Response to: "A proposal regarding island closures on the west coast"

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For readers' ease, responses have been entered below into the original document in *red italics*.

A proposal regarding island closures on the west coast

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This document proposes the following

- Dassen Island should remain closed for a further three years (2014-2016), with a minimum of a one-year of closure in 2014
- Island-scale surveys of pelagic fish should continue to be undertaken around Dassen and Robben islands
- Penguin tracking and monitoring of demographics should continue as in previous years
- A combined data analysis workshop should be conducted after the 2014 breeding season ends (September) to jointly analyse all available data

Motivation

The feasibility study has been in place since 2008 and is due to run until the end of 2014. It was also noted that the "feasibility study may be terminated before the end of 2014 should the data allow for sufficiently precise estimation of variance parameters to allow the power of a possible subsequent closure experiment to be reasonably estimated before then". An analysis has been presented which claims that such a stage has been reached. However, this analysis does not utilise all the available data. Critically, local fish survey abundance indices are not included which represents a significant shortcoming.

Certain studies on these local abundance data first need to be undertaken, as proposed in FISHERIES/2014/APR/SWG-PEL/ICTT/16, pgs 5-6, to evaluate whether this would actually have any utility.

Fundamentally, penguins will respond to fish abundance within their daily foraging range, but they may or may not respond to fishing activity within that range, depending on whether fishing reduces the density of fish below that required by birds to meet their energy requirements. It has become clear that some index of fish abundance around islands is needed (i.e. at finer spatial and temporal scales than the annual spawner and recruit biomass surveys). Therefore it was decided to initiate a programme of island-scale acoustic surveys, which began in 2010. At that point both Robben and Dassen islands were open to fishing. Dassen Island was closed in 2008 and 2009 but has been open

to fishing in the four years since then. Hence, there are no island-scale acoustic surveys from around this island while it has been closed.

This need is certainly clear in principle, but the analyses referenced in the response above are first needed to ascertain utility in practice.

When the study began, Dassen and Robben islands were paired as controls. It has not been convincingly shown that they are valid controls of one another, and in many analyses the two islands are now being treated separately. The absence of island-scale fish abundance data for Dassen Island in the absence of fishing is a significant gap in the available data for this island.

The reference to "controls" is inappropriate and reflects a misunderstanding of the analysis approach being used. Separate treatment of the islands requires an index of abundance for each island. There are three possibilities sources:

a) *The relevant stratum estimates from the bi-annual pelagic surveys (already considered in Robinson's thesis).*
b) *Small scale surveys around the islands (see responses above).*
c) *The use of catch as an index of abundance (this approach is completely flawed).*

These responses are elaborated in FISHERIES/2014/APR/SWG-PEL/ICTT/24 and 25.

The analyses in Robinson (2013) suggest that fishing has a positive effect on penguin breeding demographics. However, a significant correlation does not automatically imply cause and effect, and we demur with this interpretation. An entirely plausible (and we believe more likely) alternative explanation for this is that high fish abundance favours both penguins and fishing because there is likely a high degree of correlation between fish abundance in an area and fishing effort (or catch data). Robinson (2013) included a "year effect" in the GLMs (equations 3.1-3.4) to account for this correlation and suggested an explanation for the beneficial effect of fishing. However, the inclusion of the year effect only addresses problems that arise if the biomass and its effects on penguins varies from year to year, not if biomass differs between islands. Indeed the use of the year effect assumes that fish abundance is similar at both islands. The island-scale acoustic surveys have shown that this is not a valid assumption. For surveys done in the same month at both islands, biomass can differ by an order of magnitude (Merkle et al. 2011, 2012). This suggests that by not using the island-scale abundance data a significant portion of the variability in the system has not been accounted for. We conclude that the interpretation that fishing is beneficial or not harmful to penguins, is premature.

Unfortunately the comments above serve only to indicate that the authors of ICTT/22 have failed to understand the method being applied, which does not make the assumptions attributed to it above (see FISHERIES/2014/APR/SWG-PEL/ICTT/24, pg 2 and the ***Note*** *in FISHERIES/2014/APR/SWG-PEL/ICTT/25).*

All three variables – fish catch, local fish abundance and penguin foraging – should be combined to achieve maximum power when assessing possible impacts of fishing on penguins. To achieve that it is critical that there is at least one year of data with monthly penguin tracking and monthly, island-scale acoustic surveys but without fishing at Dassen Island, with three years being preferable. This will provide some contrast in an analysis using holistic datasets in which islands are not treated as

true controls of one another. While one year is not long enough to show any trends in breeding success parameters, penguin foraging parameters respond very quickly to food availability and these parameters are most likely to show sensitivity to abundance and fishing.

