

Results of an alternative pelagic biomass series for the relationship with penguin adult survival

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Introduction

A key component of the Robben Island penguin population model (Robinson and Butterworth 2011a,b) is the relationship between annual penguin adult survival and the abundance of small pelagic fish. This is of primary importance as it enables one to produce penguin population projections based on different future small pelagic abundance levels. The sardine and anchovy OMPs may then be designed to take into account the risk to penguins of reaching a low pelagic abundance level.

Moseley *et al.* (2011) compiled a list of various penguin life history parameters which may depend on prey abundance. The only hypothesis which could be tested in the model in its current form is that pertaining to the relationship between penguin survival and pelagic fish abundance. The hypothesis is that “*adult survival is dependent on total biomass west of Cape Agulhas (November) and total recruitment west of Cape Infanta*”. In this paper, results under this hypothesis are compared to the alternative that adult penguin survival is dependent on the sardine November biomass only.

Results

The two alternative pelagic biomass series are shown in Figure 1. The fitted deterministic relationship between penguin mortality and fish abundance for the two alternatives is plotted in Figure 2 (a) and (b). Time series of residuals are shown in Figure 2 (c)–(f). It is quite clear that a much better fit is obtained with the sardine only dependence. A particular reason for this is that penguin survival in the period 2007–2010 was low even though anchovy abundance was high during these years.

References

Moseley C, Wanless R, Altwegg R, Crawford R, Badenhorst A, Coetzee J. 2011. Hypotheses for relating anchovy and sardine abundance with African Penguin population processes. FISHERIES/2011/SWG-PEL/03.

Robinson W, Butterworth DS. 2011a. Full description of the Robben Island Penguin–Fish interaction model and base case Bayesian results. FISHERIES/2011/SWG–PEL/40.

Robinson W, Butterworth DS. 2011b. Penguin model update: an improved penguin mortality relationship with sardine biomass and results of sensitivities to the base case. FISHERIES/2011/SWG–PEL/58.

