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Research Article

Length-weight relationship of *Labeo calbasu* (Hamilton, 1822) and *Labeo fimbriatus* (Bloch, 1795) along the lower stretches of Tamiraparani river, Tamil Nadu

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ABSTRACT

Length-weight relationship of *Labeo calbasu* and *Labeo fimbriatus*, was studied a period of one year from June 2017 to May 2018. The slope value (b) estimated for *L. calbasu* and *L. fimbriatus* both male were found to be 2.1655 and 2.8185, which shows both the species exhibits negative allometric growth pattern. The regression equation calculated for *L.calbasu* was Log W = -1.0004 + 2.1655 Log L and for the *L. fimbriatus* was found to be Log W = -1.40391 + 2.8185 Log L. Both the species were length-weight relationships analysed by Analysis of Variance (ANOVA).The result was found lower stretches of Tamiraparani river with three sampling sites respectively. The F value between the species showed a significant difference at 1% level. The b value differed from the ideal cube law of '3' as is with the case of length-weight relationship studied in this species else-where. *L. fimbriatus* and *L. calbasu* had a 'b' value of 2.8185 and 2.1655. The slope value was compared here could be very useful for comparison with Labeo species in other geographical locations.

INTRODUCTION

Fisheries are one of the most important sources of revenue and socio-economic industry of our country and serves as an important food sector next to agriculture in human nutrition. However, the freshwater capture fisheries play a vital role in fulfilling the animal protein requirement of human beings. India is blessed with good water resources like many rivers, dams, floodplains *etc*. More than 60.3% of the primary freshwater fishes of India are endemic to the country, with the highest endemicity found in Western Ghats biogeographic zone. As per the IUCN (2015) Red Data List, 17.25% among primary freshwater fishes are in threatened category. *Labeo* genus under cyprinidae family is having high diversity of species all over India with very good consumer preference because of its taste and acceptance. At present, there are 25 species available throughout India (Gopi *et al*., 2017). In Tamil Nadu, commonly 5 species (*L. rohita*, *L. calbasu*, *L. boga*, *L. fimbriatus*, *L. punctatus*) are available in southern districts *Labeo rohita*, *Labeo calbasu* and *Labeo fimbriatus* are widly available. During the early 2000, *Labeo calbasu* and *Labeo fimbriatus* were having a great importance throughout Tamiraparani river stretches and their fishery is similar to the three other Indian Major Carps such as Catla (*Gibelion catla*), Rohu (*L. rohita*) and Mrigal (*Cirrhinus mrigala*), while the availability of *L. calbasu* and *L. fimbriatus* fishes are in declining stage. Although fish farmers lost interest due to the unavailability of seeds either natural or artificial sources. It is one of the most important causes for this species is going to reach threatened level in Indian freshwater ecosystem.

First, it establishes the mathematical relationship between the two variables, Length and weight so that the unknown variable can be readily calculated from the known variables from the practical fisheries problem. Secondly, the relative condition can be estimated to assess the general wellbeing of the animals. Finally it is used in the estimation of potential yield per recruit in the study of their population dynamics. The actual relationship of length and weight may part from the cubic value 3, and this may be due to environmental condition in which animal lives and also due to the physiological condition of the animal. Length-weight relationships studies of any fish species is a pre requisite for the study of its populations. The knowledge length-weight relationships of the fish is essential, since various important biological aspects, *viz*, general wellbeing of fish, appearance of first maturity, onset of spawning, etc., can be assessed

with the help of condition factor, a derivative of the relationship. Moreover the length-weight relationships of the fish is an important fishery management tool because they allow the estimation of the average weight of the fish of the given length group by establishing a mathematical relationship between the two. As length-weight relationships of the fish are among the important morphometric characters, they can be used as a purpose of fish stock assessment. The estimation of yield per recruit in prediction models, and in the estimation of biomass from the length observation and limited studies has been made on population dynamics. As no work has been done in the species region, in this present study the length- weight relationship of *L. calbasu* and *L. fimbriatus*

MATERIALS AND METHODS

The length frequency and catch data were collected for both the species from the lower stretches of Tamiraparani river in Thoothukudi and Tirunelveli districts from June 2017 to May 2018. The length-weight relationship was carried out *L. calbasu* and *L. fimbriatus* in accordingly 850 and 730 specimens respectively. The smallest size of *L. fimbriatus* was recorded with 110 mm TL and 26.34 gm weight and the largest size was recorded than the TL 305 mm and the weight of 523.05 gm. The smallest size recorded for *L. calbasu* was with 121 mm TL and 180.65 gm weight. The largest specimen recorded as 420 mm TL with 467.05 gm weight.

The length-weight relationships was calculated by method of least squares using the equation of (Le cren, 1951) $W = a L^b$ (or) Log W = Log a + b * Log L Where, W is total body weight (gm), L is the total length (mm), 'a' and 'b' are the co-efficient of the functional regression between W and L. Analysis of variance was employed to find out whether the regression coefficients differed significantly between both the species. The significance of the difference in the estimate of 'b' in pooled data of the sexes from the expected value of 3 (isometric growth) was tested by as given formulae.

RESULTS AND DISCUSSION

The maximum length recorded for *L. calbasu* and *L. fimbriatus* was found to be 420 mm and 305 mm respectively. The linear equation was also fitted separately for both the species.

