

Routine Update of the 2008 Baseline Assessment for the South African Hake resource

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SUMMARY

The 2008 “New Baseline” assessment for hake is updated to take account of further information that has become available over the past year. The update leads to only slight changes to results, which continue to manifest a lack of fit to catch-at-length distributions. The “New Reference Case” methodology (Rademeyer and Butterworth, 2009), which resolves that discrepancy, suggests a less depleted *M. paradoxus* but a more depleted *M. capensis* resource than does this updated “New Baseline” assessment.

INTRODUCTION

The “New Baseline” assessment presented in Rademeyer and Butterworth (2008), which is the assessment discussed at the December 2008 international stock assessment workshop as MARAM IWS/DEC08/H/5, is updated here to take account of new data inputs. The new inputs are:

1. Updated 2008 catches.
2. For the catch in 2009, the TAC for that year is assumed, with the split between the species and fleets taken in the same ratio as in 2008.
3. Updated 1978-2008 offshore trawl catches (Glazer and Butterworth, 2009).
4. Updated GLM-standardised CPUE series (1978-2008) (Glazer and Butterworth, 2009).
5. Updated survey biomass estimates: these include the new survey estimates (2009 west coast summer, 2008 south coast spring and 2009 south coast autumn) and some slight changes to some previous estimates (see Fairweather, 2009).
6. Updated survey catch-at-length information: this includes the new information (as for the survey estimates) and the previous data as recalculated in Fairweather *et al.* (2009). Due to constraints of time, the catch-at-age information has not been updated to take account of the new method to compute the catch-at-length.

No further commercial catch-at-length or catch-at-age data are available.

METHODS

The methods are as described in Rademeyer and Butterworth (2008). More generally, the methods are similar to those of the new Reference Case (Rademeyer and Butterworth, 2009) except that:

1. The model is aggregated over gender.
2. The model is not fit to age-length keys (ALKs), so that the growth curves are fixed on input to those developed in (Punt and Leslie, 1991) rather than estimated in the model-fitting process.
3. The model is fit to catch-at-age instead of catch-at-length proportions for years where an ALK is available.

RESULTS

Table 1 compares estimates of management quantities for the 2008 new baseline and the 2009 updated new baseline assessment, while Fig. 1 plots the spawning biomass trajectories and compares these to those from the 2009 New Reference Case (Rademeyer and Butterworth, 2009) aggregated over gender. For both *M. paradoxus* and *M. capensis*, the results are very similar for the two baseline assessments, but there are important differences when compared to the New Reference Case.

The estimated survey and commercial selectivities are plotted in Fig. 2. Figs 3 and 4 show the fits the CPUE and survey abundance series for the 2009 updated assessment.

The fits to the commercial CAA and CAL data are show in Fig. 5. Although the fits are poor for certain CAL (West Coast Offshore, Both Coasts Offshore particularly, and the inshore *M. capensis* CAA), these poor fits were also apparent in the 2008 baseline assessment. The likely reason for this is a conflict between the CAA and CAL information and the growth curves input.

The fits to the survey CAA and CAL are shown in Fig. 6. As for the commercial CAA and CAL fits, the poor fits observed are probably due to a conflict between the CAA and CAL information and the growth curves input.

Fig. 7 plots the standardised stock-recruitment residuals and the estimated stock-recruitment relationships for *M. paradoxus* and *M. capensis*.

Fig. 8 compares the Punt and Leslie (1991) growth curves used in the 2009 updated assessment (as in the 2008 baseline), with the (gender-specific) curves estimated in the 2009 new Reference Case. As would be expected from the bias inherent in externally estimated growth curves introduced by length-specific selectivity effects, an upward bias in the Punt and Leslie (1991) curves at low ages is evident.

CONCLUDING REMARKS

It is clear that the “New Baseline” assessment methodology has problems, given the lack of fit to some catch-at-length distributions (Figs 5 and 6). Fortunately the “New Reference Case” methodology solves that problem, and also leads to important differences in results (Fig. 1). The *M. paradoxus* resource is not estimated to be as depleted for the New Reference Case compared to the New Baseline, with the reverse true for the *M. capensis* population.

