Annex A - F
Phase II workshop on assessment modelling of hake in Ecofish:
DTU Aqua, Charlottenlund Castle, 26-28 May 2014

Annex A:

Participation list:

Anders Nielsen	DTU Aqua
Casper Berg	DTU Aqua
Doug Butterworth	UCT
Eva Maria F. Pedersen	DTU Aqua
Fritz Köster	DTU Aqua
Henrik Degel	DTU Aqua
Jan E. Beyer	DTU Aqua
John Katena	DTU Aqua/NatMirc
Kai Wieland	DTU Aqua
Kasper Kristensen	DTU Aqua
Niels Gerner Andersen	DTU Aqua
Paulus Kainge	DTU Aqua/NatMirc
Rebecca Rademeyer	UCT
Teunis Jansen	GINR/DTU Aqua
Uffe H. Thygesen	DTU Aqua

Annex B:

Documents considered:

Kathena JN, Nielsen A, Thygesen UH, Jansen T, Gordoa A, Guijarro B, Hamukwaya H. (in prep) A comparison of different assessment models for the Namibian hake stock.

Kirchner C, Kainge P, Kathena J (2012). Evaluation of the Status of the Namibian Hake Ressource (Merluccius spp.) Using statistical catch-at-age analysis. Environment for Development October 2012 EfD 12-12

Rademeyer RA (2013) An initial attempt at a spatially structured stock assessment for the South African hake resource including explicit movement. MARAM IWS/DEC13/Hake/P9

Rademeyer RA (2014) An updated Reference Case for the South African hake resource. March 2014

Rademeyer RA and Butterworth DS (2014) Results leading to a Proposal for a Reference Set of Operating Models for Testing the 2014 OMP Revision for the South African hake resource. May 2014

Smith ADM, Cox S, Parma A, Punt AE (2013) International review panel report for the 2013 international fisheries stock assessment workshop. 2-6 December 2013, UCT. MARAM IWS/DEC13/General/4

BCC (2014) Report of the Benguela Current Commission ECOFISH WP1-WP2 Hake Stock Structure Workshop. DAFF Research Aquarium at Sea Point. 26 – 28 March 2014

Annex C:

Part I.

Main Goals for EcoFish WP1 Modelling workshop

26-28 May 2014, DTU

Closing Phase I by D 1.3: Report on comparison of the basic SCAA and SAM (Month 18, D. Butterworth, UCT)**. Complete John's paper: What is required?**

Task 1.6 SAM: The basic model will be extended to take into account two species as well as the South African West coast, south coast and possibly also the Namibian regions. These extensions may also take account of improved growth and catchability estimates, and stock structure information provided by genetic studies.

D 1.6: Web-based interface for the regional and two-species SAM (Month 48, A. Nielsen, DTU Aqua)

Which steps are required?

Operational plan:

(a) Goal for Oct 2014 (ASF): ?
(b) Goal for Nov 2014 (2nd Biology workshop): ?
(c) Goal for Dec 2014 (International stock assessment workshop): ?
(d) Milestones in 2015: ?

Task 1.4 SCAA: The spatial box model developed will be extended to include Namibia, and also to take account of data on possible stock-structure within species The approach used will follow that set out in the May 2006 BCLME international workshop.

D 1.7 Report giving the details of the SCAA box model developed and listing its results for key hake dynamics and management-related quantities (Month 48, D. Butterworth, UCT).

Which steps are required?

Operational plan:

(a) Goal for Oct 2014 (ASF): ?
(b) Goal for Nov 2014 (2nd Biology workshop): ?
(c) Goal for Dec 2014 (International stock assessment workshop): ?
(d) Milestones in 2015: ?

Part II.

