

January 2016 Crab Modeling workshop

Terms of reference

The main goals for ensuring progress of software development for crab modeling can be summarized as:

1) Application of Gmacs and documentation

- a) Update of progress and overview of gmacs software development and model specifications
 - i) Minor updates to plotting software, core model code, documentation, reference list, GitHub repository and support code (e.g. Makefiles)
 - ii) Major updates to the selectivity code
 - (1) Improved prior and bound specification
 - (2) Unit testing to ensure that this additional flexibility did not slow down the code
 - (3) Fitting the model to BBRKC and investigating the changes
 - (4) Updated BBRKC input files to include one more year of data
 - iii) Major updates to the size-composition handling
 - (1) Allows any combination of size-compositions to be fitted simultaneously (e.g. males and females fitted together in the multinomial)
 - iv) User experiences (Jie?)

2) Migrate an approved assessment to Gmacs for use in specifications

- a) BBRKC side-by-side evaluations and reconciliations
 - i) “fixed” parameter values to same as BBRKC assessment model
 - ii) Alternative evaluations (and summary of where differences occurring)
 - iii) Simulation testing
- b) SMBKC model development and configuration tests
 - i) Comparisons with scenario 1 of 2015 assessment
 - ii) Evaluation of alternative scenarios (in principle)
 - iii) Simulation testing
- c) NSRKC
 - i) Update from Hamachan

3) Future Gmacs development and collaboration plans

- a) Plan forward for consideration in 2016 specs cycle including plan for May CPT review and what is needed to get there.
- b) Planning for Stage #2 timing/etc for broader workshop to pull in outside assessment folks interested in application to stocks outside of AK (and/or also other AK stocks?).
- c) Follow up on planning for broader Seattle-based workshop to increase usage/knowledge base of Gmacs application (need to contact potential contributors/interested users etc), timing
- d) Develop plan for ownership i.e., relative contributions/roles from Council, Universities, ADFG, AFSC, and BSFRF

Points and notes identified from CIE review

- The current implementation of GMACs uses a continuous-F approach that operates with instantaneous fishing mortality rates across a full year. As a preliminary step to getting the assessment software functional this is a good first approximation, but to adhere to the generic technical specification (Maunder, 2012), and to allow for the idiosyncrasies of each fishery it will be necessary to convert the equations describing the dynamics into a step-wise seasonal

interpretation of events, with the duration of each 'step' being approximated by the proportion of natural mortality imposed during each such 'step'.

- Include a SR relationship with a suitable lag (not urgent)
- Add an option for environmental forcing (not urgent)
- Add features to do snow crab growth and biology, i.e., a terminal molt (not urgent)
- Not all features in existing crab assessments should be added to GMACS. But enough to make valid side-by-side comparisons
- Audit of key characteristics of crab fisheries and biology for Alaska crab stocks (not urgent)

Other important things to do (see the gmacs GitHub repository issues list for a more comprehensive list of specific tasks <https://github.com/seacode/gmacs/issues>):

- Decide between the continuous F approach and the Hybrid F approach. This could be a key outcome of the workshop and could be coded during the workshop
- Add the coefficients selectivity option (will be done before January workshop)
- Ongoing improvements side-by-side comparisons (between Gmacs and Jie's model)