

Draft Objectives for the Management of the South African Pelagic Fishery for Anchovy and Sardine, using OMP-17

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Introduction

This document tables a draft list of qualitative objectives for the management of the fisheries on sardine and anchovy in South Africa under OMP-17 in three tiers. The first tier consists of “non-negotiable” objectives, which will in due course be defined quantitatively. A second tier consists of core decision objectives, while a third tier consists of further trade-off objectives. The objectives are split amongst those which address target resource (i.e. sardine or anchovy) concerns, those which address social-economic concerns and those which address ecosystem concerns. Naturally trade-offs between the objectives in each of these three sets of concerns will exist. Performance statistics to quantitatively (or in a few cases qualitatively) measure the ability of a candidate management procedure (MP) to meet each objective are also proposed. All performance statistics will additionally be reported under a no future catch scenario.

“Non-negotiable” objectives

The non-negotiable objectives in the management of anchovy and sardine have historically been incorporated in the “Risk” criteria. The risk criteria consist of two parts: the risk definition and the risk level. In summary, the definition relates to a level of biomass (“risk threshold”) to which the future projections are tuned, while the level relates to how frequently future projections should be allowed to drop below the risk threshold during a specified period (historically taken to be 20 years).

A number of former sardine-anchovy OMPs have been based on risk definitions of:

$risk_S$ - the probability that total sardine 1+ biomass falls below the average total sardine 1+ biomass over November 1991 and November 1994 at least once during the projection period of 20 years.

$risk_A$ - the probability that anchovy 1+ biomass falls below 10% of the average anchovy 1+ biomass between November 1984 and November 1999 at least once during the projection period of 20 years.

It has been agreed that new thresholds will be required for sardine and anchovy and the OMP Task Team will develop these further before reporting back to the SPSWG.

An objective process to choose acceptable risk criteria has previously been established (see eg Anon. 2011 and Appendix D of de Moor and Butterworth 2010). Where possible, such a process will be mimicked again, but may require substantial modification following new risk definitions.

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Core decision objectives

Table 1 lists the target resource, socio-economic and ecosystem core decision objectives for the anchovy and sardine fisheries. For each objective, the performance statistic suggested to measure this objective is also listed. These core decision objectives are those which will be accorded the highest weight in choosing amongst alternative candidate MPs.

Trade-off objectives

Table 2 lists the further target resource, socio-economic and ecosystem trade-off objectives for the anchovy and sardine fisheries. Again, the performance statistic(s) suggested to measure each objective are listed. These further trade-off objectives are those which are to be used as a “third tier” check when choosing amongst alternative candidate MPs and to help inform on trade-offs between competing objectives.

Acknowledgements

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References

- Anon. 2011. International Review Panel Report for the 2011 International Fisheries Stock Assessment Workshop, 28 November – 2 December 2011, UCT. 18pp.
- de Moor, C.L., and Butterworth, D.S. 2010. Items to be considered in the development of an updated management procedure for the South African pelagic fishery (OMP-12). MARAM International Stock Assessment Workshop, December 2010, Cape Town, South Africa. 13pp
- Robinson, W., and Butterworth, D. 2012. Some updates to the penguin-fish interaction model. DAFF: Branch Fisheries document FISHERIES/2012/SWG-PEL/01. 9pp

Table 1. Core decision objectives and corresponding performance statistics. The performance statistics relating to the target resource objectives will be reported in terms of the number of assumed underlying components¹. The performance statistics relating to the socio-economic/industry objectives will be reported by area². The performance statistics relating to the ecosystem objectives will be dependent on the west component biomass projections for the two-component OM (Operating Model) and a proportion of the total biomass (taken to mimic the portion of the stock west of Cape Agulhas) for the single-stock OM.