WP1: Stock assessment

WP-leader: F. Köster (DTU-Aqua)

Objectives:

1. Improve abilities to discriminate between two species of hake and the possible substocks of each species.
2. Improve the reliability of stock assessments through checking robustness under use of alternative models for selectivity and how this varies with time.
3. Move towards trans-boundary assessment models for hake that could provide a basis for regional management advice.
4. Improve understanding of hake spatial dynamics.
5. Establish improved statistical stock-assessment methodologies for horse mackerel and sardinella that take due account of the data available for input.

Description of work

The work follows two phases. The first phase is extending existing hake stock assessments to take better account of current data and knowledge, as well as setting up alternatives to these models to determine how robust their outputs are. The second stage involves use of the new information gathered from WP2 to improve and elaborate the stock assessments further. For horse mackerel and sardinella phase one is focused on compilation of available data, and phase two on setting up a basic assessment that improves current practice. Both phases are initiated by a workshop to clarify data issues for cross-boundary analyses.

Task 1.1. A basic single-stock SAM, including web interface, will be set up for one of the hake species within South African borders. The results will be compared to an equivalent run of the current SCAA assessment approach to aid checking the implementation.

Task 1.2 The existing SCAA assessment model for South African hake will be modified to move from the current selectivity-based approach for reflecting spatial structure to a spatial-box model with movement. This is a prerequisite to possible trans-boundary extension of the assessment.

Task 1.3 Compilation of existing data available for the stock assessment of horse mackerel and sardinella.

Task 1.4 *SCAA*: The spatial box model developed will be extended to include Namibia, and also to take account of data on possible stock-structure within species The approach used will follow that set out in the May 2006 BCLME international workshop.

Task 1.5. Models developed will be extended to take explicit account of hake cannibalism and inter-species predation (updating and extending the approach of Punt and Butterworth, 1995).

Task 1.6 *SAM***:** The basic model will be extended to take into account two species as well as the South African West coast, south coast and possibly also the Namibian regions. These extensions may also take account of improved growth and catchability estimates, and stock structure information provided by genetic studies.

Task 1.7*. GeoPop:* The geographically explicit model GeoPop will be run on existing survey data to explore the potential utility of this approach as a basis to determine the effects of environmental variation on hake catchability.

Each phase is initiated by a workshop, organized by WP4, capacity building: A preparatory meeting by scientists from SA and Namibia (which could include Angola if only to observe and assist plan for a later similar event between Angola and Namibia for horse mackerel and Sardinella) will review all available hake survey and commercial

catch and biological data to assess their current state and suitability for use in assessments. This should ideally take place before the end of 2010.

The phase II workshop is a review in a regional meeting of stock assessment models and methods currently in use, and existing plans to extend these to a regional level. The outcomes include recommendations on structures for developing regional models for providing regional scientific management advice. External assessment experts should be included in, and possibly chair this meeting.

Deliverables

D 1.1. Report on data compilation for hake (Month 12, D. Butterworth, UCT)
D 1.2 Web-based interface for basic SAM (Month 20, A. Nielsen, DTU Aqua)
D 1.3 Report on comparison of the basic SCAA and SAM (Month 18, D. Butterworth, UCT)
D 1.4 Report of data compilation for sardinella and horse mackerel (Month 30, D'Almeida, Namibia)
D 1.6 Web-based interface for the regional and two-species SAM (Month 48, A. Nielsen, DTU Aqua)
D 1.7 Report giving the details of the SCAA box model developed and listing its results for key hake dynamics and management-related quantities (Month 48, D. Butterworth, UCT)
D 1.8 Report on the spatial geostatistical modelling (Month 48, J. Beyer, DTU-Aqua)
D 1.9 Report on assessment of sardinella and horse mackerel (Month 48, D'Almeida, Namibia)

Annex D:

Extract from BCC (2014)

