



# International Journal of Fisheries and Aquatic Studies

ISSN: 2347-5129

(ICV-Poland) Impact Value: 5.62

(GIF) Impact Factor: 0.352

IJFAS 2016; 4(3): 548-551

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www.fisheriesjournal.com

Received: 19-03-2016

Accepted: 20-04-2016

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## Length- Weight relationship and relative condition factor of Peacock eel (*Macrogathus aral* (Bloch and Schneider, 1801) from Dora Wetland of Assam

**Snigdha Chakraborty and MM Goswami**

### Abstract

*Macrogathus aral* (Bloch and Schneider, 1801) commonly known as peacock eel belongs to the family Mastacembelidae. The present study describes the length-weight relationship of the fish collected from Dora Beel. A total of 94 specimens were investigated in the study. The fishes were separated into male and female to calculate length- weight relationship of each individual of the species. The growth performance in both male & female are found high since the correlation co-efficient 'r' exhibits high degree of correlation between the length-weight relationships. The correlation co-efficient 'r' in *Macrogathus aral* is closer to 1.0. The length-weight relationship showed a positive allometric growth in both sexes of this species.

**Keywords:** Dora beel, *Macrogathus aral*, allometric growth, correlation.

### 1. Introduction

The standard spiny eel *Macrogathus aral* (Bloch and Schneider, 1801) is commonly known as peacock eel. The body of the fish is long and eel like with a long fleshy snout and a rounded tail fin which is separated from dorsal and anal fin. The body color is brownish to yellowish ventrally and marked with two long dark bands on either side of the body. There are 3-11 ocelli at the base of the dorsal fin. Both the dorsal and caudal fins have several fine streaks. This species is distributed to India, Pakistan, Bangladesh, Sri Lanka, Myanmar and Nepal (Talwar and Jhingran, 1991) [32]. *Macrogathus aral* has high demand as an ornamental fish as well as in the export market due to its playful behavior, brilliant coloration and eye-catching body shape (Das and Kalita, 2003) [10]. Since it is difficult and time consuming to record weight in the field, length-weight relationship is extensively used in the analysis of fishery data (Andrade and Camos, 2002) [2]. The relationship is frequently used to convert growth in length equation for prediction of weight at age and used in stock assessment models (Pauly, 1930) [27]. Length and weight of fish are very important morphometric characters which can be used for the purpose of taxonomy and fish stock assessment (Goel *et al.*, 2011) [15]. According to Arslan *et al* (2004) [4], it is easier to measure length than weight and weight can be predicted later on using the length-weight relationship. A variation from the expected weight or length of an individual or group of fish indicates the general well-being and state of gonadal development (Mathur and Bhatara, 2007) [26]. The condition factor gives information on well-being of a fish. It is based on the hypothesis that heavier fish of a given length are in better condition (Bagenal and Tesch, 1978) [6]. The condition factor also used as an index of growth and feeding intensity (Fagade, 1979) [13]. Fish specimens of a given length, exhibiting higher weight are said to be in better condition (Anyanwu *et al.*, 2007) [3]. The study on length-weight relationship is still scanty for most tropical and sub-tropical fish species. (Martine- Smith, 1996; Harrison, 2009; Ecoutin *et al.*, 2005; Hossain *et al.*, 2009 a & b) [25, 16, 12, 19, 20]. So far not much work has been done on Mastacembelidae family from this north eastern region of India. So the present study aims to provide information on length-weight relationship and relative condition factor of *Macrogathus aral* from Dora wetland of Assam.

### 2. Materials and Methods

**2.1 Study Site:** The study area, Dora wetland (beel) is situated in Kamrup district, Assam. It is a floodplain wetland in the south bank of river Brahmaputra.

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The Beel is very rich in biotic communities. The Beel lies between 26°04'19"-26°05'50"N latitude and 91°26'05"-91°26'0"E longitude. According to the Survey of India, 1971 the total area of the Beel was 297.96 acres which has shrunk to 278.41 acres according to Land sat imagery 2005. The Beel is surrounded by following villages- Rajapukhuri, Nahira, Bhakatpara, Tezpur, Rampur, Majpara, Kuldung, Dhantola, Bortari and Khidirpukhuri.