REFERENCES

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Table 1: Comparison of management quantities for the 2008 new baseline assessment and the 2009 updated new baseline assessment. Note that the negative log likelihoods shown are not comparable as they are based on different data sets.

		2008	2009
	-lnL total	-40.9	-140.2
<i>M. paradoxus</i>	K^{sp}	1821	1805
	h	0.95*	0.95*
	MSY	114	112
	B^{sp}_{2008}	265	229
	B^{sp}_{2008}/K^{sp}	0.15	0.13
	B^{sp}_{2009}/K^{sp}		0.14
	$B^{sp}_{2008}/MSYL^{sp}$	0.82	0.72
	$MSYL^{sp}$	0.18	0.18
	M	0	0.36
		1	0.36
		2	0.36
	3	0.35	
	4	0.34	
	5+	0.33	0.32
<i>M. capensis</i>	K^{sp}	871	864
	h	0.95*	0.95*
	MSY	86	95
	B^{sp}_{2008}	501	464
	B^{sp}_{2008}/K^{sp}	0.57	0.54
	B^{sp}_{2009}/K^{sp}		0.56
	$B^{sp}_{2008}/MSYL^{sp}$	2.31	2.20
	$MSYL^{sp}$	0.25	0.24
	M	0	0.40
		1	0.40
		2	0.40
	3	0.40	
	4	0.41	
	5	0.41	
	6	0.41	
	7+	0.41	0.44
2008 species ratio	B^{sp}	1.89	2.03
(<i>paradoxus/capensis</i>)	B^{2+}	1.66	1.65