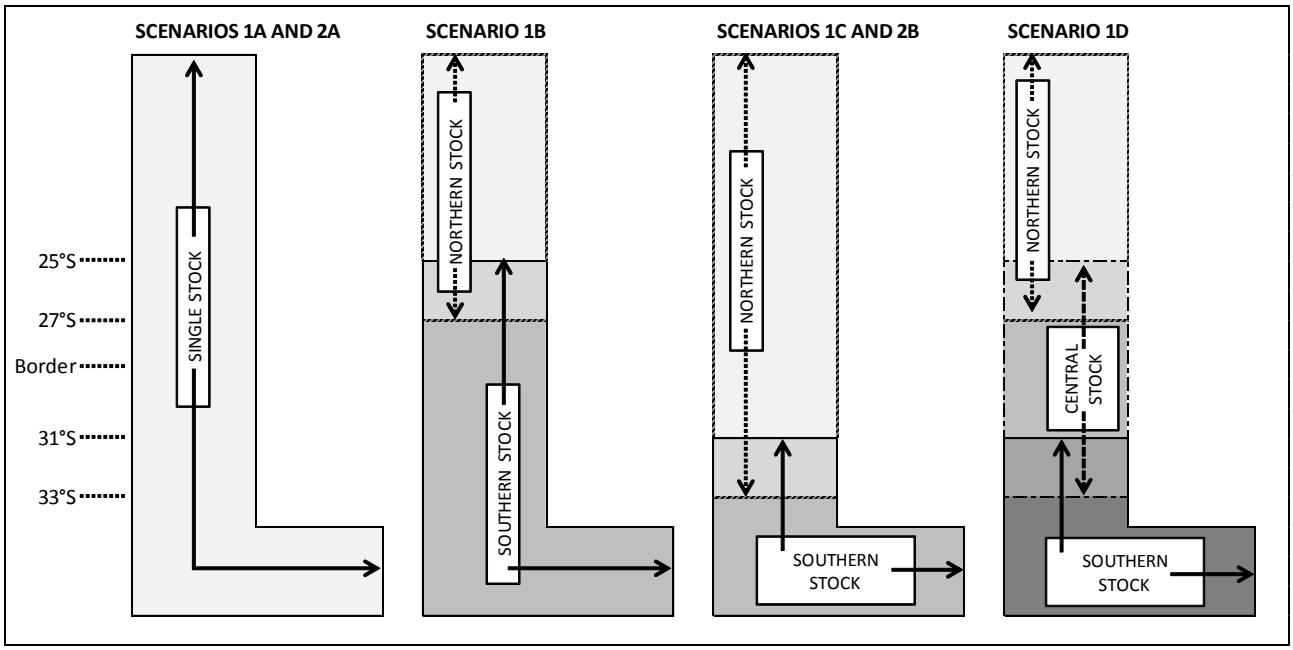

Figure 11: Schematic illustration of the preliminary hake stock structure hypotheses developed during the workshop. *Merluccius capensis*: Scenarios 1A – 1D. *M. paradoxus*: Scenarios 2A and 2B.

Annex E:

Example plot for a moving matrix estimated in Rademeyer (2013)

