Excerpts from the 2024 IWS panel report pertaining to the chokka squid resource, together with responses

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ABSTRACT

This paper provides the 2024 Panel's review and recommendations for proposed changes to the assessment model for the squid resource. Responses to those recommendations are also given.

KEYWORDS: IWS panel, excerpts, recommendations, squid

EXCERPTS FROM THE 2024 IWS PANEL REPORT IN RELATION TO SQUID AND RESPONSES

Listed below are excerpts from the 2024 IWS panel report in relation to squid, with red text indicating which panel recommendations have been addressed to date and how.

INTERNATIONAL REVIEW PANEL REPORT FOR THE 2024

INTERNATIONAL FISHERIES STOCK ASSESSMENT WORKSHOP
2 – 6 December 2024, UCT
[André E. Punt, Ralph Tiedemann, Michael J. Wilberg]

Squid

The monthly age-structured population dynamics model developed to mimic data on catch by pack category has been updated based on recommendations from the 2023 Panel, and the results presented indicate that the revised model is capable of capturing changes over month in average pack proportions adequately, and to lesser extent their inter-annual variation. The Panel recommends that the future stock assessments be based on this model, which is able to capture year-to-year fluctuations in recruitment and the short life span of squid better than the earlier biomass dynamics model. It also identified several additional data sources that should be included within the model-fitting process. These data sources (e.g., survey length-frequency data and within-year trends in CPUE) could not be used in the biomass dynamics model.

C. Squid

C.1. Questions to the Panel

C.1.1 Does the simulation exercise in MARAM/IWS/2024//SQUID/P4 and MARAM/IWS/2024//SQUID/P5 need to be taken further to seek better prediction of the

observed catch-at-length pattern before extending it to serve as the basis for an assessment model?

The work undertaken to date has shown that the modelling framework of MARAM/IWS/2024//SQUID/P5 can capture the general trends in the pack category data, and indicates that recruitment to the population needs to occur throughout the year (albeit it being greater in November to January) to explain the pack category data given the growth model currently used. The simulation exercise has been completed to a sufficient extent that future work should focus on applying the population dynamics model as the basis for an assessment.

C.1.2 Which of the parameters of the model of MARAM/IWS/2024//SQUID/P6 should be treated as fixed and which estimated as varying from year to year, given the limited information content of the data?

The next step of the modelling work is to include the sex-disaggregated catch length-frequency data, the (sex-disaggregated) survey length-frequency data, and estimate separate survey and fishery selectivity patterns. Once the model has been extended, consideration could be given to estimating additional parameters (e.g., the variation in length-at-age, how recruitment varies among months, how fishing mortality varies over months) after which consideration could be given to making some parameters time-varying.

Projects have been initiated to facilitate the splitting of the current pack data by gender. Extraction of survey length-frequency data (possibly by gender) is still to be carried out.

The growth model should also be reconsidered especially because it will influence the other parameter estimates. The parameters of the growth model may be estimable within the assessment (but given the wide bins of the pack category data, these data may not be very informative about growth).

This has not yet been addressed in the current update of the assessment model.

The length-composition data are from landing time, while the fishery CPUE data represent the time of harvest, and landing dates can be over a month after the catches. It is necessary to ensure that the pack category data proportions are applied to the appropriate catch and CPUE data.

After discussion with local scientists, it was agreed that where trips extend into the next month, session-level squid catches during a given trip should be assigned to the month of the landing.

C.1.3 What is the best approach to make use of the sex-disaggregated proportions of pack category data in an assessment model? Are these data, which are available for a limited number of months and years only, sufficient to assume to reflect proportions for other months?

The sex-disaggregated data collected to date are broadly consistent with the predictions of the model. However, these data provide more information than the pack category data because these new data include length measurements. These sex-disaggregated data should therefore be included in the model as sex-specific length-frequency data, rather than as proportions by broad

size-bins. The model should be fitted to the sex-disaggregated data accounting for the month in which the data were collected.

These data will be included in the next round of the assessment as more data becomes available.

C.2 Other comments and recommendations

C.2.1 Additional sex-disaggregated length-frequency data should be collected. These data could be used to assess whether the size-bins used in MARAM/IWS/2024//SQUID/P6 match the sizes of animals as they are allocated to size-bin.

Projects have been initiated to obtain these data as effectively as possible.

C.2.2 Consider replacing the current "three normals" approach for modelling recruitment by month with a cyclic spine approach.

These have been replaced by a spline curve.

C.2.3 Likelihood profiles and "Piner plots" (Carvalho et al., 2017) could be used to explore which data components are informative about absolute population size and hence exploitation rates.

This will be carried out after the initial fits to the current data seem satisfactory.

C.2.4 Explore how close the surveys are to providing estimates of absolute abundance using the estimates of survey catchability. This recommendation is particularly relevant for the case where the model has difficulty estimating population scale.

Still to be done.

C.2.5 Explore whether data (e.g., on paralarvae) exist that could be used to refine the growth curve for young animals, for which there are currently almost no data on length-at-age.

Still to be done.

C.2.6 Consider approaches to explore why the proportion in the medium pack category from the model is virtually constant over months.

In the work presented to the IWS in 2024, the assumption was made that the parameter values obtained in the simulation exercise to replicate the average pack catch-at-length data could be fixed and used in the assessment model. These model parameter values are those that attained a good fit to the observed pack data proportions, averaged over all years, irrespective of

whether they were biologically meaningful/appropriate. The observed pattern for the medium pack category did change when some parameter values were changed.

C.2.7 Apply the "hybrid method" (Methot and Wetzel, 2023) for forcing the model to match the catch.

This will be pursued in the second round of the assessment.

C.2.8 Pack category data length bins are not hard bins. Reconsider how the pack category data categories are modelled by accounting for the probability that a squid that is caught at a given size may be categorized in multiple pack categories. Continue collecting more data on the size and sex distribution of the catch by pack category to refine this allocation scheme.

This will be addressed in the future as more data become available to address this issue.

C.2.9 Reconsider the natural mortality rate (*M*) pattern with age (natural mortality generally should not increase with age). If post-spawning mortality is a concern, some increase in *M* for the oldest ages may be warranted.

This has now been changed to a high juvenile mortality rate and a lower adult mortality rate.

C.2.10 Include the monthly CPUE trends in the model-fitting process.

These have been incorporated.