A Proposed Method for Standardization of the Selection of Class Intervals for Length Frequency Analysis

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The selection of a certain size class interval to group length data for length frequency analysis is generally considered to be at the option of the user. In the literature one finds at the most some simple rule of thumb, such as to use classes of 0.5 cm for fish of up to 30 cm and of 1.0 cm for bigger fish (Holden and Raitt, 1975). It is stated that very small species might require smaller class intervals.

Users of the ELEFAN programs know, however, that ELEFAN programs output values (L_∞, K and especially ESP/ASP) vary according to the interval size used for grouping the original data. It thus seems that without a generally valid rule, much subjectivity enters the analysis, or what is even worse, that expected output values might be generated by simply using the "appropriate" different interval sizes.

Populations of fast growing species will be composed of less modal (age) groups than slow growing species with the same L_{max}. The use of a certain size interval might allow for smoothing out the irregularities in the data of the fast growing species (thus screening out the noise of the data and producing visually improved modal groups) whereas in the slow growing species some modal groups might simply disappear because the resolution is too rough. So - how do I find an adequate interval if I do not know whether I am dealing with a slow or a fast growing species? I think one has to go back to the main criteria for using length frequency analysis to extract growth parameters: modal groups should be apparent from the raw data. If they are not, one should use other methods. Having a certain data range and number of assumed modal groups in the sample one can divide the value of L_{max} (in the sample) by the number of modal groups assumed to be present in the sample, thus obtaining a rough estimate of average yearly size increment or average distance from one modal group to the other (this average is only arbitrary, of course, as it does not consider that growth slows down with age and that actual distances between modes also decrease). Ten percent of the value so obtained appeared to be, empirically, the best for the final interval size; thus

$$\text{Interval size to be used} \approx \frac{L_{max} \bullet 0.1}{\text{Number of assumed modal groups}}$$

I used this formula for a great variety of species (scallops, gastropods, small fish (L_{max} about 30 cm) and big fish (L_{max} about 120 cm) to select an interval size and compared the ELEFAN estimates of K and L_∞ with the same values obtained by methods other than length frequency analysis, and found out that they generally agreed quite well. I also found that the difference between the estimates of length frequency analysis and the other method increased with increasing departure of the length interval used from that provided by the equation above.

Reference

Holden, M.J. & D.F.S. Raitt (Eds.) 1975. Manual de Ciencia Pesquera. Parte 2 - Metodos para investigar los recursos y su aplicacion. Doc. Tec. FAO Pesca, (115) Rev. 1:211 p.