



Use of CMSY Tool for the Assessment of West African Stocks

23-27 September 2019 • Dakar, Senegal

■ OBJECTIVES

The main objective of this training workshop is to introduce CSRP scientists involved in fish stock assessment to two new methods, viz.: (i) for the assessment of fish stocks using time series of catch data and estimates of resilience which can be derived from FishBase, here referred to as CMSY; and (ii) for estimating a snap shot of stock status from length-frequency data from commercial catches, here referred to as LBB.

■ MODULE DESCRIPTIONS

CMSY

This module is based on the method for estimating MSY from catch and resilience of Martell and Froese (2013)¹, which was elaborated by Froese et al. (2016)², and applied to 397 stocks in 14 European ecoregions by Froese et al. (2016; see also <https://github.com/SISTA16/cmsy>)³. The biological data used to estimate resilience will be supplied by FishBase (www.fishbase.org)⁴, created by Rainer Froese and Daniel Pauly in the 1990s, and which is the information system of choice on fish by more than half a million users worldwide. The estimation of priors for this CMSY method was recently integrated as a table in FishBase and has data for most exploited species.

Data required:

- Stock is defined according to ecosystem, and not according to fishing zone;
- A minimum of 10 continuous years of catch data expressed in weight units;
- Resilience (quantitative or qualitative) gathered from FishBase/SeaLifeBase;
- If available, abundance indicators expressed as time series (minimum of three years) of catch-per-unit-of-effort (CPUE) or standing stock biomass;
- If available, independent estimates of B/B_{MSY} for specific years (the most recent of the time series is preferred), and which can be estimated using the LBB method (see below);
- Format data sets according to the Stock_Catch.CSV and Stock_ID.CSV templates provided in the workshop Dropbox folder for the CMSY package.

¹ Martell, S. and Froese, R. (2013) A simple method for estimating MSY from catch and resilience. *Fish and Fisheries* 14(4): 504-514. (download article from http://www.fishbase.de/rfroese/Martell_Froese_2012_SimpleMethod.pdf)

² Froese, R., Demirel, N., Coro, G., Kleisner, K.M., and Winker, H. (2016) Estimating fisheries reference points from catch and resilience. *Fish and Fisheries* 18(3): 506-526. (<http://oceanrep.geomar.de/33076/>; see also http://www.fishbase.de/rfroese/Appendix_4.pdf).

³ Froese, R., Garilao, C., Winker, H., Coro, G., Demirel, N., Tsikliras, A., Dimarchopoulou, D., Scarcella, G. and Sampang-Reyes, A. (2016) Exploitation and status of European stocks. World Wide Web electronic publication (<http://oceanrep.geomar.de/34476/>).

⁴ SeaLifeBase (www.sealifebase.org) will be used for invertebrate stocks.

LBB

This module is based on the method described in Froese et al. (2018; see also https://www.fishbase.de/rfroese/LBB_UserGuide_1.zip)⁵ for estimating B/B_{MSY} based on an assumption that fish grow according to the von Bertalanffy growth equation (VBGF) with parameters, viz.: asymptotic length (L_{∞}), length at first capture (L_c), relative natural mortality (M/K) and relative fishing mortality (F/K) obtained from length-frequency data representative of the commercial catch. Estimates of L_{∞} from FishBase can be used to inform this model.

Data required:

- Length-frequency data must be representative of the annual commercial catch, i.e., can be a sample from the catch but raised to the total catch;
- Viable estimates of VBGF parameters, i.e., representative of the population sampled;
- Format data sets according to the ComDat.CSV and Stock_ID.CSV templates provided in the workshop Dropbox folder for the LBB package.

■ WORKSHOP REQUIREMENTS

1. Venue needs to have a strong and consistent/stable WIFI connection that can accommodate 40-50 users at a time and can hold at least one hour of Skype communications with screen sharing. Assure that Skype is not blocked from the firewall. Also make sure that Dropbox can be accessed.
2. Audio-visual equipment that can accommodate Skype communications.
3. LCD projector.
4. Extension cords for at least 40 laptops.
5. USB sticks (1 per group + 1 master USB stick).

