Documents for the MARAM/DAFF International Fisheries Stock Assessment Review Workshop, 2016

Note:

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General:

General 1: Announcement. 1pp.

General 2: Schedule. 1pp.

General 3: Document list. 7pp.

General 4: 2015 Panel Report. 24pp. (MARAM/IWS/DEC15/General_8)

General 5: Key questions for the Panel to address. 2pp

General 6: Presentation of the Panel Report. 25pp.

General 7: Final IWS Panel Report. 17pp.

General 8a: Lyrics of the Workshop song. 2pp

General 8b: Link to the video recording of the Workshop song

https://www.dropbox.com/s/ a7v7to1ks82mwq2/videocompress- 026-20161202_143949.mp4?dl=0

References in Panel Report:

Ref 1: Boresma, P.D. and G.A. Rebstock. 2009. Foraging distance affects reproductive success in Magellanic penguins. *Marine Ecology Progress Series*, 375: 263-275. PUBLICATION

Ref 2: Hennicke, J.C. and B.M. Culik. 2005. Foraging performance and reproductive success of Humboldt penguins in relation to prey availability. *Marine Ecology Progress Series*, 296: 173-181. PUBLICATION

Ref 3: Horswill, C., Matthiopoulos, J., Green, J.A., Meredith, M.P., Forcada, J., Peat, H., Preston, M., Tranthan, P.N. and N.T. Ratcliffee. 2014. Survival in macaroni penguins and the relative importance of different drivers: individual traits, predation pressure and environmental variability. *Journal of Animal Ecology*, 83: 1057-1067. PUBLICATION

Ref 4: McClung, M.R., Seddon, P.J., Massaro, M. and A.N. Setiawan. 2004. Nature-based tourism impacts on yellow-eyed penguins *Megadyptes antipodes*: does unregulated visitor access affect fledging weight and juvenile survival? *Biological Conservation*, 119: 279-285. PUBLICATION

Ref 5: Parada, C., Mullon, C., Roy, C., Fréon, P., Hutchings, L. and C.D. van der Lingen. 2008. Does vertical migratory behaviour retain fish larvae onshore in upwelling ecosystems? A modelling study of anchovy in the southern Benguela. *African Journal of Marine Science*, 30: 437-452. PUBLICATION

Ref 6: Rademeyer, R.A. 2013. An initial attempt at a spatially structured stock assessment for the South African hake resource including explicit movement. Paper MARAM/IWS/DEC13/Hake/P9.

Ref 7: Rademeyer, R.A. 2014. An initial attempt at a spatially structured stock assessment for the South African hake resource including movement based on a gravity model. Paper MARAM/IWS/DEC14/Hake/P5.

Ref 8: Robinson, W.M.L., Butterworth, D.S. and É.E. Plagányi. 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. PUBLICATION

Hake

Background Documents:

BG1: Butterworth DS. 2016. Overview of Hake Documents. 2pp.

BG2: Ross-Gillespie A. 2016. Response to the review panel report for the 2015 International Fisheries Stock Assessment Workshop: Hake. 2pp.

Hake Assessment:

Primary Documents:

P1: Rademeyer R and Butterworth DS. 2016. Reference Set results and projections under the current OMP for the South African hake resource. 26pp.

P2: Rademeyer R and Butterworth DS. 2016. Further projections under the Reference Set for the South African hake resource. 8pp.

Background Documents:

BG1: Rademeyer R and Butterworth DS. 2014. Final CMP Projections for the South African hake resource. 18pp.

Working Papers:

WP1: Rademeyer R. 2016. Hake – Working Paper 1. 2pp.

WP2: Rademeyer R. 2016. Hake – Working Paper 2. 2pp.

WP3: Rademeyer R. 2016. Hake – Working Paper 3. 1pp.

Hake Modelling Predation:

Primary Documents:

P1: OLRAC SPS. 2016. Method used to include cannibalism and inter-species predation in the species, sex, age and size disaggregated hake stock assessment model. 12pp.

P2: Ross-Gillespie A and Butterworth DS. 2016. Hake cannibalism and inter-species predation model: A summary of the PhD thesis and the development of the model since IWS 2015. 26pp.

P3: Fourie A, Ross-Gillespie A, Bergh M and Butterworth DS. 2016. A comparison between the hake cannibalism and inter-species predation models in Bergh *et al.* (2016) and Ross-Gillespie (2016). 18pp.

P4: Ross-Gillespie A and Butterworth DS. 2016. The hake predation model: future developments and research. 2pp.

