Journal of Fisheries International 7 (1): 10-12, 2012
ISSN: 1817-3381

Comparative Study of Length-Weight Relationship of Puntius, Inhabiting Nainital and Bhimtal Lakes, India

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Abstract: Length-weight relationships of Puntis was calculated, collected from lake Nainital and Bhimtal. Total 50 samples (pooled) of fish from Nainital and 65 samples (pooled) from Bhimtal were calculated. Results reveal that that there is a close relationship between the length and weight of fish. The value n of length-weight relationship in Lake Bhimtal was 3.759 and 3.695 in lake Nainital from pooled data.

Key words: Puntius, Himalayan lakes, Kumaun, fish, Nainital, India

INTRODUCTION

Total length and fork lengths are usually utilized in studies of fish growth where as standard length is mainly used in systematic studies. When making comparisons between populations, it is essential to use standard measures for all populations so that the results will be more reliable. This is why, the length-weight relationship of species under various environmental conditions should be known (Arslan *et al*., 2004). The length-weight relationship is a very useful tool in fisheries assessment. It is usually easier to measure length than weight and weight be predicted later on using the length-weight relationship. Furthermore, standing crop biomass can be estimated (Morey *et al*., 2003) and seasonal variations in fish growth can be tracked in this way (Richter *et al*., 2000).

The purpose of this study was to find out the comparative analysis of same fish specie in two different lake and to find out that is there any difference in length-weight relationship of fishes between Lake Nainital and Bhimtal because Lake Nainital is eutrophic and lake Bhimtal is oligotrophic in nature.

MATERIALS AND METHODS

Samples were collected from lake Nainital and Bhimtal, those are situated at 1937 m altitude, 29°24'N latitude and 79°28'E longitude and at 1331 m altitude, 29°20'N latitude and 79°29'E. Length-weight relationship of 50 fishes from Nainital lake and 65 fishes from Bhimtal lake were recorded pooled from May 7 and April 9. The statistical relationship between length-weight of fishes were established by using the parabolic equation by Le Cren (1951).

$$W = aL^n$$

Where:
W = Weight of fish
L = Length of fish
a = Constant
n = An exponential expressing relationship length-weight

The relationship ($W = aL^n$) when converted into the logarithmic form gives a straight line relationship graphically:

$$\text{Log } W = \text{Log } a + n \text{ Log } L$$

When (n) represents the slope of the line.

$$\text{Log } a = \text{Constant}$$

RESULTS AND DISCUSSION

The specimens for their total lengths in Lake Bhimtal ranged between 4.9-8.8 cm those deguted immediately and weighed 2.7-13.2 g and in Lake Nanital, it ranged between 4.8-8.8 cm and weighed 2.6-13.3 g. The curvilinear relationship was observed when original deguted weights were plotted the respective total length of the fish however, linear relationship was obtained when the values converted to logarithermic value (Fig. 1-4). An analysis of samples of was done pooled data obtained following as:

Lake Bhimtal:

$$\text{Pooled Log } W = 1.673122 + 3.695 \text{ Log } L$$
$$= 47.111\ L^{3.695}$$

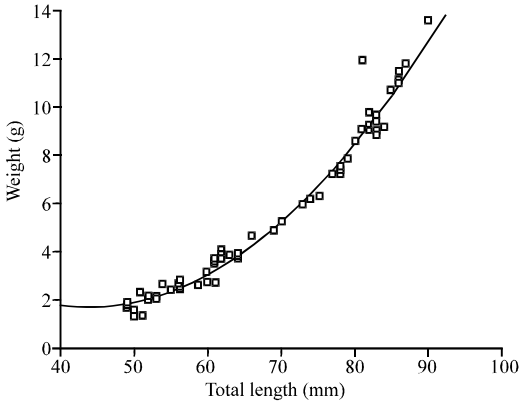

Fig. 1: Length-weight relationships between total length and weight (lake Bhimtal)

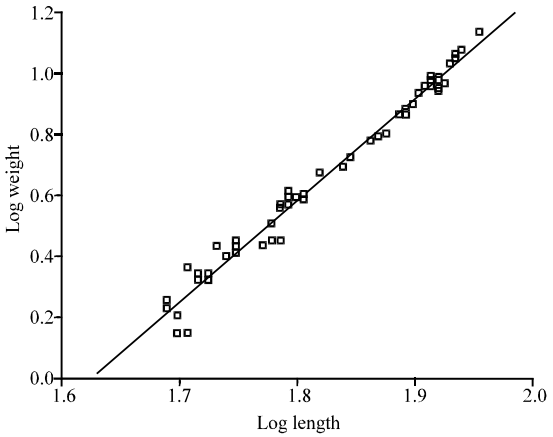

Fig. 2: Log total length and log weight relationship (Lake Bhimtal)

Lake Nainital:

$$\text{Pooled Log } W = 1.673343 + 3.759 \text{ Log } L$$
$$= 47.135\ L^{3.759}$$

The value of n of length-weight relationship of pooled data in Lake Bhimtal was 3.759 and 3.695 in Lake Nainital. According to Le Cren (1951), the exponent n usually varies between 2-5 in the majority of case the values of n = 3. The length-weight relationship of *Tor putitora* has been discussed by Johal and Tandon (1981) and Johal *et al.* (2005) collected from different streams and reservoirs. They found the value of n of length-weight relationship is either 3 or very near to 3. The present result are more in conformity to Nautiyal (1984) and Shafi and Quddus (2000). Pandey (1995, 1998) and Mohan and Saraswat (2000) in their observation on the length-weight relationship expressed the view that cubic relationship hold good only when the form of the

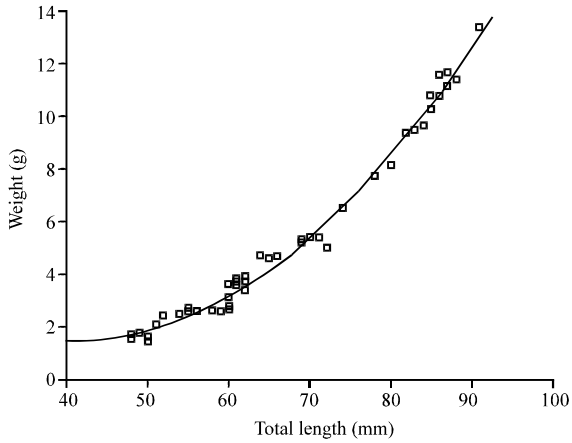

Fig. 3: Length-weight relationships between total length and weight (Lake Nainital)

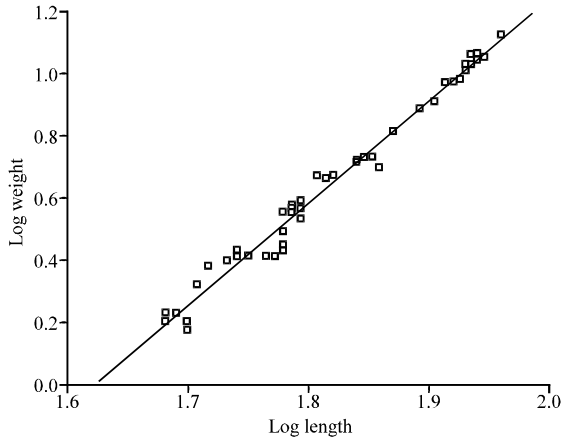

Fig. 4: Log total length and log weight relationship (Lake Nainital)

fish and its gravity remain constant throughout life. However, Chonder (1972), Sultan (1981) and King (1996) reported some deviations in the length-weight relationship on the basis cube law as applied for fishes.

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