

LIST OF QUESTIONS TO THE PANEL REGARDING THE 2018 HAKE OMP REVISION

Note: Questions initially considered more important have been **yellow highlighted** and will be given preference in what will be limited discussion time, but this categorisation may change as the workshop progresses.

Checks on existing assessment/operating model fits (with emphasis on the Reference Case - RC)

1) Is the new selectivity model adequate/appropriate?

See MARAM/IWS/2017/Hake/P2 sections 4.1.2 and 4.1.3 and Figures B.3 and B.4 with subsequent Figures showing fits to catch-at-length data. A previous Panel encouraged change to a double normal form for selectivity.

2) Are the stock-recruitment models used adequate/appropriate, including the extent of annual variation about these relationships?

*See MARAM/IWS/2017/Hake/P2 section 1.3 and Figure B.2. The input σ_R value is 0.45 (linearly down to 0.1 in the last five years of the assessment) and the output values are 0.52 and 0.56 for *M. paradoxus* and *M. capensis* respectively.*

3) Are other fit diagnostics, especially for the CPUE and survey abundance residuals, satisfactory? Is the systematic overestimation of recent south coast *M. capensis* CPUE a cause for concern?

See MARAM/IWS/2017/Hake/P2 Figures B5 to B9 for fit diagnostics and retrospectives reported in MARAM/IWS/2017/Hake/P3.

4) Is sex-disaggregation of the model warranted given the limited sex-specific data?

See MARAM/IWS/2017/Hake/P2: Tables App.A.5.f-i report such data as are sex-disaggregated, while Figures B8 and B9 show the corresponding model fits.

5) Could the shrinkage procedure used for estimation of recent recruitments be improved?

See MARAM/IWS/2017/Hake/P2 Section 3.6 (final paragraph) and Figure B2.

6) Currently OMP testing projections are initiated from MPLE estimates. How might taking estimation uncertainty into account best be achieved?

This has not been given priority previously under the assumption that uncertainty is dominated by large model structure uncertainty. Ideally estimation uncertainty could be incorporated through use of a variance-covariance matrix from the Hessian; however ADMB convergence is seldom sufficient to produce a Hessian. Should

attempts be made to obtain a Hessian by fixing some estimable parameters with relatively little impact on key results at their MPLE values?

- 7) Was the basis for the previous Reference Set (RS) selection adequate, and if not how should future selections be made?

See MARAM/IWS/2017/Hake/BG2 and BG3 for the basis for the 2014 RS selection, and MARAM/IWS/2017/Hake/P4 for an update of this RS.

- 8) Can the estimation of B/Bmsy be improved?

See MARAM/IWS/2017/Hake/P2 (Table B1) and P4 for estimates and there extent of variability. The process of MSC certification accords much attention to such estimates. How best are they summarised/improved given this variability?

- 9) Was the previous set of robustness tests adequate?

See MARAM/IWS/2017/Hake/P5.

Clear further possible lines of investigation into the assessment/operating models

- 10) Should a change be made to use of M -at-age estimates from the hake predation model – an average over last 2-3 decades, or time varying by year since commencement of fishery?

See MARAM/IWS/2017/Hake/P6.

- 11) Should a penalty function on survey q 's be included (e.g. restrict to values below 1)?

See MARAM/IWS/2017/Hake/P2, Table 2, indicating some estimated values of survey q 's to be > 1 .

- 12) Should a penalty function on von Bertalanffy L_{inf} values be included?

See MARAM/IWS/2017/Hake/P2, Table 2, where results for $\ln(\kappa)$ indicate κ to be sufficiently small that the von Bertalanffy curves fitted are effectively straight lines.

- 13) How best should (differing?) q values for surveys be estimated given gear changes and sometime use of industry vessels?

See MARAM/IWS/2017/Hake/P2, both the final part of section 3.2, and MARAM/IWS/2017/Hake/BG4 which includes an estimate of q for an industry vessel used for surveys relative to the research vessel (Africana) used normally.

- 14) Is there a need to change to random walk models for selectivity?

See MARAM/IWS/2017/Hake/BG5 for an example of where this has been attempted.

15) Need the ageing error matrices used be reconsidered?

See MARAM/IWS/2017/Hake/P2 section 3.5 for the methodology and MARAM/IWS/2017/Hake/BG6 for the matrices in current use.

16) For surveys might changing abundance estimation from the current random stratified to a geostatistical approach constitute an improvement?

See MARAM/IWS/2017/Hake/P7 for specific suggestions, with MARAM/IWS/2017/Hake/BG7 and BG8 providing background information on the approach put forward.

17) How best might results from the extension of surveys into deeper water be taken into account?

See MARAM/IWS/2017/Hake/P8.

18) How important is the incorporation of further longline catch-at-length data and the development of a longline CPUE series?

See MARAM/IWS/2017/Hake/P2, Tables App.A.1b and 5d-i for lists of what longline data are available for use in assessments.

Possible more extensive assessment modification options

19) Should more complex stock-structure, including perhaps an extension to a transboundary assessment including Namibia be considered?

*MARAM/IWS/2017/Hake/BG1 refers to genetic evidence suggesting two stocks on *M. capensis* in South African waters, but one of these is relatively far north on the SA west coast that only a small component of the total SA *M. capensis* catch would be taken from it.*

*Regarding possible extension to Namibia, the 2016 Panel remarked that “Development of models for the entire *M. capensis* and *M. paradoxus* resources should consider hake in Namibia as well as South Africa. Unfortunately, to date this has proved to be infeasible owing to a lack of data for Namibia being shared. The Panel strongly recommends that efforts be made to allow assessment analysts to have access to all data from the entire southern African region to maximize the opportunities for progress on models that use all of the available information.”*

20) Should attempts be made to allow for some explicit movement, either as the basis for an updated RC or as a robustness test?

See MARAM/IWS/2017/Hake/BG9 for the some of the most recent work in this direction.

- 21) Is there any way of independently checking the *M. paradoxus/capensis* biomass ratio implied by the assessments?

*See MARAM/IWS/2017/Hake/P2, Figure B1, which indicates and *M. capensis* biomass is currently similar to or greater than *M. paradoxus* biomass, contrary to industry's perceptions.*

Aspects of the revision of the OMP

See MARAM/IWS/2017/Hake/BG10, 11 and 12 for the specifications of the existing OMP, results from the comparison of candidate OMPs that led to the final selection of hake OMP-14, and an example of the application of this OMP.

- 22) How should the different Reference Set OMs be weighted in reporting performance statistics?

See MARAM/IWS/2017/Hake/P9 which applies an approach to weighting different models in inverse relation to the similarity of their results, which is borrowed from an approach to averaging over an ensemble of different climate change models.

- 23) Should slope as well as target approaches be used in the OMP's fundamental HCR?

See MARAM/IWS/2017/Hake/P10 which contrasts results from target- and slope-based approaches in a recent MP development process for Greenland halibut.

- 24) Should HCRs that react more rapidly to the most recent data be explored further (this is a particular concern of industry)?

See MARAM/IWS/2017/Hake/BG13 for results from an earlier investigation of this which failed to achieve success.

- 25) Should HCRs that investigate the use of some recruitment index (probably from younger fish in survey) be explored further?

Results from an earlier investigation of this which failed to achieve success (R Rademeyer, pers. commn).