

Proposed Reference Set for the South African hake resource

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Three aspects have been found to account for most of the uncertainty regarding the key considerations of resource status and productivity: a) pre-1978 species split of the offshore trawl catches; b) natural mortality-at-age specifications; and c) the stock-recruitment relationship.

Pre-1978 species split of the offshore trawl catches:

The RC has a central year for the shift from *M. capensis* to *M. paradoxus* in 1958. We suggest that the RS should be robust to a central year between 1950 and 1965.

Natural mortality-at-age specifications:

The RC fixes the natural mortality vector with $M_2=0.75$ and $M_{5+}=0.375$. We suggest the RS should include two further vectors that arguably span the plausible range: a high M scenario of $M_2=0.9$ and $M_{5+}=0.5$ and a low M scenario of $M_2=0.6$ and $M_{5+}=0.25$.

Stock-recruitment relationships:

A modified Ricker stock-recruitment curve is used for the RC. We suggest to also include in the RS a Beverton-Holt stock-recruitment curve with the steepness parameter h estimated or fixed ($h=0.7$).

Initially, a full cross of 3 center-years x 3 natural mortality vectors x 3 stock-recruitment relationship will be run, but the final OMs selected in the RS will be subject to the constraint that a fit with a $-\ln L$ difference of more than about 15 from that for the best of the fits will be excluded on the basis of poor compatibility with the data.