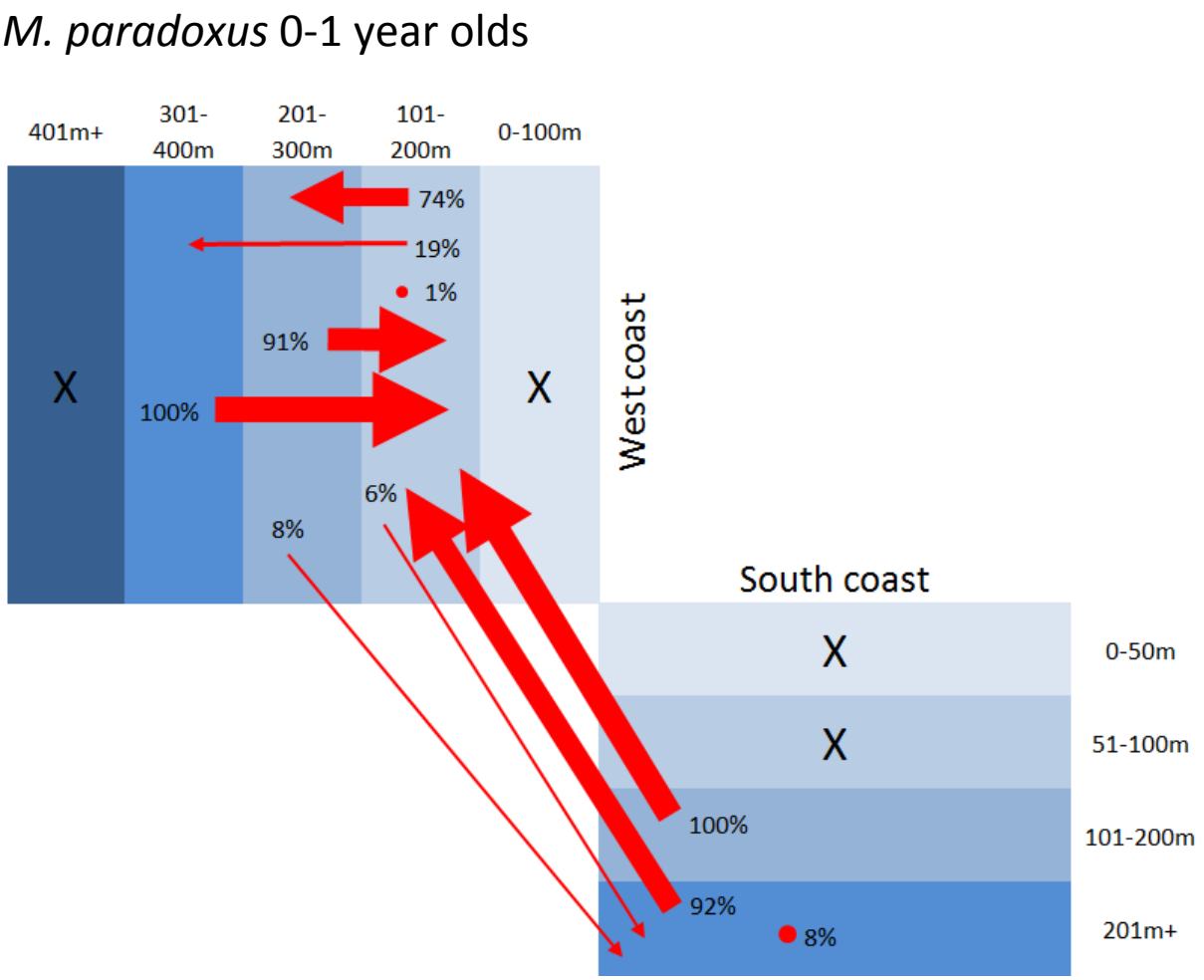

Figure 1: Estimated movement of 0 and 1 year-old *M. paradoxus*. The size of the arrows is proportional to the percentage of fish moving. The circles represent the percentage of fish staying in an area. Black crosses show the regions in which this species is assumed to be absent for this age group.

Annex F:

Example plots of trawl intercalibrations using the simplified GeoPop method (Thygesen et al. in prep.)

