REPORT of the third MSE Web Meeting

Remote meeting via Teams, 25/26 June 2020

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INFORMAL NOTES FROM THE MSE WEB MEETING

(Marianne Vignaux)

1. Introduction

1. Niels recapped progress on the MSE project. He indicated that he wanted to use his University Microsoft Teams site as a central spot for documentation, with simulations available on the SPRFMO Github.

2. Commission guidance

2. Jim recapped on Commission guidance. The Commission were aware that MSE development takes a long time, and that an agreed benchmark is needed first, to which the operating model can be applied.

3. Two new sources of funding have been provided; Australia gave a voluntary contribution of $50000 for SC and the EU gave funding to bring the MSE work to the managers.

4. It has been proposed that at COMM9 there be a 1 day workshop to set management objectives, possibly with an external facilitator

5. So the timeline is Management Objectives to be set at Commission in 2021, and Advice to be provided in 2022

6. Martin P asked whether we could use the tool for the benchmark process, and Niels said yes, but Jim pointed out that we cant use MSE stuff to influence catch limits.

7. Ignacio asked whether there was a detailed schedule of tasks or a terms of reference, and what stock assessment model would be used. It was clarified that the JJM model would be used.

8. Niels stressed that he wanted more people involved in collaborating on the MSE work.

3. Iago's presentation and technical questions

9. Iago presented on his work to develop a "plug and play" for the operating model, based on a Fisheries Library in R (FLR/JJM).

10. JJM outputs give some results in FLR.

11. It has been done for the one stock model, need to extend to the 2 stock model or the 1+1 model, but this shouldn't be a problem.

12. Expect soon a test run of the simple Management Procedure, assuming perfect information, and then will do some initial runs of possible Management Procedures.

13. Jim noted that we haven't had much discussion yet on what we will actually do to provide advice, for example what data will we assume that the model has (going into the future), for example what indices of abundance can we rely on.

14. Iago agreed that we need to clarify those things, and also what output advice is required. He suggested that we might need an example to show Commission.

15. Jim indicated that ideally the advice would be based on clearly documented requirements.

16. Ignacio asked how to deal with uncertainty. There is uncertainty at a range of levels, for example in simulations and in MCMC. If he wants to include different growth models is this all documented?

17. Iago clarified that MCMC sampling is from the chain and will have the correct correlation structure within the chain. This will all be documented as soon as the platform is ready.

18. Ignacio says that the group needs to know what is going on inside the code, FLR is new for us – is the code available? Chile is building a similar platform for Chilean assessment models.

19. Iago clarified that they will assist.

20. Aquiles noted that regime shifts was an important consideration for MSE analyses.

21. Jorge noted that there were a number of different options such as regarding stock structure, growth, different regimes. He wondered if the plan was to bring a single MSE to Commission, that makes the best case under all the different options, or to present a range of different MSEs, depending on the choice of option. He thought that trying to cover all the possibilities in one MSE might not be what Commission wants, and they may need a range of management strategies "If A then do B".

22. Jim clarified that at the Commission level it is necessary to choose a method that is robust, that achieves the goals. As scientists we use the best data in a transparent way to generate a rule e.g. index up 10% quota up 10% and the aim is to have an agreed procedure that does the best overall.

23. Martin asked if we know what kinds of Harvest Control Rules the Commission wants?

24. Jim clarified that it was for the SC to propose.

25. Iago wants the Commission not to worry about the shape of the HCR or how it is parameterised, but focus on the objectives and whether they are achieved.

26. Ignacio noted that biological reference points such as stock recruit relationship steepness has a big influence, and asked if we were planning to analyse different steepness, or could a proxy be used. Jim noted that we will look at it, but there probably wont be much information available about what the best value would be.

27. Iago asked what would happen if the model had one value but the operating model had a different one, and whether the HCR would be robust to that?

28. Ignacio clarified that this may depend on how we deal with uncertainty, but that it might not matter if there is a great deal of recruitment variability anyway.

29. Ignacio asked how to incorporate implementation error, e.g. if the actual catch is larger than was recommended by Commission.

4. MSE experiences elsewhere

30. Robert Scott noted that at WCPFC they started with a plan based around COMM decisions but getting confidence and buy in from Members has taken a long time, and that has been the issue rather than technical problems.

31. Juan noted that MSE processes involve managers, and end up redefining objectives, so we need to be realistic and plan to have lots of workshops with managers.

32. Ignacio picked up on a word "stakeholder" and asked who was meant by that, and Jim clarified that this was Commission, delegates involved in the process as they needed to evaluate and discuss performance indicators for deciding a management procedure.

33. Niels reiterated that Commission didn't want a small group deciding these matters.

34. Gerry asked whether there will be advice available for the next meeting on the carry-over idea. Jim clarified that this will be a very limited advice year, but that Commission did ask for advice on that point, so we will see what can be done, but possibly outside of the MSE process.

