group on Climate and Ecosystem Predictability (SG-CEP)	All of the above	Year 1-3	Report from joint workshop held with SG-CEP in year 3

### Summary of the Work Plan

Year 1	Identify case studies. Review methods for assessing predictability. Develop protocols for delivering products operationally.
Year 2	Assess the predictability of identified case studies .
Year 3	Joint activities with PICES SG-CEP. Development and delivery of operational forecasts.

### Supporting information

Priority	Due to the new opportunities to improve the advisory process that this working group will examine, the work should be considered as a high priority.
Justification	<p>Tremendous advances in oceanographic observing and modelling systems over the last decade have led to dramatic improvements in our ability to predict the ocean; skillful annual and multi-annual forecasts are now a reality in e.g. the North Atlantic. However, the logical next step of translating these predictions of the physical environment into predictions about biological outcomes and incorporating them into advice remains just a dream: just 1-2% percent of stocks today incorporate any form of environmental information into their tactical management procedures. Nevertheless, exploiting this predictive skill to aid in the management of marine resources is emerging as one of the new challenges in marine science and can be seen as a key prerequisite for developing ecosystem-based management of marine systems.</p> <p>WGS2D aims to take up this challenge. While research has historically focused on recruitment, many other biological responses with management relevance, such as spatial distributions, growth and the timing of key events, are also tightly linked to the physical environment and therefore potentially predictable. The group will identify these “low-hanging” and predictable management-relevant biological variables and use them to produce ecological forecast products delivered in an operational manner for applications in advice-generation within the ICES area.</p> <p>WGS2D will also harness the momentum developing in this research area. Theme Session I to be held at the 2016 ICES ASC, entitled “Seasonal-to-decadal prediction of marine ecosystems: opportunities, approaches, and applications” has been well received within the ICES community, with over 30 abstracts submitted. CLIVAR and PICES (with co-sponsorship from ICES) will hold a workshop this August on the closely related theme of ENSO-driven biological forecasts and intend to develop a “sister” PICES working group to the group proposed here. The proposed WGS2D working group is therefore the logical move for ICES to continue to push developments in this area and to reap the benefits.</p>
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	Participants would include scientists with expertise in fisheries management, marine biology, oceanography and climate. It is envisaged that the working group will be attended by 10-15 members from within the ICES community, together with guests from PICES.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and group under ACOM	ToR e) will generate operational forecasts of biological variables that have direct relevance for advice generation and the monitoring of these stocks. The relevant end-user ACOM working-groups will be closely involved in this process.
Linkages to other committees or groups	<p>Given the interdisciplinary nature of the working group, there are natural linkages of many other ICES groups, including</p> <ul style="list-style-type: none"> <li>•SICCME - The ICES-PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems</li> <li>•WGSPEC - Working Group on Small Pelagic Fishes, their Ecosystems and Climate Impact</li> <li>•WGOH - Working Group on Oceanic Hydrography</li> <li>•WGOOFE – Working Group on Operational Oceanographic Products for Fisheries and Environment</li> <li>•WGRFE - Working Group on Recruitment Forecasting in a Variable Environment</li> </ul> <p>Depending on the case studies chosen in ToR a) linkages to relevant end-user working-groups, including ACOM, the relevant advice-generating working groups (e.g. HAWG, WGWIDE) and survey planning groups (e.g. WGMEGS) will also be formed and used to help shape the operational forecast products.</p>
Linkages to other organization	The working group will have close linkages to a sister group within the PICES community, the Study Group on Climate and Ecosystem Predictability (SG-CEP) that is currently being established. ICES is also co-sponsoring a workshop together with CLIVAR and PICES in August 2016 that will be instrumental in the establishment of this group. The proposed chair of WGS2D has already had close conversations with this group, and linkages have been written into the Terms of Reference here (ToR f). Activities to link the two groups even closer, including at least one joint meeting and manuscript production, are envisaged.