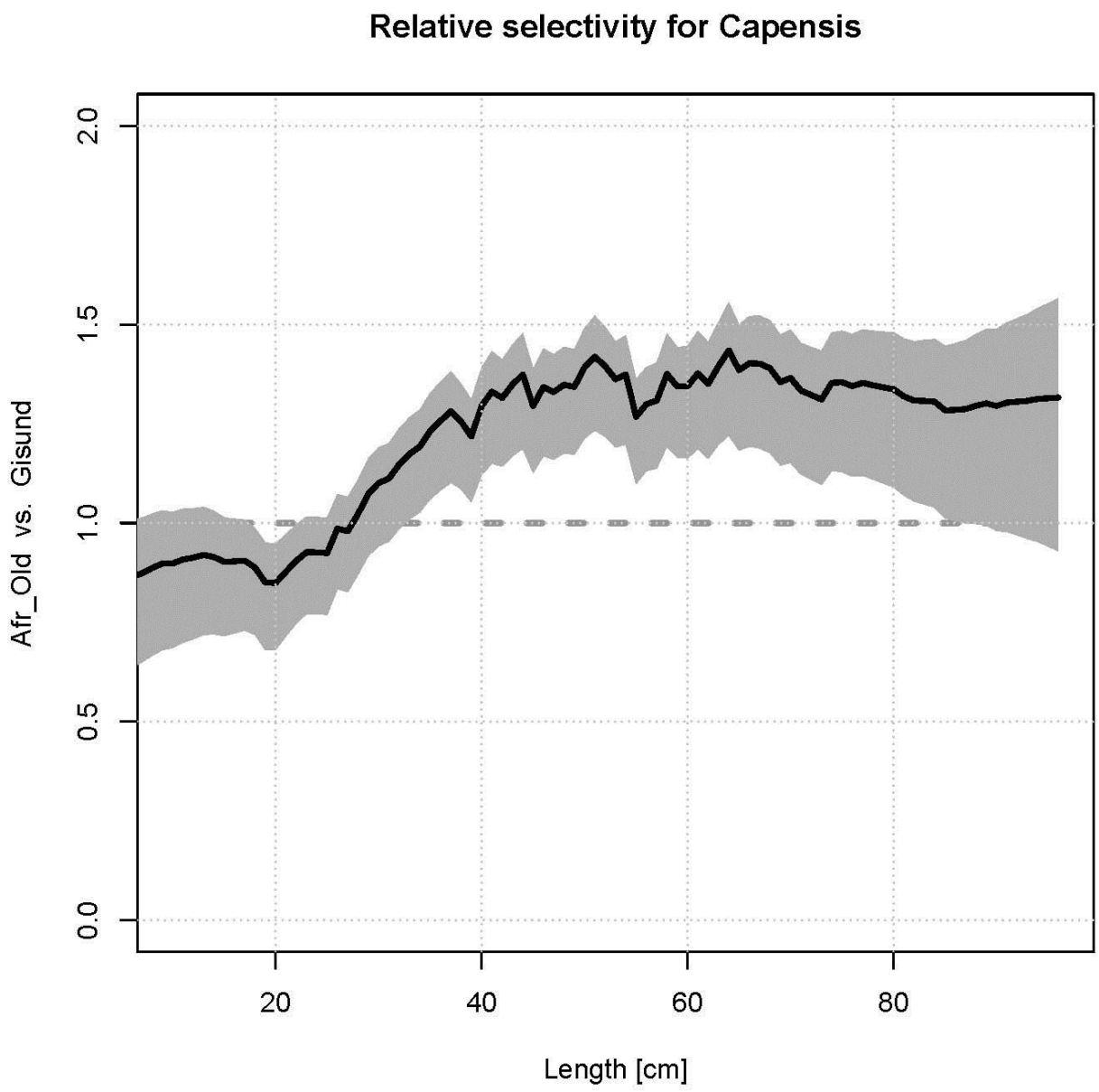

Figure 1: Relative selectivity between Africana New and Gisund, for M. Capensis, by length. 95 % confidence intervals are indicated with grey background. The selectivity is estimated non-paramerically using a GeoPOP-type analysis and based on a dedicated intercalibration of trawl pairs. The model includes a random abundance spectrum at each station, size-specific clustering in each haul, and a continuous intercalibration curve for which no shape is assumed. The result should be seen as preliminary because the variability in the swept is not taken into consideration.

