The Joint Research Center (JRC) of the European Commission in collaboration with the General Fisheries Commission for the Mediterranean and the Black Sea (GFCM) and the FAO Regional Projects Adriamed, MedSudMed, EastMed and CopeMed is organizing a 5 day training course titled:

## "**Improving the Analysis of Fisheries Data: An Introduction to R and the Fisheries Library based on R (FLR)".**

The training will be held from 04 to 08 November 2013 at the GFCM premises, Palazzo Blumenstihl, Via Vittoria Colonna 1, Rome 00193, Italy.

This training will be held under a series of priority actions of the different institutions involved. The joint Research Centre (JRC), in order to support the EU enlargement policy, promotes the integration of the EU New Member States, Candidate Countries and Potential Candidate Countries in the European Research Area and assists them through an increased participation in relevant activities by offering training and mobility possibilities. In addition to the European Neighborhood Policy (ENP), the JRC is offering the same possibilities on an ad hoc basis also to the ENP Partner Countries. For the GFCM and the FAO Regional Projects, the course is included within the actions towards capacity building in stock assessment, as a way to improve science underpinning management of fisheries in the Mediterranean and the Black Sea, and to follow related recommendations made by the GFCM Scientific and Advisory Committee (SAC).

### *Introduction*

FLR (Fisheries Library in R) is a generic software framework for fisheries biology and assessment, intended to be used to evaluate and develop management strategies for a broad range of biological and economic objectives. Currently the framework is being used (within Europe and farther afield) to develop bio-economic models, multi-annual management plans and fishery independent assessment methods within a variety of fora, including EU research projects, regional fisheries management organisations and national fisheries research institutions.

### *Objectives*

FLR has been developed to enable the development of management strategy evaluation (MSE) models and techniques through a collaborative and open source approach. The objectives of this course are to provide an overview of the classes and data structures that comprise FLR and to show how its modular approach to model building enables complex models to be developed from the combination of simple, smaller units. The course will show how the statistical software environment R ([www.r-project.org](www.r-project.org)) and FLR ([http://flr-project.org](http://flr-project.org)) can be used for simple data exploration and routine stock assessment as well as for complex MSE simulation analyses. The course is intended for fisheries scientists and will assume a basic understanding of concepts related to fisheries stock assessment. In addition, the course is intended to have a specific focus on Mediterranean and Black Sea fisheries and where possible examples will be used that are relevant to these regions. Some prior knowledge of R may be useful but is not an essential prerequisite for this course.

*Structure*

The course will be conducted in English. It will run over a 5 day period and will comprise a combination of presentations, demonstrations and practical exercises. The course material (including all software, presentations, tutorials and data sets) will be available online. Time will be made available towards the end of the course to address specific areas of interest. To this end, participants are encouraged to bring their own data in order to apply the software to their specific requirements. A more detailed outline of the course content is provided below. The first few days of the course will follow a specific program to provide the necessary introductory information. The agenda for the end of the course is intended to be more flexible in order to allow participants to concentrate on areas of specific interest.

*Hardware/Software Requirements*

All software used throughout the course will be open-source and freely available for download from the internet. Participants will be required to provide their own laptops which should, ideally, be wifi enabled.

*Trainers*

The course will be delivered by JRC trainers Mr Colin Millar, Mr Chato Osio and Mr Finlay Scott.

*Registration and funding*

Registration for the course should be done through the registration page, available at the GFCM site

The course is free and registration is open to everybody, however due to limitations of the venue, maximum attendance is set up to 25 participants. Acceptance of applications will be done taking into account maximum attendance. Preference will be made to participants from Mediterranean and Black sea countries, and for those participants involved in the assessment of fish stocks in the GFCM, STECF, SGMED or FAO Regional Projects Stock Assessment Groups. Priority will also be given to participants with some previous experience in R.

