

SA hake genetics and stock structure

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Background:

The population structure of the two South African hake species was evaluated by the IWS Panel in 2014, largely using information on hake genetics (Henriques *et al.*, 2014) and parasites (Reimer, 1993). The panel concluded that:

- *M. paradoxus*. The most likely hypothesis is that there is a single stock off Namibia and South Africa.
- *M. capensis*. The most likely hypothesis based on the genetics data is that there are two stocks off Namibia and South Africa. There are northern and southern stocks and an area of mixing.

The topic was re-visited during the 2019 IWS, with further genetics results made available by Henriques *et al.*, (2016) and largely within the context of the likely transboundary distribution of the *M. paradoxus* stock and hence likely sharing with Namibia. Following evaluation of the information, the Panel were of the view that “...a single panmictic population in South Africa and Namibia is still the most plausible hypothesis for *M. paradoxus*. However, as was the case in 2014, there are some scenarios involving more than one stock that cannot be rejected by the current genetic data due to lack of statistical power”.

More recently, Forde *et al.*, (2023), using genome-wide SNP data collected from spatially referenced hake tissue samples from the Benguela region concluded that:

- a) *M. capensis* shows three highly structured populations across the Benguela Current region (one in the northern Benguela and two in the Southern Benguela)
- b) *M. paradoxus* might be composed of two highly connected populations, one in the Atlantic and one in the southwest Indian Ocean.

Question to the Panel:

Do the findings of Forde *et al.*, (2023) require any changes to the current SA hake analytical and/or management approach that considers both species to each comprise a single stock distributed throughout South African waters? If so, what alternatives could be considered?

References:

Forde, S., von der Heyden, S., Le Moan, A., Nielsen, E.S., Durholtz, D., Kainge, P., Kathena, J.N., Lipinski, M.R., Ndjaula, H.O.N., Matthee, C.A. and Henriques, R. 2023. Management and conservation implications of cryptic population substructure for two commercially

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- Henriques, R., Matthee, C. and von der Heyden, S. 2014. Assessment of the genetic population structure of the Cape Hakes (*Merluccius capensis* and *M. paradoxus*) around southern Africa (unpublished, restricted data).
- Henriques R, von der Heyden S, Lipinski MR, du Toit N, Kainge P, Bloomer P and Matthee CA. 2016. Spatio-temporal genetic structure and the effects of longterm fishing in two partially sympatric offshore demersal fishes. *Molecular Ecology*. doi: 10.1111/mec.13890. 19pp.
- Reimer, L.W. 1993. Parasites of *Merluccius capensis* and *M. paradoxus* from the coast of Namibia. *Applied Parasitology* 34: 143-150. 8pp.