THE CHOKKA SQUID RESOURCE:

A BRIEF OVERVIEW OF BIOLOGY, GROWTH RATES AND TRENDS IN SIZE COMPOSITION

International Stock Assessment Workshop (IWS)
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University of Cape Town.

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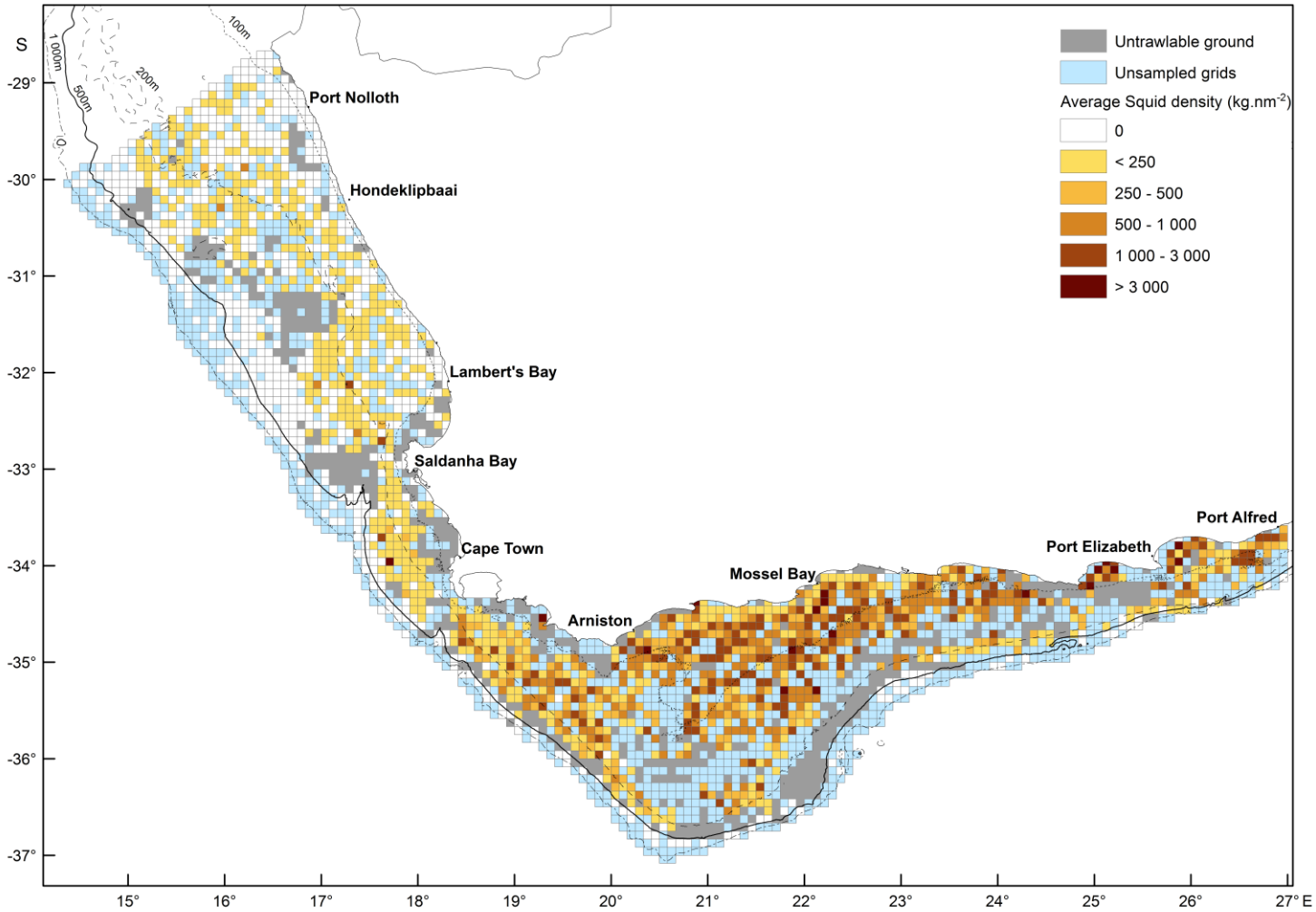
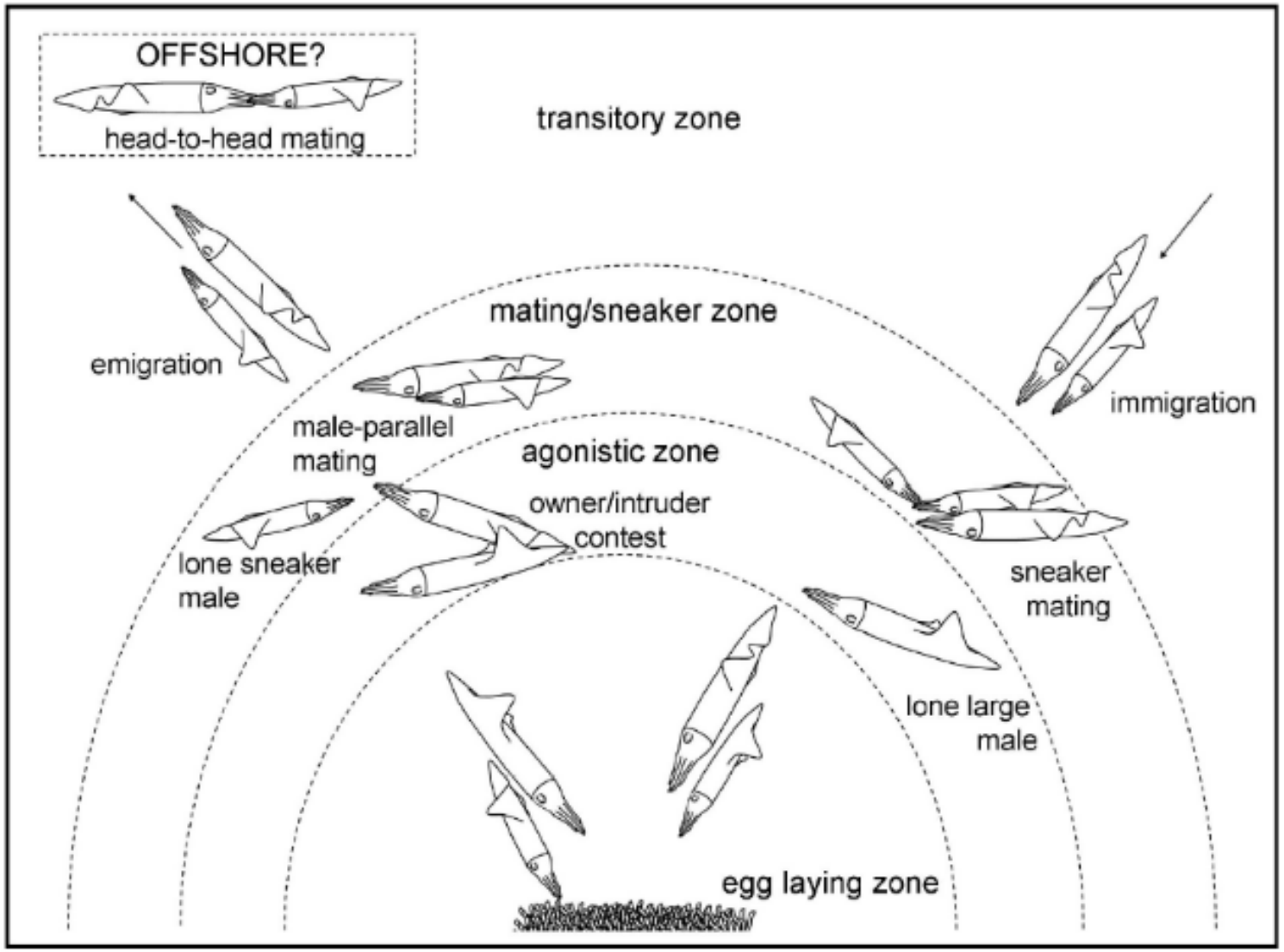
DISTRIBUTION