* on constraint boundaries

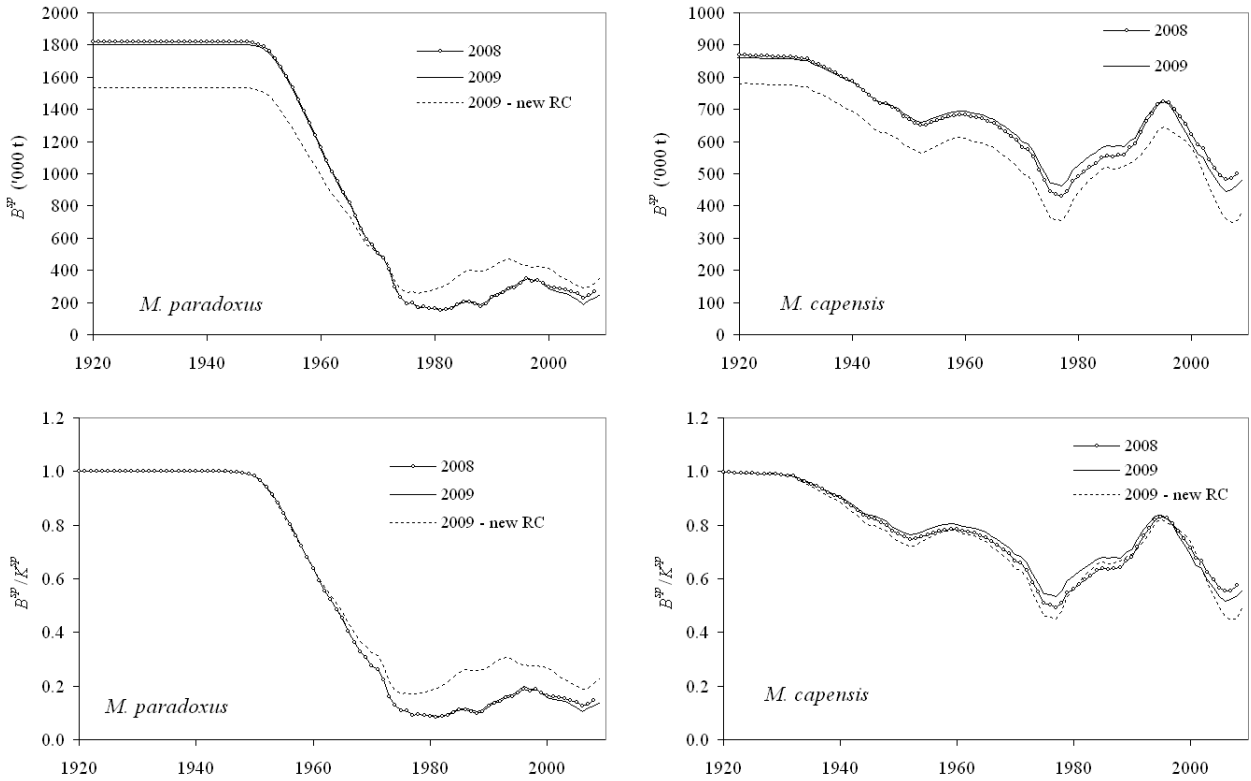


Fig. 1: *M. paradoxus* and *M. capensis* spawning biomass trajectories for the 2008 new baseline and 2009 updated new baseline assessments. Results for the 2009 new Reference Case (Rademeyer and Butterworth, 2009) are also shown, aggregated over gender.

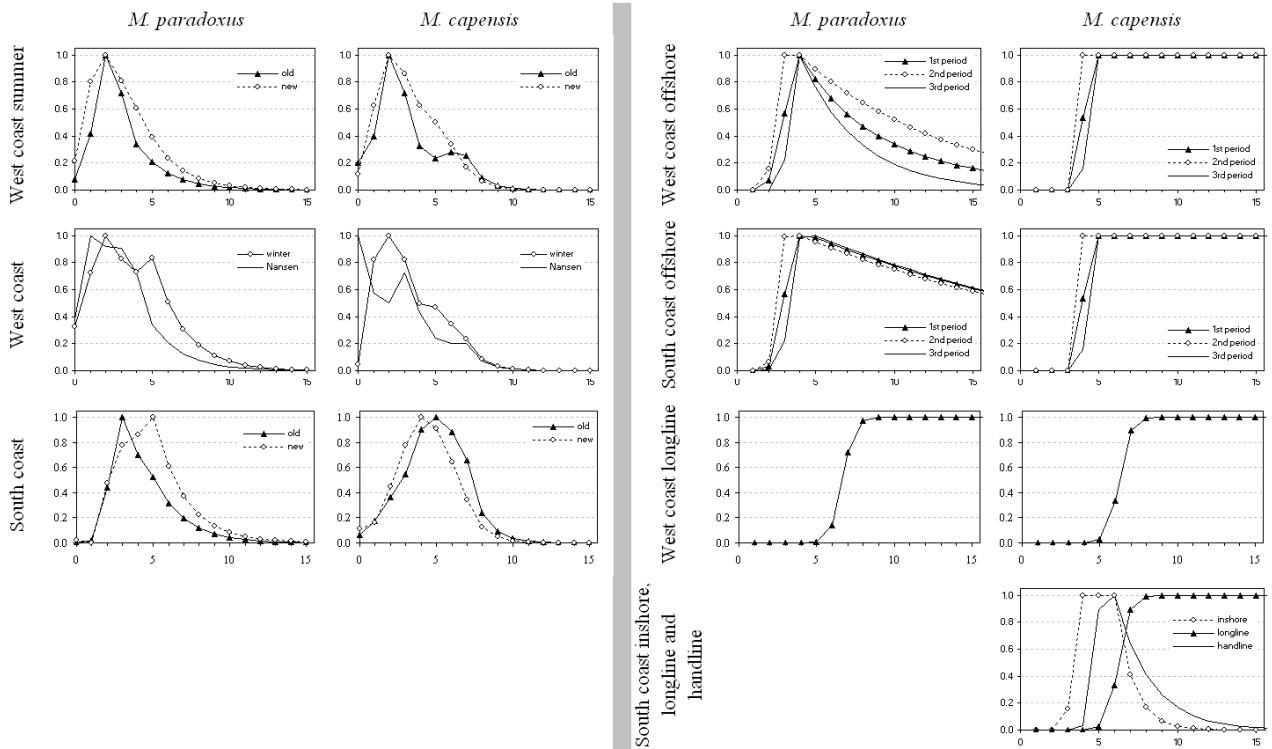


Fig. 2: Estimated survey and commercial fishing selectivities-at-age for the 2009 updated new baseline assessment.