A total number of 94 (48 males and 46 females) individuals of *Macrognathus aral* were collected randomly from Dora beel within a period from May 2013 to May 2014. Collection was done with the help of fisherman of the locality. Total length (TL) of each individual was measured to the nearest 0.01cm using digital slide caliper and whole body weight (BW) was taken with the help of the digital balance with 0.01 gm accuracy. The length-weight relationships were calculated by using the formula  $W = aL^b$  (Le Cren, 1951) [23], which is expressed logarithmically as

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

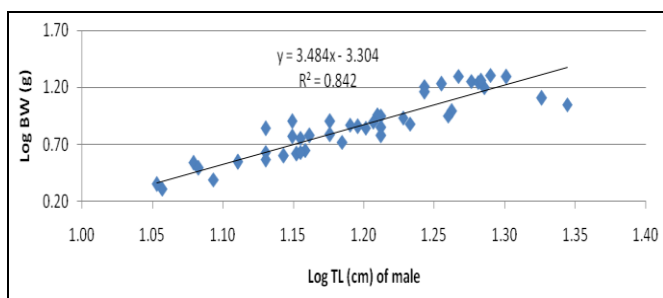
Where, W is the body weight of the fish; L is the total length of the fish; 'a' is a constant showing the initial growth index and 'b' is growth coefficient. Parameter 'a' and 'b' were calculated by method of least square regression:

$$\text{Log } a = \frac{\sum \text{Log } W \cdot \sum (\text{Log } L)^2 - \sum \text{Log } L \cdot \sum (\text{Log } L \cdot \text{Log } W)}{N \cdot \sum (\text{Log } L)^2 - (\sum \text{Log } L)^2}$$

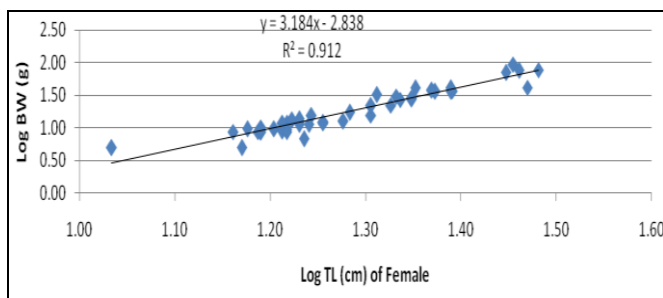
$$\text{Log } b = \frac{\sum \text{Log } W - N \cdot \text{Log } a}{\sum \text{Log } L}$$

**Table 1:** Mean ± Standard deviation of Body weight (BW) and Total length (TL), value of 'a' and 'b'.

Species	Weight range(g)	Size range(cm)	Mean±SD BW(g)	Mean±SD TL(cm)	Value of a	Value of b
<i>Macrognathus aral</i> (male)	2.05-20.27	11.3-22.1	8.52±5.38	15.75±2.66	-3.305	3.48
<i>Macrognathus aral</i> (female)	4.95-93.6	10.8-30.3	24.12±20.73	19.78±4.57	-2.838	3.18



**Fig 1 (a):** Relation between Log Total Length (cm) and Log Body Weight (g) of *Macrognathus aral* (male)



**Fig 1 (b):** Relation between Log Total Length (cm) and Log Body Weight (g) of *Macrognathus aral* (female)

Relative condition factor (KN) were estimated by following Le Cren (1951) formula as expressed below:

$$K_n = \frac{W}{\hat{W}}$$

Where W = observed weight

$\hat{W}$  = calculated weight derived from length-weight relationship.

The mean, standard deviation and Correlation coefficient of total length and body weight were calculated with the help of SPSS software (version-16) and Microsoft Office 7.

**3. Results and Discussion:** From the present study, it is recorded that the total length of *Macrognathus aral* (male and female) ranges from 11.3 to 22.1 cm in male whereas 10.8 to 30.3 cm in female. The total body weight ranges from 2.05 to 20.27 g in male and 4.95 to 93.6 g in female. The value of 'a', 'b', mean ±SD of total length and body weight for *Macrognathus aral* are depicted in the Table-1. Degree of variation of exponential value of length-weight relationship indicated by 'b' value in male is more than female. However, in both the cases the 'b' value indicates positive allometry. The positive allometry shown by the fish may be due to higher proficiency in feeding (Soni and Kathal, 1953; Kaur, 1981; Saikia *et al.*, 2011) [31, 22, 30] and better environmental condition for survival for the species. Bura Gohain and Goswami, 2013 [5]; Rahman *et al.*, 2015 [29]; Das *et al.*, 2015 [9]; Deka and Bura Gohain, 2015 [11] and Kalita *et al.*, 2016 [21] have also observed the effect of availability of food and other associated factors responsible for positive allometric growth.

