Output from the South African Hake OMP-2014 for the 2018 TAC recommendation

R.A. Rademeyer

October 2017

Abstract

The TAC output from the South African hake OMP-2014 for 2018 is **133 119 t**, a decrease of 5% from the 2017 TAC.

1. OMP-2014 formula

The formula for computing the TAC recommendation under OMP-2014 is as follows:

$$TAC_{y+1} = C_{y+1}^{para} + C_{y+1}^{cap} \quad (1)$$

with

$$C_{y+1}^{spp} = b^{spp}\left(J_y^{spp} - J_0^{spp}\right) \quad (2)$$

where

TAC_y is the total TAC recommended for year *y*,

C_y^{spp} is the intended species-disaggregated TAC for species *spp* year *y*,

J_0^{spp} and b^{spp} are tuning parameters (see Table 1), and

J_y^{spp} is a measure of the immediate past level in the abundance indices for species *spp* that is available to use for calculations for year *y.*

J_y^{spp} for the abundance indices is computed as follows:

$$J_y^{para} = \frac{1.0J_y^{WC\_CPUE,para} + 0.75J_y^{SC\_CPUE,para} + 0.5J_y^{WC\_surv,para} + 0.25J_y^{SC\_surv,para}}{2.5} \quad (3)$$

$$J_y^{cap} = \frac{1.0J_y^{WC\_CPUE,cap} + 0.75J_y^{SC\_CPUE,cap} + 0.5J_y^{WC\_surv,cap} + 1.0J_y^{SC\_surv,cap}}{3.25} \quad (4)$$

with

$$J_y^{WC/SC\_CPUE,spp} = \sum_{y'=y-3}^{y-1} I_y^{WC/SC\_CPUE,spp} \Big/ \sum_{y=2010}^{2012} I_y^{WC/SC\_CPUE,spp} \quad (5)$$

$$J_y^{WC/SC\_surv,spp} = \sum_{y'=y-2}^{y} I_y^{WC/SC\_surv,spp} \Big/ \sum_{y=2011}^{2013} I_y^{WC/SC\_surv,spp} \quad (6)$$

Thus the weighting of the different indices (denoted by *I*) is taken to be the same as for OMP-2010, and the normalization is such that a value of *J*=1 reflects resource abundance about the same as in 2011/2012.

Table 2 reports the GLM-standardised CPUE series (Glazer pers. comn) and survey biomass abundance estimates (Fairweather pers. comn), with the J^{i}_{2017} and J_{2017} values (equations 3 to 6). The 2013 to 2016 survey biomass estimates are from industry vessels and are taken to have the same *q* as the *Africana* New Gear. The 2017 survey has been conducted by the *Africana* with New Gear.

The recent data are compared to the projections under OMP-2014 for the RS in Figure 1. The latest data points for the CPUE and survey indices for *M. paradoxus* are virtually all well within the bounds projected. For *M. capensis*, the South Coast 2014 to 2016 CPUE indices are well below the projected lower 5 percentile. The recent West coast CPUE and survey are just within the bounds projected.

The J^{spp}_{2016} values are then computed as:

$$J^{para}_{2016} = \frac{1.0 \cdot 1.157 + 0.75 \cdot 0.868 + 0.5 \cdot 0.910 + 0.25 \cdot 4.882}{2.5} = 1.393$$

$$J^{cap}_{2015} = \frac{1.0 \cdot 0.760 + 0.75 \cdot 0.585 + 0.5 \cdot 1.221 + 1.0 \cdot 0.755}{3.25} = 0.789$$

and the catch by species is then:

$$C^{para}_{2016} = 83.83(1.393 - 0.132) = 105.752$$

$$C^{cap}_{2016} = 33.33(0.789 - 0.240) = 18.306$$

so that the TAC before applying the constraints on maximum allowable annual change, would be 124.058 thousand tons.

1.1 Maximum allowable annual change

The maximum allowable annual increase in TAC is 10%, and the maximum allowable annual decrease in TAC is 5% unless the *M. paradoxus* average biomass index falls too low, in which case the maximum allowable annual decrease becomes:

$$MaxDecr_{y} = \begin{cases} 5\% & \text{if } J_{y} \geq J^{thresh1} \\ \text{linear between x\% and 5\%} & \text{if } J^{thresh2} \leq J_{y} < J^{thresh1} \\ \text{x\%} & \text{if } J_{y} < J^{thresh2} \end{cases} \quad (7)$$

x, $J^{thresh1}$ and $J^{thresh1}$ are tuning parameters (see Table 1).

Here, the *M. paradoxus* average biomass index (1.393) is above $J^{thresh1}$ (0.75), so that the maximum allowable decrease of 5% would apply: the TAC after applying the constraint is 133 119t (reduced by 5% from a 2017 TAC of 140.125 thousand tons).

1.2 Upper cap and fixed TAC

Two further rules are included in OMP-2014:

i. An upper cap on the TAC is imposed, so that the TAC cannot exceed 150 000t.
ii. The TAC for 2015 and 2016 is fixed at 147 500t.

Hence the final TAC for 2017 is 133 119t.

Table 1: Tuning parameter values for OMP-2014.

	M. paradoxus	*M. capensis*
J_0	0.132	0.240
b	83.83	33.33
$J^{thresh1}$	0.75	
$J^{thresh2}$	0.65	
x	25	

Table 2: GLM standardised CPUE series and West coast summer and south coast autumn survey abundance estimates. Note that the abundance estimates in bold incorporate the calibration factors agreed for OMP application as they are for surveys in which the old gear was used on the *Africana* (q^{old}/q^{new}=0.883 for *M. paradoxus* and 0.652 for *M. capensis*).

