Initial Directed Sardine and Anchovy TACs and TABs for 2017, Using OMP-14

C.L. de Moor[*]

Correspondence email: carryn.demoor@uct.ac.za

Following the recent 2017 November biomass survey, the initial 2018 TACs and TABs for South African sardine and anchovy are to be recommended. The following data have been used:

1) November 2017 survey sardine biomass: 334 804 tonnes.
2) November 2017 survey anchovy biomass: 1 568 398 tonnes.
3) Directed >14cm sardine TAC for 2017: 45 560 tonnes.
4) Directed anchovy TAC for 2017: 450 000 tonnes.

Using the above data, the initial 2018 TAC and TAB recommendations are calculated by OMP-14 to be:

Initial directed >14cm sardine TAC:	59 214 tonnes
Initial ≤14cm sardine TAB with directed >14cm sardine fishing:	4 145 tonnes
Initial anchovy TAC:	247 500 tonnes
Initial ≤14cm sardine TAB with directed anchovy fishing:	25 129 tonnes
>14cm sardine TAB with directed round herring and anchovy fishing:	7 000 tonnes
≤14cm sardine TAB with directed round herring fishing:	1 000 tonnes
Anchovy TAB for sardine only right holders:	500 tonnes

The equations used to calculate these TAC/Bs are given in the Appendix.

Comments on the OMP-14 recommended TACs

The anchovy initial TAC was subject to the constraint of a maximum decrease from the "two-tier threshold", as the TAC in 2017 was above this threshold of 330 000t. This is a threshold above which high TACs can be awarded during years of high survey estimates of abundance and recruitment, with the provision that the TAC in the following year will be restricted by a 25% reduction from this threshold rather than a 25% reduction from the relatively high TAC.

The directed >14cm sardine TAC was constrained at the minimum TAC in the absence of Exceptional Circumstances, but because the survey estimate of sardine abundance was less than the threshold of 600 000t, only a portion of this TAC is recommended at the start of the year.

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[*] MARAM (Marine Resource Assessment and Management Group), Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch, 7701, South Africa.

According to the agreement reached by the Small Pelagic Scientific Working Group on 7th December 2017, the initial directed sardine TAC will not be subject to explicit spatial management restrictions. Instead, implicit spatial management will apply to the initial directed sardine TAC requiring the proportion of catch taken west-east of Cape Agulhas to mimic that of the recent past.

It is expected that a new OMP (OMP-18) will be adopted before the final small pelagic TACs and TABs for 2018 are recommended, and thus it is expected that any final TAC/Bs for 2018 will be calculated using the new OMP, subject to the constraint that the final TAC/Bs for 2018 cannot be less than the initial TAC/Bs.

The >14cm sardine TAB with directed round herring and anchovy fishing, the ≤14cm sardine TAB with directed round herring fishing and the anchovy TAB for sardine only right holders are <u>final for the year</u>.

Acknowledgements

References

de Moor, C.L. and D.S. Butterworth. 2014. OMP-14. DAFF Branch Fisheries Report No. FISHERIES/2014/DEC/SWG-PEL/60.

Appendix: Summary of Initial TAC and TAB Equations of OMP-14 (from de Moor and Butterworth 2014).

The directed >14cm sardine TAC is initially calculated in proportion to the 2017 November 1+ biomass estimate:

$$TAC_{2018}^S = \beta B_{2017,Nov}^{obs,S} \tag{A.1}$$

This results in $TAC_{2018}^S = 29\,094$t. As the TAC in 2017 was below the 2-tier threshold, the following constraint applies:

$$max\{(1 - c_{mxdn}^S)TAC_{2017}^S; c_{mntac}^S\} \leq TAC_{2018}^S \leq c_{mxtac}^S \tag{A.2}$$

The above constraints result in $TAC_{2018}^S = 90\,000$t. As $B_{ec}^S < B_{2017,Nov}^{obs,S} < 2B_{ec}^S$, the following constraint applies:

$$TAC_{2018,init}^S = \frac{TAC_{2018}^S}{2} + \frac{TAC_{2018}^S}{2}\left(\frac{B_{2017,Nov}^{obs,S} - B_{ec}^S}{B_{ec}^S}\right)^{0.535} \tag{A.3}$$

This results in an initial directed >14cm sardine TAC is $TAC_{2018}^S = 59\,214$t.

