A Note on the Penguin Feasibility Study and "Alternation"

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The objective of the penguin feasibility study is "to assist the design of an experiment which could have the potential to achieve adequate power within a realistic time period to confirm the effects of closure [to pelagic fishing in areas near to colonies] on African penguins". However some of the documents circulated in regard to aspects of the design of a continuation of the existing feasibility study to be discussed at an ICCT meeting on 22nd November appear to show some misunderstanding as to the objectives of the feasibility study, and in particular to confuse it with the potential experiment itself. It therefore seems important to re-iterate the rationale that has led to the existing feasibility study, so that the basis for discussions on the 22nd is clear.

Rationale

It is not clear whether or in particular to what extent suspension of pelagic fishing in the neighbourhood of breeding colonies of penguins might impact penguin dynamics. It has been proposed that an experimental programme of closures might allow this extent to be estimated reliably.

- An experimental programme requires specification of what data are to be collected and how they are to be quantitatively analysed to estimate the impact of fishing close to islands on penguin dynamics.

- Since closures around islands are economically disadvantageous to industry, there is an obligation before any experimental programme of closures is put into effect, to demonstrate that it has a reasonable chance of providing an answer to the question posed within a reasonable time frame. In particular, one must avoid the sequence of putting certain closures in place for, say, 10 years and at the end of that period report that the question has not been answered ***and that one could in any case have determined that before the programme started***.

- Three years ago it was decided by the PWG (for this reason, but in any case as sound scientific practice) that any possible experimental programme would be preceded by evaluation of experimental power.

- Evaluation of experimental power is not possible without appropriate knowledge of certain of the statistical properties of the quantities being monitored, in particular aspects of their variance. Though there was some information on this for certain of the penguin demographic quantities proposed to be monitored in an experiment, there certainly was none for some promising new monitoring techniques which were at that time proposed for immediate development.

- Accordingly it was decided three years ago by the PWG that any potential experimental programme of closures would be preceded by a feasibility study to allow experimental power to be estimated for the demographic quantities proposed to be monitored during such an experiment.

- Initially a two-year period was intended for that feasibility study. However inadequate progress with that study has thus far been made to allow experimental power to be estimated for all the quantities proposed to be monitored, so that a proposal for an extension of up to three years has been tabled.

I understand that this proposal has in essence been accepted by the ICTT for submission to the PWG. What remains is to finalise certain aspects of that proposal, in particular whether the same islands of the two pairs around which fishing was suspended in the study to date should remain those that are closed for the remainder of the study, or some form of alternation within each pair should take place.

At the last meeting of the ICTT, it was agreed that any proposal in relation to such alternation or otherwise should be set out in terms of what data were to be collected, how they were to be quantitatively analysed, and how the associated experimental power might be estimated (i.e. in line with the underlying historical rationale for the feasibility study as set out above).

Some Comments on Documents Submitted

Confusion between the Feasibility Study and the Potential Future Experiment

Document ICTT/22 appears to demonstrate such confusion, as its opening statement mis-defines the feasibility study as the experiment itself, and much of its rationale speaks to the latter instead of the former.

A Requirement for Controls?

Both documents ICTT/23 and 24 appear to consider that "controls" are necessary for any feasibility study/experiment, and that this requires maintaining one island of each pair closed (continuously?). This is not the case. The methodology of ICTT/19 does not require "controls" in this sense to estimate the quantities at issue. An absence of alternation (with the associated decrease in the extent of data contrast) would probably decrease the reliability of the requisite variance estimates obtained from the feasibility study, and would certainly unnecessarily increase the time required for an experiment following the feasibility study to yield results at an appropriate level of precision.

Impact on juveniles' decisions on where to breed

Speculative comments are offered on this point in ICTT/23, 24 and 26 without any data-based confirmation. Certainly any such impact cannot be considerable, otherwise there would have been a virtual absence of juvenile recruitment to colonies near to which fishing has taken place in the past, which clearly has not been the case. The hypothesized effect would seem to potentially influence only emigration (which would contribute to immigration to another colony), and not measures of reproductive success at the island itself which are the primary quantities proposed to be monitored.

Estimation of variances

ICTT/26 criticises ICTT/20 and the papers it references for concentrating on variances. But it is those very variances whose estimation is ***the*** primary purpose of the feasibility study, for the reasons given above.

Joint rather than isolated analyses of responses

ICTT/26 proposes joint analyses of responses using a "penguin pressure model". It is impossible to evaluate the merit or otherwise of such a proposal without that model being tabled (in line with the requirements above), and at the very least reliance on such an approach would seem premature when

that model is not yet at the stage of development where it can be documented and tabled for its details to be evaluated (T. Stewart, pers. commn). Furthermore it may be that the claims made for such an approach in ICTT/26 an unrealistically optimistic, given that no similar approaches have been successfully developed elsewhere in the world.

Indeed reliance on statistical linkages between potential causative factor and effect of interest has been the norm in the field for over two decades, as the problems of the alternative "mechanistic" approach (apparently advocated by ICTT/26) were realized over two decades ago. These are that even if some (perhaps many) of the constituent mechanisms can be determined and their parameters be estimated, there are always some others for which this is not possibble, and further that accumulation of variance contributions for each component leads to results of high imprecision and hence hardly any reliability. In other words, the problems of the "experimental" approach to which ICTT/26 alludes are not avoided, but rather are generally exacerbated, for the approach seemingly advocated. In any case, even if this "penguin pressure model" ***can*** deliver what ICTT/26 seems to claim, the requirements set out in the bullets above (in terms of which the meeting on the 22nd must make its decisions) cannot be realized for a model whose details have yet to be developed.

ICTT/26 does correctly infer that the results of the existing power analyses in ICTT/21 are not promising. However the purpose of the feasibility study is to ascertain whether those results might improve given both the availability of new monitoring indices, and planned small scale acoustic surveys around some penguin colonies on multiple occasions during the year.