Stock Assessment Summer School, Module II

Trainers: Chato Osio, Alessandro Mannini, Coilin Minto, Alessandro Orio and Alessandro Ligas

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# Stock assessment in R and formulation of management advice (5 days, 17-21 July 2017)

## Day 1

### Morning

#### Course Introduction

1. Lecture

* Overview summer school, objectives of stock assessment and fisheries management (M Vasconcellos)
* Overview of types of stock assessment methods, their advantages and limitations (A Ligas)
* Data types: data rich and data poor (A Ligas)
* Data-limited stocks/fisheries: an overview of available methods and approaches, their application and limitations, catch only and length based methods (C Minto)

1. Live coding: R (A Orio)
   * Refresher on R data types and operations on data
   * Exercise
   * Build and modify data

### Afternoon

#### Introduction to FLR (Fisheries Library in R) packages. (C Osio)

1. Lecture

* The FLR ecosystem: from simple stock assessment to Management Strategy Evaluation

1. Live coding: The building blocks of FLR (C Osio)

* Data structure:
  + FLCore
  + FLQuant
  + FLIndex
  + FLStock

1. Exercise

* Plot and access FLStocks
* Build an FLStock

## Day 2

### Morning

#### Biomass dynamic models

1. Lecture: Biomass dynamic models and their implementation (SPiCT, mpb), commonalities and differences. (C Minto)
2. Live coding (C Osio)

* SPiCT
* mpb

### Afternoon

1. Exercise

* Fits to datasets with varying contrast
* Diagnostic of model fit to data
* Interpreting model outputs
* If time permits, model trials with own data?

## Day 3

### Morning

#### Virtual Population Analysis

1. Lecture: Virtual Population Analysis and Tuned VPA (XSA) (C Minto)
2. Live coding (A Mannini)

* VPA
* FLXSA

### Afternoon

1. Exercise

* Contrasting un-tuned and tuned VPA assessments
* Diagnostic of model fit to data
* Interpreting model outputs
* If time permits, model trials with own data?

## Day 4

### Morning

#### Statistical Catch at Age (SCA) models

1. Lecture: Statistical Catch at Age models, when to use and what advantages? (C Minto)
2. Live coding (C Osio, A Mannini, A Orio)

* FLa4a (assessment for all)
* Uncertainty in Growth and M
* Time-varying selectivity

1. Exercise

* Basic SCA fit - what's being estimated?

### Afternoon

**Methods for data-limited stocks**

#### Lecture: Data-limited stocks/fisheries: an overview of available methods and approaches, their application and limitations, catch only and length based methods (C Minto)

## Day 5

### Morning

#### Formulation of management advice

1. Lectures:

* Model projections and reference points (A Ligas)

1. Live coding (A Ligas)

* reference points (FLBrp)
* forecasting (FLash)

1. Exercise

* Setting up a short-term forecast

1. Lecture:

* Presenting the results of stock assessment for management advice: best practices (M Vasconcellos/ M Bernal)
* Introduction to the Management Strategy Evaluation approach for management advice (C Osio, A Mannini)

1. Exercise: Preparing a management advice for a case study fishery-

### Afternoon

1. Results and Discussion of management advice for a case study fishery