P5: OLRAC SPS. 2016. The Bergh *et al.* (2016) hake cannibalism and inter-species predation model with the predator/prey preference, the daily ration of hake predators and the diet of the predators from the Ross-Gillespie (2016) model. 8pp.

Background Documents:

BG1: Ross-Gillespie A. 2016. Modelling cannibalism and inter-species predation for Cape hake species *Merluccius capensis* and *M. paradoxus.* PhD thesis. 195pp.

Working Papers:

WP1: OLRAC SPS. 2016. Cannibalism methods simplified. 4pp.

WP2: Ross-Gillespie, A. 2016. Implications of how the competition term is implemented in MARAM/IWS/DEC16/Hake Pred/P2: 2pp.

Hake GeoPop:

Primary Documents:

P1: Jansen, T., Kristensen, K., Kainge, P., Durholtz, D., Strømme, T., Thygesen, U.H., Wilhelm, M.R., Kathena, J., Fairweather, T.P., Paulus, S. and Degel, H. 2016. Migration, distribution and population (stock) structure of shallow-water hake (*Merluccius capensis*) in the Benguela Current Large Marine Ecosystem inferred using a geostatistical population model. *Fisheries Research*, 179: 156-167. PUBLICATION

P2: Jansen T and Thygesen U. 2016. Geostatistical modelling of the spatial life history of post-larval deep-water hake (*Merluccius paradoxus*) in the Benguela Current Large Marine Ecosystem. 34pp.

Slides and Presentations:

1: Jansen, T and others. 2016. Inferring migration and population structure from Geo-statistical population modelling of *M. capensis* and *M. paradoxus*. 8pp.

Sardine:

Primary Documents:

P1: de Moor CL, Butterworth DS and van der Lingen CD. The Quantitative Use of Parasite Data in Multi-Stock Modelling of South African Sardine (*Sardinops sagax*). 50pp.

P2: de Moor CL and Butterworth DS. 2016. Assessment of the South African sardine resource using data from 1984-2015: Results at the joint posterior mode for the two mixing-stock hypothesis. 44pp.

P3: Coetzee JC. 2016. Estimation of the effective proportion of sardine biomass contributing to putative western stock recruitment by including the proportion of eggs transported to the West Coast nursery area from South Coast spawning areas. 10pp.

P4: de Moor CL. 2016. An alternative two mixing stock hypothesis for South African sardine. 6pp.

P5: de Moor CL. 2016. The two mixing stock hypothesis for South African sardine without an assumed stock-recruit relationship. 8pp.

P6: Butterworth DS. 2016. A Draft Framework for Assigning Probabilities to Alternative Assumptions concerning the Contribution of Sardine Spawning Biomass on the South Coast to Recruitment on the West Coast. 12pp.

P7: Butterworth DS, van der Lingen CD, Coetzee J and de Moor C. 2016. The present agreed hypothesis for South African sardine stock structure. 4pp.

P8: van der Lingen CD, Coetzee JC and McGrath A. 2016. Data for informing the choice of a prior for the contribution of South Coast spawner biomass to West Coast recruitment. 6pp.

P9: Butterworth DS. 2016. An assignment of probabilities to alternative assumptions concerning the contribution of sardine spawner biomass on the South Coast to recruitment on the West Coast. 10pp.

P10: OLRAC SPS. 2016. A statistical basis for estimating the proportion of South Coast spawning biomass that contributes to West Coast recruitment and of West Coast spawning biomass that contributes to South Coast recruitment. 6pp.

P11: de Moor CL. 2016. An alternative method to estimate the contribution of south coast spawning to west coast sardine recruitment. 6pp.

P12: de Moor CL, Butterworth DS and Coetzee JC. Alternative hypotheses of west to south movement considered for South African sardine. 8pp.

P13: Vrancken C and Butterworth DS. 2016. Some insights into sustainable yield rates. 10pp.

P14: de Moor CL. 2016. Draft simulation testing framework to be used during the development of OMP-17. 26pp.

P15: de Moor CL. 2016. Initial simulation projection results assuming a no-catch scenario. 6pp.

P16: OLRAC SPS. 2016. Comments on a recent stock hypothesis about the spatial structure of the sardine stock. 2pp.

Background Documents:

BG1: de Moor CL and Butterworth DS. 2016. Overview of Sardine Documents. 4pp.

BG2: de Moor CL and Butterworth DS. 2016. Response to the review panel report for the 2015 International Fisheries Stock Assessment Workshop: Sardine. 5pp.