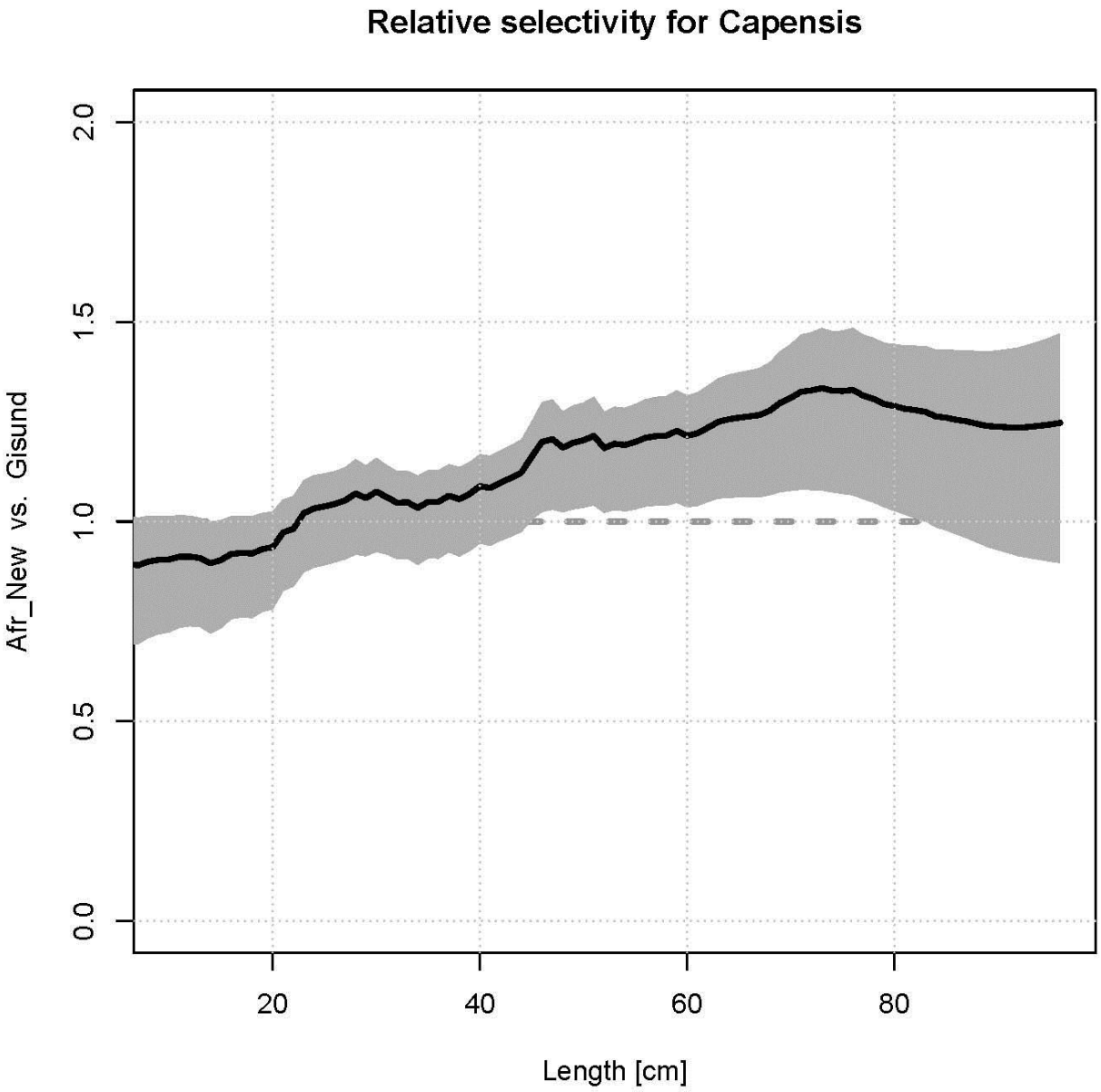

Figure 2: As figure 1, but between Africana Old and Gisund.

