

Recruitment variability estimated by the sardine assessment model

C.L. de Moor*

Correspondence email: carryn.demoor@uct.ac.za

When the Hockey-stick stock recruitment relationship was estimated during the conditioning of the Operating Model for South African sardine (de Moor 2016a, de Moor 2018), the estimated σ_R^S was close to the lower bound of the prior distribution for the west component, where $(\sigma_R^S)^2 \sim U(0.16, 10)$. Mixing of the MCMC chain for σ_R^S has been slow and thus σ_R^S has been fixed at a constant during MCMC simulations, and therefore also in projections of the population dynamics during the development of multiple OMPs.

However, when the Operating Model was conditioned without any stock recruitment relationship and the Hockey-stick stock recruitment relationship subsequently estimated after conditioning (de Moor 2016b), the estimated σ_R^S was much higher for both the south and west components.

References

- de Moor CL. 2016a. Assessment of the South African sardine resource using data from 1984-2015: Results at the joint posterior mode for the two mixing-stock hypothesis. DAFF: Branch Fisheries Document FISHERIES/2016/JUL/SWG-PEL/22REV2.
- de Moor CL. 2016b. The two mixing stock hypothesis for South African sardine without an assumed stock-recruitment relationship. DAFF: Branch Fisheries Document FISHERIES/2016/NOV/SWG-PEL/57.
- de Moor CL. 2018. Posterior distributions for the South African sardine assessment. DAFF: Branch Fisheries Document FISHERIES/2018/MAR/SWG-PEL/01.

Table 1. The estimated σ_R^S for the west and south components of sardine when the stock recruitment relationship was estimated during and after conditioning, assuming 8% of the south component spawner biomass contributes to the west component effective spawner biomass.

Hockey stick model estimated:	West (non-pulse years)		South component	
	Joint posterior mode	Posterior distribution	Joint posterior mode	Posterior distribution
During conditioning	0.4	Fixed at 0.5	0.4	Fixed at 0.5
After conditioning	0.85	0.96 [0.83,1.09]	3.06	3.76 [3.16,4.27]

* MARAM (Marine Resource Assessment and Management Group), Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch, 7701, South Africa.

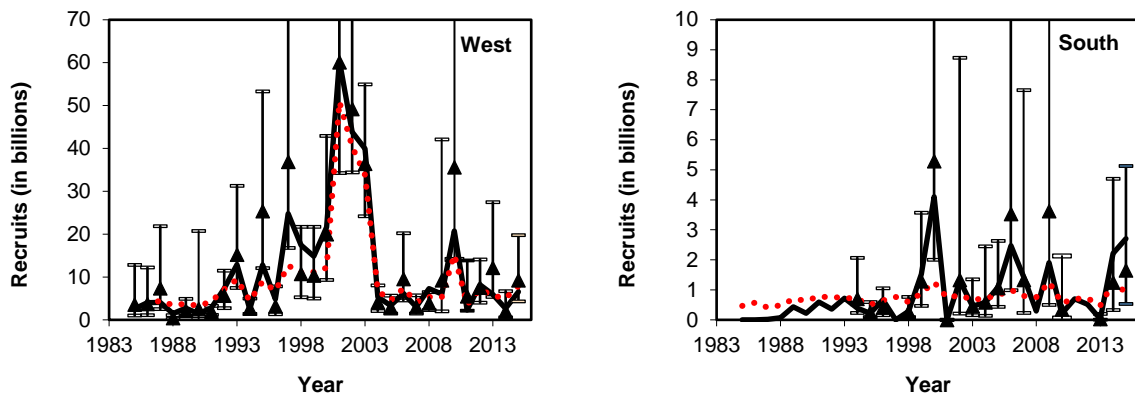


Figure 1. Acoustic survey estimated and model predicted (at joint posterior mode) sardine recruitment numbers from May 1985 to May 2015, for the assessment with a Hockey Stick stock recruitment relationship estimated during conditioning (red) and after conditioning (black). The survey indices are shown with 95% confidence intervals.

