ICES MGWG REPORT 2018

Interim Report of the Methods Working Group (MGWG)

10–14 September 2018

Ispra, Italy

ICES

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International Council for
the Exploration of the Sea

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Executive summary

The 2018 meeting of the Methods Working Group (MGWG), held in Ispra, Italy, 10–14 September, was chaired by Arni Magnusson, ICES Secretariat, and attended by 22 participants. The objective of the meeting was to continue work on the ongoing projects, under the following working titles:

1) State-space vs. traditional stock assessment models;

2) Estimating stock-recruitment curves inside vs. outside an assessment model;

3) Appropriate level of stock assessment model complexity;

4) Evaluating the consequences of alternative age selection in cod fisheries.

The four projects are organized on the group GitHub site (https://github.com/ices-eg/mgwg). Each project homepage is currently listing: two team coordinators, participants, project plan, task table, literature links, and a schedule of monthly web meetings. New working group members joined the existing teams, brought with them fresh ideas and skills, and are now engaged in specific tasks of a project of their choice.

The projects vary in terms of team size, the nature of the work involved, and the tangible progress so far. All projects have in common that they are on the frontier of current stock assessment research, and all efforts by the group are oriented to fit in the format of multi-authored journal papers.

Overall, the objectives of the meeting were achieved, and the working group participants are enthusiastically continuing the collaborative research. To maintain pace and coordinate the work between the annual meetings, the working group has scheduled monthly project web meetings and quarterly group-wide web meetings.

1   Administrative details

Working Group name
Methods Working Group (MGWG)
Year of Appointment within current cycle
2017
Reporting year within current cycle (1, 2 or 3)
2
Chair(s)
Arni Magnusson, ICES Secretariat
Meeting dates
10–14 September 2018
Meeting venue
Ispra, Italy

2   Terms of Reference

- a) Development of new assessment models;
- b) Improving existing assessment models;
- c) Organise a collection of datasets;
- d) Test performance of existing and new models;
- e) Develop, improve and test assessment-related techniques.

3   Summary of 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.

4   List of Outcomes and Achievements of the WG in this delivery period

Groupwide outcomes

- **Project organization**
  After a plenary discussion about project management, it was decided to have monthly web meetings within each project team, and quarterly web meetings for the whole working group.
- **Video conference session**
  A video conference was held, to get status update and discussion feedback from working group members who could not attend in person.
- **Working group organization**
  Based on discussions with other chairs at the 2018 WGCHAIRS meeting, the MGWG chair proposed in a plenary discussion that the working group could be co-chaired by two people instead of one. Chris Legault volunteered to make himself available for the role of co-chair and was recommended by all participants at the 2018 meeting in Ispra, Italy.

Status of Project 1: State–space vs. traditional stock assessment models

- **Team coordinators and participants**
  Coordinators: Miller and Nielsen.
  Other participants: Magnusson, Berg, Legault, Monnahan, Marsh, Kasper, Trijoulet, Johnson, Deroba, Hintzen, Cadigan, Jardim, Hennen, Breivik
- **Research question**
  Do state-space assessment models tend to have better retrospective patterns than other models?
- **Project plan**
  Part I: Work with stocks that have shown bad retrospective patterns in the past, from North America and Europe. Apply a variety of models to these datasets, both state-space and traditional models. Evaluate whether the state-space models tend to have a better retrospective pattern.
  Part II: Simulation study designed to analyze in detail the findings and initial conclusions from Part I.
- **Analysis**
  The study design involves fitting 4 stock assessment models to 13 datasets. All the models are fitted to age-structured data, but two of the models are state-space models and two are traditional likelihood-based models. The data come from a variety of demersal and pelagic stocks in the Northwest and Northeast Atlantic, some of which have shown large retrospective bias in the official assessments. The datasets, analysis, and results have been uploaded to the GitHub

site. The next steps are to summarize the results, decide how to present and interpret the findings, and to evaluate whether some follow-up analysis is required to address questions that arise from the results.

- **Manuscript**
An initial manuscript outline was drafted during the meeting, describing two of the models used.

