

Adjustment to OMP-08 to Allow for Penguin Foraging at Low Pelagic Biomass

C.L. de Moor*

The alternative rules tested apply an equal percentage decrease to the directed sardine and anchovy TAC if the total sardine and anchovy biomass is below a set threshold. The alternative rules are applied AFTER the TAC has been calculated using OMP-08 as it currently stands. Thus there is no change to the control parameters of OMP-08 and all other constraints and/or Exceptional Circumstances are applied before this additional alternative rule is applied (Figure 1):

$$\text{Alternative 1: } TAC^{adjusted} = TAC^{OMP-08} \times \begin{cases} \left(0.7 + 0.3 \frac{B^S + B^A}{Threshold}\right) & \text{if } B^S + B^A \leq Threshold \\ TAC^{OMP-08} & \text{if } B^S + B^A > Threshold \end{cases}$$

$$\text{Alternative 2: } TAC^{adjusted} = TAC^{OMP-08} \times \begin{cases} \left(0.2 + 0.8 \frac{B^S + B^A}{Threshold}\right) & \text{if } B^S + B^A \leq Threshold \\ TAC^{OMP-08} & \text{if } B^S + B^A > Threshold \end{cases}$$

The alternative rules are applied BEFORE the TAB is calculated and thus if the anchovy TAC is decreased due to the total sardine and anchovy biomass being below the threshold, the TAB will also be adjusted accordingly.

The threshold chosen was 4 239 000t, corresponding to the median projected total sardine and anchovy biomass in 2027 under OMP-08. Alternative less conservative thresholds, for which results were computed but are not shown below include 2 826 000t (66% of the median projected total sardine and anchovy biomass in 2027 under OMP-08) and 1 413 000t (33% of the median projected total sardine and anchovy biomass in 2027 under OMP-08).

The total sardine and anchovy biomass distribution projected in 2027 under OMP-08 and the alternative penguin-related Exceptional Circumstances rules is compared to that under a no catch scenario in Figure 2. The median and 5%ile are listed in Tables 1 and 2 and shown graphically in Figure 3. The ratio of the alternative catch scenarios to the no catch scenario are compared in Table 3. Although there is little difference at the median level, the difference between the alternatives is noticeable at the 5%ile level. This is reasonable, given that this rule was designed to lower the TAC only when the total biomass is low.

Tables 4 and 5 show the effect on the average, median and lower 5%ile of the projected anchovy and directed sardine catch, respectively over the next 20 years (part a) and the next 5 years (part b).

* MARAM (Marine Resource Assessment and Management Group), Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch, 7701, South Africa. Email: c.l.demoor@telkomsa.net, doug.butterworth@uct.ac.za.

Table 1. Median projected total sardine and anchovy biomass (million tons) in 2027 under a zero catch scenario, under OMP-08, and under the two alternative penguin-related Exceptional Circumstances rules.

	No Catch	OMP-08	Alternative 1 (70%)	Alternative 2 (20%)
Sardine	3.44	2.48		
Anchovy	2.42	1.15		
Total Sardine & Anchovy	6.77	4.24	4.45	4.68

Table 2. Lower 5%ile projected sardine and anchovy biomass (million tons) in 2027 under a zero catch scenario, under OMP-08 and under the two alternative penguin-related Exceptional Circumstances rules.

	No Catch	OMP-08	Alternative 1 (70%)	Alternative 2 (20%)
Sardine	1.48	0.41		
Anchovy	0.78	0.18		
Total Sardine & Anchovy	3.05	1.22	1.67	2.02

Table 3. The ratio of projected median and lower 5%ile total sardine and anchovy biomass in 2027 under OMP-08 and under the two alternative penguin-related Exceptional Circumstances rules to that under a zero catch scenario.

	OMP-08: No Catch	Alternative 1 (70%): No Catch	Alternative 2 (20%): No Catch
Median	0.63	0.66	0.69
Lower 5%ile	0.40	0.55	0.66

Table 4a. Average anchovy catches (in '000t) over the 20 year projection period of 2008-2027 under OMP-08 and the two alternative penguin-related Exceptional Circumstances rules. The percentage change from OMP-08 to the alternatives are also shown.

	OMP-08	Alternative 1 (70%)	% Change	Alternative 2 (20%)	% Change
Average	381	361	5.2%	333	12.7%
Median	400	349	12.9%	301	24.9%
Lower 5%ile	66	77	-16.4%	62	6.0%

Table 4b. Average anchovy catches (in '000t) over the 5 year projection period of 2008-2012 under OMP-08 and the two alternative penguin-related Exceptional Circumstances rules. The percentage change from OMP-08 to the alternatives are also shown.

	OMP-08	Alternative 1 (70%)	% Change	Alternative 2 (20%)	% Change
Average	434	401	7.4%	361	16.7%
Median	467	395	15.5%	332	28.9%
Lower 5%ile	141	124	11.9%	83	40.8%

Table 5a. Average directed sardine catches (in '000t) over the 20 year projection period of 2008-2027 under OMP-08 and the two alternative penguin-related Exceptional Circumstances rules. The percentage change from OMP-08 to the alternatives are also shown.

