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Ram Kumar

Fishery and Aquatic Biology
Laboratory, Department of
Zoology, Rajiv Gandhi
University, Rono Hills,
Doimukh, India

Santoshkumar Abujam

Fishery and Aquatic Biology
Laboratory, Department of
Zoology, Rajiv Gandhi
University, Rono Hills,
Doimukh, India

Achom Darshan

Centre with Potential for
Excellence in Biodiversity,
Rajiv Gandhi University,
Rono Hills, Doimukh, India

Anita Kumari

Department of Zoology, B. R.
A. Bihar University,
Muzaffarpur, Bihar-842001

D. N Das

Fishery and Aquatic Biology
Laboratory, Department of
Zoology, Rajiv Gandhi
University, Rono Hills,
Doimukh, India

Correspondence:

Santoshkumar Abujam

Fishery and Aquatic Biology
Laboratory, Department of
Zoology, Rajiv Gandhi
University, Rono Hills,
Doimukh, India

Length-Weight Relationship of *Lepidocephalichthys guntea* (Hamilton, 1822) From Dikrong River, Arunachal Pradesh

Ram Kumar, Santoshkumar Abujam, Achom Darshan, Anita Kumari, D. N. Das

Abstract

The length-weight relationship of *Lepidocephalichthys guntea* had been carried out from the Dikrong River Arunachal Pradesh during September 2016 to August 2017. The value of regression coefficient (b) for male, female and pooled was 2.85, 2.76 and 2.81 respectively. It reveals that males have slight better growth than females. However, both sexes signify a negative allometric growth pattern. The coefficient of correlation (r) shows more or less similar trend in males (r = 0.8056), females (r = 0.8492) and pooled (r = 0.7593). It indicates that there was a good correlation between length and weight of the fish. The overall average condition factor 'K' value of male was recorded as 9.15, for females (9.10) and for combined gender (9.12).

Keywords: *Lepidocephalichthys guntea*, Length-weight, Dikrong River, Arunachal Pradesh.

Introduction

Length-weight relationships (LWRs) of fishes which are important in the biology of fishes and stock assessments, estimate the fish's average weight with a given length category using mathematical equations. LWRs of fishes were originally used to provide information on the condition of fish and determine whether somatic growth was isometric or allometric (Le Cren 1951; Ricker, 1975). LWRs may be used as morphometric characters among taxonomy and also shows relationship of different developmental events of life such as growth, maturity, metamorphosis (Thomas et al., 2003). *Lepidocephalichthys guntea* are generally found on the bottoms of streams, swamps, flooded fields, lakes in the Brahmaputra and Ganges stream wastes in North India, Bangladesh and Nepal (Havird and Page, 2010). In natural conditions, they remain incompletely covered under sand or mud. They are considered as food and ornamental value. The colour of the fish is charcoal brownish, a series of dark blotches along mid lateral, ventral whitish, dorsal and caudal fin light brownish and small dark spots scattered the body. The study of length-weight of Genus *Lepidocephalichthys* is very limited in the Indian sub-continent. Dhakal and Subba (2003) described length-weight relationship of *L. guntea* from the PathriKhola in Morang District, Nepal. Hossain (2010) investigated on the morphometric relationships of length-weight of *L. guntea* from the Padma River Bangladesh. Das and Bordoloi (2014) investigated on the Length-weight relationship of *L. goalparensis* from Kukurmara of Kamrup district, Assam. Recently, Gohain and Deka (2017) studied the length-weight relationship and relative condition factor of *L. guntea* from the GhatiBeel of Dhemaji district of Assam, India. Islam et al. (2017) studied the length-weight relationship of *L. guntea* from the Atrai and Brahmaputra rivers, Bangladesh. However, there is no information on the length-weight relationship of *L. guntea* from Arunachal Pradesh. Hence, the present investigation on length-weight relationship of *Lepidocephalichthys guntea* has been taken up from the Dikrong River in Papum Pare district of Arunachal Pradesh, India.

Materials and Methods

A total of 147 species of *L. guntea* species (Fig. 1) was collected using electro-fishing device from three sites of the Dikrong River, Arunachal Pradesh, during September, 2016 to August, 2017. The collected samples was preserved in 10% formalin solution and then identified following the standard procedure of Havird and Page (2010). Samples were measured to the nearest 0.01 mm total length (TL), using a Vernier digital caliper (Precisa ES 225SM-DR) and weighed to the nearest 0.01 g total weight (TW). The parameters of the length–weight relationship $W=aL^b$ were estimated by linear regression of the log-transformed



Fig. 1: A specimen of *Lepidocephalichthys guntea*

Results and Discussion

The logarithmic regression equations of length-weight relationships (LWRs) in male, female and pooled (both sexes) of *Lepidocephalichthys guntea* was given below:

Male: $\text{Log } W = -4.731 + 2.85 \text{ Log } L$

Female: $\text{Log } W = -4.567 + 2.76 \text{ Log } L$

Pooled: $\text{Log } W = -4.671 + 2.81 \text{ Log } L$

The value of regression coefficient (b) for male was 2.85, for female 2.76 and pooled 2.81 (Table 1). The highest b value was found in male in compared to female. The growth coefficient of male gained the weight at the rate in relation to its length whereas a low growth coefficient in female implies a low growth rate. Both male and female had a clear deviation from the isometric growth pattern ($b=3$) and didn't follow the cube law. This growth pattern signifies a negative allometric growth pattern ($b < 3$) which means increase of weight in either sex is not proportional to the increment in body length. The pooled data of both the sexes also gave a negative allometric growth pattern ($b < 3$). The regression graph indicated a curvilinear relationship in case of observed value and a straight line relationship in respect to logarithmic transformation (Fig. 2-4). The significance of variation in the estimated regression coefficient 'b' from '3' was tested using 't' test for both the sexes and pooled. The result of t-test was recorded as 71.213 in males, 43.345 in females and 74.706 in pooled. It reveals that there is a significant departure of b from the standard 3 ($p < 0.05$) for male, female and pooled. The present observation was found to be divergent with the findings of Dhakal and Subba (2003); Gohain and Deka (2017) as the female and combined gender of *L. guntea* followed the positive allometric growth. Further, it was also

weight and length (Le Cren, 1951). The equation was transformed into a logarithmic and expressed as: $\text{Log } W = \text{Log } a + b \text{ Log } L$; where 'a' is a constant being initial growth and 'b' is the growth coefficient. The values of 'a' and 'b' were determined empirically. Regression analysis for log-log of length–weight data were analyzed using Microsoft Excel 10. Condition factor or Ponderal index (K) was calculated by using the following formula: $K = W \times 1000/L^3$; where, K = Condition factor; W = average weight of the fish (g); and L = mean length of the fish (mm); the number 10^3 is a factor to bring the Ponderal index (K) near to unity (Carlander, 1970).

divergent with the findings of Hossain (2010); Islam et al. (2017) as the growth coefficient of combined gender for *L. guntea* was positive allometric growth. However, the present finding was close similar with the observations of Das and Bordoloi (2014) in *Lepidocephalichthys goalparensis*. In other freshwater fishes, the allometric growth was also reported by various workers (Froese, 2006; Abujam and Biswas, 2014; Abujam and Biswas, 2016; Dakua et al., 2016). Deviation from the isometric growth may be due to the change in error sampling, locality, sex, gonad maturity, condition of the fish and environmental factors. If the fish growth is isometric, the exponential value will be exactly 3.0 or else a value significantly smaller or larger than the given standard indicates an allometric growth pattern (Wootton, 1990). Again, Froese (2006) also reported growth the exponential value for isometric must be between 2.5 and 3.5. The correlation coefficient 'r' between log length and log weight (Table 1) of *L. guntea* was found to be 0.80 (for males), 0.849 (for females) and 0.7593 (for pooled). It reveals that there was a good correlation between length and weight in *L. guntea*. Further, the length-weight regression coefficient was highly significant in both the sexes. The overall average K value (Table 1) of male was recorded as 9.15, for females (9.10) and for combined gender (9.12). The highest K value was noticed in male and lowest in combined gender. It reveals that both the sex is in healthy condition and the fish inhabiting the aquatic ecosystem is favorable for the optimum growth. Variation of the 'K' value may be due to the different sexual maturity, feeding intensity and available of natural food.

Table1. Length -weight relationship and condition factor of *Lepidocephalichthys guntea*

Sex	n	Log a	b	t	P	r	K
Male	75	-4.7317	2.85	71.213	<0.05	0.80	9.15
Female	72	-4.567	2.76	43.345	<0.05	0.849	9.10
Pooled	147	-4.6719	2.81	74.706	<0.05	0.759	9.12

Legend: n = number of fish; log a = intercept; b = regression coefficient; and t = t-test
 r = coefficient of correlation; K = Condition factor