5. Next meeting

35. Niels suggested that we schedule technical details for the next session, so that if an agenda point is documented people can prepare to discuss it.

36. He proposed 27/28 August for the next meeting, to give Iago time to do more work, and for agenda items to be proposed.

37. Niels will coordinate with the Secretariat when the next meeting would be, with a Doodle poll to select a date, and an invitation to Teams.

Report of the Fourth MSE Web Meeting 2020

Remote meeting via Teams, 25/26 August 2020

REPORT OF THE FOURTH MSE WEB MEETING 2020

1. Welcome

1. Niels Hintzen (lead on MSE SPRFMO EU-contract) welcomed all participants and the meeting in total was attended by 20 delegates. A list of participants is provided in Annex 1.

2. Agenda (Annex 2) and topics were agreed as below.

2. Development of MSE

3. Iago gave a presentation of recent work on the MSE project. The output of JJMS runs now load directly into FLR, and so it is possible to generate an operating model from JJM. A simple Observation Error Model has also been built, so that it is possible to load previous abundance indices, extend them and sample the catch, to obtain simulated catch, weight-at-age, stock status etc with error. The Estimator is based on JJMS code set up to run from inputs provided from the Observation Error Model.

4. A question was made regarding error structures in the error model. Correlation can be built in, at the moment the Observation Error Model has been built with zero error to prove the mechanics of running the sequence.

5. A question was made regarding run time of the MSE. The JJMS model takes around 50-60 seconds to run, including inverting the Hessian matrix. This means that a full scenario would take of the order of 5-10 hours, so it can still run overnight. It may also be possible to find ways in which the Hessian would not need to be inverted separately for every run.

6. A number of complexities will need to be built into the system, and decisions will need to be made about how to deal with them. These include:

    a. Uncertainty in biological processes such as weight-at-age

    b. Deviances between the Operating Model and the model used for projecting forward

    c. Movement of fish between regions (in the meta-population model)

    d. Recruitment regimes in the Operating Model

    e. Implementation Error (i.e. between what the Management Procedure dictates and what happens in the following year)

    f. Interim Year Assumption

3. Interim Year Assumption

7. The Interim Year Assumption is a question about whether the TAC in one year (e.g. 2021) should simply be set on the basis of the Spawning Stock Biomass of the year two years before (i.e. 2019) or whether the model should do a full forecast of the biomass in the interim year based on some assumptions (and any data about catch or effort that would in real life be available from that year), so that the TAC in 2021 would be based on the Spawning Stock Biomass of 2020 (as forward projected by the model).

8. A complicated implementation of this would be a reasonable amount of work, so should be built upfront if a decision can be made early. For testing purposes no lag is used (i.e. when the 2019 data is available the 2020 TAC is set). The Benchmark workshop may change the decision on what Interim Year assumption should be used.

9. In real life the interim year catch is based on estimates from each Member on how much they will catch, which is hard to model. An alternative is to skip the interim year or to make a simple assumption (e.g. F status quo or "catch the total TAC").

10. Ignacio Payá (Chile) pointed out that in the past two years the lower bound of the confidence interval was used in order to control the influence of a single high recruitment index in a single area, and asked whether it would be necessary to model this. As this is hard to model, either a proxy could be used, or it could be ignored, and then the robustness of the Management Procedure to a noisy estimator could be evaluated.

11. It was agreed that as a placeholder in the model, a simple short term forecast would be used, to be reassessed after the Benchmark workshop.

4.   Uncertainty in the models

12. Decisions also need to be made about Implementation Errors, in which the Management Procedure generates a decision, but something else happens (for example Rollover or Exceeding the TAC).

13. The range of Harvest Control Rules has also not yet been decided. For testing purposes a very simple rule has been used, but options for the future include HCR based on setting the catch or setting the level of Fishing mortality.

14. Harvest Control Rules could in principle be built using any of the information that can be output from the Operating Model, for example something built using Age Composition data.

15. When considering uncertainty in the Operating Model, a range of factors should be considered, including obvious structural factors such as 1,2 or 1+1 stocks and alternative growth models (historically leading to a matrix of 12 model runs) and more subtle factors such as parameter uncertainty. If there is a lot of structural uncertainty, parameter uncertainty may be relatively unimportant. The structural uncertainty has already been agreed at the 2nd session and includes 3 stock structure hypotheses, 2 growth assumptions and 2 recruitment regimes.

16. It was agreed that a small group would make a list of all the types of uncertainty that should be included. This will need to work closely with people familiar with the model, as there are a lot of details. It will be more efficient if as many of these decisions as possible can be made early on.

