SOME RESPONSES TO COMMENTS BY SHERLEY IN FISHERIES/2014/MAR/SWG-PEL/ICTT/13

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Sherley's SWG-PEL/ICTT/13 is a welcome contribution, given the key role that efforts at reproducibility and potential rebuttability should always play in the development of fisheries management advice. Responses to some of the arguments he presents are, however, necessary to point out their problematic nature.

- Residual variance estimates presented in the original version of FISHERIES/2014/MAR/SWG-PEL/ICTT/5 were indeed too small, essentially through failure to adjust for the bias associated with a low number of degrees of freedom. This has been corrected in the new Addendum to that paper. The associated results change quantitatively, but not qualitatively in the sense that the conclusion that the objective of the feasibility study at Robben and Dassen islands has been achieved remains.
- There is no necessary bias in the estimates of the fishing effect λ in the original version of ICTT/5. Indeed in the majority of cases in Table 4 of SWG-PEL/ICTT/13, the "preferred model" estimates of λ do not differ greatly from those in ICTT/5. Even when they do, the difference is either such that the preferred estimates become statistically significant at the 5% level, or that a likely change in the associated power computation would not change the conclusion that the objective of the feasibility study has been achieved.
- The estimates of λ in that Table 4, in particular for the model of equation (3) of SWG-PEL/ICTT/13 which treats year as a random effect, are all positive, indicating that a positive impact on penguins is associated with fishing. The numerous arguments given in SWG-PEL/ICTT/16rev make clear that Sherley's inference that such results rather reflect high prey abundance is completely indefensible.
- Sherley's model selection approach is partly flawed: AIC_c is not comparable across, for example, models treating year as a fixed effect and using MLE, and models treating year as a random effect and using REML.
- Sherley points to some minor differences between his and Robinson's analyses arising from some changes to the catch series used, but these make no qualitative difference to conclusions.

Most seriously though, Sherley's SWG-PEL/ICTT/13 evidences a complete failure to understand the purpose of the feasibility study and the method used to analyse it, as first proposed in 2007 and later endorsed at the 2010 international stock assessment review workshop as the form of analysis to be used. With short time series showing inadequate data contrast, it is obviously not going to be possible to obtain statistically significant estimates of the effect of catches, given residual noise. The whole purpose of the feasibility study, followed perhaps by an experiment, was to extend data series to be able to attain such significance, with the feasibility study to indicate how long this would probably take.

Sherley's document indicates that model selection under AIC_c in some cases excludes selection of catch as an explanatory variable. **But that is exactly what is to be expected for**

a limited data set – roughly speaking the AIC criterion will, for a single additional estimable parameter, not select models where that parameter estimate is not statistically significant at the 15% level. Crucially though a non-significant result does **not** necessarily imply absence of the associated effect, particularly given few data. It would hardly be precautionary to conclude in such cases that fishing has no impact on penguins. Obviously these are the very cases where a power analysis needs to be conducted to be clear on how much further monitoring is needed to confirm whether a current non-significant catch effect would become significant, and such an analysis in turn clearly requires a model (desirably models to check robustness, as in Robinson's work) which includes catch as an explanatory variable. In essence then, Sherley's appeal to model selection exercises to effectively exclude catch from analyses in these cases is misguided and irrelevant.

It is also important to re-emphasise that the proposal in SWG-PEL/ICTT/16rev to re-open the area currently closed to pelagic fishing around Dassen island is NOT primarily based on the results of the power analyses of ICTT/5 *per se*. Rather it is a non-parametric inference, which points to the large majority (80%) of different GLMs explored which result in estimates of λ which, even if often not statistically significant at the 5% level, are positive and hence, **considered in their totality**, indicate that fishing is not having a negative impact on penguin reproduction at Dassen and Robben islands.