Some initial ideas for data required before the next assessments for sardine and anchovy

C.L. de Moor[*] and J. Coetzee[#]

Correspondence email: *carryn.demoor@uct.ac.za*

Introduction

This document lists the standard data required prior to the commencement of the next assessments of South African anchovy and sardine, as well as some ideas for changes to the use of these data and the inclusion of some potential new data. This is to help prioritisation of any data analyses required this year. Furthermore, the current two-stock hypothesis (and in particular mixing) needs to be re-investigated. What further data are available to improve the two-stock model and current assumptions?

Anchovy commercial catch data

1) Monthly commercial length frequencies from November 1983 to October 2014.

   - Previously split into ages 0 and 1 by monthly varying cut-off lengths informed by the May recruit survey cut-off lengths. Catches summed by year and assumed known without error.

   - Possibly fit the model directly to the proportion-at-length data? Would require selectivity-at-length to be estimated within the model and an estimation of length-at-age (e.g. error about a von Bertalanffy growth curve, informed by ageing data from Kerstan for Novembers 1990, 1992-1995).

2) Juvenile catch prior to the survey from November-May/June 1985-2014.

   - Previously calculated using monthly varying cut-off lengths as above.

   - If the model is fit to proportion-at-length data, do we still use cut-off lengths to determine this?

Data analysis required (Carryn): Split into age classes (repeat of previous method) or modify model to fit to length data (new work). About 1 week or 1 month.

Sardine commercial catch data

3) Monthly commercial length frequencies from November 1983 to October 2014.

   - Previously split into bycatch with anchovy, bycatch with round herring and directed catch.

Data analysis required (Jan/Carryn): How do we split catches given "old" and "new" classifications? About 1 week.

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[*] MARAM (Marine Resource Assessment and Management Group), Department of Mathematics and Applied Mathematics, University of Cape Town, Rondebosch, 7701, South Africa.
[#] Department of Agriculture, Forestry and Fisheries – Branch Fisheries, Private Bag X2, Rogge Bay, 8012, South Africa.

- Previously split the bycatch with anchovy into ages 0 and 1 using monthly varying cut-off lengths informed by the May recruit survey cut-off lengths. Bycatch assumed without error. Can we do any better? Probably not as fishing mortality is driven by the anchovy fishery, abundance and mixing with sardine.

Data analysis required (Carryn): Split into age classes (repeat of previous method). About 1 week.

- Maintain same method as before: Fit the model directly to proportion-at-length data for combined directed catch and bycatch with round herring. Estimate selectivity-at-length and length-at-age.

4) Juvenile catch prior to the survey from May 1985-2014.
    - Maintain same method as before: estimate juvenile catch from 1 May using the same cut-off length as that used in the recruit survey.

Data analysis required (Carryn): Split catch prior to the survey into 0 and 1+ (repeat of previous method). About 1 week.

Anchovy survey data

5) November biomass from egg production estimates from November 1984 to 1991
    - Maintain same assumption that this is an estimate of absolute spawner biomass.

6) November hydro-acoustic survey estimate of biomass from November 1984 to 2014
    - Maintain same assumption that this is an estimate of 1+ biomass

7) May hydro-acoustic survey estimate of recruitment from May 1985 to 2014
    - Maintain same assumptions and methods to estimate cut-off lengths

Data analysis required (Janet): Janet can provide without delay.

8) Proportion-at-age 1 in the hydro-acoustic survey from November 1984 to 1991
    - Previously estimated by fitting a model of estimated distributions of lengths-at-ages 1 and 2+ (de Moor et al. 2013).
    - Either extend the same analysis or fit the model directly to length frequencies and estimate / assume a fixed survey selectivity-at-length. Note this links with above decision whether to fit to commercial catch-at-length data.

Data analysis required (Carryn/Janet/Doug): Estimate proportion-at-age 1 with CVs (extension of previous method) or modify model to fit directly to length data (new work). About 1 month for either option.

