Overview of Penguin Documents

D S Butterworth

A short summary of each of the Penguin documents for the November-December 2016 MARAM International Stock Assessment Workshop is provided below.

Background Documents:

BG1: Butterworth DS. 2016. This document.

BG2: Butterworth DS and Bergh M. 2016. Response to the review panel report for the 2015 International Fisheries Stock Assessment Workshop: Penguins.

- Lists the recommendations from the 2015 Panel that relate to penguins, together with responses on progress made.

Penguins Island Closure:

Note: Documents P1 – P4 are appendices to a report by a Penguin Island Closure Task Team for which the cover summary is in preparation and will be added later

Primary Documents:

P1a: Ross-Gillespie A and Butterworth DS. 2016. Penguin power analyses using the approach recommended by the international panel: methods and the complete set of results.

- Application of the method put forward in 2015 Panel recommendation A.2 to compute future detection probabilities for four response variables.

P1b: addendum to **P1a.**

- Contains further detailed plots of intermediate output from the power analysis computations.

P2: Sherley RB. 2016. A Bayesian approach to understand the effect sizes, uncertainty and demographic impact associated with purse-seine fishing closures around African penguin colonies. RESTRICTED (R.Sherley@exeter.ac.uk)

- Contains application of a Bayesian estimator to individual chick condition data in relation to 2015 Panel recommendation A.5, together with some related analyses.

P3: Butterworth DS. 2016. On the use of aggregated vs individual data in assessment models.

- A discussion of the comparative merits of use of aggregated vs individual data in assessment models, with emphasis on variance estimation given non-independence of individual data.

P4: Sherley R. 2016. Additional analysis suggested in response to differences in variance estimates between Sherley (2016) and Ross-Gillespie & Butterworth (2016).

- Comparison of different methods of variance estimation for the case of chick condition data, both to follow up on points made in **P3** and to provide comparative estimates of variance for different approaches to allow a test (currently in computation) of the consequence for power analysis results.

P5: Morris T and Hagen C. 2016. Multifaceted approach to research and conservation of the African Penguin in South Africa.

- A summary of penguin research in progress in South Africa in response the 2015 Panel recommendation A.1.

Background Documents:

BG1: Penguin Island Closure Task Team. 2015. Consolidated analyses produced in implementation of the approaches described in document MARAM/IWS/DEC15/PengD/P2.

- Duplicated from 2015 for reader convenience given a key reference to this made in **P3** above.

Penguins Pressure Model:

Primary Documents:

P1: Butterworth, D.S. 2016. Questions arising from Weller *et al.* articles.

- A critique of various aspects of the "penguin pressure model" set out in a form that leads to questions to the authors of the Weller *et al.* articles.

P2: Weller F, Sherley RB, Altwegg R, Jarre A and Shannon LJ. 2016. Additional perspectives for the Stock Assessment Review Panel on penguin population modelling for decision making.

- A response to **P1**.

Background Documents:

BG1: Weller, F., Cecchini, L., Shannon, L., Sherley, R.B., Crawford, R.J.M., Altwegg, R., Scott, L., Stewart, T. and Jarre, A. 2014. A system dynamics approach to modelling multiple drivers of the African penguin population on Robben Island, South Africa. *Ecosystem Modelling*, 277: 38 – 56.

- The original "penguin pressure model" publication.

BG2: Butterworth, D.S., Plagányi, É.E., Robinson, W.M.L., Moosa, N. and de Moor, C.L. 2015. Penguin modelling approach queried. *Ecological Modelling*, 316: 78-80.

- A rebuttal to **BG1**.

BG3: Weller, F., Sherley, R.B., Shannon, L.J., Jarre, A., Stewart, T., Scott, L., Altwegg, R., Cecchini, L., Crawford, R.J.M., Geldenhuys, D., Ludynia, K. and Waller, L.J. 2016. Penguins' perilous conservation status calls for complementary approach based on sound ecological principles: reply to Butterworth *et al.* (2015). *Ecological Modelling*, 337: 1 -3.

- A response to the rebuttal in **BG2**.

BG4a: Weller, F., Sherley, R.B., Waller, L.J., Ludynia, K., Geldenhuys, D., Shannon, L.J. and Jarre, A. 2016. System dynamics modelling of the *Endangered* African penguin populations on Dyer and Robben islands, South Africa. *Ecosystem Modelling*, 327: 44 – 56.

- An extension of the original penguin pressure model of **BG1**.

BG4b: TRACE document – supplement to **BG4a.**

- Further details of results reported in **BG4a**.

BG5: Robinson, W., Butterworth, D.S. and Plagányi, É.E. 2015. Quantifying the projected impact of the South African sardine fishery on the Robben Island penguin colony. *ICES Journal of Marine Science*, 72(6): 1822-1833.

- An assessment model for Robben island penguins fitted to abundance and tag-recapture data, and used to estimate a relationship between penguin demographic parameters and sardine abundance.

BG6: Sherley, R.B., Abadi, F., Ludynia, K., Barham, B.J., Clark, A.E. and Altwegg, R. 2014. Age-specific survival and movement among major African Penguin *Spheniscus demersus* colonies. *International Journal of Avian Science*, 156(4): 716 – 728.

- Listed here as quoted in documents above as a reference to estimates of penguin survival rates from tag-recapture data.

BG7: Sherley, R.B., Winker, H., Altwegg, R., van der Lingen, C.D., Votier, S.C. and Crawford, R.J.M. 2015. Bottom-up effects of a no-take zone on endangered penguin demographics. Biology Letters, 11(7): 20150237.

- Listed here as both quoted and critiqued in documents listed above.

BG8: Robinson. W.M.L. 2013. Modelling the impact of the South African small pelagic fishery on African penguin dynamics. PhD thesis. xiv + 207 pp.

` - A detailed account of the basis for the results reported in **BG5** above.