

## “Third for the Birds” for South African Sardine and Anchovy?

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### Background

The suitability of performance statistics relating future projected levels of sardine and anchovy biomass to one third of the historical maximum survey estimate of abundance was discussed during the May 2015 SWG-PEL meeting. This document provides some further information to assist discussions.

### Suitability of One Third of Historical Maximum

de Moor (2015) reported that under OMP-14, combined sardine and anchovy biomass was simulated to fall below one third of the maximum historical (1984-2011) value 46% of the time, compared to 12% of the time simulated in the absence of all future catch. However, de Moor (2015) also showed that the median proportion of times historical combined biomass fell below this same “one third of maximum” threshold is 0.61, with a 90% PI of 0.46-0.71 (Figure 1).

Figures 2 and 3 separate out the historical data into survey estimates of biomass west and east of Cape Agulhas for sardine and anchovy respectively. This shows an even higher proportion of times that the survey estimate of sardine biomass has historically been below one third of the maximum – with that proportion being 84% of the time for sardine east of Cape Agulhas (Figure 2b). The anchovy survey estimates of biomass have historically been below one third of the maximum 45% (west of Cape Agulhas) to 61% (east of Cape Agulhas) of the time.

Thus the suitability of any performance statistic relating to one third of the maximum of either historically observed survey estimates or model predicted estimates of abundance is questionable for South African sardine and anchovy. Such an approach does not take account of likely non-stationarity in key parameters describing pelagic fish dynamics, such as changes in carrying capacity over time. In addition, one would need to demonstrate the negative effect on birds which prey on sardine and anchovy throughout the large proportions of these historical years. In contrast, for example, Robinson et al. (2015) shows the numbers of adult female penguins moulting at Robben Island were increasing in the early- to mid-1990s, a period during which the sardine west of Cape Agulhas was mostly below a proposed one third of the maximum threshold.

### Acknowledgements

Janet Coetzee is thanked for providing the survey data separated east and west of Cape Agulhas.

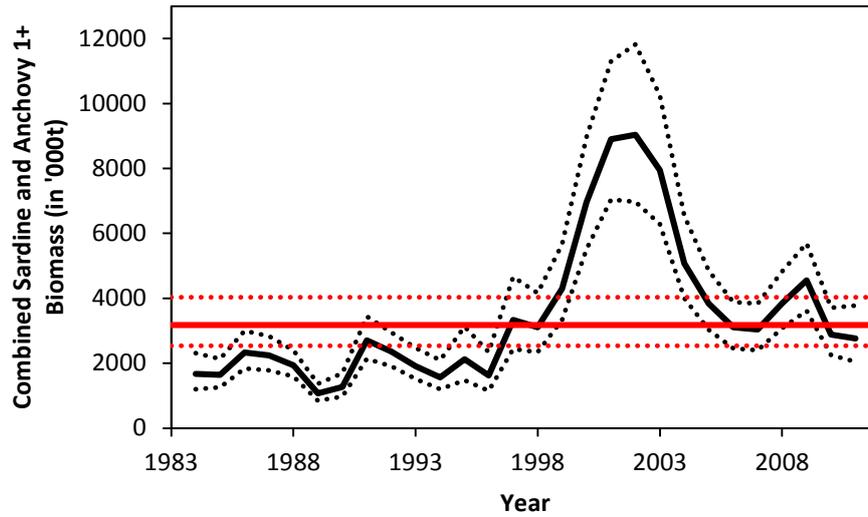
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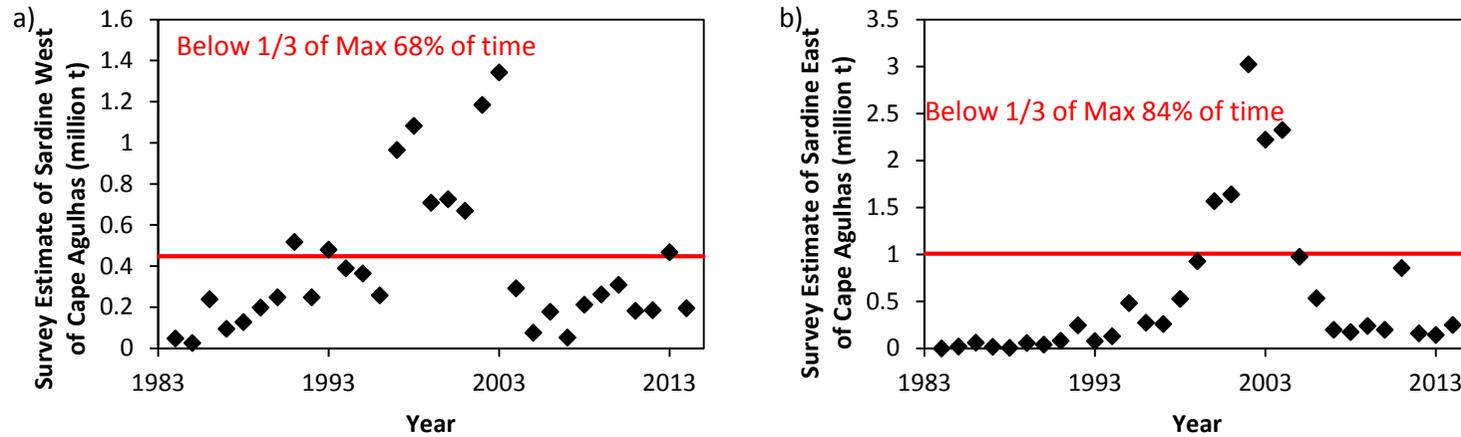
**References**

