The FLR platform for quantitative fisheries science

FISHREG

Maritime Affairs Unit - IPSC

European Commission

Joint Research Center

Why?

Schnute *et al.* (2007 and 1998) compared the number of software tools currently available for fisheries analysis to the Tower of Babel and concluded that:

> *"The cosmic plan for confounding software languages seems to be working remarkably well among the community of quantitative fishery scientists!"*

FLR

The FLR project provides a **platform for quantitative fisheries science** based on the R statistical language.

The guiding principles of FLR are:

- **openness** - through community involvement and the open source ethos
- **flexibility** - through a design that does not constrain the user to a given paradigm
- **extendibility** - through the provision of tools that are ready to be personalized and adapted

FLR mission

To **promote and generalize** the use of **good quality, open source, flexible software** in all areas of quantitative fisheries research and management advice, with a key focus on Management Strategies Evaluation.

FLR goals

In detail, FLR aims to facilitate and promote research about:

- Stock assessment and provision of management advice
- Data and model validation through simulation
- Risk analysis
- Capacity development & education
- Promote collaboration and openness in quantitative fisheries science
- Support the development of new models and methods
- Promote the distribution of new models and methods to a wide public.

FLR development

FLR is a **collaborative development project**, where scientists that constitute the *FLR Core Team* work simultaneously on code, documentation, etc.

Really, what is FLR?

- Extendable toolbox for implementing bio-economic simulation models of fishery systems
- Tools used by managers (hopefully) as well as scientists
- With many applications including:
  - Fit stock-recruitment relationships,
  - Model fleet dynamics (including economics),
  - Simulate and evaluate management procedures and HCRs,
  - More than just stock assessment (VPA, XSA, ICES uptake)
  - etc. . . .
- A software platform for quantitative fisheries science
- A collection of R packages
- A team of devoted developers
- A community of active users

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Design principles

- 'Classes' to represent different elements of fisheries systems
  - 'physical' elements (e.g. **FLStock** class represents a fish stock)
  - 'methodological' elements (e.g. **FLBRP** class containing methods to calculate BRP)

- Link objects to create simulations - Lego blocks (MSE example)

- Learning curve: trade off between flexibility and simplicity (no black boxes and no handle turning)

Packages

FLR packages' development model
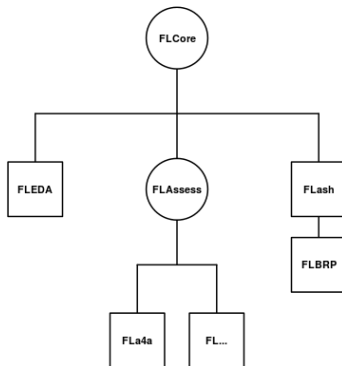
MSE - The Lego block approach
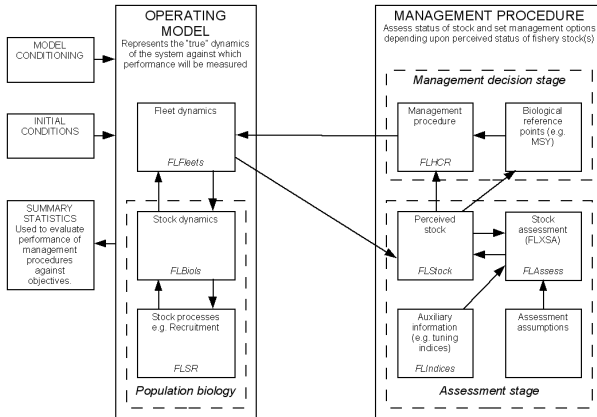
Who's using it ? (2009)

- ICES - 22+ stocks
- STECF - Several including MP & HCR studies
- AFMA - Northern Prawn Fishery
- CECAF - Istam project
- CCAMLR - Patagonian toothfish, Mackerel icefish
- GFCM - Deepwater pink shrimp, Hake in GSA 05
- ICCAT - Bluefin CITES evaluations, Swordfish, Albacore
- IOTC - Albacore, Skipjack, Bigeye, Yellowfin Tuna
- NEAFC - Blue Whiting, NOSS Herring
- NAFO - Greenland Halibut, American Plaice, Placentia Cod
- EC - Evaluation of new CFP
- JRC - a4a Initiative

Open All !!

- Open Science
- Open Data
- Open Source
- Reproducible research
- Open Mind !!

More information

- FLR Project @ `http://flr-project.org`
- Source code @
  `http://r-forge.r-project.org/projects/flr/`
- Repositories
  `install.packages(repos="http://flr-project.org/R")`
- Teach Yourself FLR wiki @
  `http://tyflr.flr-project.org`

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