9) Weights-at-age for Novembers 1984 to 2014.
    - Previously we used an annually varying weight-at-age 1+ from the survey together with time-invariant ratios of weights-at-ages 2 to 5+ to weight-at-age 1.
    - If the model is modified to fit directly to length data, should we rather work with weight-at-length?

Data analysis required (Carryn/Janet): How do we move from the average length-at-weight relationship to a time-varying relationship, taking into account the average weights from the surveys – Janet can modify acoustic database to provide (1 week) once Carryn has assisted with specification.

Sardine survey data

10) November hydro-acoustic survey estimate of biomass from November 1984 to 2014

- Previously assumed to represent the 1+ biomass. The main problem with this assumption is that sardine recruitment occurs over a long period, possibly even during winter, and thus the estimated biomass includes some recruits (see de Moor et al. 2012 for further discussion).

Data analysis required (Janet/Dagmar/Carryn/Doug): Either develop two time series of relative age 0 and 1+ biomass with associated proportions-at-length. Proposal includes using a method similar to that used for anchovy by de Moor et al. 2013. Should this be done separately for the west and south coasts? Or modify model to estimate multiple cohorts of recruits and include winter spawned recruits in the model predicted biomass and proportions-at-length fit to the November survey data. About 3-4 months. de Moor et al (2014) recommended as a first step that a quantitative analysis of the November survey length frequencies be undertaken to determine if the contribution of recruits to the survey differs by stratum. Janet and Dagmar can do first step preliminary investigation - About 2 weeks

- Previously assumed west/south stock biomass are reasonably represented by the survey strata west/east of Cape Agulhas. Maintain same assumption (Coetzee and Merkle 2012).

11) May hydro-acoustic survey estimate of recruitment from May 1985 to 2014

- Maintain same assumptions and methods to estimate cut-off lengths

Data analysis required (Janet): Can be provided without delay

- Previously assumed west/south stock recruitment is reasonably represented by the survey strata west/east of Cape Infanta. Maintain same strata

12) Proportion-at-length in the hydro-acoustic survey from November 1984 to 1991

- Maintain same method as before: Fit the model directly to proportion-at-length data. Estimate / assume fixed selectivity-at-length.
- Janet can provide without delay

13) Weights-at-age for Novembers 1984 to 2014.

- Previously we used an annually varying weight-at-age 1+ from the survey together with time-invariant ratios of weights-at-ages 2 to 5+ to weight-at-age 1.
- If the model is modified to fit directly to length data, should we rather work with weight-at-length?

Data analysis required (Carryn/Janet): How do we move from the average length-at-weight relationship to a time-varying relationship, taking into account the average weights from the surveys. Janet can modify acoustic database to provide (1 week) once Carryn has assisted with specification.

Other

14) Anchovy ageing.

- Previously used a von Bertalanffy growth curve estimated from ageing information from Kerstan from Novembers 1990, 1992-1995 to inform the ratios of weights-at-ages.

- Will any new ageing information become available (No?). If resources exist, what would be the most important data/years to analyse? (By whom?)

Data analysis required (Deon et al.): To be advised

15) Sardine ageing.

- Previously used estimates from von Bertalanffy growth curves estimated by Durholtz / Mtengwane to inform prior distributions for model estimated time-invariant von Bertalanffy growth curves and to inform the ratios of weights-at-ages.

- Will any new ageing information become available? (Unlikely?) If resources exist, what would be the most important data/years to analyse?

Data analysis required (Deon et al.): To be advised

16) Sardine mixing.

- Estimates of the proportions-by-length of sardine infected by a digenean "tetracotyle" type metacercarian parasite west and east of Cape Agulhas in 2011 to 2014, and associated CVs (e.g. van der Lingen and Hendricks 2014).

Data analysis required (Carl et al.): Ongoing and requires further discussion to link data and possible models

References

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