Distribution of Chokka squid *Loligo reynaudii* in South African waters, as derived from fishery-independent demersal research surveys. Densities (kg.nm^{-2}) are averages over all survey stations within each survey grid block over the period 1985-2023. (Ref: Fairweather 2023)

SPAWNING BEHAVIOUR

•Owner/ intruder contest



•Serial spawners

•Now known to spawn all year round

•Peak spawning in summer

•Complex mating arena/different behavioural "zones" (Ref: Hanlon et al, 2002)

•Chokka squid known to form huge spawning aggregations

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LIFE CYCLE / SPAWNING BEHAVIOUR

Pic: Jean Tresfon

- Fertilized bright orange egg capsules deposited by female on mainly sandy sea bed
- Potential fecundity calculated as 17 809 eggs
- Benthic egg clusters take about 5-6 weeks to hatch
- Similar spawning behavior to *L. Opalescens* (Californian market squid)

LIFE CYCLE / PARALARVAL STAGE

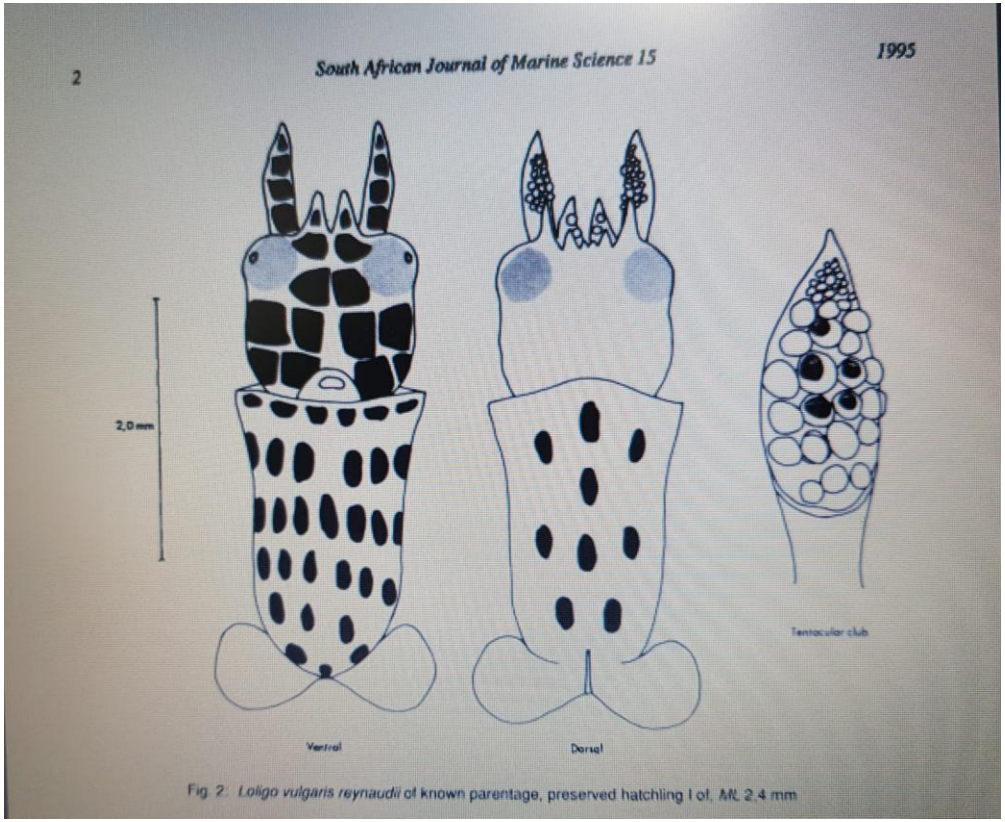
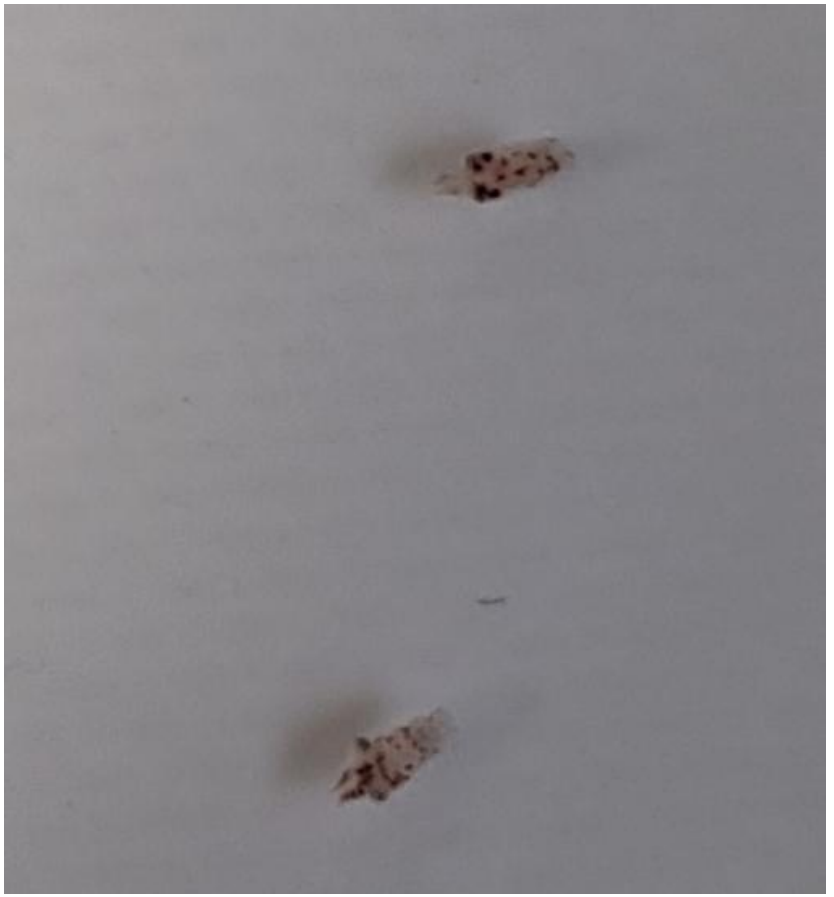


Fig. 2: *Loligo vulgaris reynaudii* of known parentage, preserved hatchling I of, ML 2.4 mm



•Chokka squid- paralarvae

• (Left. Vechione & Lipinski, 1995; Right Mwicigi, 2023)

•Ecological information about paralarvae generally scant (Sauer et al 2010)

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•Ongoing research on paralarvae distribution & their dominant prey types

(i.e. DFFE Squid-directed Acoustic and Ecosystem Assessment Surveys 2019-2025)