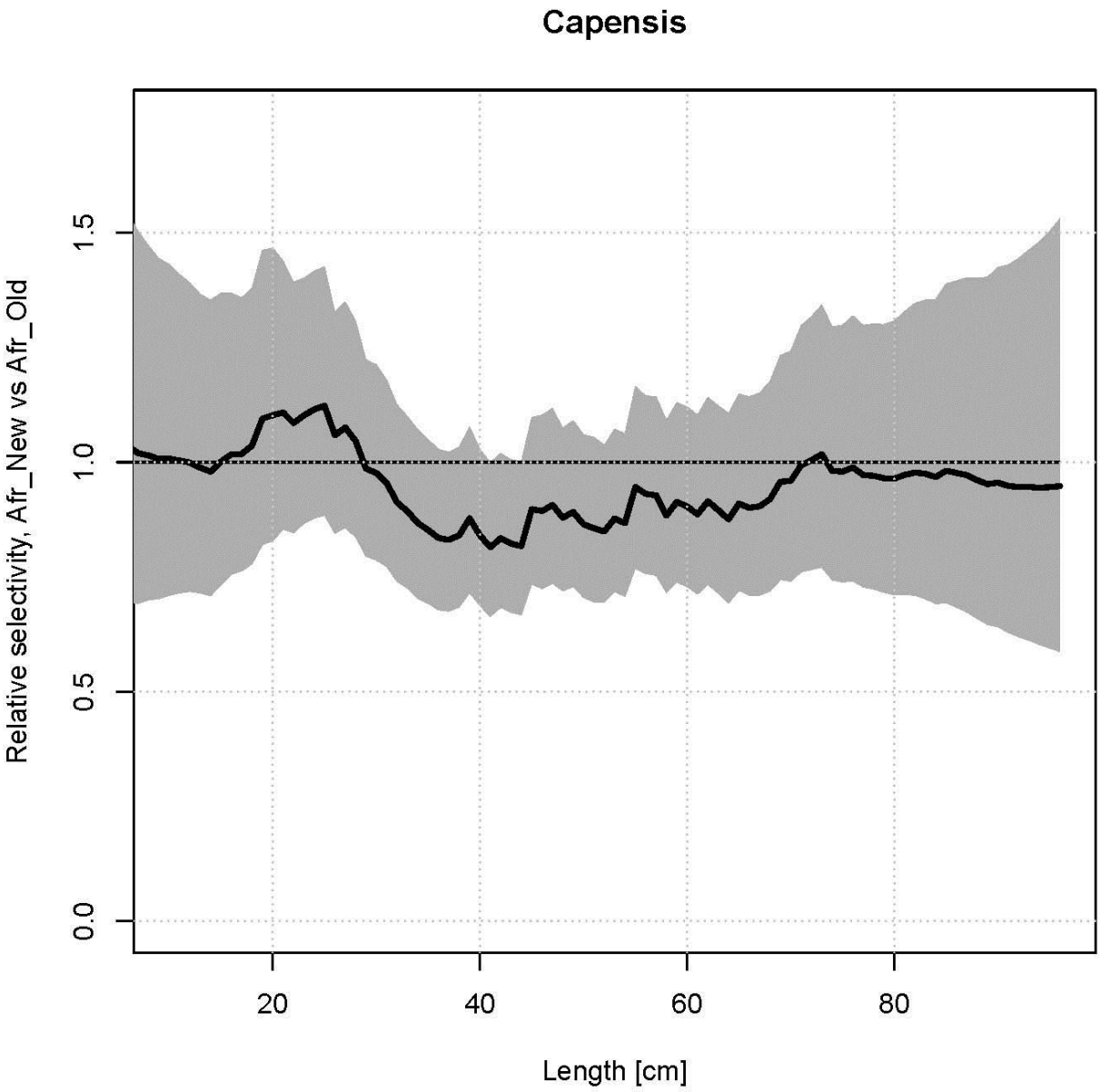

Figure 3: Relative selectivity between Africana Old and Africana New, as estimated indirectly by comparing each gear to Gisund. This indirectness increases the uncertainty, relative to figures 1 and 2.