



Alternative single-species approaches for the assessment of the southern African hake resources

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This document summarises alternative single-species approaches for the assessment of the southern African hake resources. Note that the term “single-species” as used here does NOT mean restriction of the assessments to one species (it is intended that the two hake species be considered throughout) but is used rather to distinguish from “multi-species” approaches. “Multi-species” assessments take biological interactions (predator-prey, etc.) between species into account explicitly, while “single-species” assessments do not. The alternatives put forward could apply to either *M. capensis* or *M. paradoxus*. In the scenarios considered, the stock structure models assumed (Butterworth and Rademeyer, 2006) for *M. capensis* and *M. paradoxus* do not need to be the same for both species..

A schematic representation of the three regions and the depth stratifications considered (Namibia, South African west and south coasts; and inshore and offshore) is given in Fig. 1. Four alternative approaches are illustrated:

- 1) One homogeneous resource – Fig. 2.
- 2) Current assessments – Fig. 3:

In the South African assessment, selectivity-at-age vectors are used for the surveys to determine the differential presence by age of South African hake stocks across the west coast/south coast boundary. Commercial offshore trawl and longline selectivities however do not make this distinction; commercial inshore trawling and handlining do not need to as they are limited to the south coast.

Note also that for the current assessments of the South African hake the species are split, but Namibian hake is assessed as a single species.

- 3) January 2004 BENEFIT/NRF/BCLME workshop recommendation (BENEFIT, 2004) – Fig. 4:

The model has four/six spatial strata (depending whether Namibia is included or not). As in 2) above, the differences in the distributions by age within each stratum are handled by allowing for stratum-specific commercial and survey selectivities, rather than by explicitly modelling movement.

- 4) Direct modelling of movement with age – Fig. 5:

The structure of the model is the same as for 3) above, i.e. four/six strata, but age-specific movement between the strata is modelled directly.

Questions:

- a) Are two strata by depth and three strata longshore sufficient (biological realism vs parameter estimability limits)?
- b) For the approach using direct modelling of movement:
 - i. what level of differentiation by age is needed (e.g. yearly, two-yearly)?
 - ii. from what data could longshore movement rates be estimated (offshore rates should be easier to obtain from the pattern of age-by-depth obtained from surveys)?

References

- BENEFIT 2004. Formal report: BENEFIT/NRF/BCLME Stock Assessment Workshop 2004. 12-17 January 2004. University of Cape Town. South Africa.
- Butterworth DS and Rademeyer RA. 2006. Alternative stock structure hypotheses for the southern African hake resource. Unpublished document, BCLME Joint Hake Research Planning workshop, Cape Town. South Africa. BCLMEHW/MAY06/5.1
- Rademeyer RA and Butterworth DS. 2004. South African hake data discussion – continued. Unpublished document, MCM. South Africa. WG/07/04/D:H:9.

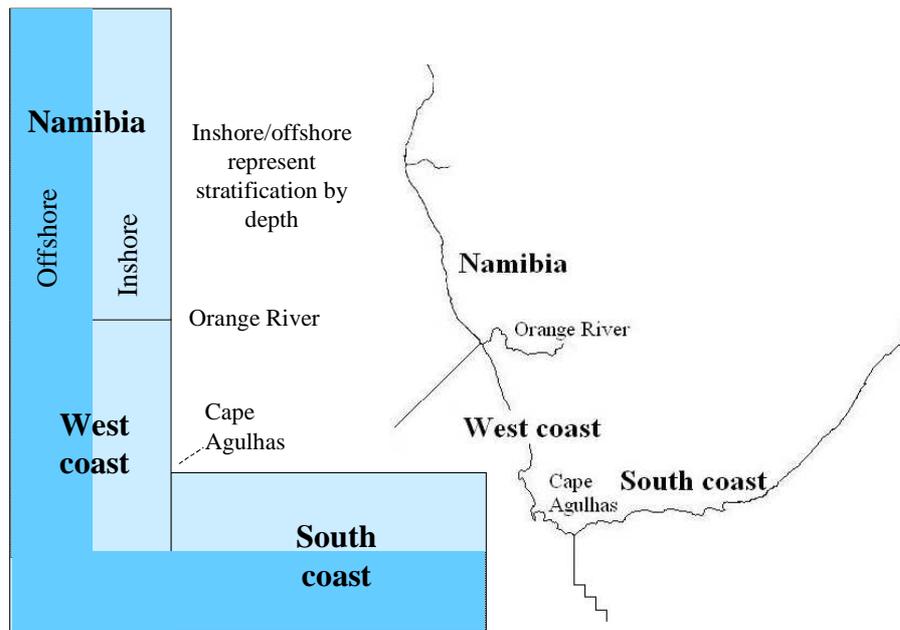


Fig. 1: Schematic representation of the three regions and depth stratification.

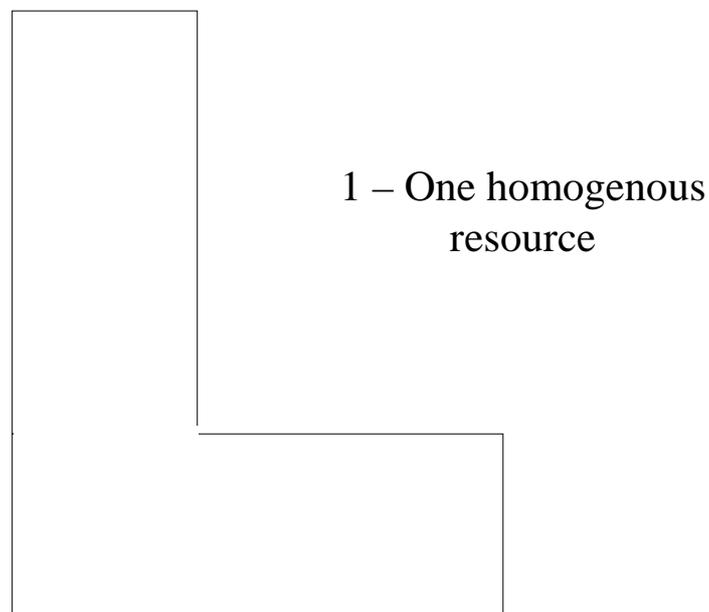


Fig. 2: One homogenous resource.