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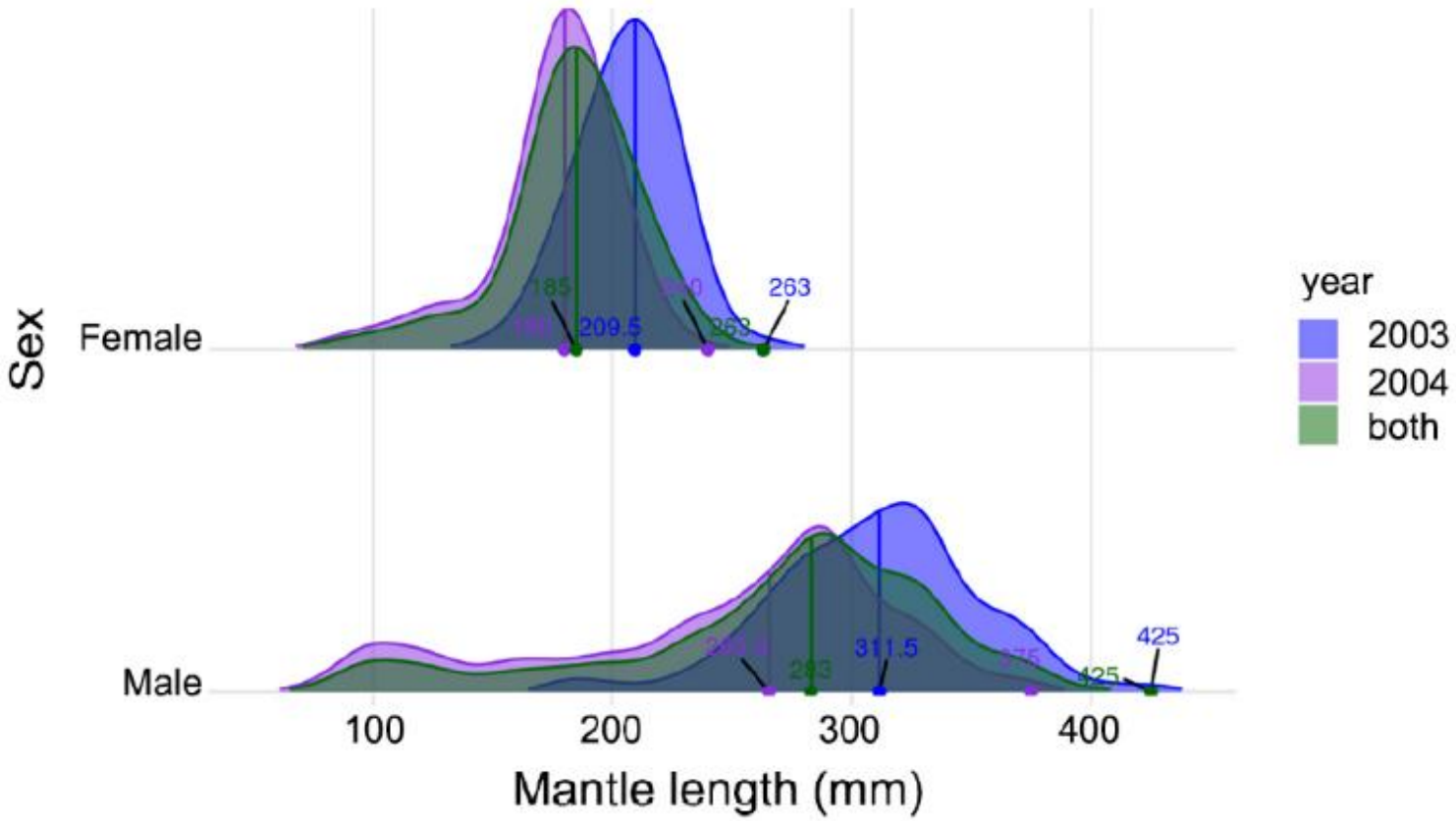
LIFE CYCLE / GROWTH RATES (Mwangombe et al 2021)



Female and male length distribution of *Loligo reynaudii* for the surveys conducted during November/ December of 2003 and 2004.

Males ML: 71-425 mm
Females ML: 83-263 mm

Median and maximum length of squid for each sex and year are represented by the dots. Kernel density graph, therefore no y axis

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Figure 1 in Mwangombe, Durholtz, Yemane, Mwicigi, Sauer, Lipinski (2021)

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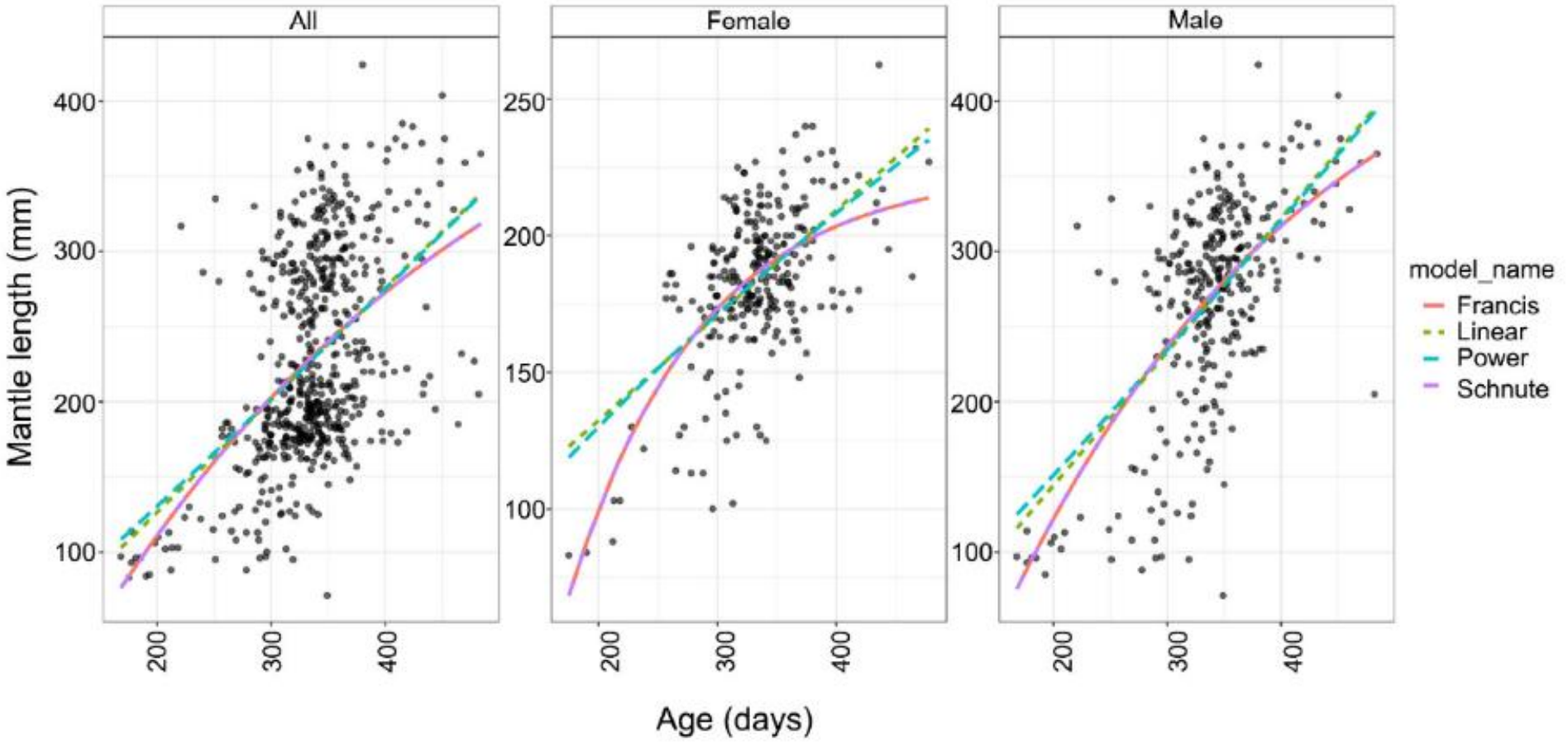
LIFE CYCLE / GROWTH RATES (Mwangombe et al 2021)



Fits from the four growth models (Francis, Power, Linear and Schnute) for males, females, and all individuals combined.