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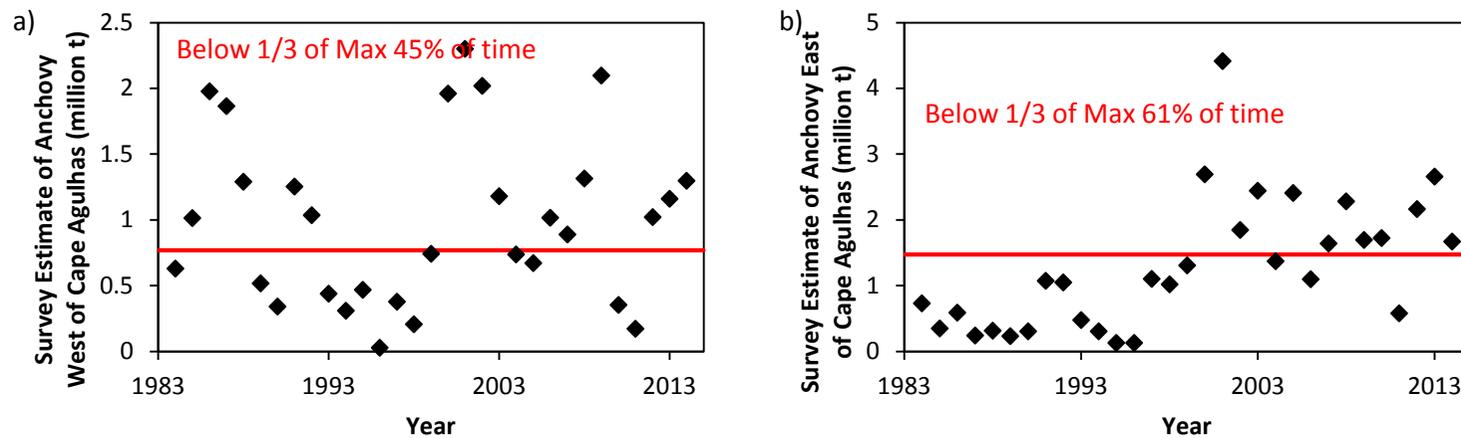
Robinson WML, Butterworth DS, Plaganyi EE. 2015. Quantifying the projected impact of the South African sardine fishery on the Robben Island penguin colony. *ICES Journal of Marine Science. In Press*



**Figure 1.** The median (solid line) and 90% probability interval (dotted lines) of the historical model predicted combined sardine and anchovy biomass, with one third of the historical maximum combined biomass shown in red.



**Figure 2.** The survey estimate of sardine biomass a) west and b) east of Cape Agulhas from 1984 to 2014. The horizontal red line indicates one third of the maximum.



**Figure 3.** The survey estimate of anchovy biomass a) west and b) east of Cape Agulhas from 1984 to 2014. The horizontal red line indicates one third of the maximum.