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Figures

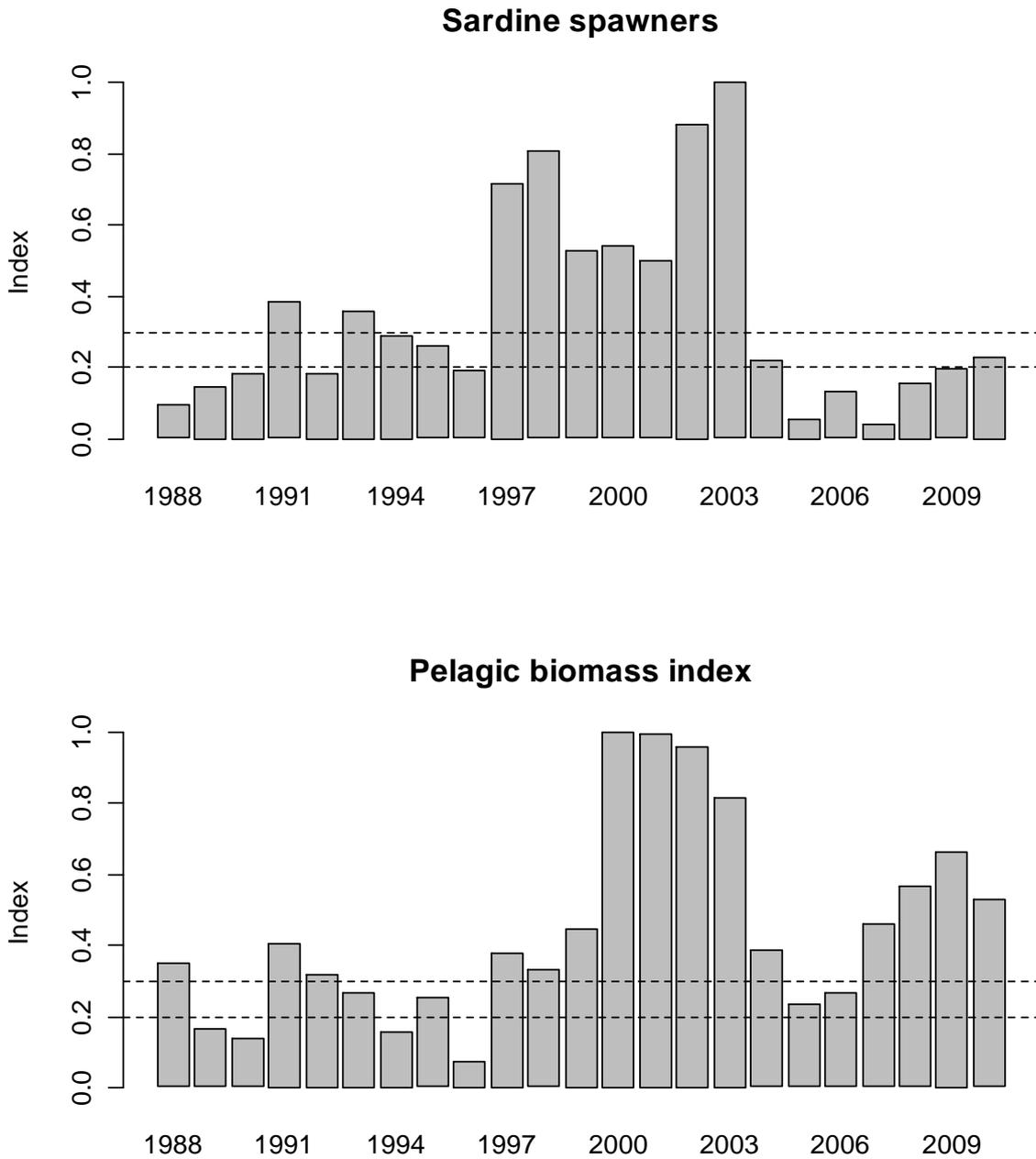


Figure 1: Top: the sardine spawner biomass index time series. Bottom: time series of the combined sardine and anchovy abundance index including spawners west of Cape Agulhas and recruits west of Cape Infanta.

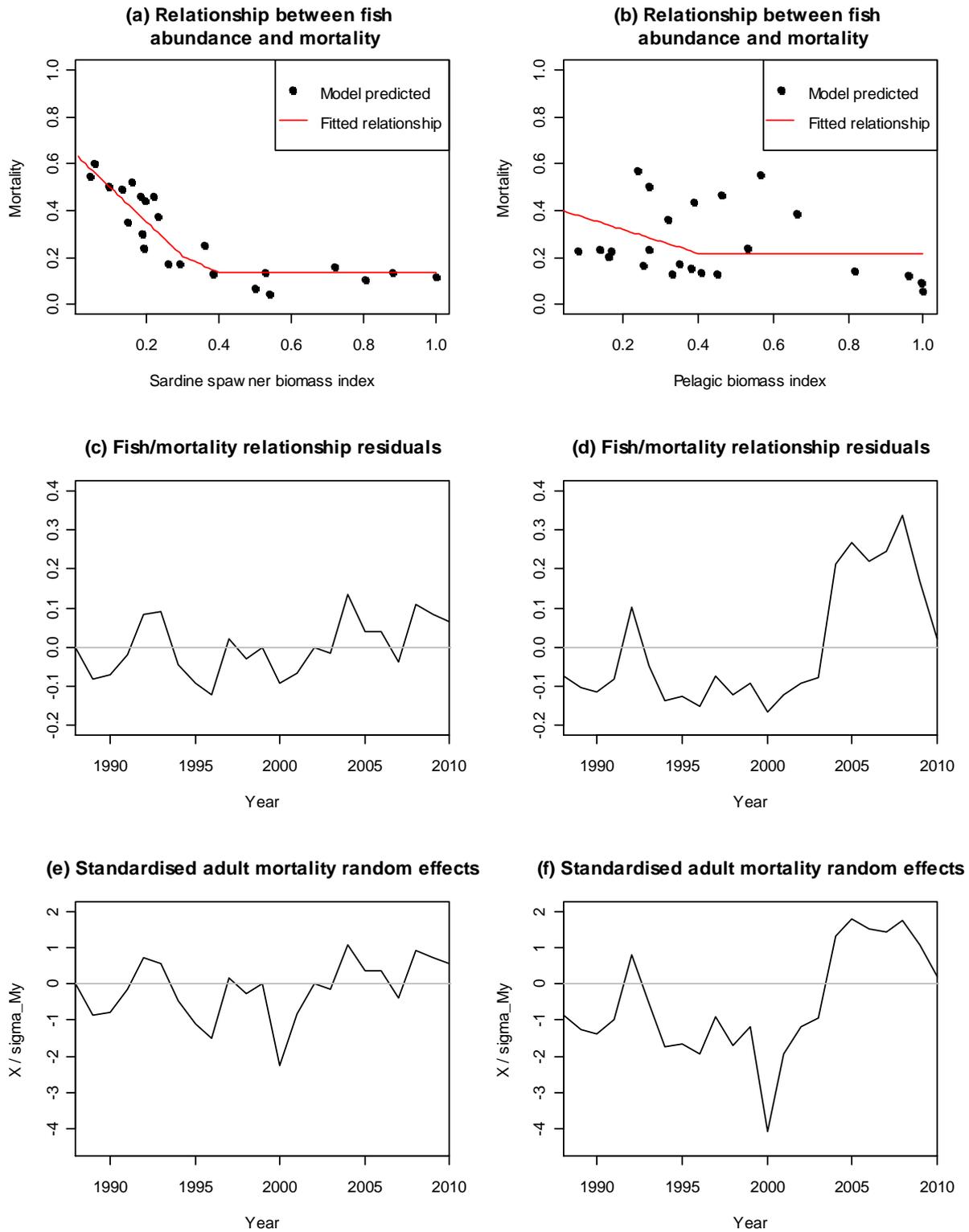


Figure 2: Comparison of model residuals for the penguin mortality relationship with sardine spawner biomass index only (left column) and the index of sardine and anchovy spawner biomass and recruits (right column).