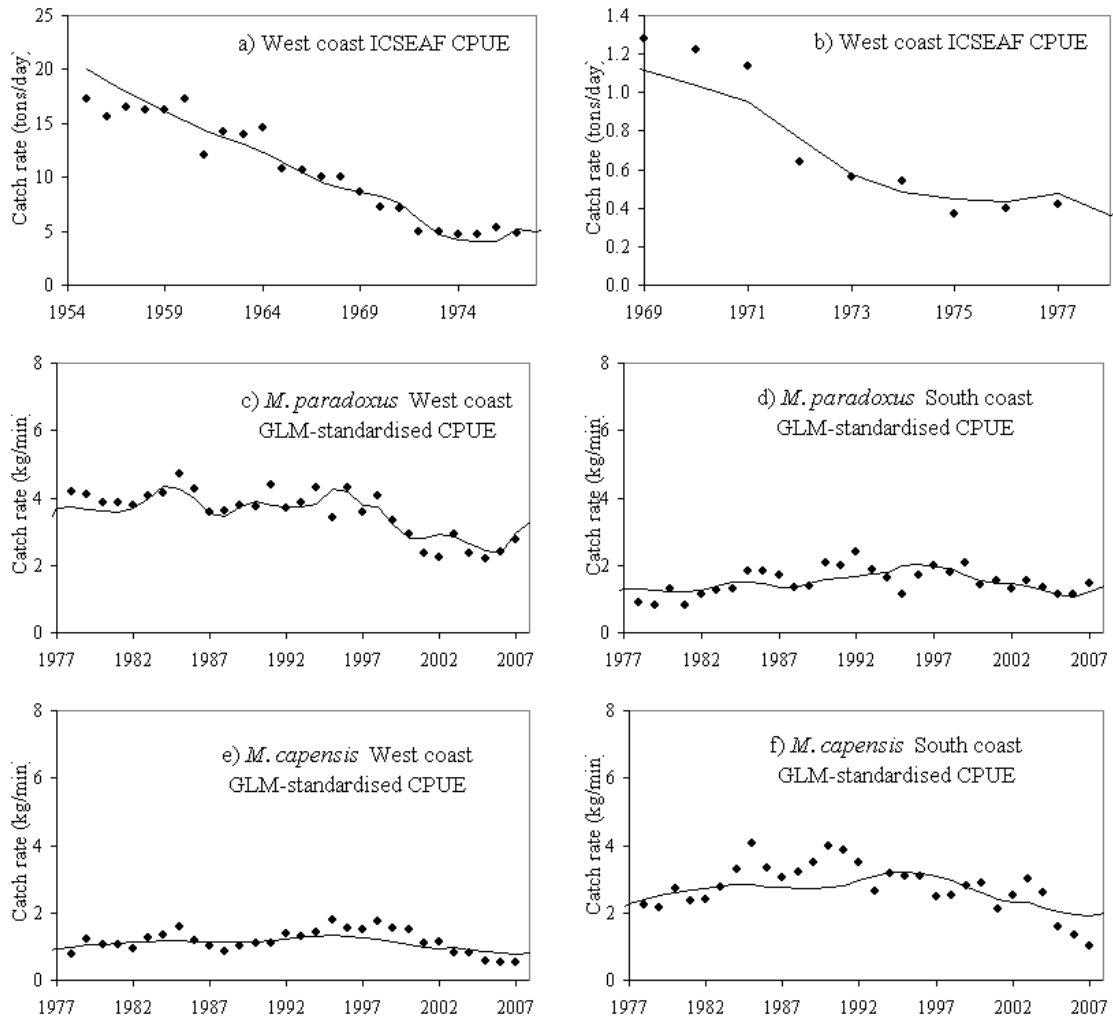


Fig.3: Fits to the CPUE abundance indices for the 2009 updated new baseline assessment. The historic (pre-1978) CPUE data are for both *M. capensis* and *M. paradoxus* combined.