Ideally this study should include closely coordinated activities that pair regular island-scale acoustic surveys with penguin tracking effort. While it may be difficult to achieve perfect overlap at scales less than monthly surveys, every effort should be made to align these activities.

While this sounds attractive, in fact it provides little of the detail required to assess whether it is achievable, and again makes the mistake of referring to "controls". That detail (which must be mathematically expressed) is required to be able to evaluate the prospects of success in relation to the resources required to collect the data and analyse the results. In particular, in further developing such a proposal, the comments in the concluding paragraph of the ***Note*** *in FISHERIES/2014/APR/SWG-PEL/ICTT/25 need to be addressed. Regarding the comment about three years being the preferable closure period, once again it is notable that no cogent rationale is given (i.e. what mechanism is hypothesised to lead to autocorrelation at an inter-year time scale?). Repeated requests have been made for this rationale to be specified in the mathematical form necessary for clarity and lack of ambiguity – yet another failure to provide this leads inevitably to doubt whether this rationale yet exists.*

There are additional points of uncertainty that need to be considered in making a decision on whether to continue with the island closures.

1. The analyses in Robinson (2013) incorporate data only up until 2012 (in some cases earlier than that). While this was appropriate for completing a PhD, management decisions should be taken on the most up-to-date information available.

   The results in FISHERIES/2014/APR/SWG-PEL/ICTT/5 show that it is scarcely likely that a further one of two years data will change the core results of Robinson (2013) from which the recommendations in FISHERIES/2014/APR/SWG-PEL/ICTT/16 follow, so that the rationale offered here lacks validity.

2. Robinson (2013) suggests that fishing is beneficial to penguins and suggests a mechanism for this: that fishing breaks up shoals of fish, making it easier for the penguins to catch them. Crawford et al. (2014) has provided a plausible biological explanation for why this is not the case and why purse-seine fishing is likely to be detrimental to penguins.

   It needs to be noted that (with one exception related to an analysis for St Croix in Pichegru et al. 2014) the evidence/arguments/conclusions provided in Crawford et al. (2014) have been shown to be universally flawed (FISHERIES/2014/APR/SWG-PEL/ICTT/24).

3. There are several analyses that contradict the view that fishing is beneficial to penguins (Weller et al. 2014, Pichegru et al. 2014). These analyses need to be carefully considered when a decision is made.

   The response immediately above again applies.

A combined data analysis workshop is suggested so that the conflicting data analysis methods and assumptions (point 3 above) can be discussed in an open and transparent manner, with all parties

accepting the process. It is suggested that this would follow a similar format to international workshops where data are provided only for the analyses at the workshop (not on a permanent basis).

The spirit of this suggestion is appreciated, and in due course some such further discussions may be warranted and beneficial, but it needs to be noted that:

a) *There is no point in wasting more time in discussing some current approaches already comprehensively demonstrated to be flawed (see FISHERIES/2014/APR/SWG-PEL/ICTT/24 and 25). At the very least, substantial time would be needed to effect the necessary adjustments to correct those amongst those methods which were open to salvage.*
b) *All parties did not question the current process with its agreed method of analysis for seven years, until some seemingly changed their minds at the "last minute" on the basis of flawed arguments, as detailed in FISHERIES/2014/APR/SWG-PEL/ICTT/26 – very firm assurances will have to be given by these parties that this will not happen again before such a process can be considered.*
c) *A single workshop would be insufficient – it would be quite impossible to develop and carry out detailed analyses needed in the limited associate time – the first of this set would need to plan and agree exactly what analyses were to be pursued.*
d) *Given c), the idea of data being available only for the workshop is untenable. But in any case, since in terms of international commitments the ultimate scientific recommendations for management from DAFF SWGs have to be arrived at by an open and transparent process, with analyses accordingly subject to confirmation or rebuttal by anyone, ANY data to be considered must then become openly available to all (subject only to reasonable protection to data collectors of first publication rights in terms of international norms – which currently typically allow a few months)..*

References

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