

Comparison of results for the South African Hake 2017 Reference Case Assessment before and after the correction of some minor coding errors

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Introduction

We thank OLRAC for checking the code for the hake assessment provided by the first author. This exercise identified some small errors and/or inconsistencies with the specifications document (DEM/11).

The 2017 Reference Case (Rademeyer and Butterworth, 2017) has been rerun with those errors/inconsistencies corrected, and the results are compared with those circulated earlier in the Table and Figures below.

The coding errors

The coding errors identified by OLRAC are listed below, with the responses in *italics*.

1. Grouping of CAL bins where the observed proportions are equal to zero. This is not specified in DEM/11, but is implemented in the code.
Yes. This has been modified in the code.
2. The bias correction factor for year $y+1$ uses the recruitment variance (recruitment sigma) for year y , when it should use the value for year $y+1$.
Yes. This has been corrected.
3. Rebecca's code normalises only the selectivities-at-length for "Offshore Trawl" and not for the other fleets as would be consistent with DEM/11. This probably has no numerical implications.
This has no numerical implication but has been modified in the code.
4. The longline gender normalisation Equation (35c) of DEM/11 is not consistent with Rebecca's code. In the code Males + Females add up to 1 across all lengths and in Equation 35c there is no summation over gender in the denominator.
This is a typo in the model specification document that will be corrected.
5. The specification in DEM/11 at the bottom of page 12 "Selectivities-at-length are converted to selectivities-at-age using the begin-year age-length matrix for the summer and autumn surveys, and the mid-year age-length matrix for winter and spring surveys" is not reflected in Eq (38), which just uses the mid-year age-length matrix. The code is consistent with equation 38 but not with page 12.
Actually the code was consistent with equation 38 and page 12, but page 12 and equation 38 were not consistent. The code has been modified so that both the selectivities-at-lengths' and the predicted proportions-at-length's computations use the begin-year age-length matrix for the summer and autumn surveys, and the mid-year age-length matrix for the other surveys. The specification document will reflect this change.
6. The code refers to the incorrect survey season's timing in line 1600, and in line 1612.
Yes. This has been corrected.

Results

Results for the corrected 2017 RC are given in Table 1 and Figures 1-2. The results are compared to the October 2017 RC (Rademeyer and Butterworth, 2017). Spawning biomass trajectories are plotted in Figure 1 while the estimated stock-recruitment curves and trajectories of recruitment and recruitment residuals are shown in Figure 2. Generally differences are fairly small, with recent *M. capensis* recruitments estimated to be less variable.

Reference

Rademeyer RA and Butterworth DS. 2017. Routine update of the South African Hake Reference Case Assessment. Unpublished report. FISHERIES/2017/OCT/SWG-DEM/51.

Table 1: Estimates of hake management quantities for the corrected 2017 RC and the October 2017 RC (Rademeyer and Butterworth, 2017).

	October 2017 RC	Corrected 2017 RC	
-lnL total	-3833.7	-5244.1	
<i>M. paradoxus</i>	K^{sp}	539	547
	B^{sp}_{MSY}	121	125
	B^{sp}_{2016}	108	106
	B^{sp}_{2017}	112	112
	B^{sp}_{2017}/K^{sp}	0.21	0.20
	$B^{sp}_{2017}/B^{sp}_{MSY}$	0.92	0.89
	MSY	122	123
<i>M. capensis</i>	K^{sp}	179	187
	B^{sp}_{MSY}	34	39
	B^{sp}_{2017}	112	120
	B^{sp}_{2017}/K^{sp}	0.62	0.64
	$B^{sp}_{2017}/B^{sp}_{MSY}$	3.27	3.04
	MSY	64	66