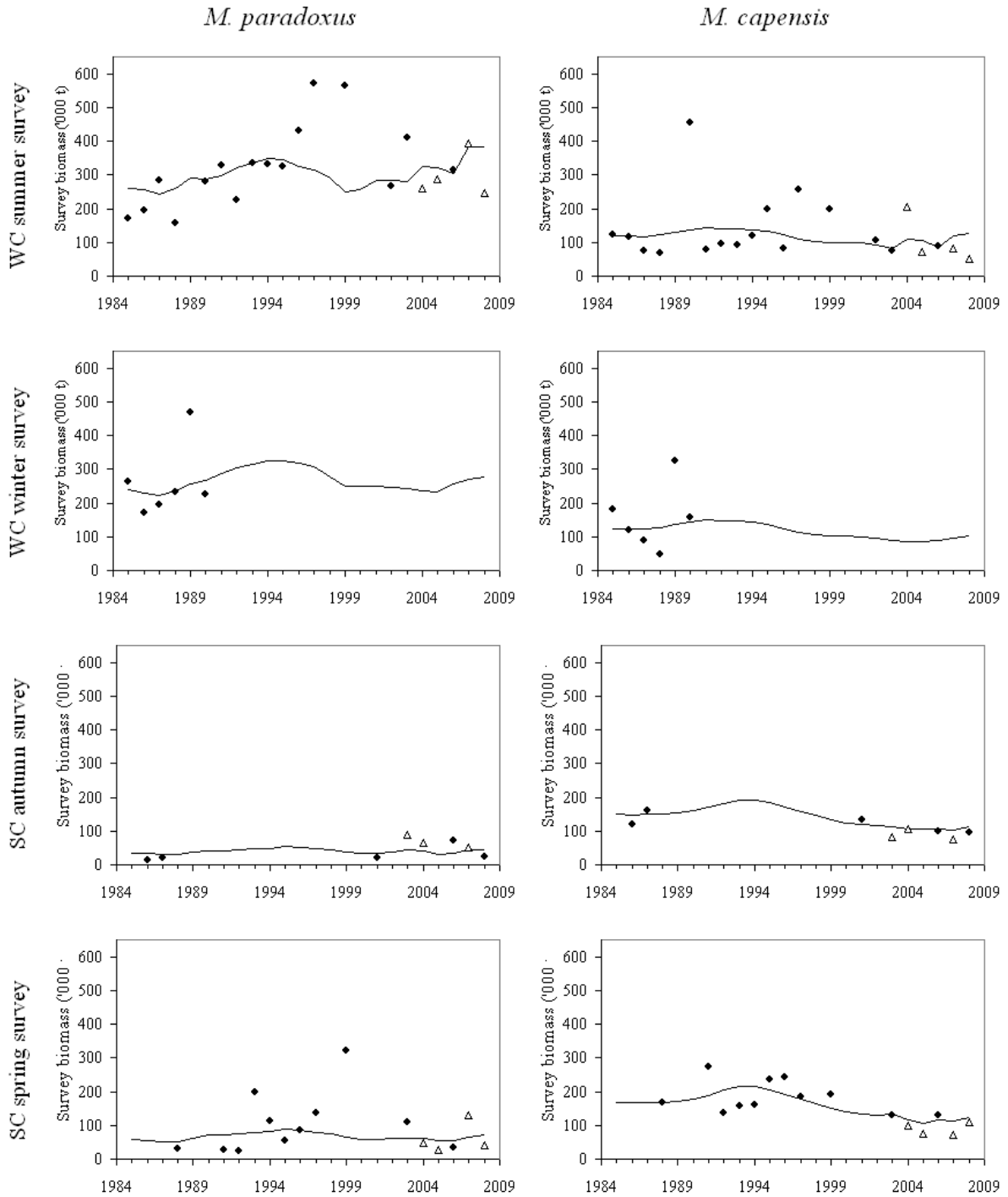


Fig. 3: Fits to survey abundance series from surveys by *Africana* for the 2009 updated new baseline assessment. The observed values shown as Δ were conducted by the *Africana* with the new gear and have been rescaled by the agreed calibration factor for the species concerned (0.95 and 0.8 for *M. paradoxus* and *M. capensis* respectively). Note: the estimated survey biomass trends incorporate the change in selectivity between the old and new *Africana* gear.

