

fish610.060 EAFM Tools: Gadget

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<http://minouw-project.eu/>

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1 Introduction to Gadget

1.1 What is Gadget?

At its core, Gadget is a simulator which projects forward the number of fish per cell.

The fish in a cell correspond to
a species a length group
an age group
a spatial unit
a temporal unit
a maturity stage
a sex

1.2 Estimation in Gadget

Gadget estimates unknown parameters using least squares (or maximum likelihood)

Most parameters can be set to initial values
Most parameters can be either estimated or fixed
Each forward projection results in a population trajectory
The projection can be compared to data
The comparison gives sums of squares (or likelihoods)
The estimation is done by repeating the process

2 Stock Assessment Models

2.1 Population model classes

Gadget inherits its model classes from traditional stock assessment models.
For a data-rich species a model will specify ages, length etc
For a data-poor species one may only have a bulk-biomass model (i.e. single age group)

Various models can be used to estimate growth and other functional relationships

Modularity ensures that new functional descriptions can be added

3 Fishing Fleet Models

3.1 Fishing fleets in Gadget

The most common Gadget implementations use a single fleet catching a single species, much like a traditional single species assessment
More elaborate schemes may allow a single fleet to catch multiple species
Similarly multiple fleets may catch multiple species
The selectivity of a fleet for an individual species can be estimated
An per-species catchability multiplier for a fleet can then be estimated and used with an annual effort index to obtain overall fishing mortality for each species

4 Multi-Species Models

4.1 Several species in Gadget

Gadget is sometimes used for multiple species
Normally this only involves technical interactions
Species interactions are rarely modelled