Status of Project 2: Estimating stock–recruitment curves inside vs. outside an assessment model

- **Team coordinators and participants**
Coordinators: Deroba and Brooks
Other participants: Berg, Legault, Hart, Jardim, Cadigan, Miller, Trijoulet, Mosqueira, Millar, Konrad, Marsh
- **Research question**
What are the main pitfalls when fitting curves to stock-recruitment scatter that is model output rather than data?
- **Project plan**
This project is based on earlier analysis of the Methods Working Group, last presented at the 2013 meeting. It will also follow up from recent papers such as Brooks and Deroba (2015). The focus is on the estimation bias, analyzed by fitting different assessment models with various assumptions about the stock-recruitment relationship.
- **Analysis**
The first steps of the analysis, study design and simulation of data are underway.

Project 3: Appropriate level of stock assessment model complexity

- **Team coordinators and participants**
Coordinators: Brooks and Hart
Other participants: Lynch, Howell, Hennen, Jardim, Yanez
- **Research question**
How well do model selection approaches perform in selecting a model that corresponds to the true level of complexity?
- **Project plan**
The plan is to conduct a simulation study consisting of 3 operating models (OM) of low/medium/high complexity and 3 estimation models (EM) of low/medium/high complexity. A variety of validation/selection metrics and diagnostics will then be evaluated for their ability to identify the correct model complexity.
- **Analysis**
The first steps of the analysis, study design and simulation of data are underway.

Project 4: Evaluating the consequences of alternative age selection in cod fisheries

- **Team coordinators and participants**

    Coordinators: Magnusson and Kasper

    Other participants: Yanez, Pinto, Howell, Korsbrekke, Schirripa, Vasilakopoulos, Earl

- **Research question**

    Some fisheries mainly catch cod at a young age (2–4 yrs), is this a form of underutilization or risking stock collapse?

- **Project plan**

    Part I: Gather data for as many Atlantic cod stocks as possible.

    Part II: Within each stock, calculate recent selectivity, weights at age, natural mortality, and recruitment.

    Part III: Calculate the potential catch of each stock if the selectivity is shifted towards younger or older ages.

    Part IV: Explore side stories: length-based selectivity and fecundity.

- **Analysis**

    Data from 15 Atlantic cod stocks have been uploaded to the GitHub site, along with the analysis of recent selectivity, weights at age, natural mortality, and recruitment of those stocks. Some of the stocks are currently under moratorium or subject to no direct fishing, and may turn out to be unsuitable for the main analysis.

5 Progress report on ToRs and workplan

The work conducted at the second meeting followed the original work plan and reached the objectives (continue working on projects, finalise collection of datasets). Projects 1 and 4 have produced collections of diverse stock assessment datasets from both sides of the North Atlantic, accessible from the GitHub site for anyone to browse and study. Having the data organized in a public repository on the web serves as a foundation to make the MGWG research open and reproducible, and can also be useful for follow-up studies by the MGWG or others.

The first interim MGWG report (ICES 2017, Section 5) elaborated on how the research topics relate to the original ToRs a–e.

The progress of this working group can be tracked by following the path of each research project through milestones towards peer-reviewed publications. See table in next section.

6   Revisions to the work plan and justification

The milestones for each project towards peer-reviewed publication include: (1) define research topic, (2) form subgroup, (3) draft project plan, (4) prepare data and analysis, (5) conduct the analysis, (6) draft manuscript, (7) complete manuscript, (8) submit manuscript, (9) follow up with editor and reviewers.

All four research projects are at the stage of early or mid-analysis:

	State space	Stock recruitment	Model complexity	Selectivity
1 Define topic	X	X	X	X
2 Form group	X	X	X	X
3 Plan	X	X	X	X
4 Early analysis	X	x	x	X
5 Complete analysis				
6 Draft manuscript	x			
7 Complete manuscript				
8 Submit manuscript				
9 Follow up with reviewers				

- not started
x   started
X done

7   Next meetings

The 2019 meeting is scheduled to take place on 23–27 September, venue is to be decided.

MGWG proposes Chris Legault, USA, as an incoming co-chair from 2019 onwards.

Annex 1: List of participants

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