The correlation coefficient 'r' in female is the closest to 1.0 (0.96) than male (0.92). This indicates that male *Macrognathus aral* has the highest degree of relationship in growth performance. It is interesting to note that male *Macrognathus aral* maintains higher degree of exponential growth (Table-1) and correlation coefficient (Table-2) during experimental period in the present study. In both sexes of *Macrognathus aral*, the value of exponent 'b' is found in normal ranges between 2.5 and 4.0 as suggested by Hile, 1936 [17] and Martin, 1949 [24] and between 2.5 and 3.5 as reported by Froese, 2006 [14] for most fishes. However, the value of 'b' deviate from 'cube law' as it remains constant at 3.0 for an ideal fish (Allen, 1938) [1] in a particular environmental condition.

The result of logarithmic length-weight relationship in *Macrognathus aral* under the present study is as follows during the period of investigation in Dora Beel.

*Macrognathus aral* (male) -  $\text{Log } W = - 3.305 + 3.48 \text{ log } L$

*Macrognathus aral* (female) -  $\text{Log } W = - 2.838 + 3.18 \text{ log } L$

The co-efficient of co-relation 'r' and relative condition factor  $K_n$  are depicted in the Table-2. The regression graph of length-weight relationship and relative condition factor ( $K_n$ ) are given in Figure-1 (a & b) and Figure-2 (a & b). Relative condition factor is an index to monitor feeding intensity, well-being and growth rate (Oni *et al.*, 1983) [27]. of fishes which is

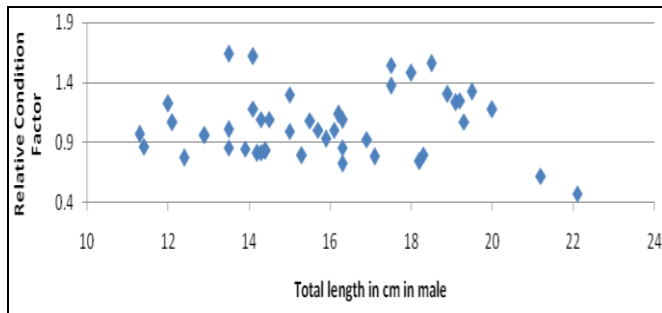
based on hypothesis that heavier fish for a given length are in better condition (Bagenal and Tesch, 1978) [6]. Generally 'Kn' value greater than 1 indicates better condition of fish (Le Cren,

1951) [23]. The present study reveals that the relative condition factor (Kn) is significantly more or less similar (Table-2) in both sexes.

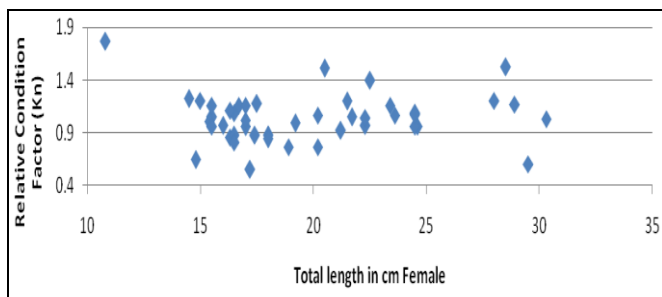
**Table 2:** Value of Correlation coefficient 'r', Kn range and Mean  $\pm$  Standard deviation of condition factor 'Kn'.

Species	Sex	Value of 'r'	Kn range	Mean $\pm$ SD of Kn
<i>Macrognathus aral</i>	Male (n=48)	0.92**	0.48-1.64	1.04 $\pm$ 0.26
	Female (n=46)	0.96**	0.55-1.76	1.04 $\pm$ 0.23

\*\*Correlation is significant at the 0.01 level (2-tailed).



**Fig 2 (a):** Relative condition factor (Kn) in relation to total length (cm) of *Macrognathus aral* (male)



**Fig 2 (b):** Relative condition factor (Kn) in relation to total length (cm) of *Macrognathus aral* (female)

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