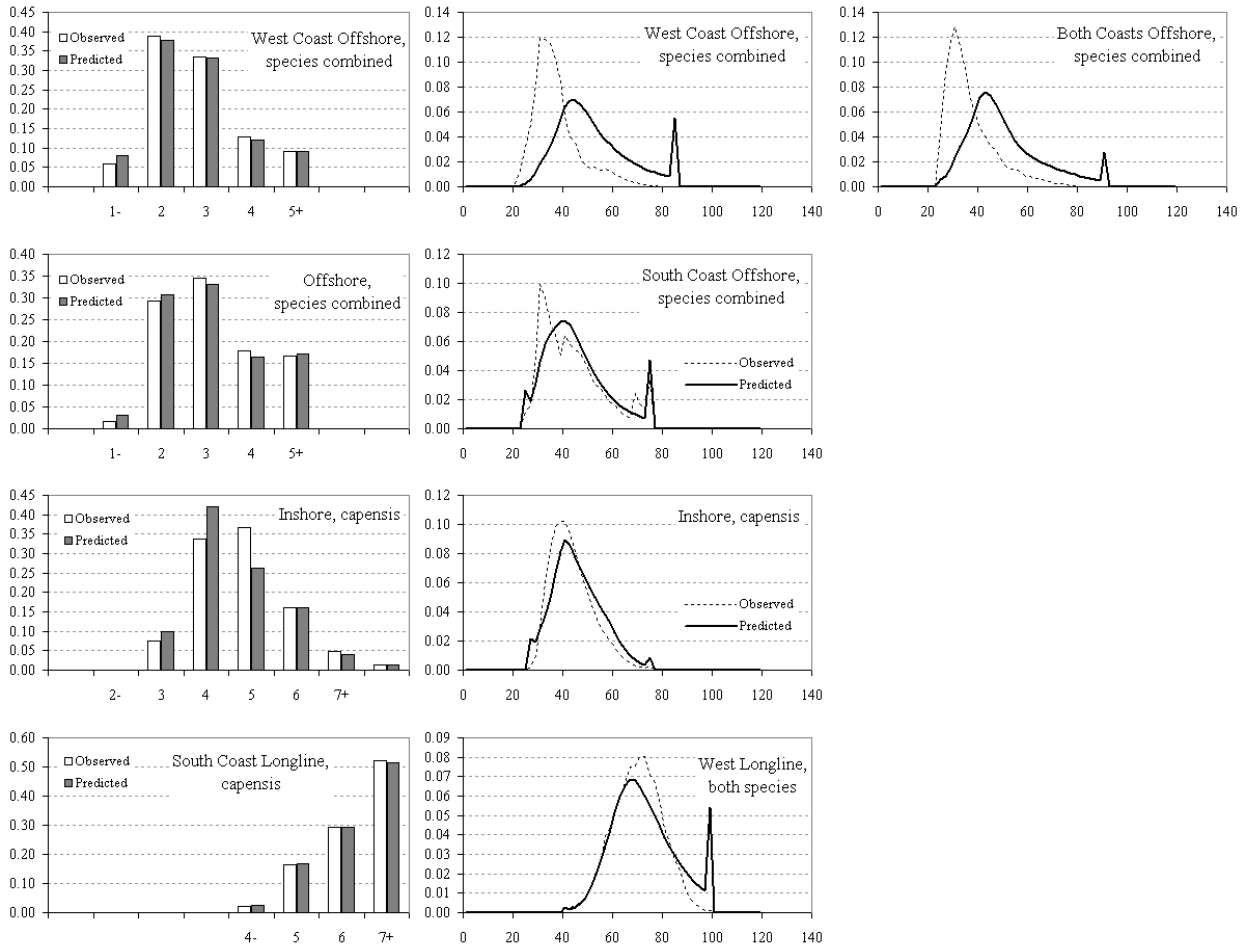


Fig. 5: Fit to the commercial CAA and CAL data for the 2009 updated new baseline assessment.

