Final Anchovy TAC and Sardine TAB for 2013, Using Interim OMP-13v2

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Following the recent 2013 recruit survey, the revised 2013 South African anchovy TAC and sardine TAB are to be recommended. The following data have been used:

1) November 2012 survey sardine 1+ biomass: 345 054 tonnes.
2) November 2012 survey anchovy spawner biomass: 3 187 964 tonnes.
3) May 2013 survey anchovy recruitment: 352.987 billion.
4) Time after 1 May that the survey commenced: 0.742 months (survey commenced on 24th May)
5) Anchovy recruit catch from 1st November to 23rd May, using monthly cut-off lengths from de Moor *et al*. 2012 and assuming recruit cut-off lengths of 9.5cm for April and 10cm for May: 4.820 billion
6) Anchovy adult catch from 1st November to 23rd May, using monthly cut-off lengths from de Moor *et al*. 2012 and assuming cut-off lengths of 9.5cm for April and 10cm for May: 2.227 billion
7) Juvenile sardine : anchovy ratio (by mass) observed in the May recruitment survey: 0.0878
8) Juvenile sardine : anchovy ratio (by mass) observed in the May commercial catches: 0.0992
9) Directed sardine TAC for 2012: 100 595 tonnes.
10) Directed anchovy normal season TAC for 2012: 352 718 tonnes[1].

Using the above data, the final 2013 TAC and TAB recommendations are calculated by Interim OMP-13v2 (de Moor and Butterworth 2013) to be:

Directed >14cm sardine TAC:	90 000 tonnes
≤14cm sardine TAB with directed >14cm sardine fishing:	6 300 tonnes
Initial normal season anchovy TAC:	247 500[2] tonnes
Revised normal season anchovy TAC:	450 000 tonnes
Initial normal season ≤14cm sardine TAB with directed anchovy fishing:	25 139[3] tonnes
Revised normal season ≤14cm sardine TAB with directed anchovy fishing:	44 571 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

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[1] The total anchovy TAC for 2012 was 472 718t, comprising of 352 718t for the normal season and 120 000t for the additional season.

[2] Calculated using Interim OMP-13. Using Interim OMP-13v2 this would have been 309 369t.

[3] Calculated using Interim OMP-13. Using Interim OMP-13v2 this would have been 31 423t.

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

Comments on the TACs

As no Exceptional Circumstances were declared for sardine in December 2012, there is no update to the directed sardine TAC.

The normal season anchovy TAC was constrained by the maximum TAC of 450 000t. Exceptional Circumstances do not apply.

Acknowledgements

Dagmar Merkle, Janet Coetzee and Jan van der Westhuizen are thanked for providing the input data for these computations.

References

de Moor, C.L. and D.S. Butterworth. 2013. Interim OMP-13v2. DAFF Branch Fisheries document: FISHERIES/2013/JUL/SWG-PEL/16. 18pp.

de Moor, C.L., Coetzee, J., Durholtz, D., Merkle, D., van der Westhuizen, J.J. and Butterworth, D.S. 2012. A record of the generation of data used in the 2012 sardine and anchovy assessments. DAFF Branch Fisheries document: FISHERIES/2012/AUG/SWG-PEL/41. 29pp.

Appendix: Summary of revised anchovy TAC and sardine TAB equations of Interim OMP-13v2 (from de Moor and Butterworth 2013).

The revised anchovy TAC is initially calculated as:

$$TAC^{2,A}_{2013} = \alpha_{ns}\ q\left(p\frac{N^{A}_{2012,rec0}}{\overline{N}^{A}_{rec0}} + (1-p)\frac{B^{obs,A}_{2012,N}}{\overline{B}^{A}_{Nov}} \right)$$

This results in $TAC^{2,A}_{2013} = 771\,546\text{t}$. As the normal season anchovy TAC in 2012 was above the 2-tier threshold of 330 000t, this TAC is subject to the following constraints:

$$\max\left\{TAC^{1,A}_{2013}; \left(1-c^{A}_{mxdn}\right)c^{A}_{tier}\right\} \leq TAC^{2,A}_{2013} \leq c^{A}_{mxtac}$$

which results in $TAC^{2,A}_{2013} = 450\,000\text{t}$. The anchovy biomass projected for November 2013 is above the Exceptional Circumstances threshold and thus no Exceptional Circumstances provisions were invoked. In the above equations we have:

$B^{A}_{2012,Nov}$ - the estimate of anchovy abundance (in thousands of tons) from the hydroacoustic spawner biomass survey in November 2011.

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

$N^{A}_{2012,rec0} = (N^{obs,A}_{2013,r} e^{t^{A}_{2013}\times 1.2/12} + C^{A}_{2013,0bs})\, e^{6\times 1.2/12}$

- the simulated estimate of anchovy recruitment from the recruitment survey in 2013, $N^{obs,A}_{2013,r}$, back-calculated to 1 November 2012 by taking natural and fishing mortality into account.

$\overline{N}^{A}_{rec0} = 217.3$ - the average 1985 to 1999 observed anchovy recruitment (in billions) in May, back-calculated to November of the previous year.

$\alpha_{ns} = 0.871$ - a control parameter which scales the anchovy TAC to meet target risk levels for sardine and anchovy.

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

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

$c^{A}_{mxdn} = 0.25$ - the maximum proportional amount by which the normal season directed anchovy TAC can be reduced from one year to the next (note that the additional season anchovy TAC is not taken into consideration in this constraint).

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

$C^{A}_{2013,0bs} = 4.820$ - the observed juvenile anchovy landed by number (in billions) from the 1st of November 2012 to the day before the recruit survey commenced in 2013.

$t^{A}_{2013} = 0.742$ - the timing of the anchovy recruit survey in 2013 (number of months) relative to the 1st of May.

The revised <14cm sardine TAB with anchovy is calculated using:

$$TAB^{2,S}_{2013,anch} = \lambda_{2013}\, TAC^{1,A}_{2013} + r_{2013}\,(TAC^{2,A}_{2013} - TAC^{1,A}_{2013})$$

This gives $TAB^{2,S}_{2013} = 44\,571\text{t}$, where $\lambda_{2013} = \max\{\gamma_{2013}, r_{2013}\} = 0.102$.

In the above equations we have:

$\gamma_{2013} = 0.102$ - a conservative allowance for the ratio of juvenile sardine to juvenile anchovy in subsequent catches.

$r_{2013} = \frac{1}{2}(r_{2013,sur} + r_{2013,com}) = 0.093$

- the ratio of juvenile sardine to anchovy "in the sea" during May 2013, calculated from the recruit survey and the sardine bycatch to anchovy ratio in the commercial catches[4] during May.

[4] Only commercial catches comprising at least 50% anchovy with sardine bycatch are considered.