In the above equations we have:

$\beta = 0.0869$ — a control parameter reflecting the proportion of the previous year's November biomass index of abundance that is used to set the directed sardine TAC.

$B_{y,Nov}^{obs,S}$ — the estimate of sardine abundance (in thousands of tonnes) from the hydroacoustic survey in November of year y.

$c_{mxdn}^S = 0.20$ — the maximum proportional amount by which the directed sardine TAC can be reduced from one year to the next, above the buffer zone.

$c_{mntac}^S = 90$ — the minimum directed TAC (in thousands of tonnes) that may be set for sardine.

$c_{mxtac}^S = 500$ — the maximum directed TAC (in thousands of tonnes) that may be set for sardine.

$c_{tier}^S = 255$ — 2-tier threshold for directed sardine TAC

$B_{ec}^S = 300$ — the biomass threshold (in thousands of tonnes) below which Exceptional Circumstances apply for sardine.

As the directed >14cm sardine TAC is an initial TAC for 2018, the ≤14cm sardine bycatch with directed sardine fishing is also an initial TAB, and is calculated as follows:

$$TAB_{2018,small,init}^S = \omega TAC_{2018,init}^S \tag{A.4}$$

where

$\omega = 0.07$ — an estimate of the maximum percentage of ≤14cm sardine bycatch in the >14cm sardine catch

The directed anchovy initial TAC is based on how the 2017 November biomass survey estimate of abundance relates to the historical (pre-2000) average.

$$TAC_{2018}^{1,A} = \alpha_{ns}\delta q \left(p + (1-p)\frac{B_{2017,Nov}^{obs,A}}{\bar{B}_{Nov}^{A}} \right) \qquad (A.5)$$

This results in $TAC_{2018}^{1,A} = 235\ 964$t. As the TAC in 2017 was above the 2-tier threshold, the following constraint applies:

$$max\{(1-c_{mxdn}^{A})c_{tier}^{A}; c_{mntac}^{A}\} \leq TAC_{2018}^{2,A} \leq c_{mxtac}^{A} \qquad (A.6)$$

This results in $TAC_{2018}^{1,A} = 247\ 500$t. The anchovy biomass estimated by the November survey is above the Exceptional Circumstances threshold and thus no Exceptional Circumstances provisions were invoked. In the above equations we have:

$B_{y,Nov}^{obs,A}$ - the estimate of anchovy abundance (in thousands of tonnes) from the hydroacoustic spawner biomass survey in November of year y.

$\bar{B}_{Nov}^{A}$ - the historical average index of anchovy abundance from the biomass surveys from November 1984 to November 1999, of 1 380.28 thousand tonnes.

$\alpha_{ns} = 0.889$ - a control parameter which scales the anchovy TAC to meet target risk levels for sardine and anchovy.

$\delta = 0.85$ - a 'scale-down' factor used to lower the initial anchovy TAC to provide a buffer against possible poor recruitment.

$p = 0.7$ - the weight given to the recruit survey component compared to the biomass survey component in setting the anchovy TAC.

$q = 300$ - reflects the average annual TAC expected under OMP99 under average conditions if $\alpha_{ns} = 1$.

$c_{mxdn}^{A} = 0.25$ - the maximum proportional amount by which the directed anchovy TAC can be reduced from one year to the next.

$c_{mntac}^{A} = 120$ - the minimum directed TAC (in thousands of tonnes) that may be set for anchovy.

$c_{mxtac}^{A} = 450$ - the maximum directed TAC (in thousands of tonnes) that may be set for anchovy.

$c_{tier}^{A} = 330$ - 2-tier threshold for directed anchovy TAC

The initial ≤14cm sardine TAB with anchovy directed fishing is calculated using:

$$TAB_{2018,anch}^{1,S} = \gamma_{2018}TAC_{2018}^{1,A} \qquad (A.7)$$

where: $\gamma_{2018} = 0.1 + \dfrac{0.1}{1 = exp\left(-ln(19)\frac{\left(B_{2017,Nov}^{S}-B_{50}\right)}{(B_{ec}-B_{50})}\right)} = 0.102$

In the above equations we have:

γ_y - a conservative allowance for the ratio of juvenile sardine to juvenile anchovy in subsequent catches in year y.

$B_{50} = 2000$ - biomass where the logistic curve for γ_y reaches 50%.

$B_{95} = 3177.8$ - biomass where the logistic curve for γ_y reaches 95%.