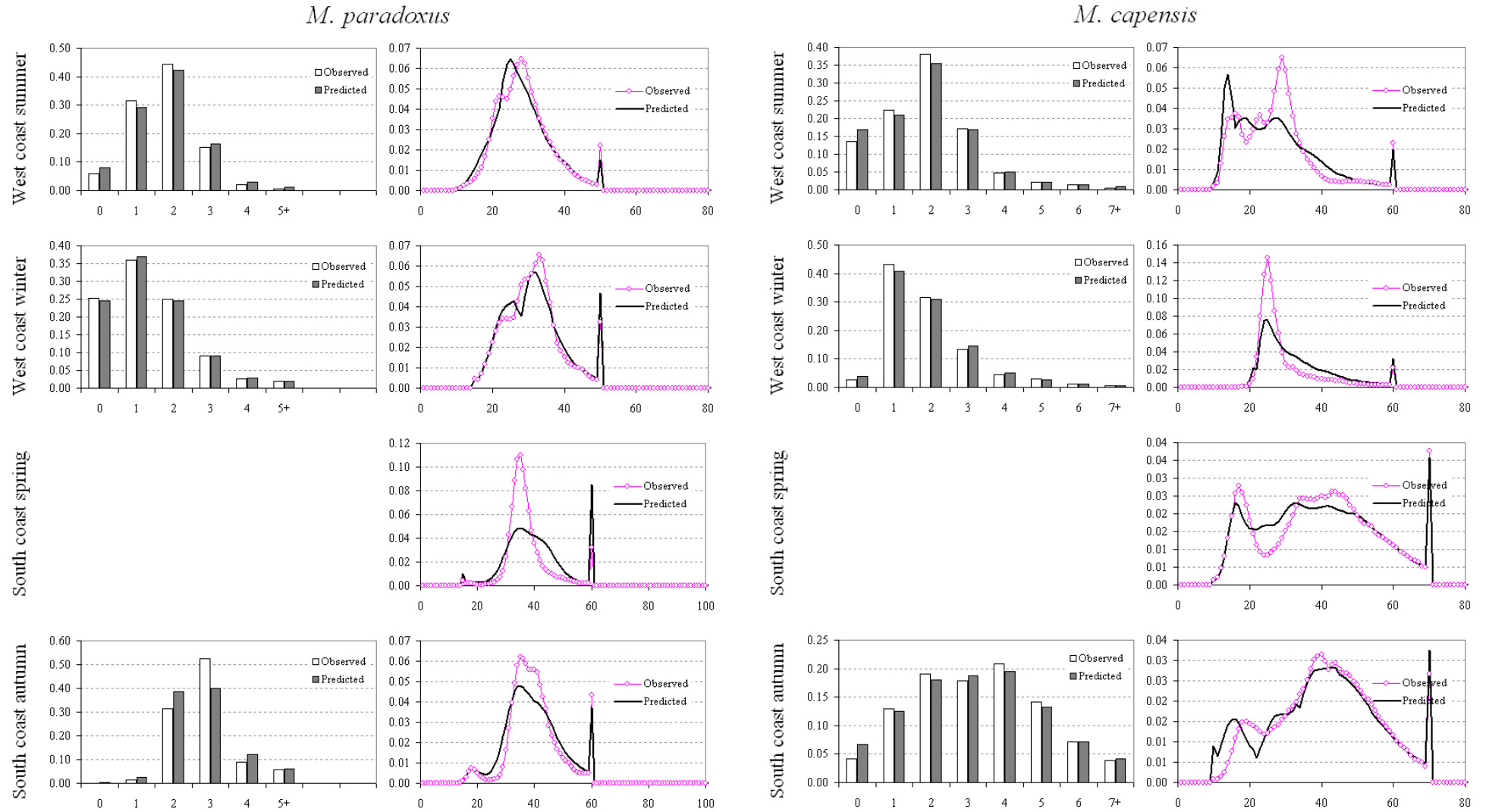


Fig. 6: Fit to survey CAA and CAL for *M. paradoxus* for the 2009 updated new baseline assessment.