BG3: de Moor CL and Butterworth DS. 2015. Assessing the South African sardine resource: two stocks rather than one? 12pp. PUBLICATION

BG4: de Moor CL, Coetzee J, van der Westhuizen JJ and van der Lingen C. 2016. A record of the generation of data used in the 2016 sardine and anchovy assessments. 24pp.

BG5: van der Lingen CD. 2016. A description of parasite data (2010-2015). 6pp.

BG6: de Moor CL and Butterworth DS. 2016. Assessment of the South African sardine resource using data from 1984-2015: Results at the joint posterior mode for the single stock hypothesis. 24pp.

BG7: de Moor CL. 2016. Assessment of the South African anchovy resource using data from 1984-2015: results at the posterior mode. 42pp.

BG8: de Moor CL. 2016. Excluding survey estimates of recruitment on the South Coast from the two mixing stock hypothesis for South African sardine. 8pp.

BG9: de Moor CL. 2016. Testing robustness of the two mixing stock hypothesis for South African sardine to parasite prevalence data between 20 and 22 degrees. 10pp.

BG10: de Moor CL and Butterworth DS. 2016. OMP-14. 28pp.

BG11: SADSTIA. 2016. Comments on the socio-economic implications of spatial management and the development of OMP-17 in the Small Pelagics fishery. 6pp

Slides and Presentations:

1: van der Lingen CD. 2016. The biological basis for hypothesizing multiple stocks in South African sardine *Sardinops sagax* (cont...). 28pp.

2: de Moor CL. 2016. Introduction to South African sardine: Assessment and Management. 31pp.

3: SAPFIA. 2016. Socio-economic implications of spatial management and the development of OMP-17 in the Small Pelagic fishery. 8pp.

4: Teske P, van der Lingen C, Golla T, Sandoval-Castillo J and Beheregaray L. 2016. A genomic appraisal of the stock structure of South African sardines. 10pp.

Working Papers:

WP1: van der Lingen CD, McGrath A and Coetzee J. 2016. Sources of uncertainty in IBM modelling of sardine off South Africa. 8pp

Penguins

Background Documents:

BG1: Butterworth DS. 2016. Overview of Penguins Documents. 4pp.

BG2: Butterworth DS and Bergh M. 2016. Response to the review panel report for the 2015 International Fisheries Stock Assessment Workshop: Penguins. 8pp.

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. 30pp

P1b: addendum to **P1a.** 8pp

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. 28pp. RESTRICTED (R.Sherley@exeter.ac.uk)

P3: Butterworth DS. 2016. On the use of aggregated vs individual data in assessment models. 6pp.

P4: Sherley R. 2016. Additional analysis suggested in response to differences in variance estimates between Sherley (2016) and Ross-Gillespie & Butterworth (2016). 4pp.

P5: Morris T and Hagen C. 2016. Multifaceted approach to research and conservation of the African Penguin in South Africa. 6pp.

P6: Cochrane, K. 2016. Chair's Introduction to documents from the technical team on the penguin island closure experiment. 4pp.

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. 40pp.

Working Papers:

WP1: Ross-Gillespie A and Butterworth DS. 2016. Penguin power analysis run with the SE values from MARAM/IWS/DEC16/Peng Clos/P4. 1pp.

WP2: Ross-Gillespie A and Butterworth DS. 2016. Details of the jack-knife approach implemented for the results presented in Table 1 of MARAM/IWS/DEC16/Peng Clos/P3. 2pp.

WP3: Sherley R. 2016. Additional model runs requested by the panel after MARAM/IWS/DEC16/Peng Clos/P4. 1pp.

WP4: Sherley R. 2016. Updated diagnostics plots for JAGS models on chick condition. 3pp.

Penguins Pressure Model:

Primary Documents:

P1: Butterworth, D.S. 2016. Questions arising from Weller *et al.* articles. 10pp.

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. 6pp

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. 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. PUBLICATION

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. PUBLICATION

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. PUBLICATION

BG4b: TRACE document – supplement to **BG4a.** 70pp

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. PUBLICATION

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. PUBLICATION

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. PUBLICATION

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

Fisheries Certification Discussion

1: Notice of Fisheries Certification Discussion. 1pp.

2: Butterworth DS. 2016. Ecolabelling Background. 11pp

3: Lallemand P. 2016. Socio-Economic Implications of MSC Certification for the South African Hake Trawl Fishery. 24pp.

4: Duncan J. 2016. The MSC and Small-Scale Fisheries. 6pp.

5: Marriott M. 2016. MSC perspectives. 8pp.

6: Link to Fisheries Certification discussion video:

https://media.uct.ac.za/engage/theodul/ui/core.html?id=f077afc6-5ef0-4cbf-962b-2f80bbd73cf6