	M. paradoxus				*M. capensis*			
	WC CPUE	SC CPUE	WC summer survey	SC autumn survey	WC CPUE	SC CPUE	WC summer survey	SC autumn survey
2007	6.451	2.804	407.38	102.20	1.301	1.899	73.23	65.94
2008	7.081	3.018	238.14	33.03	1.717	2.971	52.58	102.17
2009	7.036	3.779	310.76	45.03	3.038	5.534	140.44	111.19
2010	7.701	4.150	**653.28**	**53.16**	2.573	4.201	**259.84**	**272.42**
2011	7.312	4.872	380.19	21.05	3.138	5.065	89.10	105.42
2012	6.305	4.162	405.87		2.592	2.758	84.75	
2013	6.365	4.251	136.26*		2.479	3.123	30.38*	
2014	6.734	4.028	269.48*	62.93*	1.944	2.207	219.76*	63.39*
2015	8.830	3.594	207.58*	111.41*	2.094	2.068	65.09*	76.06*
2016	9.097	3.825	312.88*	94.18*	2.275	2.759	115.06*	83.20*
2017			319.02				69.29	
J^i_{2017}	1.157	0.868	0.910	4.882	0.760	0.585	1.221	0.755
w^i	1.00	0.75	0.50	0.25	1.00	0.75	0.50	1.00
J_{2017}	1.393				0.789			

* The 2013 to 2016 survey results are from the industry vessels and are taken to have the same q as the *Africana* New Gear.

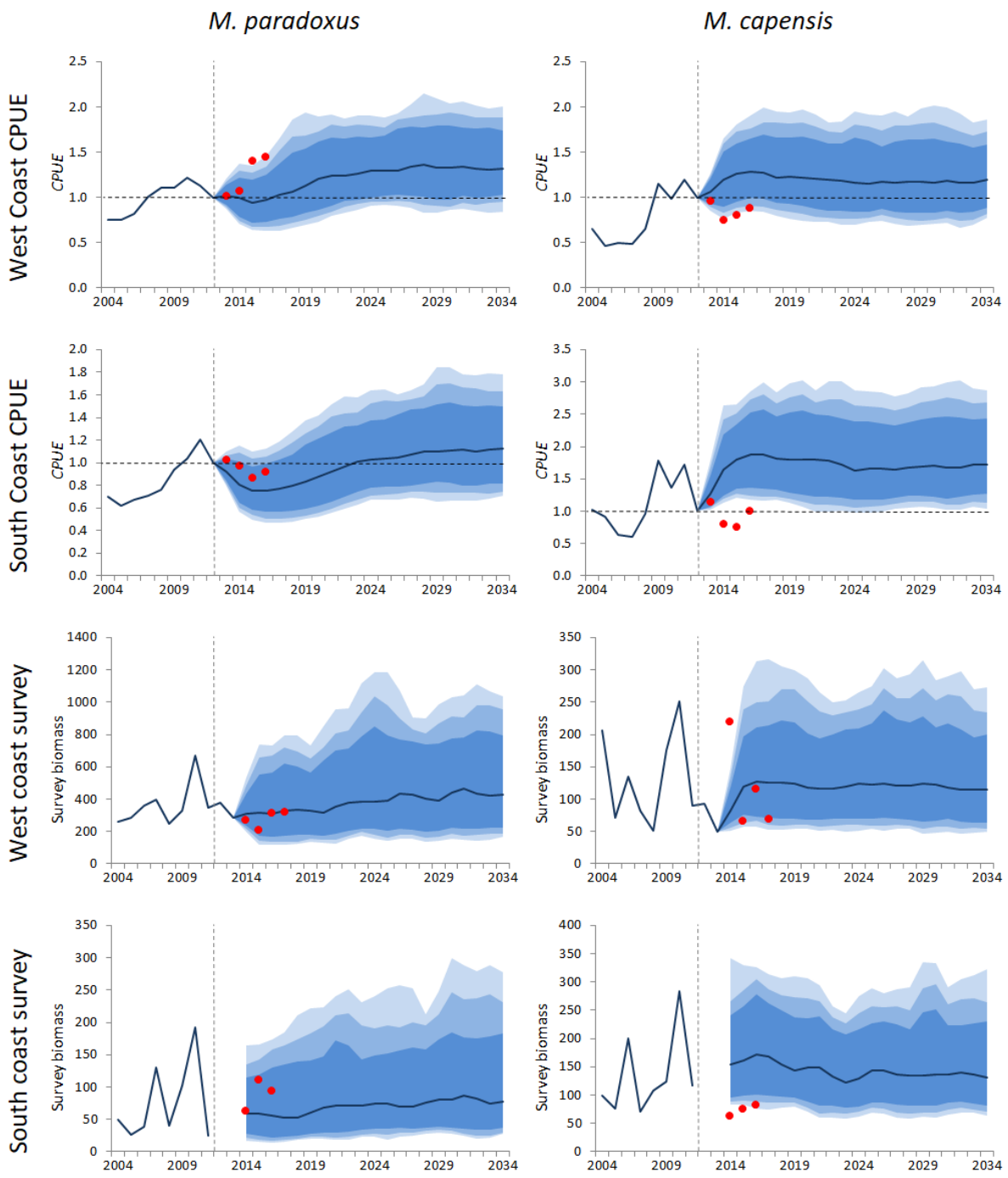

Figure 1: Projections (95%, 90% and 80% PI and medians) for the Reference Set under OMP-2014 compared with the most recent resource abundance index data. The red dots show the newest data points. For the survey, the 2014-2016 data points are shown assuming a *q* ratio of 1 between the *Africana* and the industry vessels.