The Joint Research Centre (JRC) promotes the integration of the EU New Member States, Candidate Countries, Potential Candidate Countries in the European Research Area and European Neighbourhood Policy Partner Countries and assists them in particular through an increased participation in relevant activities by offering training and mobility possibilities. Under these programs the JRC has offered funding to support participation to the training. Some additional funding for participants from Southern and Eastern Mediterranean countries as well as Black Sea countries will be made available from the GFCM and FAO Regional Projects. Funding by the Regional Projects will take into account nominations following the current procedures of the FAO Regional Projects.

Requests for funding should be addressed to the GFCM Secretariat or to the relevant FAO Regional Project via GFCM-Secretariat@fao.org

## Agenda (Draft)

**Monday Introductions, Software Installation and Familiarisation**

*Objectives:* By the end of the first day you should have successfully installed the software and have a basic understanding of R

Software: R, RStudio

Morning (09:30 - 12:30)

> Introductions
>
> coffee (10:30)
>
> Network set-up and software installation
>
> *demonstration:* Introduction to RStudio

Afternoon (14:00 - 17:00)

> *presentation:* Introduction to R
>
> *practical:* simple R examples
>
> practical: not so simple R examples
>
> coffee (15:30)
>
> *presentation:* plotting in R
>
> *practical:* R graphics examples


**Tuesday Exploratory Data Analysis and Graphical Methods**

*Objectives:* By the end of the second day you should be familiar with the basic classes of FLR, know how to manipulate FLR objects, extract information from them and produce graphical outputs

Packages: FLCore;

Morning (09:00 - 12:30)

> *Demonstration:* Installation of FLR
>
> *Presentation:* Introduction to FLR
>
> *practical:* FLQuants: manipulation of basic FLR classes
>
> coffee (10:30)
>
> *practical:* Composite Objects: more complex FLR classes

Afternoon (14:00 - 17:00)

> *presentation:* Lattice as a basis for FLR plotting
>
> *practical'.* Preliminary data analyses
>
> coffee (15:30)
>
> *demonstration:* Reading data into FLR
>
> *practical* : Data input and output for FLR

**Wednesday Conducting Stock Assessments in FLR**

*Objectives:* By the end of the third day you should be able to conduct stock assessments using FLR and to be able to develop and implement your own stock assessment methods using the tools available in R and FLR.

Packages: FLCore; FLa4a; FLAssess + friends

Morning (09:00 - 12:30)

   *demonstration:V\tt\Tig* stock and recruitment models

   practical: FLSR

   coffee (10:30)

   presentation: Introduction to assessment packages

   *demonstration:* Stock assessment using FLR

   *practical:* Stock assessment - catch free assessment models (FLSurba)

   *practical:* Stock assessment - biomass dynamic models (FLBiodyn)

Afternoon (14:00 - 17:00)

   *presentation:* Stock assessment - A complete assessment in a few lines of code

   *practical:* Stock assessment - statistical catch at age model (FLa4a)

   coffee (15:30)

   *practical:* Stock assessment - VPA based models (XSA, ICA)

**Thursday Forecasting and Estimating Biological Reference Points**

*Objectives:* By the end of the fourth day you should have an understanding of approaches for conducting deterministic forecasts in FLR and for estimating reference points using FLR and the WKFRAME method

Packages: FLCore; FLAssess; FLa4a; Flash; FLBRP; EqSim

Morning (09:00 - 12:30)

   presentation: Short term forecasting

   *practical·.* standard short term forecasts

   coffee (10:30)

   *practical·.* more advanced forecasting

Afternoon (14:00 - 17:00)

   *presentation:* Biological Reference Points

   *practical:* Estimating reference points with FLBRP and EqSim

   coffee (15:30)

   *feedback.* Comments and specific issues to address

   practical:

**Friday Practice with your own stocks**

*Objectives:* To apply what you have learned to specific issues of interest to yourselves.

<u>Morning (09:00 - 12:30)</u>

> presentation:
>
> practical:
>
> coffee (10:30)
>
> *presentation:* Course wrap up and formal conclusion

<u>Afternoon (14:00 - trainers have to leave)</u>

> *practical:* Available to those who still have the stamina to continue
>
> coffee (15:30)