

Report back on updates to the assessment model for Zones A to D

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The computer program for the assessment model of Zones A-D has been re-written and the same results as obtained previously have been reproduced. While going through this exercise a few of minor changes were implemented. These made hardly any difference to the results. Some research issues identified in MCM/2010/AUG/SWG-AB/11_Working Doc have been investigated. No results are given here apart from stating what has been done and the outcome, as it is felt that decisions for any change in the Reference-case model should be made on the basis of results for the updated data for Zones A-D. Below are lists of issues addressed and those still to be addressed.

Work completed

- Consider stratifying commercial CPUE data for Zone B (Station 11 vs. Other Stations) depending on outcomes of additional FIAS sampling. *Little difference in the model assessment results between the Reference-case model and a test that uses the stratified Zone B FIAS series (see Brandão and Butterworth, 2009) and so there is no strong need to stratify the CPUE data.*
- “Further review the software on which the estimation method is based to identify why convergence to local minima is occurring and then recalculate the 2-dimensional likelihood profile (h and μ), with a view towards selecting a base-case choice for h .” *This has been looked into and a better log-likelihood fit is achieved for a slightly higher h value.*
- “Conduct a sensitivity test in which allowance is made for an Allee effect (and use this as the basis for projections). Consider two scenarios:
(A) the stock-recruitment relationship follows the Beverton-Holt form, $BH(SB)$, for stock sizes above $0.4K$, and $\max(0, BH(SB)(SB/K - 0.08)/(0.4 - 0.08))$ for lower stock sizes, and

(B) as for (A), except that the thresholds are defined in terms of densities of 0.19m^{-2} and 0.03m^{-2} respectively.”

An option to include this option (A) in the computer program has been coded. Option (B) still needs to be done.

- “The outputs available to the workshop related to trends in spawning biomass and the fits to the data. However, these outputs are not sufficient to fully understand the changes over time in the size- and age-structure of the population. Revise the diagnostics produced by the model to show changes over time in the age- / length-structure by zone.” Many more diagnostics are already available apart from those presented previously. It is just a matter of deciding exactly what diagnostics are wanted so as not to drown people with Tables and Figures.
- “Report estimates of depletion for the inshore and offshore strata.” Same comment as above.

Issues not dealt with as yet

- Move towards TURF-based management by assessing both whether there has been a reduction in poaching in a particular TURF (based on confiscation data) as well as modelling the dynamics using information from FIAS, other research surveys and CPUE data.
- Longer-term refinements, e.g. fit the A-D population model directly to length data; investigate the implications of alternative error structure models in applying a General Linear Model to the CPUE data; The approach in A-D should be extended to a full Bayesian analysis of Zones ABCD together with some common parameters, so as to allow for covariance in some uncertainties.
- “Reconfigure the assessment so that either
(a) it is based on fitting to the length-frequency data (where the length-frequency data are predicted using the model estimates of population age-composition), or
(b) it is based on a size-structured population dynamics model. Implementation of this suggestion will require the existing growth data to be re-analysed (and perhaps augmented).”
- “Measures of uncertainty in indices of illegal catches should be carried through into projections in order to indicate the effects of this uncertainty on stock trends. Such measures are conditional on several assumptions and are almost certainly underestimates of the true uncertainty involved.”
- “Investigate a model configuration in which the inshore area corresponds to the area surveyed during inshore FIAS, assume that selectivity for inshore FIAS is

asymptotically flat, and estimate the proportion of the commercial and illegal catch in the inshore area.”

- “Evaluate, using simulation, the ability of the estimation method to reliably estimate the magnitude of illegal catches.”

REFERENCE

Brandão, A. and Butterworth, D.S. 2009. Further results and sensitivity tests for the Reference-case abalone spatial- and age-structured assessment model for Zones A, B, C and. Marine and Coastal Management document: MCM/2009/OCT/SWG-AB/10.