	OMP-08	Alternative 1 (70%)	% Change	Alternative 2 (20%)	% Change
Average	190	186	2.4%	180	5.4%
Median	152	142	6.3%	133	12.7%
Lower 5%ile	90	70	21.8%	45	50.1%

Table 5b. Average directed sardine catches (in '000t) over the 5 year projection period of 2008-2012 under OMP-08 and the two alternative penguin-related Exceptional Circumstances rules. The percentage change from OMP-08 to the alternatives are also shown.

	OMP-08	Alternative 1 (70%)	% Change	Alternative 2 (20%)	% Change
Average	131	125	4.7%	117	10.8%
Median	115	109	5.8%	100	13.0%
Lower 5%ile	90	73	19.2%	47	45.6%

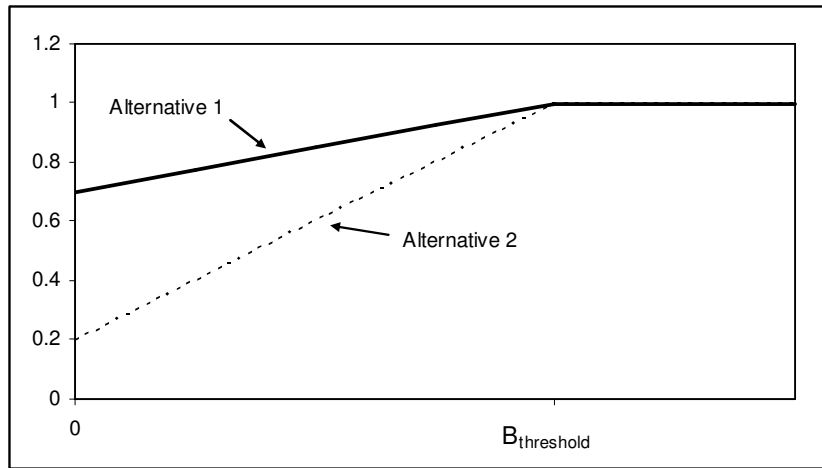


Figure 1. The proportion by which the directed sardine and anchovy TAC is decreased under penguin-related Exceptional Circumstances.

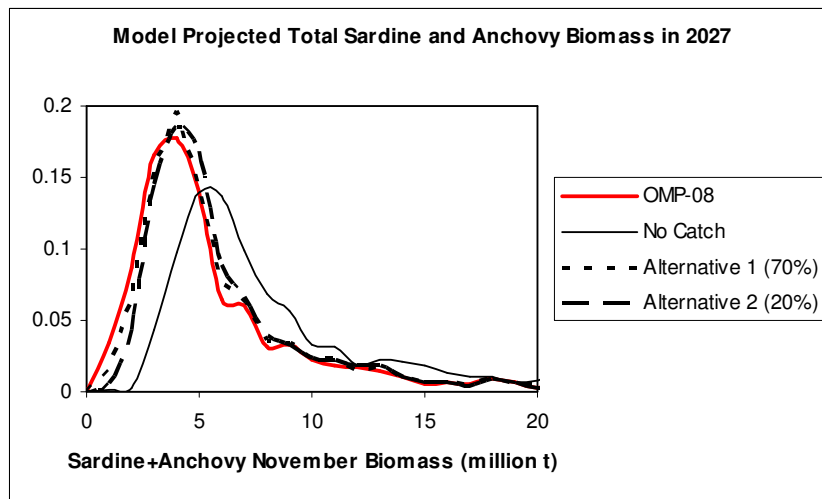


Figure 2. The distribution of the projected total sardine and anchovy biomass in 2027 under a no catch scenario, under OMP-08 and under the two alternative penguin-related Exceptional Circumstances rules.

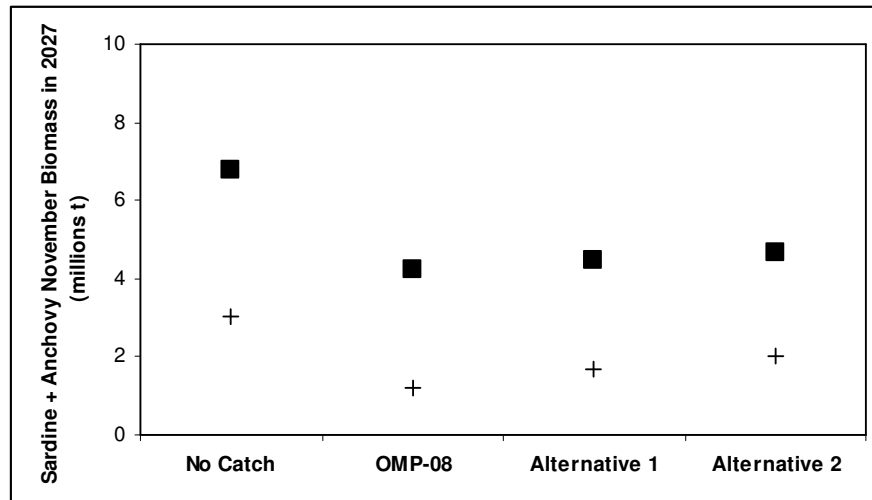


Figure 3. The median (solid square) projected total sardine and anchovy biomass in 2027 and the lower 5%ile (plus signs) under a no catch scenario and under OMP-08 and the two alternative penguin-related Exceptional Circumstances rules.