

Review of the potential implications of a shared *M. paradoxus* stock between South Africa and Namibia on the performance of OMP2018

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March 9, 2020

*TOR: Provide a brief written review of the two documents attached to provide broad overview advice as to whether, given the data available, their analyses are consistent with best scientific practice, and sufficient to justify whether the management approach proposed by the South African client is adequate to cater for the possibility that the *M. paradoxus* resource may be shared to some extent between South Africa and Namibia.*

Two analyses were conducted to explore whether the current South African OMP for hake (*M. capensis* and *M. paradoxus*) was robust to potential stock mixing of *M. paradoxus* with Namibia: robustness trials of the South African Hake OMP2018 and a sensitivity of the stock assessment model to including Namibian catches. The analyses appear to be appropriate, and they support the conclusion that the current OMP for *M. paradoxus* should still perform relatively well for *M. paradoxus* even in the case of a demographically mixed *M. paradoxus* stock that is shared between South Africa and Namibia. I have organized my review around the two questions below.

Question 1. Were the analyses appropriate for the question?

Additional robustness trials were conducted to determine the effect of potential increased catches of *M. paradoxus* in Namibia on the performance of the South African OMP2018. These trials are an appropriate test of the OMP under the hypothesis that the *M. paradoxus* stock is well mixed. One reason this is an appropriate analysis is that if the stock is well-mixed between South Africa and Namibia, then the Namibian fishery is implicitly taken into account in the South African Reference Case model. Therefore, the robustness trials are of increased catches in Namibia.

The operating model for *M. paradoxus* was implemented using the estimates of Namibian *M. paradoxus* catches. This model implementation is an appropriate representation of the hypothesis that the *M. paradoxus* stock is well mixed between South Africa and Namibia. With the addition of the Namibian catches, the model diagnostics seem very similar to those for the original base case.

*Question 2. Does the OMP appear adequate even if the *M. paradoxus* resource is shared with Namibia?*

The additional robustness trials show that increased Namibian catches are likely to lead to an appropriate response to maintain sustainability even if the *M. paradoxus* stock is well mixed. In the cases of large increases in the Namibian *M. paradoxus* catches, the Exceptional Circumstances provision should be triggered before there is concern about sustainability.

When the Namibian catches are added to the stock assessment model, the fits to the data are not substantially degraded, and the model results are more optimistic than the reference case in terms of stock status.

The combination of the robustness trials and updated stock assessment model indicates that OMP2018 should work reasonably well for *M. paradoxus* even if the stock is fully mixed (i.e., individuals redistribute

randomly each year across South Africa and Namibia). It is likely that mixing is less extreme than this, in which case OMP2018 should perform better than these analyses indicate.

Documents reviewed:

Butterworth, D.S., and A. Ross-Gillespie. On the robustness of the SA hake OMP2018 to an increased Namibian catch of *M. paradoxus*. DEFF Fisheries document FISHERIES/2020/MAR/SWG-DEM/02.

Butterworth, D.S., and A. Ross-Gillespie. Simple variants of the SA hake Reference Case Operating Model (assessment) to take account of Namibian catches of *M. paradoxus*. DEFF Fisheries document FISHERIES/2020/MAR/SWG-DEM/03.