Figure 2 in Mwangombe, Durholtz, Yemane, Mwicigi, Sauer, Lipinski (2021)

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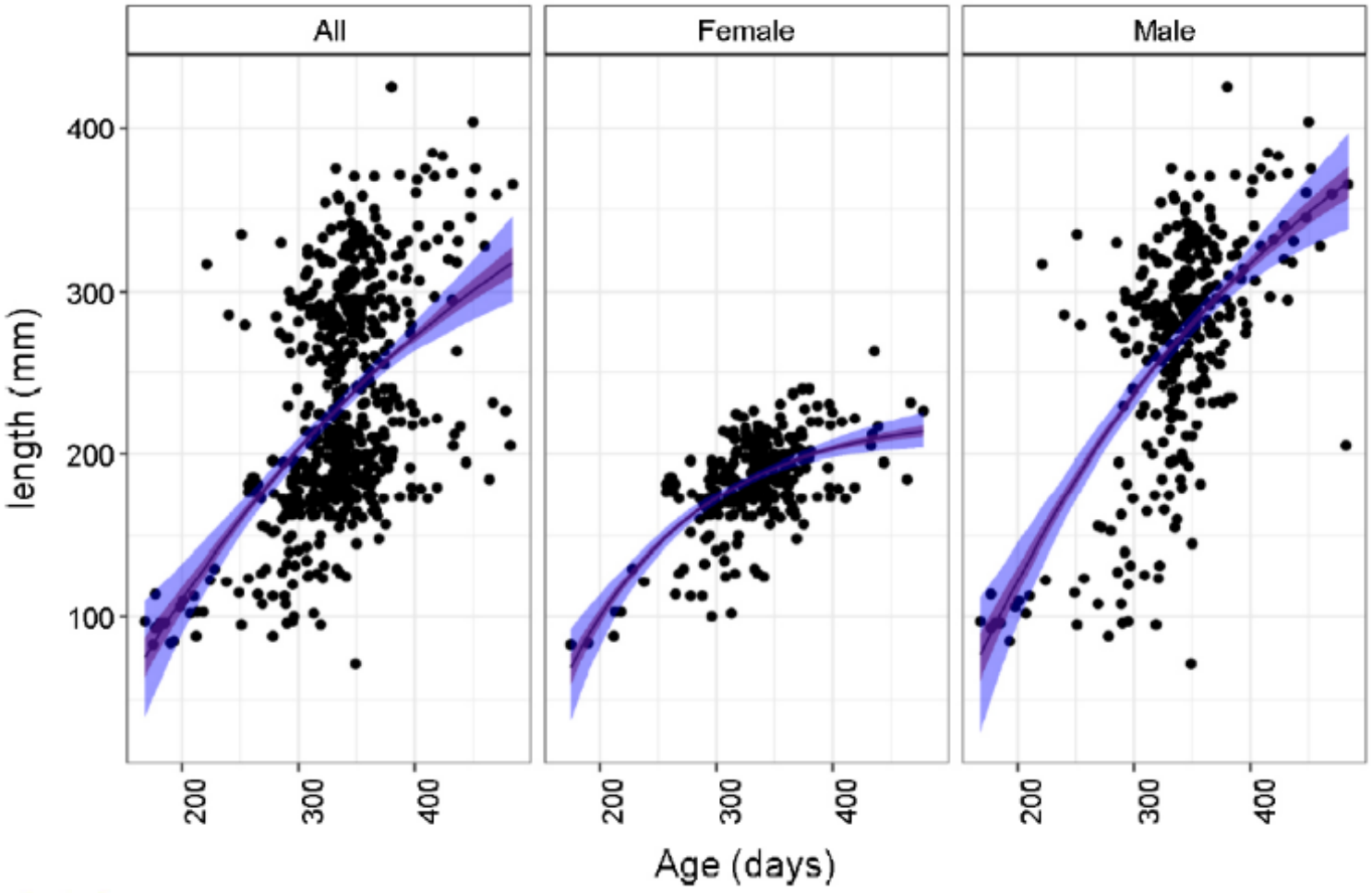
LIFE CYCLE / GROWTH RATES (Mwangombe et al 2021)



Sex-specific observed mantle lengths (mm) at age (dots) pooled for both sampling years (2003 and 2004), with the **Francis growth models** fitted to the data.

As ages increased, males grew substantially faster than females

Solid lines represent the median of predicted mantle length. Light brown and light blue envelopes represent the 50% and 95% confidence intervals, respectively

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Figure 4 in Mwangombe, Durholtz, Yemane, Mwicigi, Sauer, Lipinski (2021)

