

# Modelling growth and converting from length-based to age-based data



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## Introduction

Stock assessment model is age-based.

But 'raw' data is often length-based.

Need to convert length-based to age-based data.

Also need to include uncertainty in the conversion.

## a4aGr - the growth class

Relates age to length (and vice versa).

Requirements:

- Growth model:  $\text{age} \sim \text{length}$  (formula)
- Inverse growth model:  $\text{length} \sim \text{age}$  (formula)
- model parameters (FLPar)
- variance-covariance matrix (optional - parameter uncertainty)

## Modelling uncertainty

Uncertainty in growth comes through parameter uncertainty.

Variance-covariance matrix PLUS an assumed distribution, e.g.:

- Multivariate normal
- Multivariate with triangular marginals (copulas)
- Something else using copulas

Result is an a4aGr object with iterations.

## l2a() - length to age method

Individual FLQuant, FLStockLen, FLIndex

- 'Number' slots (e.g. 'catch.n') are summed
- 'Weight' slots (e.g. 'catch.wt') use mean, weighted by numbers
- Other slots (e.g. 'mat') use mean

## General approach (summary)

- Make an a4aGr object (growth model + parameters)
- Add uncertainty on the parameters
- Convert FLQuant/Stock/Index using growth model