Training course on Stock assessment Methods using Catch and Effort data

**Course Context**

This course provides instruction, demonstration, and exercises in stock assessment methods using catch and effort data, as applied to fishery resources. Stock assessment synthesizes information on life history, fishery monitoring, and resource surveys, using mathematical models of population dynamics. Results from stock assessments are used to determine stock size and sustainability of the fishery, and evaluate the consequences of alternative fishery management actions. Conventional data collection for stock assessment purposes and methods to conduct stock assessment using catch and effort data are introduced. Principles of population dynamics are reviewed from the perspective of model building, and several dimensions of complexity are explored. The course is intended as a first step to increase the stock assessment skills in the Eastern Mediterranean.

The course has three general goals. The first is to provide a sound foundation in the fundamentals of data required for stock assessment purposes using catch and effort data. Data collection is of outmost importance for stock assessment as incorrect data will result in wrong decision, leading to disastrous assessments and a waste of resources. For example, estimates of catch and effort data may be very inaccurate if they do not cover all the fleets, including the small scale fishery and the discards at sea.

Secondly an understanding of the basics principles of population dynamics is necessary to develop skills in stock assessments. Methods using catch and effort data such as surplus production models, General Linear Models (GLMs) and time series analysis will be introduced.

The third goal of the course will be to train students with practical applications using stock assessment models based on catch and effort data, with special emphasis on the methodologies currently used in Mediterranean. Students will practice by conducting stock assessments using set examples. This will also prepare the students to take the next steps in a stock assessments, by applying age based stock assessment methods and projections using different management strategies.

**Terms of Reference**

The general objective of the course is to train the students in data requirements for stock assessment, population dynamics and stock assessment models. The course is intended not only to present the theoretical elements but also to guide participants in putting theory into practice through case studies and hands-on exercises on the computer. Specific objectives are:

1. Understand the data requirements for stock assessment purposes
2. Understand the role of stock assessment in fishery science;
3. Conduct stock assessments using surplus production models, using the CEDA and ASPIC package.
4. Estimate Biological reference points (e.g. FMSY, BMSY)
5. Gain basic knowledge of the R package for stock assessment purposes
6. Build experience using R for stock assessment purposes.

**Outcome**

By the end of the course, the participants will

* understand the importance of collecting high quality catch and effort data required for different stock assessment methods
* be familiar with the most common stock assessments methods using catch and effort data used in the Mediterranean
* be able to conduct stock assessments using catch and effort data
* be familiar with indicators and reference points, mainly biological and to some extent economic, as tools in fishery management
* be able to give management advice from the results of the stock assessments
* develop basic knowledge on catch and effort based stock assessments methods and fisheries projections using simulation models to improve scientific advice for managers.

**Course dates**

16–20 March 2015.

**Venue**

Mediterranean Fisheries Research and Production Institute

Antalya, Turkey

**Organization**

The course is organized by the FAO EastMed project in collaboration with the Mediterranean Fisheries Research and Production Institute.

The course and course materials will be provided by the project

The course includes applied examples, case studies, and hand-on exercises on the computer. Participants are required to **bring their own laptops** to connect to FAO EastMed network, with Excel, and the programs CEDA, ASPIC, and R installed.

Participants are also encouraged to bring their own data to use during the course.

The course will be open to a maximum of 20 participants from the EastMed project area as a first priority. The working language is English.

The participants should have a first degree in Fisheries biology or a related discipline. Participants are encouraged to read and be familiar with the following text books:

1)     Hoggarth, D.D., Abeyasekera S., Arthur, R.I., Beddington, J.R., Burn, R.W., Hallas, A.S., Kirkwood, G.P., Mcallister, M., Medley, P., Mees, C.C., Parkes, G.B., Pilling, G.M., Wakeford, R.C., and Welcomme, R.L. (2006) Stock assessment for fishery management. A framework guide to the stock assessment tools of the Fisheries Management Science Programme (FMSP) FAO Fisheries Technical Paper. No. 487. Rome, FAO. 2006. 261 p. Includes a CD-ROM.

1. Jennings S., Kaiser MJ., Reynolds JD (2003) Marine Fisheries Ecology. Blackwell Publishing company. U.K.
2. King M (1995) Fisheries Biology, Assessment and management. Blackwell Publishing company. U.K.

The deadline for the submission of applications is 13th February 2015.

**FAO EastMed Training Course on Stock Assessment Methods using Catch and Effort data**

**Mediterranean fisheries Research and Production Institute**

**16-20 March 2015, Antalya, Turkey**

**Tentative agenda and Timetable**

***Day 1 Introduction to stock assessment and Surplus Production Models***

9.00-9.30        Introduction of the instructors and participants

9.30-10.30      Introduction to stock assessment and population dynamics (M Dimech).

* objectives of stock assessment
* the stock concept
* population growth and the MSY concept,
* input data for stock assessment using production models

11.00-13.00    Fitting models to data (M. Tirasin).

* Assumptions
* Equilibrium approaches

14.30-17.00 Practical session. Use of the excel spreadsheet for model fitting under the equilibrium assumption, with a slight introduction to the Gordon Schaefer bio-economic models (M. Dimech & M. Tirasin).

***Day 2 Surplus production models continued***

9.00 -10.30     Fitting models to data (M. Tirasin & M. Dimech)

* Non equilibrium methods
* Data problems

11.00 - 13.00 Practical session: Use of the FAO CEDA package for model fitting assuming non-equilibrium (M. Dimech & M. Tirasin).

14.30 - 16.00 Practical session: Use of the ASPIC package for model fitting assuming non-equilibrium (M. Tirasin & M. Dimech).

16:30-17:00    Conclusions regarding the use of production modelling. Advantages and disadvantages (M. Tirasin & M. Dimech).

***Day 3 Introduction to R* (**M. Tirasin)

9.00-10.30      The R environment.

-        Basic concepts & commands

-        Variable types and operators

11.00 - 12.30 Reading and exploring data in R

-        Import of data files

-        Exploratory data analysis

14.30-17.00    Practical session: Exploratory analysis and  plotting in R

***Day 4 Generalised Linear Models (GLMs)* (**M. Tirasin)

9.00-9.30        About regression models

-        Multiple regression

-        General Linear Models

-        Generalised

Linear Models

9.30-10.30      Use of GLM for the analysis of CPUE series

-        Objectives

-        Standardization of CPUE data

-        Results' interpetation

11.00-13.00    Fitting GLMs to CPUE data

-        Data exploration

-        Distributional assumptions

-        Variables to be considered

-        Evaluation of model fits

14.30-16.30    Practical session: Standardization of CPUE series by means of GLM approaches under the R environment.

***Day 5 Time Series Analysis* (**M. Tirasin)

9.00-13.00

14.30-17.00

Coffee Breaks: 10.30 - 11.00 & 16-16:30

Lunch breaks: 13.00 - 14.30