Sakari Kuikka visit to JRC under the scope of the a4a initiative, Ispra, 25-27/March/2013

April 18, 2013

1 Introduction

As agreed previously, the a4a initiative is promoting a programme of visiting scientists with the aim of getting external expert cooperation and revision of the initiative's tasks and progress. The visit of Sakari Kuikka (University of Helsinki, Iceland), professor of fisheries science and head of the Fisheries and Environmental Management Group (FEM), was considered of major relevance.

2 Agenda

- Day 01
  - Presentation of the a4a initiative and discussion of a4a objectives and achievements,
  - Discuss the a4a assessment approach
- Day 02
  - Seminar on The Role of Science on the Management of USA fisheries,
  - Discuss the a4a forecasting approach
  - Discuss cooperation with the FP7 ECOKNOWS project
  - Closing remarks

3 Discussion

The stock assessment model was presented. SK is of the opinion that it should be ran tests on the predictive power of the model, possibly doing some hindcast using the ICES stock assessment database. The possibility of sharing information between stock assessments looks statistically sound and follows on the Bayesian ideas that the FEM group uses.

MSEs and operating model approaches raise several issues that need to be considered. It's a common mistake to put too much confidence on the results obtained using these methods. Such message may drive managers to take more risk than they are prepared for.

Conditioning operating models tends to add too many scenarios which may result in a unknown number of scenarios being non-plausible. It's important to go through the exercise of attributing probabilities to the operating models to avoid ending with biased results in terms of risk, due to the effect of non-plausible scenarios. In any case, the MSE should be able to identify how

extreme nature has to be to break down the management system, even though it will always be an underestimation of the full natural variability.

In the context of MSE, it's important to:

- test for recruitment failure, that's most likely the source of uncertainty that has the highest effect on management risk;
- provide methods to test for target buffers, both to avoid unwanted stock status and stabilize the level of catches;
- integrate ecological information for example through changes in natural mortality.

There a trade-off between how much complexity one can incorporate in the MSE and the communication of results to stakeholders. It may be more efficient to sacrifice some complexity if that results in better engagement.

4 Feedback by Prof. Sakari Kuikka

4.1 Project in general and the need for the activities

The aim of the project is to provide a group of standard methods that can, rapidly be applied to a high number of stocks, without requiring strong technical background from the end users, but making use of technical knowledge on the fisheries, stocks and ecosystem characteristics.

It is obvious that there is strong need for such a methodological software package. The EU data collection programme provides currently information for more than 250 stocks, but ICES is doing only 70 assessments in a year. There is a high need to do more assessments (all 250 are target species) to understand the risks more precisely, and to justify the use of economic resources to EU taxpayers who in the end pay the costs. There is a need to consider, when the assessments should be stared for most of these stocks, and whether such assessments can be linked together to make better predictions.

In addition to these needs, many countries need methodology that is easy to apply, and which has enough users around the world to create a society that is adapting and improving new assessment techniques. A4A activities and scientists involved have a lot of potential to develop to such a society.

Moreover, there is an obvious need to automate some of the assessment and to make them available in web for all such end-users of information, which may have interests in fisheries. Many of the elements in the project and the logic of the scientists in selecting and developing the methodology support such development.

The model that is used to describe the age and/or year specific catchabilities and to make different assumptions on those based on the gears used or on the biological behaviour of the stocks is very advanced and will offer interesting possibilities to create operation models that describe the fisheries impacts in details.

4.2 Open issues that were discussed

Like in all science, the border between the known unknowns and the unknown unknowns is an issue when building operational models. In our daily life, we are willing to take into account issues that are unpredictable, but such justifications are not usually supported by science. It was discussed, whether some kind of buffer should be sued for such surprises, which are known to have taken place previously, but for which there are no data available on stock specific basis

Depending on the purpose of the exercise/study, the operational model can be used to provide the most likely stock scenarios and to include the most likely environmental impacts (like the increase of seal population after a seal protection management has started and their impact on M). In such case, there are good ecological reasons to say that future M will be different than historical M, even though the boundaries of the values would not be known very precisely. The system may also offer ways to model the justified plausible hypothesis, i.e. the concerns that stakeholder, and which require make me some scientific work to the tested.

It was concluded, that there is a need to clarify how the basic operational model assumptions are constructed, and how the additional case specific questions are then to be modelled. Especially the role of model and causal uncertainty (like which are the causes of M) are easily essential in such simulations, as they may make such patterns to data which create periodic bias to assessment results (assessment model implemented to management rules and also used in practise) compared to random noise between the years.

The use of words of process error and unstructured uncertainty in combination of the word Operational model may need some care, as the philosophical purpose of the operational model may differ, depending on the aim of the simulations. This likely needs some attention in the final report of a4a project.

4.3 Future project aspects and various alternative ways to develop the system further

The stock assessment package made available offers a relatively quick way to run several stock assessments, and to potentially link them, so that there would be some learning between the stocks. This may be helpful in predicting recruitment values, which are often correlated with some environmental settings that may be common to larger sea areas and between species.

The system may also be used to check, then it would provide a better way to predict the future catches (like using data from year x to year y to learn parameters and then predicting catch in year y +2), and this could be compared to the actual predictions made by ICES stock assessment working groups (not the estimates you get today by dropping years away from the data sets provided), s one of essential questions is, how much additional knowledge human can introduce compared to an automated assessment system, which could potentially be developed on the basis of a4a work in the near future.

The fact that Fishbase has been linked to the modelling approach is important, as it provide a lot of life cycle history data sets. The S/R knowledge is very important as well, and one of the future challenges is how to link these sources of knowledge together. Some methodology in ECOKNOWS will provide some possible ways to do that, and it would be likely very useful to link the a4a methodology and the methods of ECOKNOWS together at some later point after the projects have been finalised and conclusions made.