Concern		Objective	Performance Statistic
Target resource	P1	Avoid the resource declining to an unacceptably low level	Minimum total biomass over the projection period : carrying capacity Minimum total biomass over the projection period : risk threshold
	P2	Sound resource at the end of the projection period	Total biomass at the end of the projection period : carrying capacity Total biomass at the end of the projection period : risk threshold Total biomass at the end of the projection period : 1+ biomass at the beginning of the projection period
Socio-economic/industry	S1	Maximize average directed sardine and anchovy annual catch, subject to the known trade-off between these directed fisheries	Average annual directed catch over the projection period
	S2	Minimize average inter-annual variation in the directed sardine and anchovy catches	Average annual variation in the directed catch for each species over the projection period
	S3	In the two-area sardine TAC MPs, minimise the variation of the ratio of west:south directed sardine quotas	Average annual variation in the ratio of the west:south directed sardine TACs
Ecosystem	E1	Avoid an unacceptable fishery-induced impact on top predators. (As a first step, it has been agreed that considering the impact of alternative candidate MPs on the dynamics of penguins on Robben Island would be used as a proxy index for top predator/ecosystem impacts.)	Rate of increase of number of moulters of penguins on Robben island over the first 5 and 10 years of the projection period Number of moulters of penguins on Robben Island 5 and 10 years into the projection period : current (this goes to probability of decline), together with same ratio expected in the absence of any pelagic fishing over that period

¹ For the case of a two-component sardine OM, most biomass performance statistics will additionally be reported for total biomass.

² For the case of a single area sardine TAC and two-component OM, these statistics can be reported per component. For the case of a two-area sardine TAC and a single-stock OM, the average annual directed sardine TAC and variation in this TAC can be reported by area, although the catch statistics can be reported only for the single stock.

Table 2. Further trade-off objectives and corresponding performance statistics. The performance statistics relating to the target resource and ecosystem objectives will be reported in terms of the number of assumed underlying components. The performance statistics relating to the socio-economic/industry objectives will be reported by area.

Concern		Objective	Performance Statistic
Target resource	P3	If the resource does drop to an undesirably low abundance at any point during the projection period, Exceptional Circumstances should be declared, and on a basis that the probability of false positives and false negatives should be minimised	Proportion of times Exceptional Circumstances are declared and the true biomass is below the corresponding threshold Proportion of times Exceptional Circumstances are declared and the true biomass is above the corresponding threshold Proportion of times Exceptional Circumstances are not declared and the true biomass is below the corresponding threshold Proportion of times Exceptional Circumstances are not declared and the true biomass is above the corresponding threshold
	P4	If the resource does drop below the Exceptional Circumstances threshold, it must recover quickly to above that level	Trajectories of lower 2.5 or 5%ile of the projected biomass will be monitored. (Note that this performance statistic is less quantitative than others and requires “tick tests” of each individual trajectory which performs poorly.)
Socio-economic/industry	S4	Exceptional Circumstances should not be declared too frequently	Proportion of times during the projection period that the directed TAC decreases below the minimum TAC Average number of years for which Exceptional Circumstances, if declared, are declared consecutively
Ecosystem	E2	Ensure the biomass of sardine remains sufficient over time both west and south of Cape Agulhas	The same performance statistic as used in E1 provides an index of the sardine biomass west of Cape Agulhas For a 1 component model, which assumes full mixing, and provided that there is no sardine distribution shift away from the south coast, OMP control parameters that secure adequate performance for the west coast penguin performance statistics under E1 would be assumed to also secure such adequacy for predators south of Cape Agulhas For a 2-component OM, in the absence of a predator model for south coast penguin colonies, biomass proportional reduction statistics for the south stock similar to those required for the west stock to achieve E1 will be used. Average number of years for which observed sardine biomass west of Cape Agulhas remains below a threshold of 336 000t ³ , once it drops below this threshold

³ The threshold of 336 000t corresponds to the index of 0.25 of the maximum historical observed sardine biomass west of Cape Agulhas (Figures 4a, 5a and 6a of Robinson and Butterworth (2012)); their analyses indicate that it is below this threshold that Robben Island penguin natural mortality rates start to increase.

Table 2 (continued).

Ecosy stem	E3	Ensure a combined sardine and anchovy biomass sufficient to avoid potential catastrophic ecosystem implications	Proportion of times the future combined biomass drops below a ⁴ lower percentile of historical (1984-2011) combined biomass
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⁴ The percentile (eg 10% or 20%) will be chosen once the operating models have been completed and the implication of the percentile on historical combined biomass can be determined.