

Appendix D. Comparing Assessment Models

The 2005 cabezon assessment makes the transition from a population dynamics model written specifically for cabezon (original cabezon model (OC)) to the Stock Synthesis 2 (Methot 2005) package. Both assessment models are implemented in ADMB, but differ slightly in terms of model structure. There are three major differences between the two models:

1. Recruitment bias correction: The OC model applies the log bias-correction of recruitment deviations in the recruitment penalty function. SS2 applies the bias-correction factor when predicting recruitment.
2. Fleet weight-at-age: Weight-at-age information is used in the calculation of age-specific catch. The OC model assumes the same weight-at-age relationship for all fleets. SS2 calculates fleet-specific weight-at-age after accounting for the impact of selectivity on weight-at-age.
3. Estimation of additional survey variability: SS2 currently has no way of estimating additional variance about the survey indices and uses only the inputted CVs. The OC model estimates an extra variance component (the “catchability scaling parameter”) internally when fitting to the survey indices.

Several model runs based the OC assessment model were explored to examine the effects of these differences on estimates of reproductive output. Model runs are designated as follows:

- SS2: SS2 model
- Old SS2: SS2 v.1.09 (catch-at-age removed at the start of the year)
- OC: Original cabezon model
- SS2B: SS2 bias-correction
- OCB: OC bias-correction
- NOEX: Catchability scaling parameter not estimated
- FL1: SS2 Commercial fleet 1 weights-at-ages used for all OC fleets. This fleet was chosen because the weights-at-age for it from SS2 differed substantially from those calculated within the OC model so it was hypothesized to be influential. Other fleet weights-at-age were also examined and gave similar results.

A model with the designation OC_FL1_OCB_NOEX is the OC model using the fleet 1 SS2 weight-at-age values, the OC bias-correction method, and no estimation of the catchability scaling parameter.

Results of the comparisons are given in Figure 1 Appendix D. When recruitment deviations are not estimated, SS2 and OC give similar trends if the OC weights-at-age are replaced by the SS2 fleet 1 weights-at-age. When recruitments are estimated, this correction is not sufficient (and, in fact, not needed). Instead, it is necessary to apply the SS2 bias-correction approach for the OC model to produce similar results to SS2. Therefore, the first two differences between the OC and SS2 models are important when comparing assessment outputs. The third difference is important to consider when comparing SS2 model outputs to OC model outputs that estimated the catchability scaling parameter.

Figure 1 Appendix D. Model runs comparing the OC model to SS2. Descriptions of the model runs are found in the main Appendix D text.