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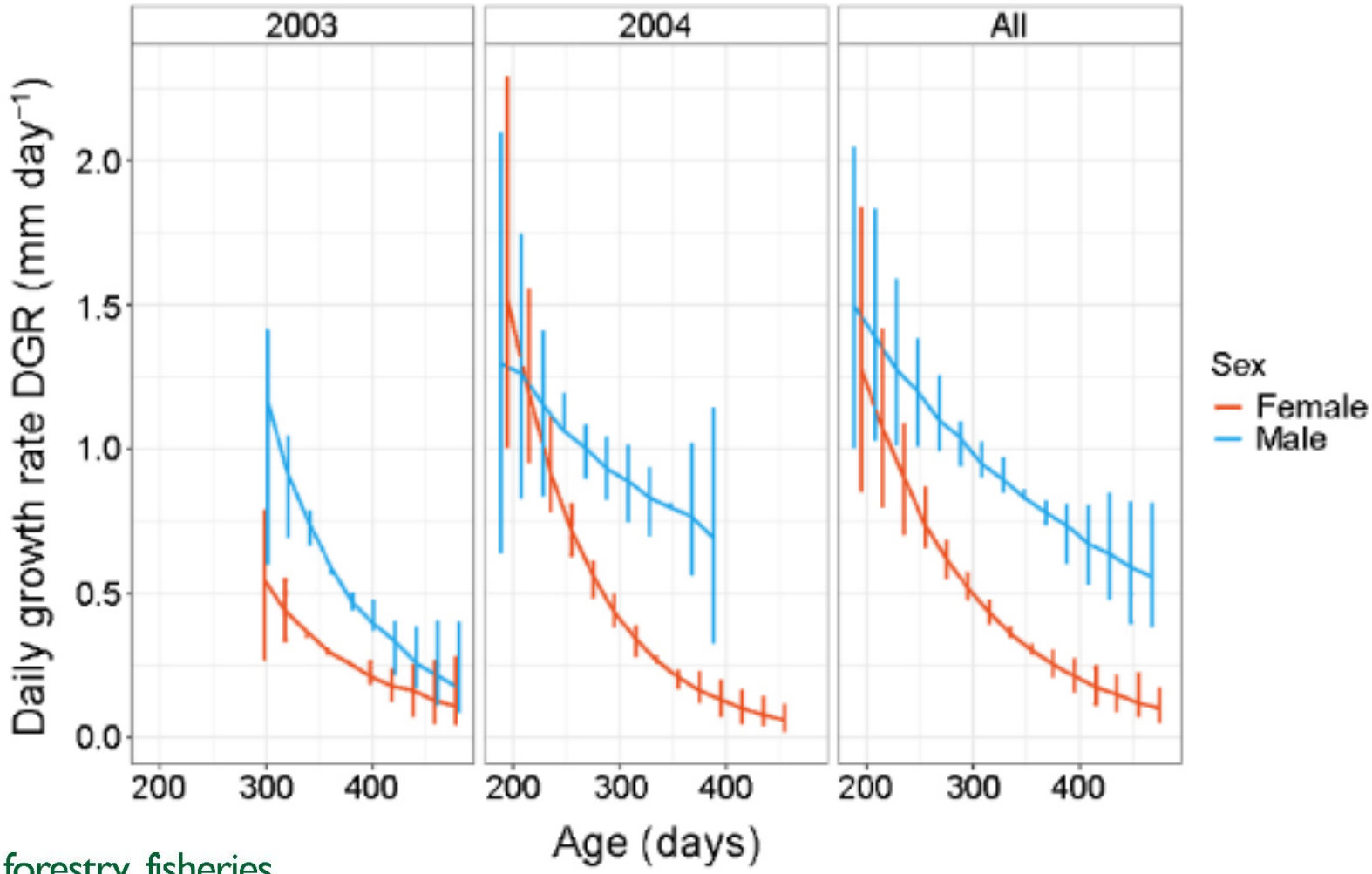
LIFE CYCLE / GROWTH RATES (Mwangombe et al 2021)



Daily growth rates (DGR), mantle size (mm/day) for females and males for the two sampling years (2003 and 2004) and the combined data.

DGR declined with age

Error bars represent 95% confidence interval

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Figure 6 in Mwangombe, Durholtz, Yemane, Mwicigi, Sauer, Lipinski (2021)

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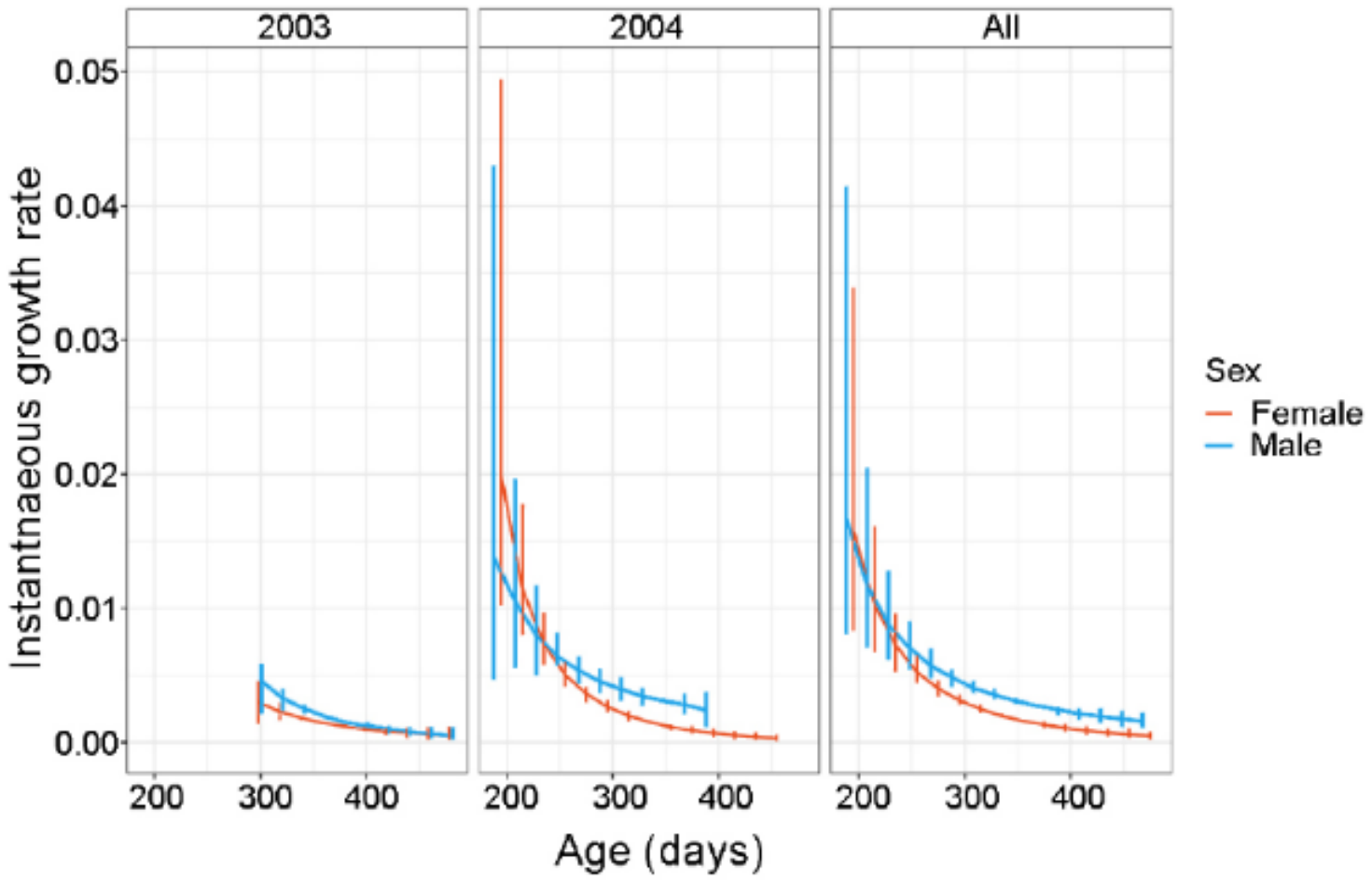
LIFE CYCLE / GROWTH RATES (Mwangombe et al 2021)



Instantaneous growth rate for females and males for the two sampling years (2003 and 2004) and the combined data.