17. This list would focus on parameter uncertainty, variability in biology.

18. People were asked to think about the effect of movement of fish between a Northern and Southern stock and how this would affect the robustness of different Management Procedures.

19. Jim also stressed the need for a list of the anticipated data requirements needed for the Management Procedure (for example, what indices might the Management Procedure follow).

20. A small team including Ignacio, Juan Carlos, Jim and hopefully someone from Peru agreed to work on a draft. Iago to create a list of what the Operating Model can provide to inform this. The list will be distributed using the GitHub site as a text document.

5.   Next session

21. It was agreed to move to the Secretariat hosted SPRFMO SC8 Microsoft Teams site.

22. It was decided that the next meeting will be a more hands-on technical session before the SC, Niels will circulate a meeting planner to arrange a suitable date.

23. Niels and Iago will make a progress report to the SC (and hence to the Commission).

24. *Action items for next meeting*:

    a. A simple form of the short term forecast to be used as a placeholder to deal with the Interim Year issue, to be reassessed after the Benchmark workshop

    b. Small group to generate a list of uncertainties that need to be considered

    c. Move to the SPRFMO SC8 Teams site

    d. Niels to arrange a technical session before the SC

    e. Niels and Iago to write a paper for SC as a progress report on this work.

ANNEX 1. List of Participants

SC CHAIRPERSON
Niels Hintzen

CHILE
Ignacio Payá
Juan-Carlos Quiroz
Víctor Espejo
Aquiles Sepúlveda
Mauro Urbina

ECUADOR
Isidro Andrade
Jorge Costain

EUROPEAN UNION
Martin Pastoors

KOREA
Seok-Gwan Choi
Eunjung Kim

PERU
Jorge Csirke
Erich Diaz

UNITED STATES OF AMERICA
Jim Ianelli

VANUATU
Gerry Geen

SPRFMO SECRETARIAT
Marianne Vignaux

INVITED EXPERTS
Lee Qi
Robert Scott
Iago Mosquiera
Sebastián Vasquez

ANNEX 2. Agenda Items

26.

1) OPENING OF THE MEETING
   a. Welcome and testing of connections
   b. Recap of previous session
2) Session

   c. Development of MSE
   d. Decisions to be made on development of MSE
   e. Round of questions
   f. Closure of the meeting & agreeing on next session

REPORT of the fifth MSE Web Meeting

Remote meeting via Teams, 20/21 October 2020

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(Marianne Vignaux)

1. Iago stepped through some of the code for the Operating Model and how people would download and run the code themselves.

2. Niels asked who had managed to download the code and get it working – some issues were identified with access to the Github repository and an error in R when running the code from some operating systems but which does not appear to affect the results.

3. The meaning of the term "Grid" was queried and it was explained that you can have a grid of different model combinations which are averaged to cover all the structural uncertainty - you can have many grid cells with different models to describe structural uncertainty or you can have fewer grid cells and use the uncertainty within the cell (e.g. MCMC) to describe the uncertainty.

4. Iago then stepped through the Management Procedure module which takes the output from the Operating Model and generates management advice. The pseudo Management Procedure sitting as a place holder at the moment uses jjms and takes 105 seconds per year because it estimates the Hessian every time. It was suggested that there may be ways to speed this up (by not recalculating the Hessian).

5. It was also queried why jjms was being used at all, and whether a much simpler model could be used each year to generate the next year's quota, based on data. The stock assessment would still be run, but would not be used to generate advice, so the simple control rule would free the system from being tightly bound to jjms. The MSE would then be a very simple loop to see whether the MP met the objectives, and what the diagnostics looked like. One of the reasons for doing this is that jjms is not particularly transparent, but the alternative (using indicators) would rely on finding one or more indicators that performs equally well.

6. Martin, Niels and Iago said that they would check to see whether there were some Management Procedures using indicators that would be easy to implement (perhaps borrowing from other jurisdictions), and Jim (possibly with Marianne's help) would think about some candidate indicators.

7. In any case the management objectives need to be identified, and are thought to include things like stability, low risk, keeping the stock above appropriate thresholds.

8. One point of discussion is whether a single Harvest Control Rule can deal with a system which has regime shifts.

9.

ANNEX 1. List of Participants

CHAIRPERSON
Niels Hintzen

CHILE
Víctor Espejo
Aquiles Sepúlveda

EUROPEAN UNION
Martin Pastoors

FAROE ISLANDS
Jan Arge

KOREA
Eunjung Kim

PERU
Jorge Csirke
Erich Diaz
Omar Rios
Pablo Marin
Daniel Grados

UNITED STATES OF AMERICA
Jim Ianelli

SPRFMO SECRETARIAT
Marianne Vignaux

CALAMASUR
Geoff Tingley

INVITED EXPERTS
Lee Qi
Iago Mosquiera
Ernesto Godelman