ADDENDUM TO:
Why does the current hake assessment indicate the extent of depletion of the *M. paradoxus* population to be high, but that of *M. capensis* to be much less?

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The results shown in Figs. 8 and 9 of MCM/2009/APRIL/SWG/DEM-24 where as the negative bias in the trend of the *M. capensis* GLM-standardised CPUE trend is increased, the assessment results suddenly switch from a low extent of depletion and high steepness to a high extent of depletion and low steepness beg further explanation.

Fig. 1 shows the –lnL contributions from each data source to the total across the full range of possible steepness values, for the case with no bias in the *M. capensis* GLM CPUE series trend. Preference for the high steepness result is either neutral or strongly indicated for each data source. For the GLM CPUE series however, the likelihood does also start improving at low steepness.

Fig. 2 gives corresponding results when a trend bias of-0.5% p.a. (a value sufficient to "flip" maximum likelihood results to the low steepness option) is introduced to this CPUE series. Here the improved likelihood for the GLM CPUE series for lower steepness becomes much more marked, to the extent that it over-rides the contrary trends in the CAA likelihoods. The result is that the total –lnL becomes multimodal in steepness, with (here) the mode at smaller steepness marginally preferred to that at high steepness.

Thus it is the multi-modality of the likelihood surface that results in the sudden switch in results evident in Figs 8 and 9 of the original analysis.. This indicates that use of maximum likelihood estimates alone for operating models may not be adequately capturing the extent of uncertainty about the status of the *M. capensis* population, so that it may be necessary to move towards Bayesian estimation for which posteror distribution would not evidence this rapid flip.

