

Final Anchovy TAC and Sardine TAB for 2014, Using Interim OMP-13v3

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Following the recent 2014 recruit survey, the revised 2014 South African anchovy TAC and sardine TAB are to be recommended. The following data have been used:

- 1) November 2013 survey estimate of sardine 1+ biomass: 851 554 tonnes.
- 2) November 2013 survey estimate of anchovy 1+ biomass: 5 153 479 tonnes.
- 3) May 2014 survey anchovy recruitment: 223.818 billion.
- 4) Time after 1 May that the survey commenced: 0.290 months (survey commenced on 10th May)
- 5) Anchovy recruit catch from 1st November to 9th May, using monthly cut-off lengths from de Moor *et al.* 2012 and assuming recruit cut-off lengths of 9cm for April and May: 14.893 billion
- 6) Anchovy adult catch from 1st November to 9th May, using monthly cut-off lengths from de Moor *et al.* 2012 and assuming cut-off lengths of 9cm for April and May: 9.743 billion
- 7) Juvenile sardine : anchovy ratio (by mass) observed in the May recruitment survey: 0.0467
- 8) Juvenile sardine : anchovy ratio (by mass) observed in the May commercial catches: 0.0357
- 9) Directed sardine TAC for 2013: 90 000 tonnes.
- 10) Directed anchovy normal season TAC for 2013: 450 000 tonnes.

Using the above data, the final 2014 TAC and TAB recommendations are calculated by Interim OMP-13v3 (de Moor and Butterworth 2013a) 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:	404 251 tonnes
Revised normal season anchovy TAC:	450 000 tonnes
Initial normal season ≤14cm sardine TAB with directed anchovy fishing:	42 592 tonnes
Revised normal season ≤14cm sardine TAB with directed anchovy fishing:	44 477 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

As no Exceptional Circumstances were declared for sardine in December 2013, there is no update to the directed sardine TAC.

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

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References

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**Appendix: Summary of revised anchovy TAC and sardine TAB equations of Interim OMP-13v3
(from de Moor and Butterworth 2013b).**

The revised anchovy TAC is initially calculated as:

$$TAC_{2014}^{2,A} = \alpha_{ns} q \left(p \frac{N_{2013,rec0}^A}{\bar{N}_{rec0}^A} + (1-p) \frac{B_{2013,N}^{obs,A}}{\bar{B}_{Nov}^A} \right)$$

This results in $TAC_{2014}^{2,A} = 668\,908t$. As the normal season anchovy TAC in 2013 was above the 2-tier threshold of 330 000t, this TAC is subject to the following constraints:

$$\max\{TAC_{2014}^{1,A}; (1 - c_{mxdn}^A) c_{tier}^A\} \leq TAC_{2014}^{2,A} \leq c_{mxtac}^A$$

which results in $TAC_{2014}^{2,A} = 450\,000t$. The anchovy biomass projected for November 2014 is above the Exceptional Circumstances threshold and thus no Exceptional Circumstances provisions were invoked. In the above equations we have:

$B_{2013,Nov}^A$ - the estimate of anchovy abundance (in thousands of tons) from the hydroacoustic spawner biomass survey in November 2013.

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

$N_{2013,rec0}^A = (N_{2014,r}^{obs,A} e^{t_{2014} \times 1.2/12} + C_{2014,obs}^A) e^{6 \times 1.2/12}$
- the simulated estimate of anchovy recruitment from the recruitment survey in 2014, $N_{2014,r}^{obs,A}$, back-calculated to 1 November 2013 by taking natural and fishing mortality into account.

$\bar{N}_{rec0}^A = 217.3$ - 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 $\alpha_{ns} = 1$.

$c_{mxdn}^A = 0.25$ - 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).

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

$C_{2013,obs}^A = 14.893$ - the observed juvenile anchovy landed by number (in billions) from the 1st of November 2013 to the day before the recruit survey commenced in 2014.

$t_{2014}^A = 0.290$ - the timing of the anchovy recruit survey in 2014 (number of months) relative to the 1st of May.

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

$$TAB_{2014,anch}^{2,S} = \lambda_{2014} TAC_{2014}^{1,A} + r_{2014} (TAC_{2014}^{2,A} - TAC_{2014}^{1,A})$$

This gives $TAB_{2014}^{2,S} = 44\,477\text{t}$, where $\lambda_{2014} = \max\{\gamma_{2014}, r_{2014}\} = 0.105$.

In the above equations we have:

$\gamma_{2014} = 0.105$ - a conservative allowance for the ratio of juvenile sardine to juvenile anchovy in subsequent catches.

$$r_{2014} = \frac{1}{2}(r_{2014,sur} + r_{2014,com}) = 0.041$$

- the ratio of juvenile sardine to anchovy “in the sea” during May 2014, calculated from the recruit survey and the sardine bycatch to anchovy ratio in the commercial catches¹ during May.

¹ Only commercial catches comprising at least 50% anchovy with sardine bycatch are considered.