The OMP-14 constraints, with straw-dog extrapolation to two-area candidate MPs

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Introduction

OMP-14 is the Operational Management Procedure that has been used to recommend total allowable catches (TACs) and bycatches (TABs) for sardine and anchovy in South African waters from 2015 to 2017 (de Moor and Butterworth 2014). A new OMP, anticipated to be called OMP-17, is currently under development. The Harvest Control Rules forming the core of OMP-14 and OMP-17 contain key control parameters which are estimated during OMP development to ensure catches are maximised subject to risk criteria being met, and some fixed (not changing between years) TABs. In addition there are control parameters and constraints on the sardine and anchovy TACs.

As part of the OMP development process, input is routinely requested from stakeholders as to whether the effect of a change to some constraints should ideally be tested under the developing OMP. Changes sought should be substantial (i.e. not a change from 90 000t to 92 000t) and stakeholders are cautioned against requesting changes to too many different constraints as considering the matrix of all changes to all the different constraints may prove challenging. Multiple alternatives for a single constraint can be requested (e.g. 70 000t, 80 000t and 90 000t).

Table 1 lists the control parameters and constraints under OMP-14, which recommended a single-area sardine TAC. Comparative values under some earlier OMPs are also reported. During the development of OMP-17, both single-area and two-area candidate MPs will be simulation tested for sardine TACs. Straw-dog constraints for the two-area scenarios are listed based on initial two-area simulations from 2013 (de Moor and Butterworth 2013). For the most part these are consistent with a 'total TAC' first being calculated and then split between the areas west and south-east of Cape Agulhas. If a two-area sardine TAC HCR is developed in which the TACs for the two areas are relatively independently calculated then further changes to the constraints may be required.

By default the values in the below table from OMP-14 and from the straw-dog extrapolations for a two-area sardine TAC will be used during early OMP-17 development. Where changes are already anticipated these are noted in footnotes to the table. In addition to any suggestions from stakeholders, alternative values for some of

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these constraints and control parameters may be further tested once initial results from candidate MPs become available.

References

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Table 1. Definitions of control parameters and constraints used in OMP-02, OMP-04, OMP-08, and OMP-14, together with their values. All mass-related quantities are given in thousands of tons.

	Fixed Control Parameters	OMP-02	OMP-04	OMP-08	OMP-14	Suggested alternatives for two-area TAC
δ	Scale-down factor applied to initial anchovy TAC	0.85[1]	0.85	0.85	0.85	N/A
p	Weighting given to recruitment survey in anchovy TAC	0.7[2]	0.7	0.7	0.7	N/A
q	Relates to average TAC under OMP-99 if $\alpha_{ns}=1$	300[3]	300	300	300	N/A
$\overline{B}_{Nov}^{A}$	Historical average 1984 to 1999 index of anchovy abundance from the November spawner biomass surveys		2 149	1 380	1380	N/A
$\overline{N}_{rec0}^{A}$	Average of 1985 to 1999 observed anchovy recruitments in May, back-calculated to November of the previous year	N/A	N/A	198 billion	217 billion[4]	N/A
ϖ	Estimate of the proportion of ≤14cm sardine bycatch in the >14cm sardine catch	N/A	N/A	N/A	0.07	0.07 for west of Cape Agulhas and 0.01 for south of Cape Agulhas
γ_{y}	Range within which initial estimate of juvenile sardine : anchovy ratio is set, dependent upon November survey sardine biomass estimate	0.1	0.1-0.2	0.1-0.2	0.1-0.2[5]	Will depend on sardine biomass west of Cape Agulhas only
γ_{max}	Maximum of the logistic curve for γ_{y}	N/A	0.1	0.1	0.1[5]	0.1[5]
B_{50}	Biomass of sardine where the logistic curve for γ_{y} reaches 50%	N/A	2 000	2 000	2000[5]	2000[5]
B_{95}	Biomass of sardine where the logistic curve for γ_{y} reaches 95%	N/A	3 178	3 178	3178[5]	3178[5]

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[1] A value of $\delta = 0.85$, used since OMP-02, reflects the industry's desire for greater 'up-front' TAC allocation for planning purposes, even if this means some sacrifice in expected average TAC to meet the same risk criterion.

[2] A value of $p = 0.7$ reflects the greater importance of the incoming recruits in the year's catch relative to the previous year's biomass survey.

[3] Leaving $q = 300$ unchanged facilitated easy comparison between the outputs from OMP-02 and subsequent revised OMP candidates

[4] This average is updated to 222 billion for OMP-17, being the average 1985 to 1999 calculated when using the OM estimated catches-at-age 0 in quarters 1 and 2 and the catch from 1 May prior to the survey. These differ from the catches used during the last OM as those catches were calculated using fixed cut-off lengths and assumed without error.

[5] The lower bound of the range for this ratio needs reconsideration during OMP-17 development given the recent high sardine TABs awarded with high anchovy TACs while sardine biomass has only allowed a relatively small directed sardine TAC.