⁵ Froese, R., Winker, H., Coro, G., Demirel, N., Tsikliras, A.C., Dimarchopoulou, D., Scarcella, G., Probst, W.N., Dureuil, M. and Pauly, D. (2018) A new approach for estimating stock status from length frequency data. ICES Journal of Marine Science 75(6): 2004-2015. (download article from https://www.fishbase.de/rfroese/LBBcor_fsy078.pdf).

■ **AGENDA**

| 23 September | Activity | Description | Resource |
|---------------------|-----------------|---|--|
| 8:00-9:00 | Registration | | |
| 9:00-10:00 | Opening | CSRP | M Mayif, Program Director, CSRP |
| 10:00-10:15 | COFFEE | | |
| 10:15-11:00 | Plenary | Why we need to manage fisheries? | D Pauly |
| 11:00-12:00 | Lecture 1 | Basic approaches for fish stock assessments I: LBB | D Pauly |
| 12:00-12:30 | Lecture 2 | FishBase/SeaLifeBase in support of LBB | MLD Palomares |
| 12:30-13:30 | LUNCH | | |
| 13:30-15:30 | Hands on | Install packages: R, RStudio et JAGS, LBB, CMSY; prepare LBB data | MLD Palomares |
| 15:30-15:45 | COFFEE | | |
| 15:45-17:00 | Hands on | LBB Analyses | Participants with help of <i>Sea Around Us</i> |
| 17:00-18:00 | Writing | Prepare reports of LBB analyses | Participants |

| 24 September | Activity | Description | Resource |
|---------------------|-----------------|--|--|
| 9:00-10:00 | Lecture 3 | Basic approaches for fish stock assessments II: CMSY | D Pauly |
| 10:00-10:15 | COFFEE | | |
| 10:15-11:00 | Lecture 4 | FishBase/SeaLifeBase in support of CMSY | MLD Palomares |
| 11:00-12:30 | Hands on | Prepare CMSY data files | MLD Palomares |
| 12:30-13:30 | LUNCH | | |
| 13:30-15:30 | Hands on | CMSY analyses | Participants with help of <i>Sea Around Us</i> |
| 15:30-15:45 | COFFEE | | |
| 15:45-17:00 | Hands on | CMSY analyses | Participants with help of <i>Sea Around Us</i> |
| 17:00-18:00 | Writing | Prepare reports of CMSY analyses | Participants |

Use of CMSY tool for the assessment of West African stocks

| 25 September | Activity | Description | Resource |
|---------------------|-----------------|---|--|
| 9:00-10:00 | Forum | Discussion on errors encountered in LBB and CMSY analyses | D Pauly, MLD Palomares |
| 10:00-10:15 | COFFEE | | |
| 10:15-12:30 | Hands on | Reconstructing reported catches, the Sea Around Us method | Myriam Khalfallah |
| 12:30-13:30 | LUNCH | | |
| 13:30-15:30 | Hands on | Continuation of LBB/CMSY analyses | Participants with the help of <i>Sea Around Us</i> |
| 15:30-15:45 | COFFEE | | |
| 15:45-18:30 | Writing | Prepare work group PowerPoint presentations | Participants |

| 26 September | Activity | Description | Resource |
|---------------------|-----------------|-----------------------------|-----------------|
| 9:00-10:00 | Presentations | Work group presentations | Participants |
| 10:00-10:15 | COFFEE | | |
| 10:15-12:30 | Presentations | Work group presentations | Participants |
| 12:30-13:30 | LUNCH | | |
| 13:30-15:30 | Writing | Work group presentations | Participants |
| 15:30-15:45 | COFFEE | | |
| 15:45-18:00 | Writing | Finalize work group reports | Participants |

| 27 September | Activity | Description | Resource |
|---------------------|-----------------|--|-----------------------------------|
| 9:00-10:00 | Writing | Finalize work group reports | Participants |
| 10:00-10:15 | COFFEE | | |
| 10:15-12:30 | Closing | CSRP | M Sané, Permanent Secretary, CSRP |
| 12:30-13:30 | LUNCH | | |
| | | Afternoon free for discussions if needed | |