Initial Sardine and Anchovy TACs and Sardine TAB for 2007, Using Re-Revised OMP-04

C.L. Cunningham* and D.S. Butterworth*

Following the recent 2006 spawner biomass survey, the initial 2007 TACs for South African sardine and anchovy and initial sardine TAB are to be set. The following data have been used:

1) November 2006 survey sardine 1+ biomass: 712 553 tonnes.
2) November 2006 survey anchovy spawner biomass: 2 106 273 tonnes.
3) Directed sardine TAC for 2006: 204 000 tonnes.
4) Directed anchovy normal season TAC for 2006: 212 251 tonnes[1].

Using the above data, the initial 2007 TACs and TAB are calculated by Re-Revised OMP-04 (with its recently accepted modification for sardine biomass estimated below 800 thousand tonnes) to be:

Directed sardine TAC: 162 436 tonnes

Initial normal season anchovy TAC: 186 942 tonnes

Initial normal season sardine TAB: 29 413.4 tonnes

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

Comments

As the observed sardine biomass was less than 800 thousand tonnes, the recently accepted modification to the directed sardine TAC came into effect (Cunningham and Butterworth 2006). This resulted in the directed sardine TAC dropping more than the maximum of 15% from the previous year's TAC that would otherwise have applied unless the biomass estimate had been below the Exceptional Circumstances level of 250 thousand tonnes.

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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. Email: c.l.cunningham@telkomsa.net, dll@maths.uct.ac.za.

[1] The total anchovy TAC for 2006 was 362 251t, comprising of 212 251t for the normal season and 150 000t for the additional season.

References

Cunningham, C.L. and D.S. Butterworth. 2005. Re-Revised OMP-04. MCM document, SWG/DEC05/PEL/05. 14pp.

Cunningham, C.L. and D.S. Butterworth. 2006. Proposed modification to OMP-04 as a result of the sardine population being outside the range tested. MCM document. SWG/NOV2006/PEL/03. 16pp.

Appendix: Summary of Initial TAC and TAB Equations of Re-Revised OMP-04, Including the Recently Accepted Modification to the Directed Sardine TAC Rule (from Cunningham and Butterworth 2005,2006).

The directed sardine TAC was set in proportion to the 2006 November 1+ biomass index of abundance:

$$TAC_y^S = \beta\, B_{y-1,Nov}^S \tag{A.1}$$

This results in $TAC_y^S = 104\,439$ tonnes. This TAC was subject to the constraints of a minimum and a maximum value. As the directed sardine TAC in 2006 was below the 'two-tier' threshold, a maximum interannual decrease of 15% in the directed sardine TAC would have applied for observed sardine biomass above B^* = 800 thousand tonnes, while the TAC would decrease linearly from this constraint down to a minimum (being the maximum of either $c_{mntac}^S = 90\,000$ t or the result of equation (A.1)) for observed biomass between 800 and 250 thousand tonnes. Letting $TAC_y^{S*} = \max\left\{\beta\, B_{y-1,Nov}^S \times 1000; c_{mntac}^S\right\}$, the constraints are given as follows:

if $TAC_{y-1}^S \le c_{tier}^S$:

$$\max\left\{\left(1-c_{mxdn}^S\right)TAC_{y-1}^S \times \frac{B_{y-1,Nov}^S - 250}{B^* - 250} + TAC_y^{S*}\,\frac{B^* - B_{y-1,Nov}^S}{B^* - 250};\, c_{mntac}^S\right\} \le TAC_y^S \le c_{mxtac}^S \quad \text{if } B_{y-1,Nov}^S \le B^*$$

$$\max\left\{\left(1-c_{mxdn}^S\right)TAC_{y-1}^S;\, c_{mntac}^S\right\} \le TAC_y^S \le c_{mxtac}^S \quad \text{if } B_{y-1,Nov}^S > B^*$$

if $TAC_{y-1}^S > c_{tier}^S$:
$$\left(1-c_{mxdn}^S\right)c_{tier}^S \le TAC_y^S \le c_{mxtac}^S \tag{A.2}$$

As the observed sardine biomass in the November 2006 survey was below B^*, the above constraints result in $TAC_y^S = 162\,436$ tonnes. In the above equations we have:

$\beta = 0.14657$ - a control parameter reflecting the proportion of the previous year's November 1+ biomass index of abundance that is used to set the directed sardine TAC.

$B_{y,Nov}^S$ - the observed estimate of sardine 1+ abundance (in thousands of tonnes) from the hydroacoustic survey in November of year y.

$c_{mxdn}^S = 0.15$ - the maximum proportional amount by which the directed sardine TAC can be reduced from one year to the next.

$c_{mntac}^S = 90\,000$ t - the minimum directed TAC that may be set for sardine.

$c_{mxtac}^S = 500\,000$ t - the maximum directed TAC that may be set for sardine.

$c_{tier}^S = 240\,000t$ -2-tier break for directed sardine TAC

$B^* = 800$ - the threshold (in thousands of tonnes) below which the directed sardine TAC may be reduced by more than c_{mxdn}^S from one year to the next.

The directed anchovy initial TAC was based on how the 2006 November spawner biomass survey estimate of abundance related to the historic (pre-2004) average.

$$TAC_y^{1,A} = \alpha_{ns}\ \delta\, q\left(\ p + (1-p)\frac{B^A_{y-1,Nov}}{\overline{B}^A_{Nov}}\right) \tag{A.3}$$

This results in $TAC_y^{1,A} = 186\,942$ tonnes. The anchovy TAC is subject to similar constraints as apply for sardine:

$$\begin{array}{lll} \max\left\{\left(1-c^A_{mxdn}\right)TAC^{2,A}_{y-1}\ ;\ c^A_{mntac}\right\} \le\ TAC^{1,A}_y\ \le\ c^A_{mxtac} & & TAC^{2,A}_{y-1} \le c^A_{tier} \\ \left(1-c^A_{mxdn}\right)c^A_{tier}\ \le\ TAC^{1,A}_y\ \le\ c^A_{mxtac} & & TAC^{2,A}_{y-1} > c^A_{tier} \end{array} \tag{A.4}$$

The above constraints had no effect on the initial anchovy TAC. In the above equations we have:

$B^A_{y,Nov}$ - the observed estimate of anchovy abundance (in thousands of tons) from the hydroacoustic spawner biomass survey in November of year y.

$\overline{B}^A_{Nov}$ - the historic average index of anchovy abundance from the spawner biomass surveys from November 1984 to November 2003, of 2149.15 thousand tonnes.

$\alpha_{ns} = 0.73752$ - 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 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).

$c^A_{mntac} = 150\,000t$ - the minimum directed TAC that may be set for anchovy.

$c^A_{mxtac} = 600\,000t$ - the maximum directed TAC that may be set for anchovy.

The initial sardine TAB was calculated using:

$$TAB^{1,S}_y = \gamma_y\ TAC^{1,A}_y + TAB^S_{rh} \tag{A.5}$$

where: $$\gamma_y = 0.1 + \frac{0.1}{1+\exp\left(-\frac{1}{0.1}0.00025\left(B^S_{y-1,Nov} - 2000\right)\right)} = 0.104$$

In the above equations we have:

$TAB_{rh}^{S} = 10\,000$ t- the fixed tonnage of adult sardine bycatch set aside for the round herring fishery each year.

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

Since observed November 2006 sardine 1+ biomass was above 250 000t, no sardine Exceptional Circumstances provisions were invoked. Similarly, since the observed November 2006 anchovy spawner biomass was above 400 000t, no anchovy Exceptional Circumstances provisions were invoked.