Assessment for All (a4a)

Proposal to operationalize the initiative

(October 27, 2011)

1 Background

The revision of the Data Collection Regulation in 2009 introduced the concept of "concurrent sampling" for metier related variables, described as "sampling all or a predefined assemblage of species, simultaneously in a vessel's catches or landings" (Reg 2008/949/EC Annex, Chapter I, 1.b). Still according to the same regulation (Annex, Chapter III, B.1.1.1) "sampling must be performed in order to evaluate the quarterly length distribution of species in the catches, and the quarterly volume of discards". The regulation identifies 250+ stocks along the European EEZ for which length frequencies and other biological information must be collected, and mentions another unknown number of species, the by-catch and/or discarded species, for which similar information must be collected. Following the reports presented by the MS to the EC all these information is being collected, processed and stored in national databases.

From these species there is a part for which ICES, GFCM and STECF perform assessments. It's difficult to identify precisely how many species are assessed now as a large percentage of these are still exploratory assessment, but there's still a large percentage that are not assessed at all, partially assessed or use simple assessment models that can be improved.

In about 10 years the time series of all these species will be long enough to be used in stock assessment and fisheries institutes/scientists will be called to assess these stocks. The need for such assessments will come not only from stock management requirements, but more broadly from ecosystem management and maritime spatial planning requirements.

At that moment a potentially huge problem may surface due to lack of personnel and methodologies, once that the present procedures for stock assessment require highly trained analysts working for 2 to 3 month per year, to give advice on the exploitation/conservation of 1 species.

The present advisory process is too slow to cope with a massive stock assessment process. It requires large amounts of data and human resources with a very sophisticated background on statistical modeling. Recent developments on stock assessment continue targeting more sophistication and data eager models. However, by 2020 there will be a large number of stocks that will not have enough data for these models but will have enough data to be assessed, or at least to be looked at. On the other hand, the number of scientists able to cope with such high sophistication will be reduced, which may result in a large number of stocks being left without assessment, no matter how much information is available.

To prevent such problem a simpler model and a comprehensive methodology must be developed suited to the level of information expected to exist for these stocks, followed by a training programme to increase the pool of scientists available for stock assessment tasks.

The table below summarizes the information that is expected to exist for most stocks exploited by EU fleets in the European EEZ. A *ad hoc* quality assessment is provided for each variable, including space/time disaggregation.

Table 1 – Quality *ad hoc* description of information provided in each variable by source (1=fair, 2=good, 3=excellent).

Source	Time	Space	Volume (L,D,C)		Effort	Index of abundance		Biology	
			weight	length		weight	length	growth	reproduction
On-auction	2	1	3	3	2	1	2	1	1
On-board	3	3	3	3	3	2	1	2	2
Surveys	1	3		3		3	3	3	3
log-books	2	1	1		2	1			
VMS	2	3			3	2			

For most of these stocks biological parameters on growth and reproduction will be a problem. Collecting, processing and conducting research in such a large number of stocks requires human and financial resources that are not available for most fisheries institutes and universities in Europe. Socio-economic information will be available, although the time frame to sort out the technical problems preventing the integration of such information into stock assessment is still unclear.

2 Objectives

This initiative aims to: (i) develop an assessment method targeting stocks that have a reduced knowledge base on biology and moderate time series on exploitation and abundance; and (ii) trigger the discussion about the problem of massive stock assessment, that will most likely exist in Europe in the next decade.

All the methodology should be driven with the primary objective on providing advice to management. The major focus should be on the robustness of the advice, not so much on computing intermediate parameters.

The solution suggested is to embed a statistical catch-at-age model on a MSE algorithm, implemented in R/FLR. The model could be based on length information of landings (L), discards (D) and some kind of abundance index (I), which are converted to age information using a growth model (G), and pooled together with a selectivity/selection pattern model (S) and a stock-recruitment model (R) to build a statistical catch-at-age model (SCAA).

To test the impact on the advice being given by the sub-models, G, S and R, which are expected to be the most uncertain ones, a Management Strategies Evaluation (MSE) algorithm can be implemented, while the base information, L, D, and I are used for diagnostics.

3 Open issues

There are a set of open scientific issues that will be important to deal with. These are generic fisheries science challenges for which solutions may be found, depending on the time available to deal with them. In general the subjects referred below will not endanger the progress of the initiative.

- How to consider multi-fleet in such simple method ?
- How to deal with species that show a marked sexual dimorphism ?
- How to take into account distinct spatial and temporal scales ?
- How to deal with the weighting of likelihood components in a transparent way for users ?

- How to integrating biomass dynamic models ?

- How information from similar stocks can be integrated in the assessment ?

- How to use time series of distinct sizes ?

- How to consider multi-species management without integrating trophic relations ?

- How to consider migration between areas ?

4 Workplan

Month	Assessment model	MSE methodology	FLR GUI	External assistance
1	Design			
2				
3	Prototype			Discuss general ideas and comment prototype and write paper for "food for thoughs"
4				
5	Tests	Design		
6				
7	Review	Prototype		Review model and discuss method prototype
8	Optimize			
9		Tests		
10				
11	Final	Review		Review method and write paper on model and discuss GUI prototype
12		Optimize	Design	
13				
14			Prototype	
15				
16		Final	Review	Review GUI and write paper on method
17				
18			Final	

5 Team

The project is located on FishReg, coordinated by Ernesto Jardim, and involving Iago Mosqueira and Giacomo Chato. The research to be carried out will be added to the scientists' work objectives without compromising other work objectives. The project is also of interest of Hans-Joachim Raetz, Jean Noel and Hendrik Doerner. External scientists will be invited to support the development of the methodology.

6 External assistance

The workplan includes 4 meetings with invited scientists (5 on average) to help on the development and implementation of the methodology, as well as to act as external reviewers of the work being done. Such collaboration can be performed by invitations to experts for visiting JRC, through the organization of small meetings or by short missions. Decisions will depend on the opportunities both in financing and availability of the experts.

7 Budget

No equipment apart from existing will be required. Costs will be constraint to expenses of visiting experts and missions. Details below:
- Four (4) Meetings in JRC with the participation of 5 external scientists (on average) for the period of 3 days (on average),

- Purchase of specialist software (program) for an amount inferior to 5000 Euros,
- Participation in 3 conferences by 2 JRC scientists.