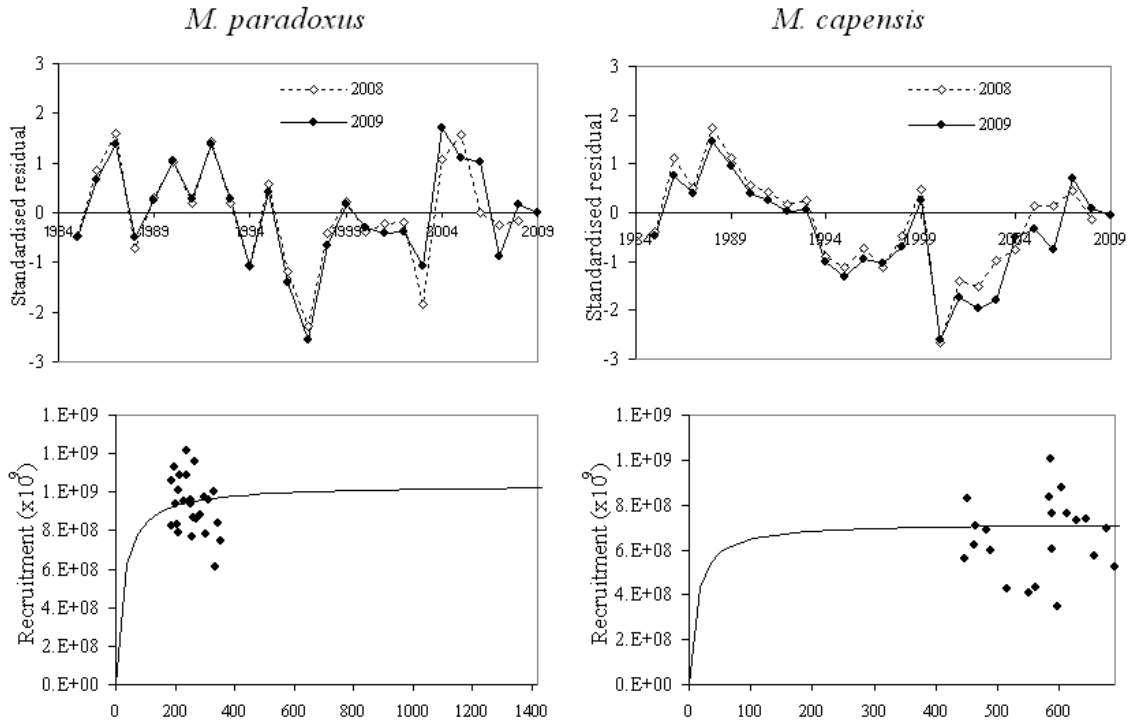


Fig. 7: Time series of standardised stock-recruitment residuals and estimated stock-recruitment relationships for the updated new baseline assessment.

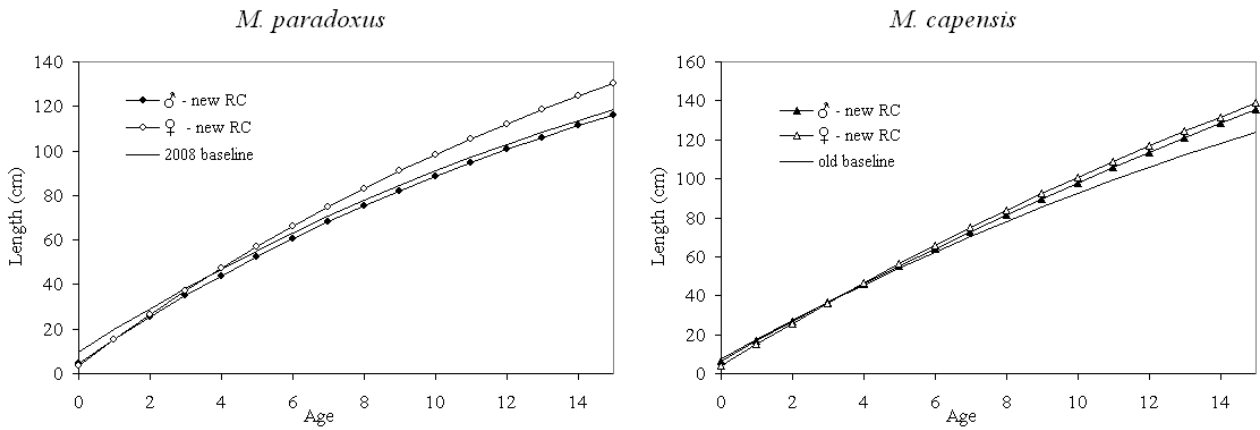


Fig. 8: Growth curves (Punt and Leslie, 1991) used in the 2008 new baseline and 2009 updated assessments compared to those (gender-specific) estimated in the new Reference Case assessment (Rademeyer and Butterworth, 2009).