Initial Directed Sardine and Anchovy TACs and TABs for 2016, Using OMP-14

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Following the recent 2015 November biomass survey, the initial 2016 TACs and TABs for South African sardine and anchovy are to be recommended. The following data have been used:

1) November 2015 survey sardine biomass: 363 230 tonnes.
2) November 2015 survey anchovy spawner biomass: 1 944 258 tonnes.
3) Directed >14cm sardine TAC for 2015: 83 470 tonnes.
4) Directed anchovy TAC for 2015: 450 000 tonnes.

Using the above data, the initial 2016 TAC and TAB recommendations are calculated by OMP-14 to be:

Initial directed >14cm sardine TAC:	64 563 tonnes
Initial ≤14cm sardine TAB with directed >14cm sardine fishing:	4 519 tonnes
Initial anchovy TAC:	254 483 tonnes
Initial ≤14cm sardine TAB with directed anchovy fishing:	25 866 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 TACs

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 to be recommended at the start of the year. This initial TAC will be revised mid-year once the results of the May survey are available. The final directed >14cm sardine TAC for 2016 will thus depend on the May survey estimate of sardine recruitment, and will range from this initial TAC of 64 563t to a maximum of 95 418t.

The ≤14cm sardine TAB associated with this directed sardine TAC is thus also an initial recommendation and its revision mid-year will depend on any revision to the directed >14cm sardine TAC.

The anchovy initial TAC was not subject to any constraints.

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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 final for the year.

Split of Sardine TAC

The proportion of the directed >14cm sardine TAC to be caught west of Cape Agulhas is recommended to be between 0.256 and 0.456.

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References

de Moor, C.L. and D.S. Butterworth. 2014. OMP-14. DAFF Branch Fisheries Report No. FISHERIES/2014/DEC/SWG-PEL/60. 27pp.

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 2015 November 1+ biomass estimate:

$$TAC^{S}_{2016} = \beta\, B^{obs,S}_{2015,Nov} \tag{A.1}$$

This results in $TAC^{S}_{2016} = 31\,565$ t. As the TAC in 2015 was below the 2-tier threshold, the following constraint applies:

$$\max\left\{\left(1-c^{S}_{mxdn}\right)TAC^{S}_{2015}\,;\,c^{S}_{mntac}\right\} \le TAC^{S}_{2016} \le c^{S}_{mxtac} \tag{A.2}$$

The above constraints result in $TAC^{S}_{2016} = 90\,000$ t and linear smoothing has no further effect on the TAC. Since $363.230 = B^{obs,S}_{2015,Nov} < 2 \times B^{S}_{ec} = 600$, the following constraint applies:

$$TAC^{S}_{2016,init} = \frac{TAC^{S}_{2016}}{2} + \frac{TAC^{S}_{2016}}{2} \times \left(\frac{B^{obs,S}_{2015,N} - B^{S}_{ec}}{B^{S}_{ec}} \right)^{0.535} \tag{A.3}$$

This results in an initial TAC of $TAC^{S}_{2016} = 64\,563$ 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.

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

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

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

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

$c^{S}_{tier} = 255$ - 2-tier threshold for directed sardine TAC

$B^{S}_{ec} = 300$ - 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 2016, the ≤14cm sardine bycatch with directed sardine fishing is also an initial TAB, and is calculated as follows:

$$TAB^{S}_{2016,small} = \omega TAC^{S}_{2016} \tag{A.4}$$

where

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

The proportion of the directed >14cm sardine TAC to be caught west of Cape Agulhas in 2016, $p_{west}(2016)$, is restricted by a 10% error about the average of that observed from the most recent two November surveys:

$$0.5\left(p_{west}^{obs}(2015)+p_{west}^{obs}(2014)\right)-0.1\le p_{west}(2016)\le 0.5\left(p_{west}^{obs}(2015)+p_{west}^{obs}(2014)\right)+0.1$$

Where $p_{west}^{obs}(2015)=0.271$ and $p_{west}^{obs}(2014)=0.440$.

The directed anchovy initial TAC is based on how the 2015 November biomass survey estimate of abundance relates to the historic (pre-2000) average.

$$TAC_{2016}^{1,A}=\alpha_{ns}\,\delta\,q\left(p+(1-p)\frac{B_{2015,Nov}^{A}}{\overline{B}_{Nov}^{A}}\right) \tag{A.5}$$

This results in $TAC_{2016}^{1,A}=254\,483\,\text{t}$. As the TAC in 2015 was above the 2-tier threshold, the following constraint applies:

$$\max\left\{\left(1-c_{mxdn}^{A}\right)c_{tier}^{A};c_{mntac}^{A}\right\}\le TAC_{2016}^{1,A}\le c_{mxtac}^{A} \tag{A.6}$$

This results in $TAC_{2016}^{1,A}=254\,483\,\text{t}$. 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:

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

$\overline{B}_{Nov}^{A}$ - 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.

$c_{mxtac}^{A}=450$ - 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:

$$TAB^{1,S}_{2016,anch} = \gamma_{2016}\, TAC^{1,A}_{2016} \qquad \text{(A.7)}$$

where: $$\gamma_{2016} = 0.1 + \frac{0.1}{1 + \exp\left(- \ln(19) \frac{\left(B^{S}_{2015,Nov} - B_{50}\right)}{\left(B_{95} - B_{50}\right)} \right)} = 0.102$$

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%.