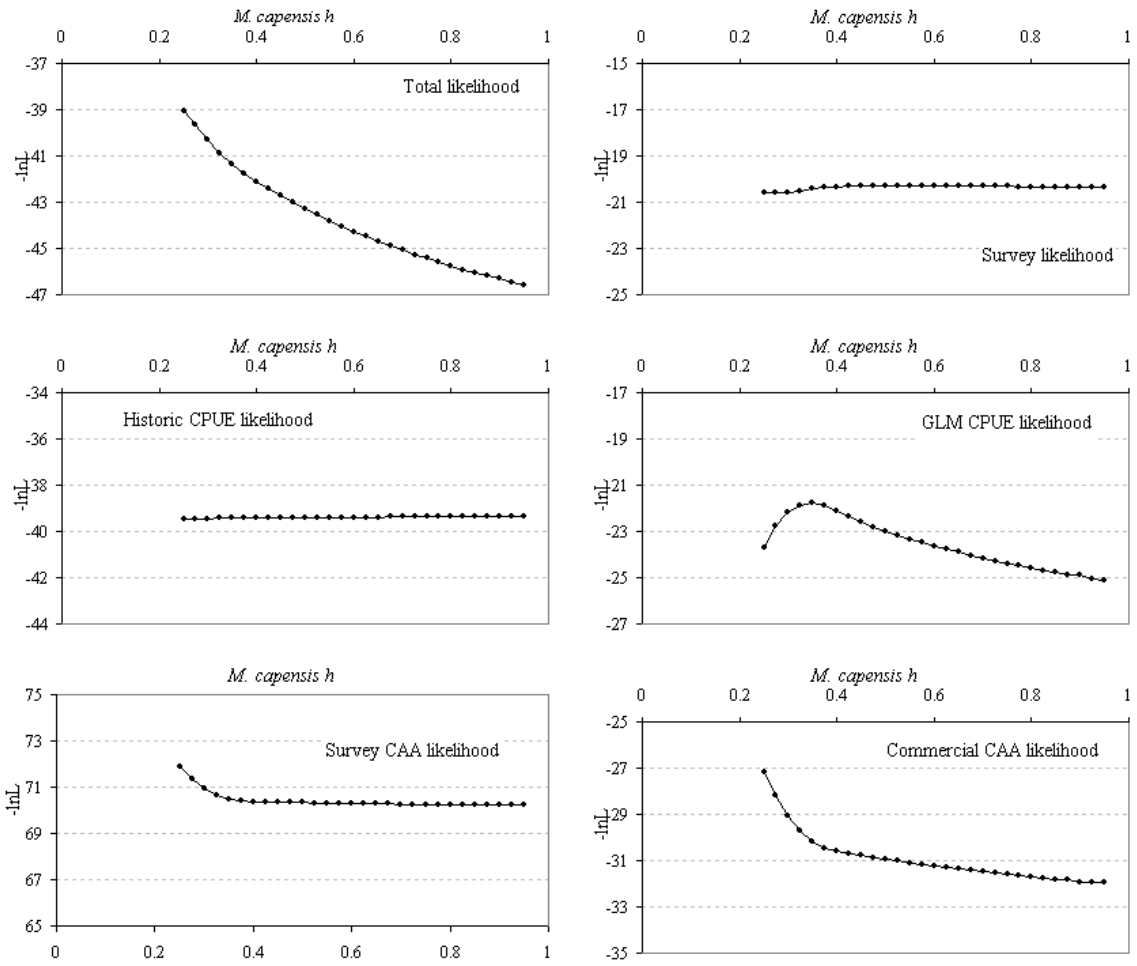

Fig. 1: -lnL contribution of each data source for a series of steepness values *h* for *M. capensis*, for the assessment with all data sources included, and no bias in the GLM CPUE series trend.

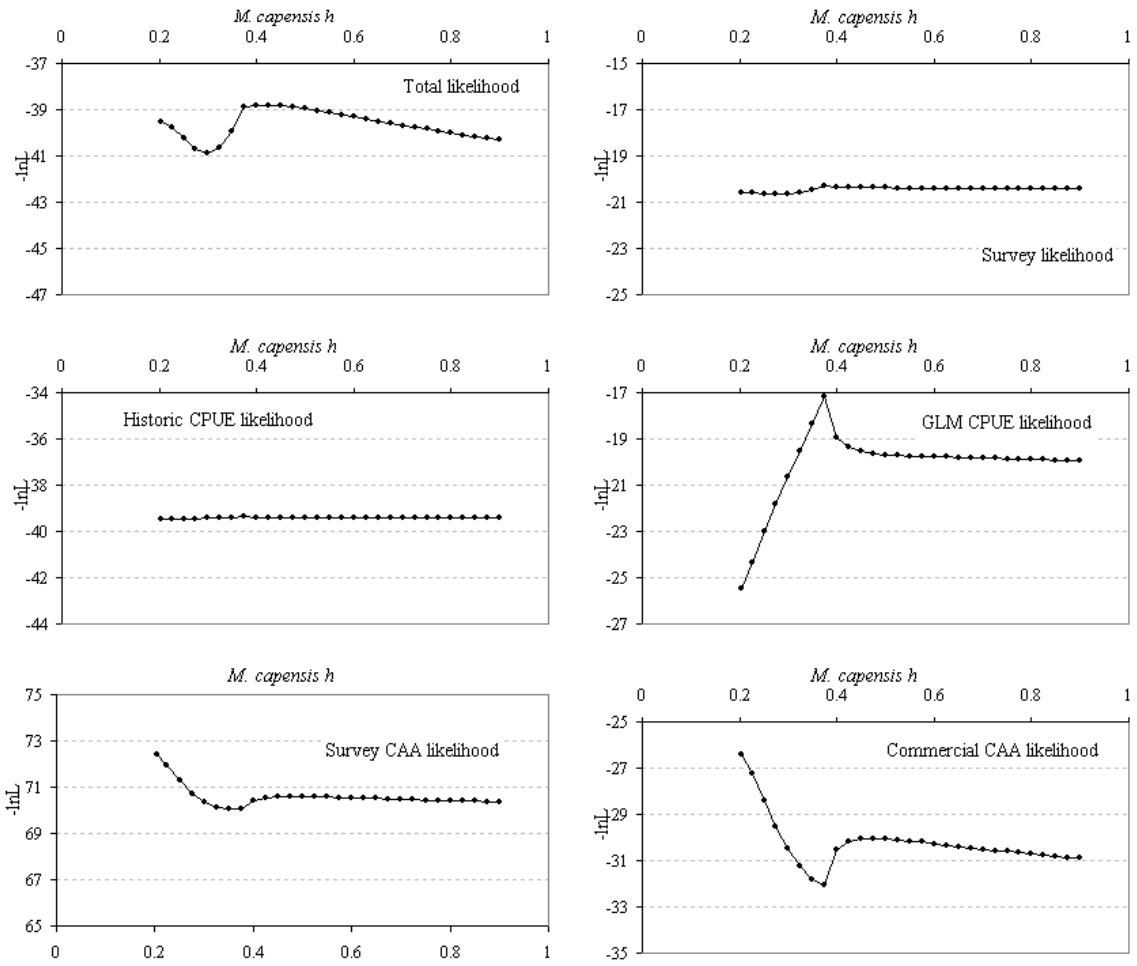

Fig. 2: As for Fig. 1, but with a small negative bias (-0.5%) in the *M. capensis* GLM CPUE series trend.