Hendrik Gislason visit to JRC under the scope of the a4a initiative, Ispra, 3-4/May/2012

September 6, 2012

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. Henrik Gislason (DTU-Aqua, Denmark) has been researching and publishing on how life history parameters relate to each other, and in particular how natural mortality links with more measurable life history characteristics.

2 Agenda

- Day 01
  - Presentation of recent developments on life history methods
  - Presentation of the a4a initiative
  - Discuss developments of multispecies applications
  - Discuss implementation in FLR
- Day 02
  - Seminaire on stocks assessment and fisheries management based on life history parameters
  - Discuss usage of life history based models to assess the status of stocks
  - Discuss a4a and possible cooperation
  - Prof. Gislason's closing notes and feedback

3 Discussion

The a4a's objectives, progress and ideas were discussed. See below for Prof. Gislason's feedback and comments.

Prof. Gislason presented his work on life history and the quantitative relationships between different parameters. The most important assumptions on his work were shown to be the existence of a (i) spawner by spawner one by one replacement at equilibrium, and (ii) that unfished populations can be reconstructed from that information.

The possibility of including life history parameters on assessment models, so that these could be estimated and their uncertainty quatified together with other model parameters, was discussed. In particular, when dealing with length-based models, there seem to be ample room for exploring the possibility of estimating L_∞ or W_∞ given the fisheries input data. In any case, the problem of mortality being estimated on an unfished situation raises issues about the validity of these models for fished populations. It may be the case that when stocks are being exploited, the model estimates total mortality, which could be included on an assessment model as a maximum level for $M + F$. Prof. Gislason suggested that size spectrum analysis could be used to correct M in the case of fished systems.

It was agreed that the dataset with life history parameters compiled by Prof. Gislason for his paper, could be used in the future for simulating stock abundances and used for testing the assessment model under development.

The methods implemented in FLR to simulate populations using life history relationships, as described by Prof. Gislason's papers, were discussed. The major problem seems to be the fact that these relationships are computed for unfished stocks and require corrections when the stock is being fished, although is not clear how to carry out those corrections. However, if used on fished populations the effect is an over-estimation of M and most likely of Z, although it's not clear how F estimates could then be affected. Simulation testing may help on this matter. Another limitation is that the relationships were computed based on information obtained from North Sea stocks, mostly demersal, and there are doubts that they can be used directly in other areas, in particular with different environmental conditions, like higher temperatures.

4 Cooperation with a4a

Prof. Gislason was interested on being updated about the initiative. No particular tasks were identified but both sides showed interest on another visit to JRC to review and comment on the results obtained by the initiative.

5 Feedback

The aim of the a4a project is to develop a method for rapid and efficient assessment of fish stocks for which a medium amount of relevant information is available. The number of fish species in the marine waters of the EU is large and population assessments are available for only a small fraction these, making the long-term viability of many targeted and non-targeted fish stocks virtually unknown. The development of the EU Maritime Policy and the Common Fisheries Policy, as well as the implementation of an ecosystem approach to fisheries management, require regular assessments of fishing impacts and stock status to be available for an increasing number of fish stocks. For this reason the interest in methods to assess data poor or data deficient fisheries is growing both within ICES and globally. With only a fraction of the species caught by fisheries within and outside the EU being regularly assessed I consider the project to be both timely and relevant.

In the project a generic single species stock assessment model will be developed and tested on both real and simulated data. The real data will be assembled from the databases available for the current stock assessments in EU waters, while simulated data will be generated by a number of methods including models using life history parameters derived from both empirical data and theoretical models. The simulated data will allow the robustness of the advice derived from the assessment model to be examined, but considering the successful implementation of the project the analysis of actual stocks for which full assessments have been undertaken should receive some priority, as these will enable the possible bias of the generic stock assessment model to be examined. In addition they will demonstrate how well the generic assessment methods perform compared to more data hungry traditional methods.

The focus of the project is on single species assessments, but in reality it is likely that many of the species will be caught by the same fishing fleets and types of fisheries, or be influenced in the same way by environmental changes or by shared predators and prey. Fishing mortality, natural mortality and recruitment may therefore be correlated across species. The problems associated with modeling biological and technical interactions are mentioned in the project proposal, but their solution requires more work than available in the project. It will not be easy, but perhaps simple size-spectra models can be used to estimate overall trends in natural mortality and growth for species of different asymptotic size. However, given the overwhelming tasks at hand and the relatively few staff members involved it is very good that the project has adopted a modular approach, where first priority is given to solving the single stock issues, before complex multifleet and multispecies questions are addressed.

It was an interesting workshop and I was impressed by the quality of the project and the technical capabilities and skills of the participating scientists. I very much hope that I will be able to follow the progress and if possible contribute to the work.

Henrik Gislason (Professor, Technical University of Denmark)