The present study showed the relationship was indicated negative allometric growth in both the *L. calbasu* and *L. fimbriatus*. Depending upon the deviation of 'b' values from '3', fishes can be classified into three groups (i) b=3 where the body form of the fish remains constant at different length (isometeric) (allen, 1938), (ii) b<3 when fish becomes more slender as the length increases and (iii) b>3 (allometeric) when fish grows stouter with increases of the length (Growner, 1976)

The previous study revealed that the length-weight relationship of *L. rohita* (Jhingran, l952), *L. calbasu* (Pathak, 1975), *L. fimbriatus* (Rajanna, 2015) exhibit positive allometeric growth patterns. *Puntius kolus* (Bhatnagar, l963) *L. fimbriatus* (Bhatnagar, l972). Where Pathak, 1975; Alam, 2000; Singh, 2006 exhibited the positive allometric growth along the Ganga River and Loni reservoir.

In the present study the data on seasonal variation in the condition of both male and female showed that the values were more or less similar in both the sexes, thus indicating almost identical metabolic activity. The high condition exhibited by both the sexes in *L. calbasu* during September (Kn = 1.4593 for male and female 1.5120) may be due to gonadal development and high feeding intensity. In *L. fimbriatus* the high K value exhibit both the sexes in November (Kn= 1.05231 and 1.13210 for male and female) (Table. 1 and Fig. 1&2) Mature gonads appearing conspicuously from June onwards will further support and increase the Kn values. Thus available data suggest that the monthly variation in Kn values may be related to maturity or feeding intensity. It is also possible that some unknown factors may also be playing a role. The earlier report also has revealed the characters Fluctuations in the condition of the fish is related to reproductive cycle (Le Cren, l95l; Qayyum and Qasim, l964a), feeding rhythms (Hile, 1948; Qasim, 1957), physicochemical factors of environment, age, physiological state of fish or some other unknown factors (Brown, l957; Kumar *et al*., 1979). Umesh *et al*.,(2012) observed an almost isometric pattern of growth in *L. rohita* and the condition factor values showed that it is in good condition or health and the condition existing was conducive for the feeding and optimum growth of fish.

The fluctuations in the Kn values of this study with respect to size indicates that the condition of fish showed more or less an increasing trend with the increase in size of the fish. The highest Kn values in *L. calbasu* observed in male (320-380mm) and female (355-410 mm). In case of *L. fimbriatus* the increase in Kn value in male (250-280 mm) and female (245-310 mm), it can be inferred that the variation in the condition of *L. fimbriatus* and *L. calbasu* is due to feeding activity and probably other unknown factors. Renukadevi (2002) also related variation in Kn values to sexual cycle and feeding intensity as the known factors.

Table 1: Length weight relationship of *L. fimbriatus* and *L. calbasu*

Species	Parabolic	Logarithmic equations
L. fimbriatus	$W = 0.0394\ L^{2.8185}$	Log W = -1.40391 + 2.8185 Log L
L. calbasu	$W = 0.0999\ L^{2.1655}$	Log W = -1.0004 + 2.1655 Log L

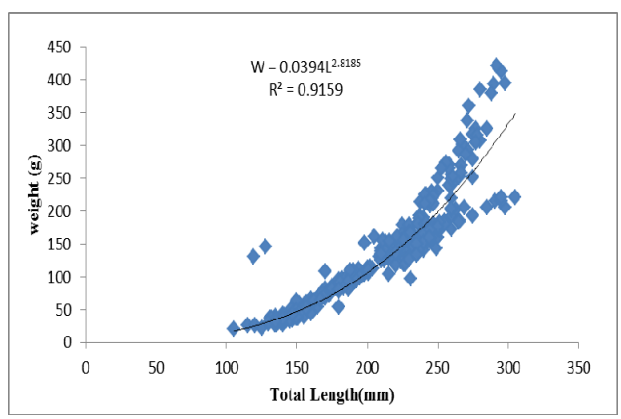

Fig. 1: Length-weight relationship of *L. fimbriatus*

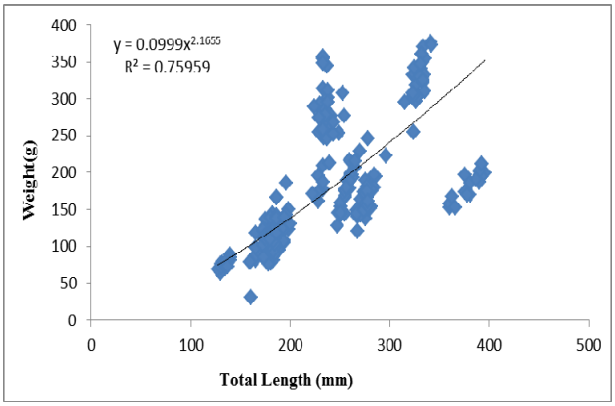

Fig. 2: Length-weight relationship of *Labeo calbasu*

CONCLUSION

In fishes 'b' usually 3 in the length-weight relationship, but during growth change in specific gravity of body contour, morphological changes due to age and ecological changes in the different environmental condition (Qayyum and Qasim, l964a). The parameter 'b' unlike the parameter 'a' may vary seasonally and even daily, and between habits. The LWR parameter may also vary with in the same species due to feeding, due to reproduction and fishing activity (Hile, 1948), environmental changes, individual metabolisms, sexual maturity and ages(Kumar et al., 1979). With comparing the slope of *L. calbasu* and *L. fimbriatus* with other Labeo species, it could be concluded that the slope value is less than 3 the both the species of *L. calbasu* and *L. fimbriatus*.

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