Growth of males more than double females; sexual dimorphism in growth and large inter-annual variation in growth

Error bars represent 95% confidence interval

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Figure 7 in Mwangombe, Durholtz, Yemane, Mwicigi, Sauer, Lipinski (2021)

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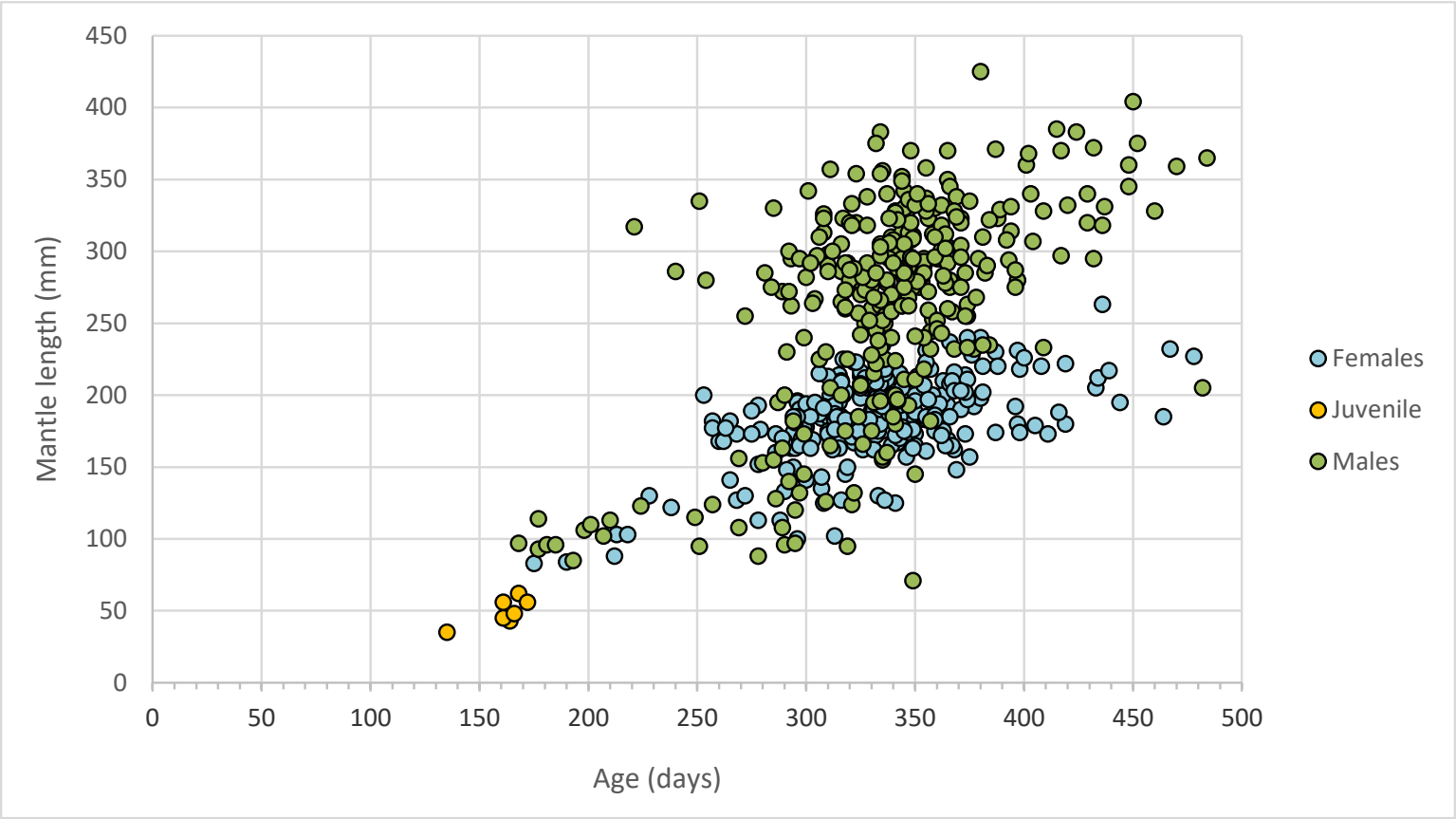
LIFE CYCLE / GROWTH RATES



- Chokka are fast growing, reaching reproductive size within one year or less.
- Life generally appears to be about 1 year, with some individuals reaching ages of 450 – 500 days post-hatching
- There is sexual dimorphism in growth, with females only growing to about 250 mm mantle length and males reaching sizes of over 400 mm ML

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(Ref: MARAM/IWS/2024/Squid/Pres1

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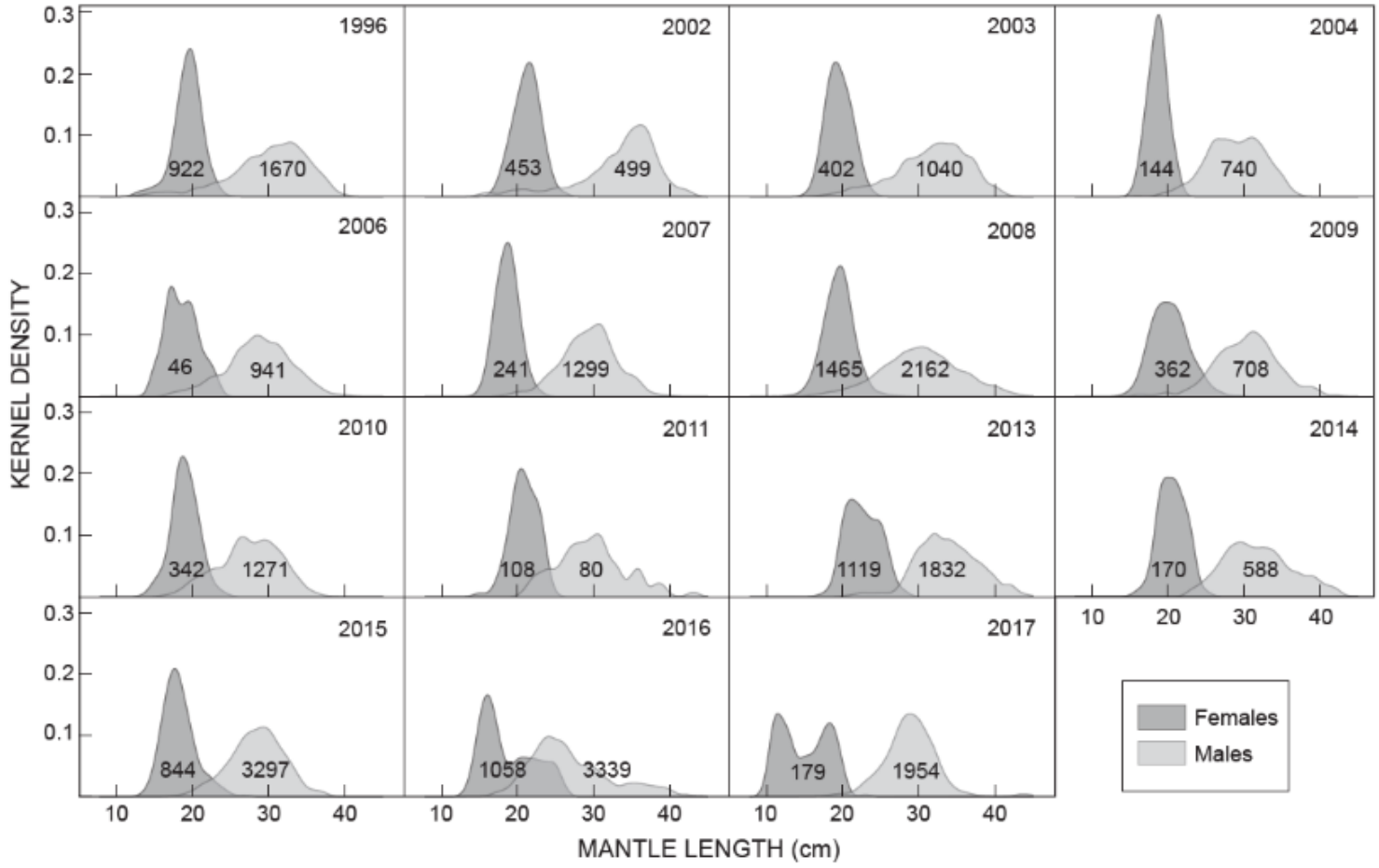
DISTRIBUTION OF MANTLE LENGTHS (Lipinski et al 2021)



General pattern of LF distributions of males and female chokka squid, from 1996 to 2017.

