

# Estimating natural mortality



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## Natural mortality

$$m = 0.2$$

## Other models

See Kenchington, 2013, Fish and Fisheries (29 estimators of  $m$ ).  
e.g.

Jensen's second estimator:  $m = 1.5 K$

Gislason's first estimator:  $m = 1.73 l^{(-1.61)} \ln f^{1.44} K$

## a4aM - the m class

Three components:

- shape (age / length effect)
- level
- trend (time trend)

The `m()` method multiplies components to give m-at-age

These components are `FLModelSim` which we also use for `a4aGr`

## Modelling uncertainty

Uncertainty comes through parameter uncertainty in each model.

Each model can have a variance-covariance matrix.

Combine this with an assumed distribution, e.g.:

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

Result is an a4aM object with iterations.

Sample from this to get an FLQuant of m-at-age / length with iterations.