

Date	06/01/20122
Reference	Web_EstPopInd_PresentationIndic_EN.Doc

The population indices available on the website

The following indices have been selected for their capacity to provide information on fishery and environmental impacts on exploited populations (see Rochet & Trenkel 2003; Trenkel & Rochet 2003; Bertrand 2004; Rochet *et al.* 2005).

1.1 For all species

[1] Total abundance in the area (relative value) (N)

Due to the limits of sampling plans and methodology, surveys do not give a true value of population abundance in the sampled area. The results must be considered as relative values able to characterize trends in survey series, when sampling plans and methodology are exactly the same all along the series. Index: N (in number)

[2] Natural Logarithm of abundance (Log(N))

Natural Logarithm of the number of individuals in the area)

[3] Total biomass in the area (relative value) (W)

Total biomass (kg) in the area. Due to the limits of sampling plans and methodology, surveys do not give an absolute value of population biomass in the sampled area. The results must be considered as relative values able to characterize trends in survey series, when sampling plans and methodology are exactly the same all along the series.

[4] Mean individual weight in the population (Wbar)

Mean individual weight (kg).

4.1 For species for which individual length is collected

[5] Mean length in the population (Lbar)

Mean individual length (cm) in the population (see Fig. 2). This is calculated ignoring the stratified sampling scheme.

[6] Length at the xth percentile of the length distribution (L0.x)

Length (cm) at the xth percentile (x=5, 25, 75, 95) of the length distribution (see Fig 2).

[7] Sample variance of length measurements (Lvar)

Variance of length distribution.

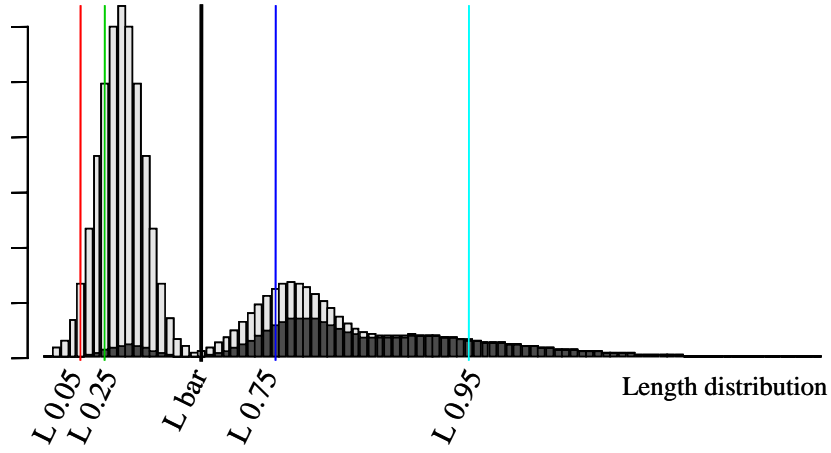


Figure 2. Schematic representation of the metrics related to body length.

[8] Methodology

All the indices are calculated for the whole area considered taking account of the stratified sampling design with the exception of length-based metrics.

Symbols used :

Data	Description
$N_i(t)$	Index of total abundance for the species i
$N_{l,i}(t)$	Index of abundance in the class l for the species i
$B_i^{(t)}$	Index of total biomass for the species i
A_j	Surface of the stratum j
$a_{k,j}$	Swept area for the haul k in the stratum j
$y_{l,i}$	Catch number in the size class l for the species i
$y_{i,k,j}$	Catch number for the species i in the haul k in the stratum j
$w_{i,k,j}$	Catch weight for the species i in the haul k in the stratum j

- Total abundance in the area : **N**

$$N_i = \sum_j N_{i,j} = \sum_j A_j \sum_{k=1}^{n_j} y_{i,k,j} / \sum_{k=1}^{n_j} a_{k,j} \quad \text{Var}(N_i) = \sum_j \frac{A_j^2}{n_j - 1} \sum_{k=1}^{n_j} \left(\frac{y_{k,j}}{a_{k,j}} - \frac{\sum_{k=1}^{n_j} y_{k,j}}{\sum_{k=1}^{n_j} a_{k,j}} \right)^2$$

- Total biomass in the area: **W**

$$W_i = \sum_j W_{i,j} = \sum_j A_j \sum_{k=1}^{n_j} w_{k,j} / \sum_{k=1}^{n_j} a_{k,j} \quad \text{Var}(W_i) = \sum_j \frac{A_j^2}{n_j - 1} \sum_{k=1}^{n_j} \left(\frac{w_{k,j}}{a_{k,j}} - \frac{\sum_{k=1}^{n_j} w_{k,j}}{\sum_{k=1}^{n_j} a_{k,j}} \right)^2$$

- Average individual weight in the population: **Wbar**

$$W_{bar_i} = W_i / N_i$$

- Mean length in the population: **Lbar**

$$L_{bar} = \frac{1}{y_i} \sum_{l=1}^L y_{l,i} l$$

- Length at the percentiles of the length distribution

$$L_{q,i} = l_{q,i} \left| \frac{\sum_{l=1}^L y_{l,i}}{y_i} = q \right.$$

- Sampling variance of length: **Lvar**

$$L_{var_i} = \left(\frac{\sum_{l=1}^L y_{l,i} l^2}{y_i} - L_{bar_i}^2 \right)$$

All the calculations have been made using a standardised software (R-SUFI software) integrating the whole data analysis chain (Rochet *et al.* 2004).

[9] Estimates available through the website

The estimates available through the website are the values of each of the indices described above. The information for the gulf of Lions and East Corsica has been validated by an international working group in an integrated approach for elaboration of population and community indicators (Medit 2007). The results are given by GSA and by species for the whole available data series.

The user may select the geographical area, the species and the index. For the selections for which the information is available, the system produces a graph showing the time series of the index, with the 95% confidence interval. It gives the possibility for downloading the corresponding data table, including the values of the index by year, as well as the standard error and its coefficient of variation.

[10] References

- Bertrand J. A. ed 2004. L'état des communautés exploitées au large des côtes de France. Application d'indicateurs à l'évaluation de l'impact de la pêche. DRV/RH/RS. Vol. 04-001. Ifremer: 172 p.
- Medit, 2007. Assessment of indicator trends related to exploited demersal fish populations and communities in the Mediterranean. DCR Medits Working group. Nantes (France), 15-18 March 2005 and Kavala (Greece), 2-6 April 2006. Available at <http://www.ifremer.fr/docelec/default-en.jsp>. 168 p.
- Rochet M. J. & V. Trenkel, 2003. Which community indicators can measure the impact of fishing? A review and proposals. *Can. J. Fish. Aquat. Sci.* **60**: 86-99.
- Rochet M. J., V. M. Trenkel, R. Bellail, F. Coppin, O. Le Pape, J.-C. Mahé, A. Morin, J.-C. Poulard, I. Schlaich, A. Souplet, Y. Vérin & J. A. Bertrand, 2005. Combining indicator trends to assess ongoing changes in exploited fish communities: diagnostic of communities off the coasts of France. *ICES Journal of Marine Science* **62**: 1647-1664.
- Rochet M. J., V. M. Trenkel, J. A. Bertrand & J.-C. Poulard, 2004. R routines for survey based fisheries population and community indicators (R-SUFI). Ifremer, Nantes. Limited distribution.
- Trenkel V. & M. J. Rochet, 2003. Performance of indicators derived from abundance estimates for detecting the impact of fishing on a fish community. *Can. J. Fish. Aquat. Sci.* **60**: 67-85.