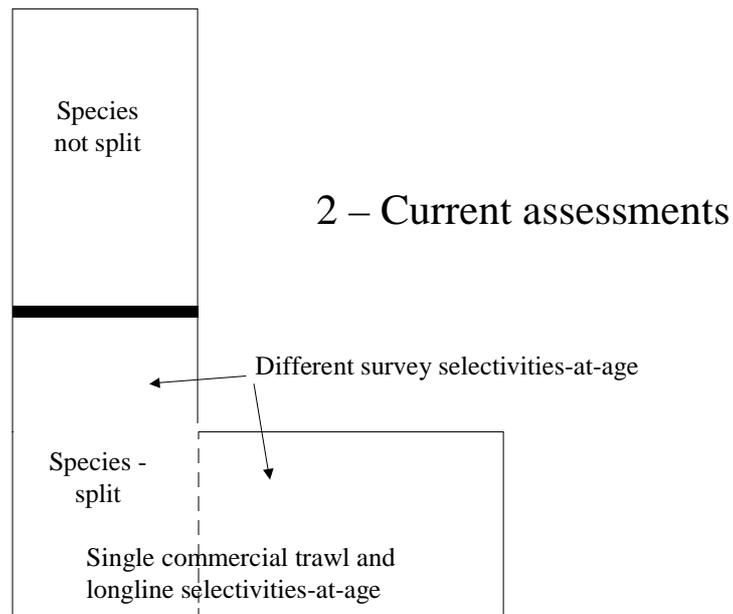


Fig. 3: Approach used in current assessments.

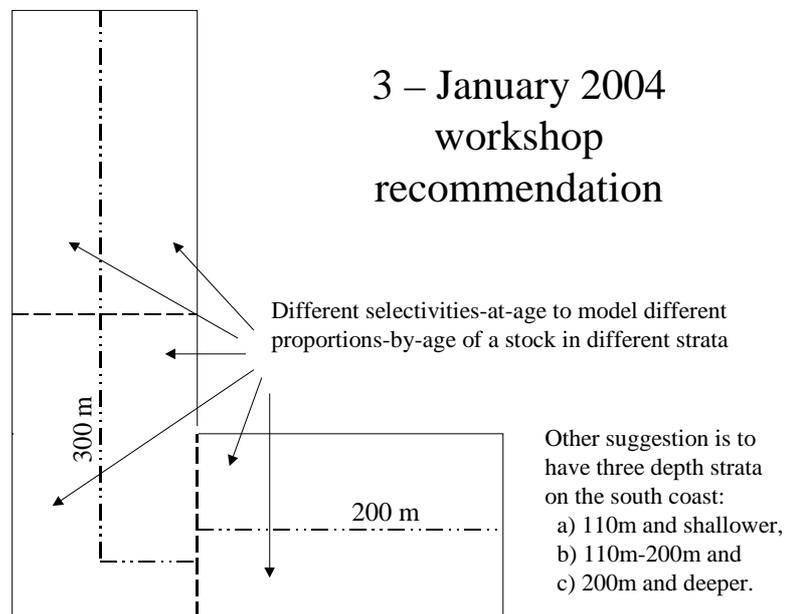


Fig. 4: Single-species approach as recommended by the January 2004 BENEFIT/NRF/BCLME workshop (BENEFIT, 2004). The depth boundaries shown for South Africa are as chosen by the MCM Demersal Working Group (WG/07/04/DH09)

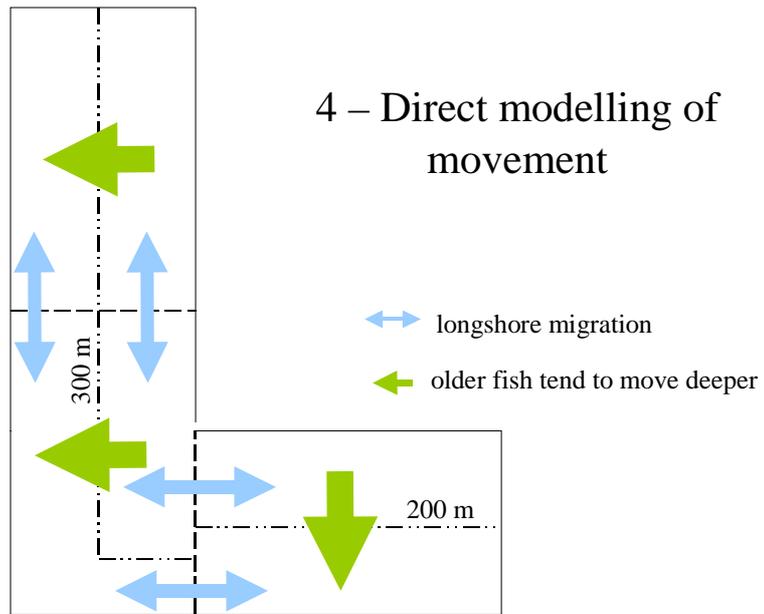


Fig. 5: Single species approach with direct modelling of movement.