Table 1 (continued)**.**

	Constraints	OMP-02	OMP-04	OMP-08	OMP-14	Suggested alternatives for two-area TAC
c_{mntac}^{S}	Minimum ≥14cm directed sardine TAC	90	90	90	90	90 000t applies to the sum of the two area-specific TACs. The proportion of the minimum TAC allocated west/south will be the same as that allocated prior to the implementation of the constraint
c_{mntac}^{A}	Minimum anchovy TAC	150	150[6]	120[4]	120	N/A
c_{mxtac}^{S}	Maximum ≥14cm directed sardine TAC	250	500	500	500	500 000t applies to the sum of the two area-specific TACs. The proportion of the maximum TAC allocated west/south will be the same as that allocated prior to the implementation of the constraint
c_{mxtac}^{A}	Maximum anchovy TAC	600	600	600	450	N/A
c_{tier}^{S}	Two-tier threshold for ≥14cm directed sardine TAC	N/A	240	255	255	The two-tier threshold applies to the sum of the two area-specific TACs. If the previous year's sum of the two area-specific ≥14cm directed sardine TACs is above the 2-tier threshold, then the sum of the current year's two area-specific ≥14cm directed sardine TACs is at most 20% below the 2-tier threshold. The proportion of this TAC allocated west/south will be the same as that allocated prior to the implementation of the constraint, unless in the prevailing circumstances that would lead to a seriously inappropriate allocation, in which case the matter would be dealt with under Exceptional Circumstances provisions[7].

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[6] Applied to the normal season which ran from January to September for OMP-02, OMP-04 and OMP-08, with an additional season from October to December

[7] These are the Exceptional Circumstances provisions as detailed in Appendix 2 of Rademeyer et al. (2008) which would initiate an OMP review.

Table 1 (continued)**.**

Constraints		OMP-02	OMP-04	OMP-08	OMP-14	Suggested alternatives for two-area TAC
c_{tier}^{A}	Two-tier threshold for anchovy TAC	N/A	330^4	330^4	330	N/A
c_{mxdn}^{S}	Maximum proportion by which ≥14cm directed sardine TAC can be reduced annually	0.20	0.15	0.20	0.20	If the previous year's sum of the two area-specific ≥14cm directed sardine TACs is below the 2-tier threshold, the two area-specific ≥14cm directed sardine TACs are restricted to decrease at most 20% from the previous year's area-specific TAC.
c_{mxdn}^{A}	Maximum proportion by which anchovy TAC can be reduced annually	0.30^4	0.25^4	0.25^4	0.25	N/A
B_{ec}^{S}	November survey biomass threshold at which Exceptional Circumstances are invoked for sardine	150	250	300	300	A single threshold, at the same biomass used for the single-area TAC HCR, will be used to determine if Exceptional Circumstances apply for sardine for the area-specific TAC HCR. If the sum of the two survey estimates of sardine biomass west and south of Cape Agulhas is below the threshold, then Exceptional Circumstances are declared. If Exceptional Circumstances are declared then the combined ≥14cm directed sardine TAC is reduced quadratically (in the same manner as for the single-area TAC HCR); this combined TAC is then split by area in the same proportion as existed prior to the application of the Exceptional Circumstances rule
B_{ec}^{A}	November survey biomass threshold at which Exceptional Circumstances are invoked for anchovy	400	400	400	600	N/A

Table 1 (continued)**.**

	Constraints	OMP-02	OMP-04	OMP-08	OMP-14	Suggested alternatives for two-area TAC
Δ^S	Threshold above B_{ec}^S at which linear smoothing is introduced before sardine Exceptional Circumstances are declared (to ensure continuity)	N/A	500	500	400	Linear smoothing to the total ≥14cm directed sardine TAC(s) is applied when the total (west+south) survey estimate of biomass is between the Exceptional Circumstances threshold and $\Delta^S = 400\,000$ t above the Exceptional Circumstances threshold
Δ^A	Threshold above B_{ec}^A at which linear smoothing is introduced before anchovy Exceptional Circumstances are declared (to ensure continuity)	N/A	N/A	100	100	N/A
x^S	The proportion of B_{ec}^S below which sardine TAC is zero	0	0	0.25	0.25	0.25
x^A	The proportion of B_{ec}^A below which anchovy TAC is zero	0	0.25	0.25	0.25	N/A
R_{avg}	Sardine recruitment threshold at which the mid-year increase in sardine TAC under Exceptional Circumstances results in the final TAC equalling the original TAC	N/A	N/A	14.48	13.74[8]	The average west of Cape Agulhas only will continue to be the threshold used for any mid-year increase in the sardine TAC

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[8] This was based on the average 1985-2011 recruitment estimated by the May-June survey west of Cape Infanta. The average 1985-2015 estimate is 12.96.