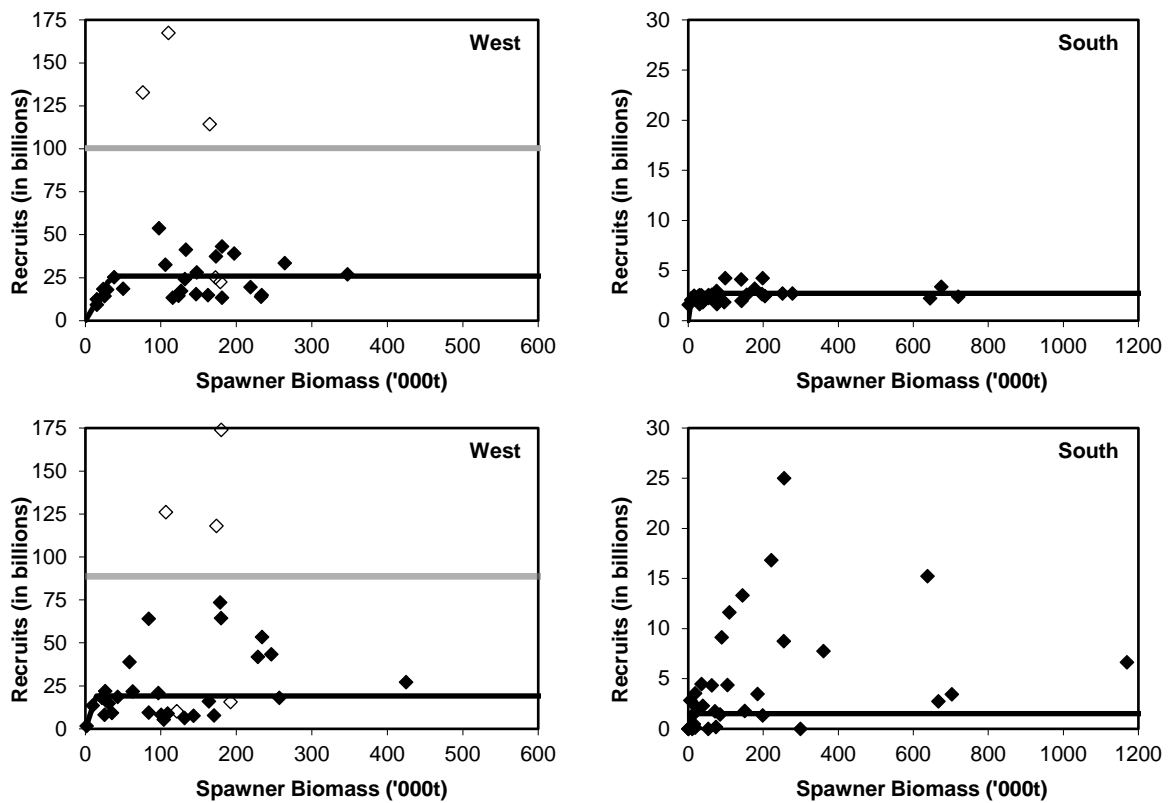


Figure 2. Model predicted (at joint posterior mode) sardine recruitment (in November) plotted against spawner biomass from November 1984 to November 2014 with the estimated Hockey stick stock recruitment relationships. The grey line shows the median 2000-2004 west component recruitment and the open diamonds correspond to these same 'peak' years. The relationships in the upper panel were estimated during conditioning, and those in the lower panel were estimated after conditioning.

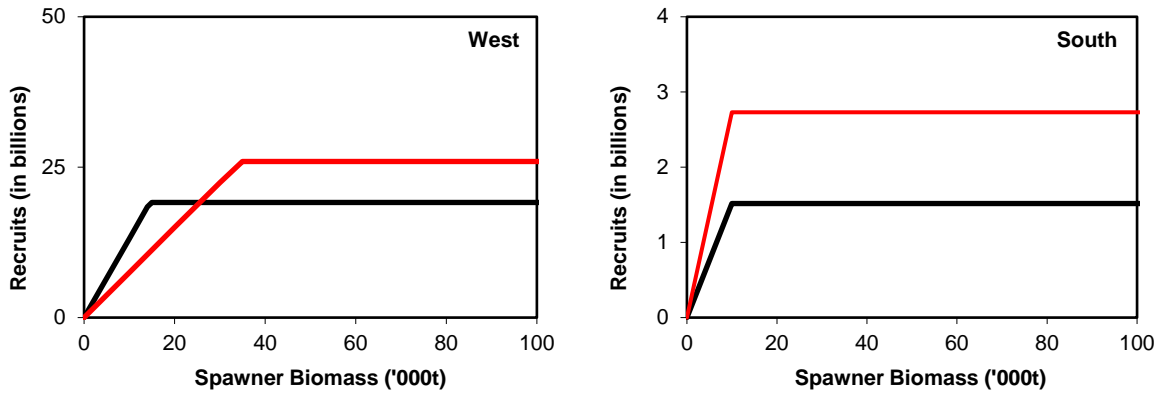


Figure 3. The Hockey-stock stock recruitment relationships from Figure 2, with red denoting the relationship estimated during conditioning and black the relationship estimated after conditioning.