Fluctuations in distribution and medial lengths but **no clearly visible apparent trends in mean length**

Distribution summarised as kernel density.

Numbers denote total numbers of individuals measured

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Figure 2 in in Lipinski, Mmethi, Yemane, Mwicigi, Sauer (2021)

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TRENDS IN MANTLE LENGTHS (Lipinski et al 2021)

Trends in median mantle length (**L/F)** (black dots; vertical lines representing 95% quantile) for males and females of chokka squid, from 1996 to 2017.

Fitted lines are from standard linear regression and piece-wise (segmented) regression (fitting separate linear regressions for the period before and after 2014)

No apparent trends except for years 2014-2017 with downward trend for females (segmented regression)

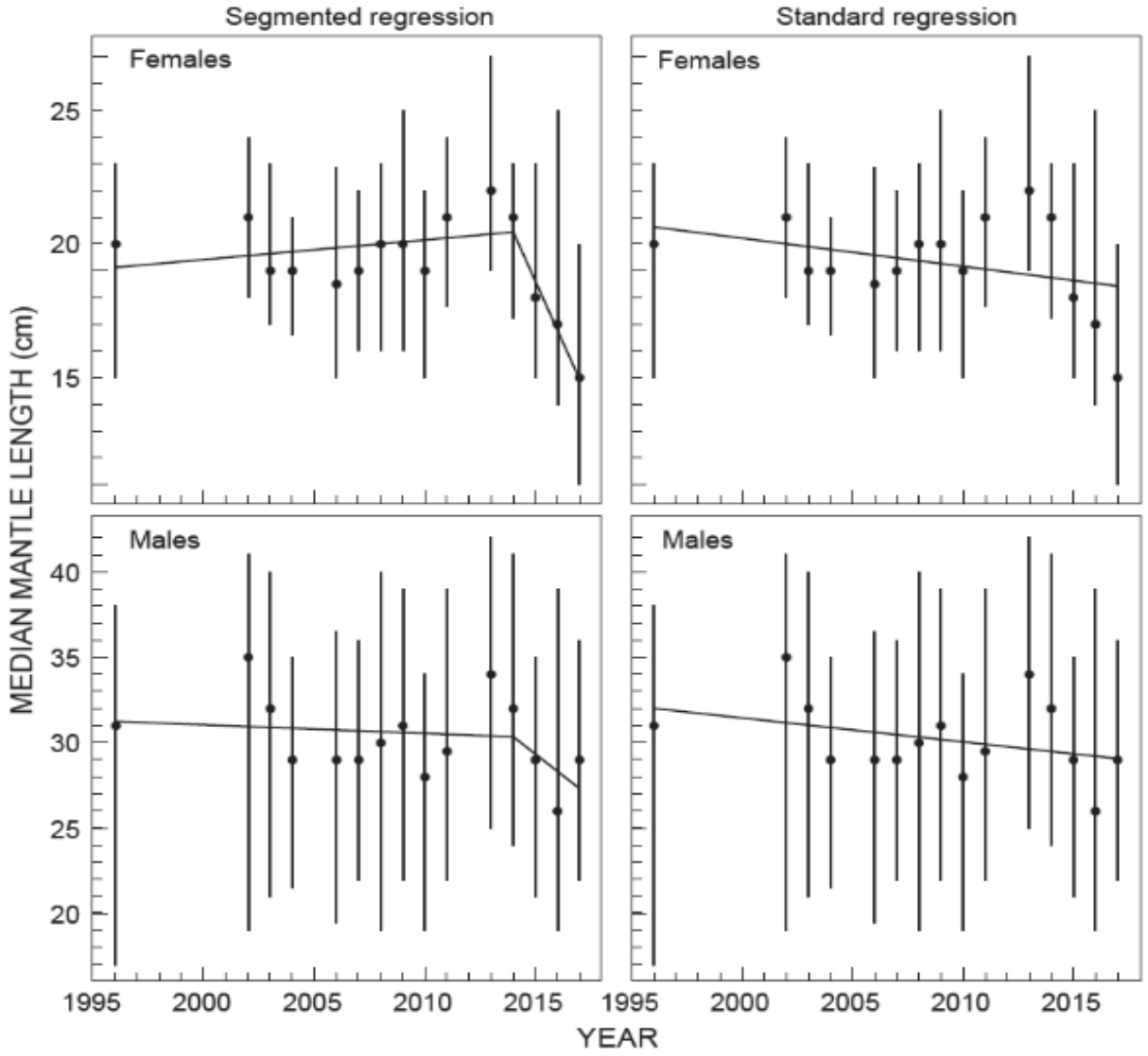

Figure 3 in in Lipinski, Mmethi, Yemane, Mwicigi, Sauer (2021)

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CATCH vs MANTLE LENGTH of Males & Females (Lipinski et al 2021)

Association between overall catch from the South African jig fishery and median lengths (mantle length) of males and females of chokka squid.

The relationship is **significant for females (*p* = 0.0371)** but not for males (*p* = 0.0771).