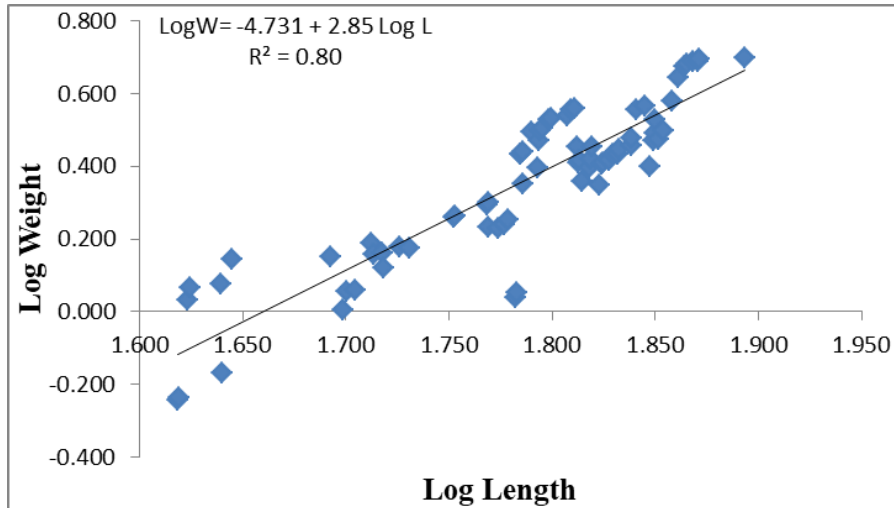


Fig. 2: Length-Weight relationship in males of *Lepidocephalichthys guntea*

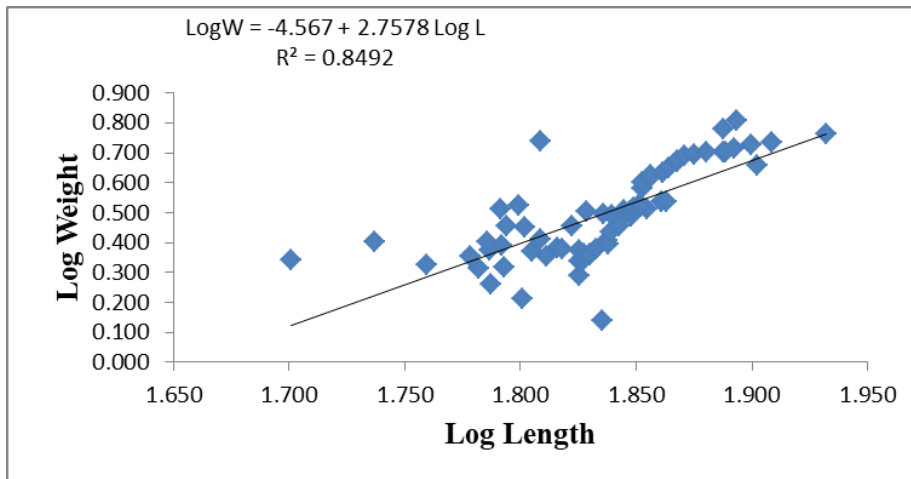


Fig. 3: Length-Weight relationship in females of *Lepidocephalichthys guntea*

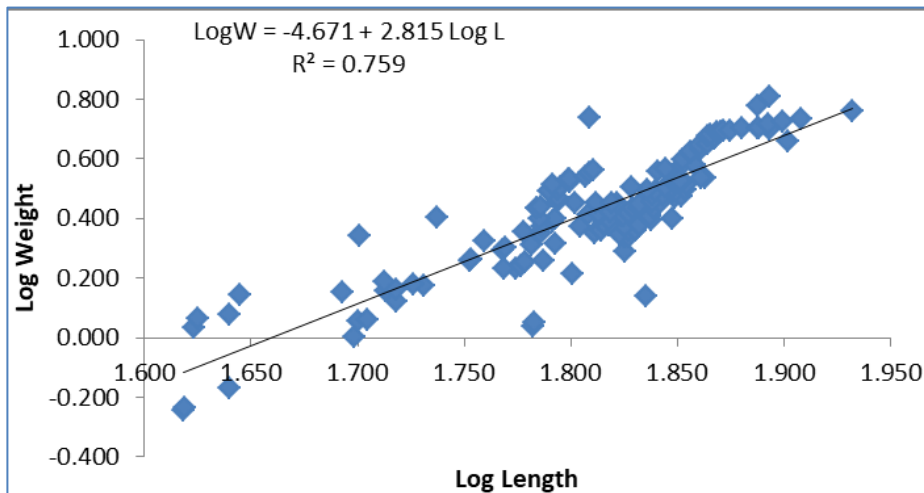


Fig. 4: Length –Weight relationship of *Lepidocephalichthys guntea* (Pooled)

Conclusion

In conclusion the length weight relationship of *L. guntea* was slightly departure from the isometric growth pattern and did not follow the cube law as the 'b' values for both the sexes found below 3. They showed a negative allometric growth rate. The condition factor 'K' was found above the ideal value and indicated that the species were in healthy conditions in their natural habitats. Moreover, it will be helpful towards the planning of conservation for this species through habitat protection.

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