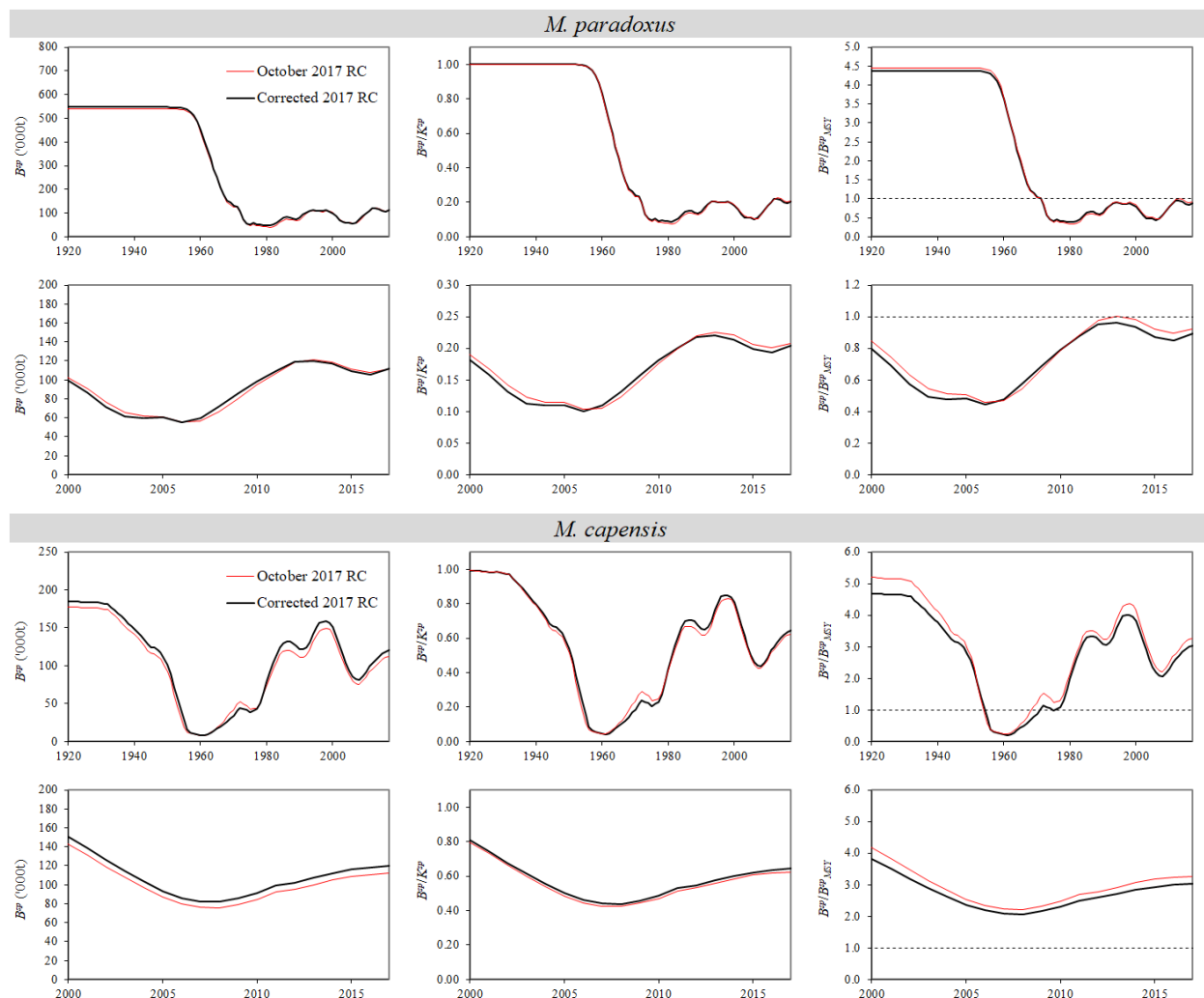


Figure 1: Spawning biomass trajectories (in absolute terms, and relative to pre-exploitation level and B_{MSY}) for the corrected 2017 RC update (black lines) and the October 2017 RC (red lines). The second and last rows repeat the first and third rows but for a different year range.