Grey shading represents the 95% confidence interval

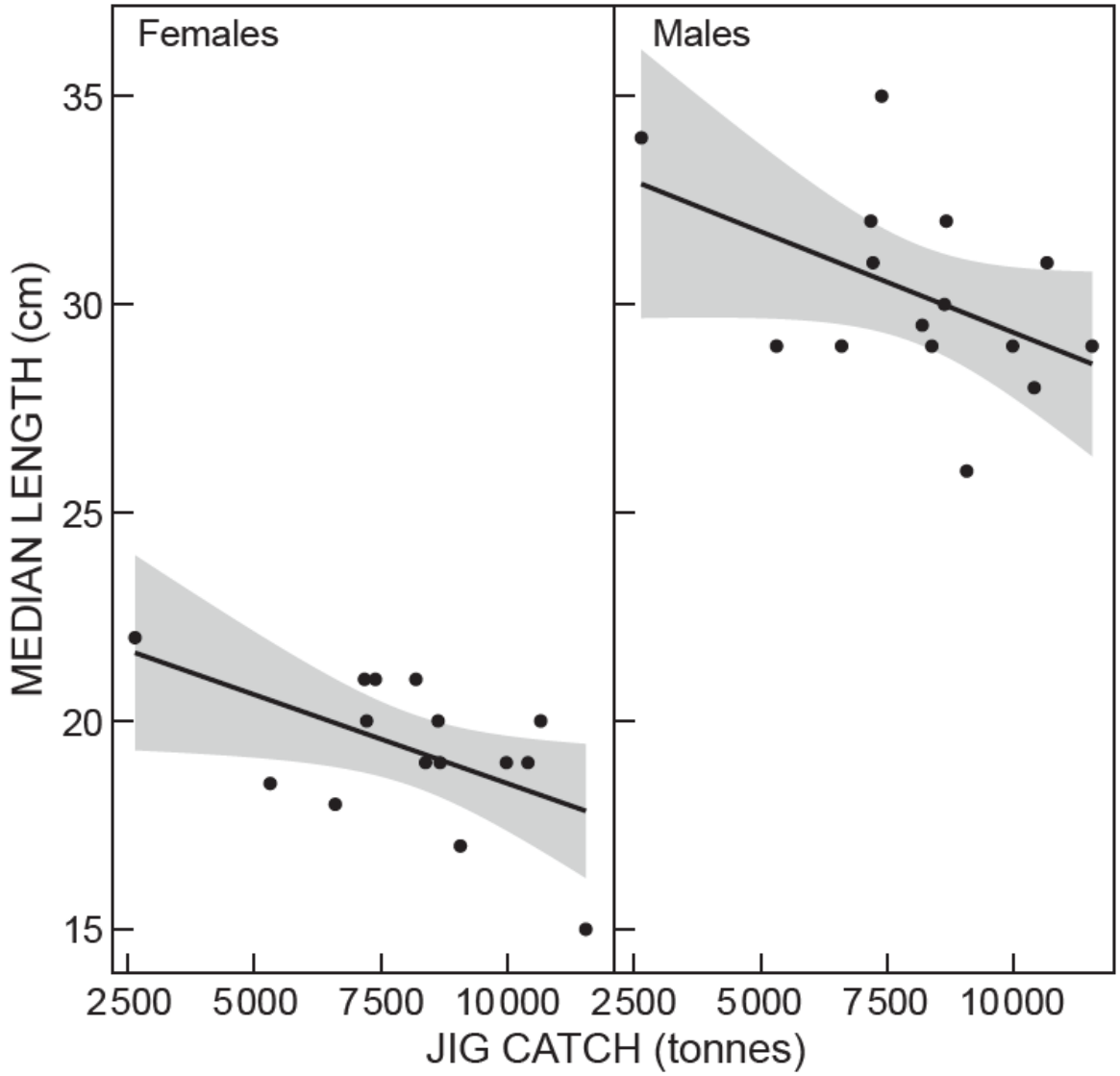

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Figure 4 in Lipinski in Lipinski, Mmethi, Yemane, Mwicigi, Sauer (2021)

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LENGTH-WEIGHT RELATIONSHIPS (Lipinski et al 2021)

Length–weight plots for chokka squid.

The solid line enclosed in the shaded envelope represents the predicted median and 95% confidence interval for the estimated weight for a given mantle length.

The predictions and corresponding confidence intervals were based on parameters estimated from bootstrapping

No apparent trends over time for both sexes

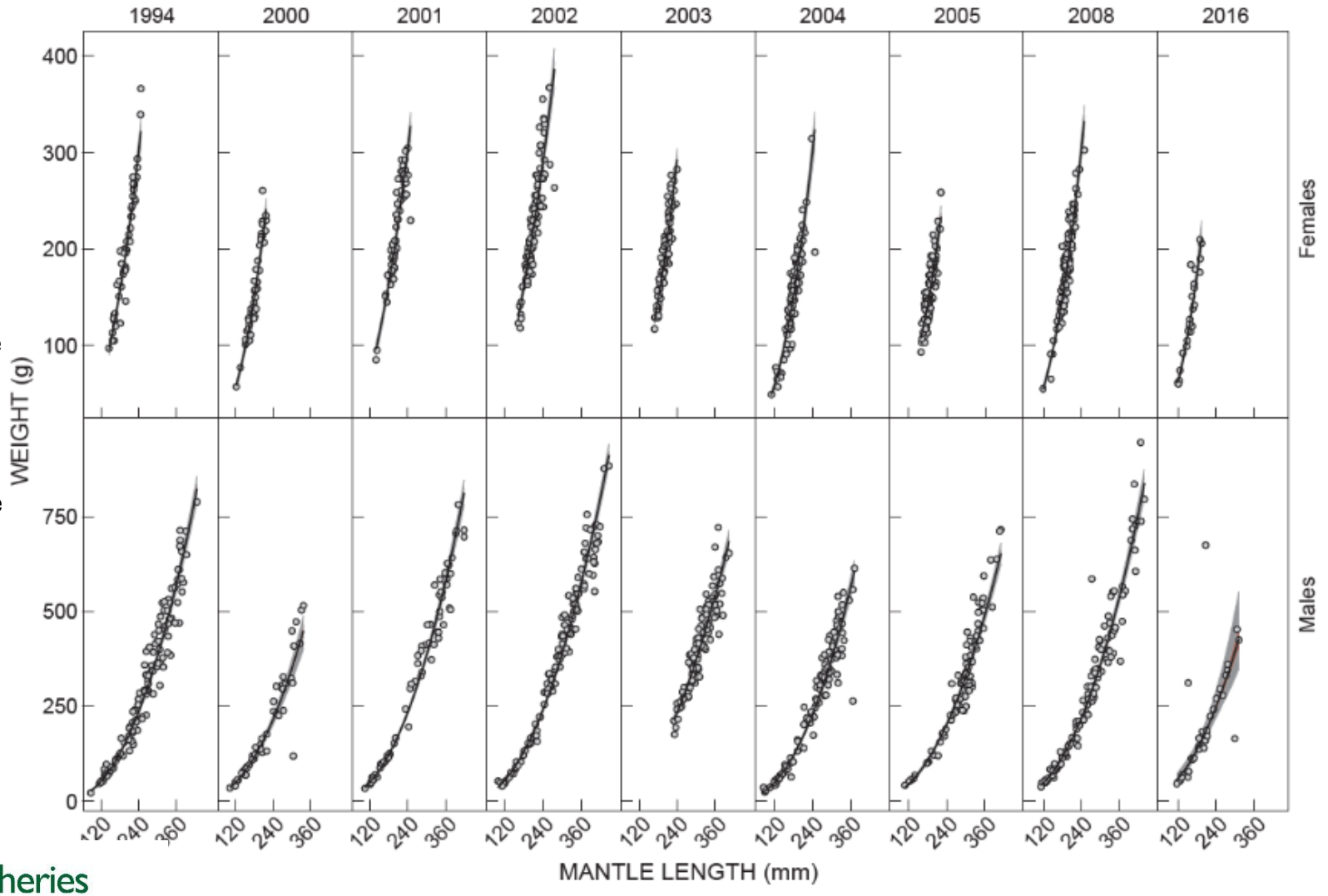

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Figure 5 in Lipinski, Mmethi, Yemane, Mwicigi, Sauer (2021)

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CONCLUSIONS .... (N.B. All these papers are from some of the data collected during the squid closed seasons)

- Chokka squid are serial spawners and spawn all year round, with peak spawning in summer
- Potential fecundity calculated as 17 809 eggs, which take 5-6 weeks to hatch
- Scant information on paralarval stage
- Mantle Length (ML): Females = 83-263 mm & one peak; Males: 71-425 mm & bi-modal
- As ages increase, males shown to grow substantially faster than females
- Daily Growth Rates (DGR) declined with age for both males and females
- **Growth of males more than double of females**; sexual dimorphism in growth and large inter-annual variation in growth; **Reach reproductive size within one year or less**
- Fluctuations in distribution and medial mantle lengths but **no clearly visible apparent trends in mean length**
- **No apparent trends in mantle length LF except for years 2014-2017 with downward trend for females**
- **Catch vs ML relationship is significant for females** (p = 0.0371) but not for males (p = 0.0771).

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Lots of fluctuations and no apparent trends!

THANK YOU!

Port St Francis Harbour, Eastern Cape. Photo: Mwicigi, November 2025

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