



## Training course:

# Introduction to Fish Stock Assessment models

**Sliema, Malta**  
**12-16 December 2011**

## Course Plan

### Day 1 Introduction to Fish Stock Assessment

1. Introduction to the course: Objectives, methods, organization; Introduction of the participants, including motivation and expectations
2. Introduction to Fish Stock Assessment as a support discipline to Fisheries Management. The usual evolution of unmanaged fisheries. The reaction of exploited fish populations to exploitation
3. Review of general approaches to Fisheries Management and main types of fisheries management measures: Input control, output control and technical measures
4. Biological Reference Points and Management Control Rules, including the Precautionary Approach to Fisheries Management
5. The contribution of Fish Stock Assessment to appropriate fisheries management:
  - Definition of Biological Reference Points
  - Assessment of the relative merits of alternative fisheries management measures

### Day 2 Modeling fish stocks

1. Basic concepts on fish stocks and fisheries:
  - Fish life cycles and the effect of fishing on stock dynamics
  - The factors leading to change in abundance of a fish stock
  - Recruitment, Growth and Mortality

2. Models for fish population dynamics: Biomass dynamic models versus structural models
3. Long-term projections versus short-term projections: The concept of equilibrium conditions
4. Production models (PMs). Basic assumptions and development of the models. The Schaefer, Fox and GENPROD models. Similarities and differences among the models. Main features and response to exploitation of exploited fish populations according to PMs

### **Day 3 Biological RPs and Dynamic Pool Models (Intro)**

1. Biological Reference Points from PMs. Long-term and short-term population and catch projections using Production Models. Analysing the effect of fishing on fish stocks
2. Structural or dynamic pool models (SMs): basic assumptions and development of the models
  - The cohort concept
  - Cohorts and Stock
3. Main features and response to exploitation of exploited fish populations according to Structural Models (SMs).

### **Day 4 Dynamic Pool Models (Cont)**

1. Biological Reference Points from SMs. Long-term and short-term population and catch projections using Structural Models (including Yield per Recruit Analysis)
2. Evolution of different stock indicators under exploitation pressure. Simple indicators. Use of length as a proxy for age, and the relative age concept
3. The recruitment process and Stock-Recruitment models. Stock-Recruitment models and their use in the Management Advice Process

## **Day 5 Critical aspects of practical fish stock assessment**

1. Main assumptions:
  - Unit stock
  - Uniformity of fishing
  - Environmental Stability
  - Consequences of invalid assumptions and ways to approach them
  
2. Steps in an Assessment:
  - Review of fishery
  - Consolidation of data and exploratory analysis
  - Selection of models
  - Fitting of models
  - Estimation of Biological Reference Points and assessment of stock status relative to these BRPs
  - Short-term projections
  - Elaboration of recommendations for Fisheries Management measures

## **General course approach and information**

### **Computational tools:**

The course will be intensively based on exercises carried out by the participants, using computer spreadsheets (Excel, Open Office Calc).

Participants should be minimally conversant with computers, and especially with the use of computer spreadsheets for scientific calculations.

During the first days of the course, participants will be given an overview of tools and techniques for programming with spreadsheets.

During the last few days of the course, participants will assess a simulated fishery, and prepare the corresponding Assessment Report.

**Bibliography:**

- **Caddy, J.F. & Mahon, R.** (1995). Reference points for fishery management. *FAO Fish. Tech. Pap.* 349: 80p.
- **Cadima, E.** (1991). Some relationships among biological reference points in general production models. *ICCAT, Coll. Vol. Sc. Papers*, (39): 27-30.
- **Cadima, E.L.** 2003. Fish stock assessment manual. *FAO Fisheries Technical Paper*. No. 393. Rome, FAO. 161p.
- **Cadima, E. & Palma, C.** (1997). Cohort analysis from annual length catch compositions. WD presented to the Working Group on the assessment of the Southern Shelf Demersal Stocks. Copenhagen, 1-10 September, 1997.
- **FAO** (1995). Code of Conduct for Responsible Fisheries, Rome, FAO, 41 p.
- **FAO** (1996), Precautionary approach to fisheries. *FAO Fish. Tech. Pap.* 350 (2): 210 p.
- **Haddon, M.** 2001. Modeling and Quantitative Methods in Fisheries. Chapman and Hall/CRC.
- **Sparre P. & Venema S.** 1998. Introduction to Tropical Fish Stock Assessment - Part 1: Manual. FAO Fisheries Technical Paper 306/1 Rev. 2.