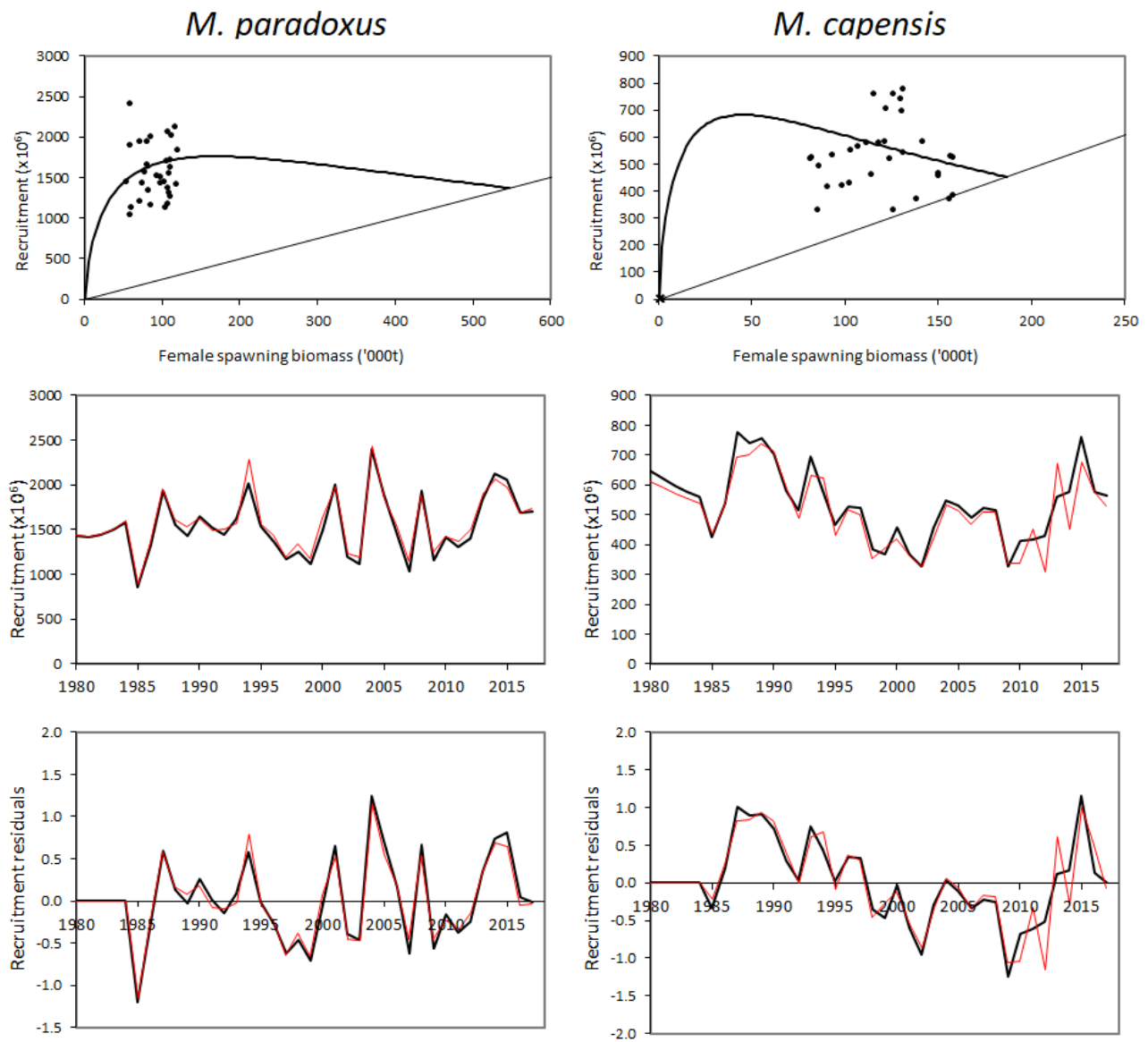


Figure 2: Stock-recruitment curves and recruitment trajectories for the hake corrected 2017 RC (black lines) and the October 2017 RC (red lines).