

# A Note on the Penguin Feasibility Study

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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”.

## 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 three years has been tabled.

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.

While the need for some form of alternation over the longer term in an experiment is not in question, there is debate over whether alternation (to enhance data contrast for improved estimation performance) should take place at the shortest possible time scale (i.e. annually), or at some longer frequency. The debate hinges on whether the major influence of closure on the penguins and their dynamics is more likely to occur at a shorter or longer time-scale.

### **Monitoring indices available**

The following indices are or will become available, though not for all four colonies under consideration in every case:

1. Pelagic fish - monthly acoustic surveys of pelagic fish abundance around some islands using the RV Echo (in addition to abundance estimate per large scale strata from the two annual small pelagic-resource-wide surveys)
2. Small pelagic fishery – catch locations, effort data
3. Penguin demographics – records of the following:
  - i. Counts of penguins breeding
  - ii. Counts of penguins moulting
  - iii. Counts of the proportion of occupied nests
  - iv. Fledgling success
  - v. Final fledgling mass (condition)
  - vi. Foraging data (area, trip distance and duration)
  - vii. Estimates of adult mortality from tag-recapture analysis.