

# Steve Cadrin visit to JRC under the scope of the a4a initiative, Ispra, 30/November/2012

January 7, 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. The visit of Steve Cadrin (UMASS, USA), Professor of the Department of Fisheries Oceanography and Director of the Marine Fisheries Institute Education, was considered of major relevance.

## 2 Agenda

- Presentation of the a4a initiative and discussion of a4a objectives and achievements,
- Seminar on The Role of Science on the Management of USA fisheries,
- Presentation of the outcomes of the Strategic Initiative on Stock Assessment and Management (SISAM)
- Discuss cooperation with SISAM and participation in the World Conference on Stock Assessment Methods (WCSAM)
- Closing remarks

## 3 Discussion

The a4a's objectives, progress and ideas were discussed. Steve Cadrin was well impressed with the progress made so far, see section 5 for feedback and comments.

With regards to the stock assessment model, the progress made is very good, but it still misses the length dynamics module, which will open the possibility of dealing with selectivity in length instead of using an age structured "selectivity". The development of the length module was thought to be a "simple" conversion between lengths and ages using a growth model. Using length-based selectivity could be better as selectivity is a length based process. The major problem is modelling the tails of the selectivity function, as these are likely to be badly represented in sampling (low number of old individuals or recruits). They do have, nevertheless, a major impact on the estimates of population size and structure.

Multispecies analysis are at the core of a4a, as having assessments for all species on an ecosystem will open the opportunity for different analyses of multispecies issues. One way to deal with it would be by running single species assessments, mining assessment results as a multispecies dataset

to uncover interactions and introduce models to explain interactions. Such process would allow the introduction of information external to stock assessments, and if the stock assessment method is flexible enough, such information could be introduced in the next round of assessments. Following this kind of analysis requires a fast, robust and automatic stock assessment method, which is the major objective of the a4a stock assessment model.

Having a stock assessment method and a standard/minimum MSE algorithm, will contribute to make fisheries modelling more accessible to scientists without a strong statistics background. Having more people able to carry out and discuss these analysis will increase the human resources available, which will become a major problem in the future as more stocks and more complex systems are required to be managed based on scientific advice. In that sense the approach taken by the a4a initiative is strategic and proactive with regards to a problem that will exist in the future, if a large number of stocks requires assessment. On the other hand, having more scientists able to understand and discuss population and fisheries dynamics will result in an increase of the work quality.

Modelling natural mortality is another subject that is important to look at. As fishing mortality starts dropping, hopefully due to management actions, natural mortality will become more relevant to population dynamics once that a larger proportion of deaths will come from its effects. This is a major issue in fisheries science that should be taken into account, if not otherwise at least as one of the risk factors to be included in a standard MSE analysis.

Finally, the participation of JRC in the WCSAM next year in Boston was discussed. The a4a initiative will take part on the stock assessment testing exercise and will submit a presentation.

## 4 Cooperation with a4a

Options for collaboration with a4a were discussed and the following tasks were identified as possibilities:

- Involvement on a4a model development
- JRC visit in 2013
- collaborate on the analysis of model testing results
- collaborate in MSE development

## 5 Feedback

The a4a initiative is a creative response to a challenge and opportunity in the European fishery management system. The data collection framework (DCF) revised in 2009 requires sampling of quarterly length distributions of landings and discards at great expense to the European community. High expectations for improved stock assessment and fishery management will be expected from the investment. Although many view the DCF as supporting the data requirements of existing analytical stock assessments, the a4a initiative recognizes that DCF will provide data to assess many more stocks that have not previously been assessed.

The challenge of developing new assessments for a large number of stocks is the large though-put of assessments with limited budgets and human resources. The solution involves a relatively simple management procedure, including a robust stock assessment model and a harvest control rule. The JRC fisheries team is well suited to the task, with expertise in data compilation and management, stock assessment modeling and management strategy evaluation.

Progress in the a4a initiative is impressive. The stock assessment model under development is a robust statistical catch-at-age model that transforms catch-at-length to catch-at-age using a growth model as an input (rather than an internally estimated growth model) and selectivity as an input and models stock dynamics with relatively few estimated parameters. Results from simulation testing of the preliminary model are promising (see `model_tests.pdf`). The preliminary model tended to recover fishing mortality and recruitment well, but often mis-estimates catch and stock size, particularly in early years. Several potential model modifications were discussed:

1. Abundance at age in the first year could be deterministically derived from starting-year fishing mortality and starting-year recruitment (e.g., equilibrium age structure) and may improve estimates of catch and stock size.
2. Multispecies applications of stocks in the same region may help inform fishing mortality and survey of fishery CPUE catchability estimates. These linked parameters are probably more length-based than age-based, but the age-based processes can be transformed to length-based using mean size at age.
3. The addition of reference point calculations in the model may help in the formation of algorithmic harvest control rules. For example, the reference points being developed through ICES WKLife (F0.1) could be derived with information in the model.

The coordination of a4a with the ICES Strategic Initiative for Stock Assessment Methods (SISAM) should continue. The management procedure being developed through a4a would be a valuable contribution to the World Conference on Stock Assessment Methods for Sustainable Fisheries (Boston USA, July 2013). SISAM may be an appropriate process to implement the products of a4a for improving European stock assessments.