



LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF  
*MACROBRACHIUM FELICINUM* AT AMASSOMA AND OTUAN AXIS OF IGBEDI  
CREEK, BAYELSA STATE, NIGERIA

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ABSTRACT

The growth parameters of *Macrobrachium felicinum* at Amassoma and Otuan Axis of Igbedi Creek, Bayelsa State, Nigeria were investigated utilising Length-Weight Relationship and Condition factor of the species. The specimens were collected from fishers at the sampling stations and analysed. The largest specimen of *M. felicinum* in both stations recorded was 8.0cm. The average length and weight were  $5.014 \pm 1.557$  cm; weight  $3.436 \pm 2.596$  g and  $5.108 \pm 1.234$  cm;  $3.254 \pm 2.200$  g in Amassoma and Otuan at Igbedi Creek. The results showed negative allometric: 2.372 and 2.518 at Amassoma and Otuan respectively. Fulton's condition factor, K for *M. felicinum* was greater than one, 2.596 at Amassoma while 2.442 at Otuan. There was positive correlation coefficient between total length and weight 0.965 at Amassoma while 0.939 at Otuan. The species *M. felicinum* was caught in a single month of November, for a twelve-calendar month research. Therefore, this study recommends an in-depth study on the population status of the species at Igbedi Creek.

**Keywords:** Condition, Factors, Length, Management and Weight

INTRODUCTION

Length and weight are two valuable parameters for assessment of the age and growth of fish or shrimp (Kumar *et al.*, 2014). Both parameters are also useful in quick estimates of shrimp biomass. Variations in fish and shrimp growth are common in tropical water systems due to variations in environmental factors (Ibrahim, 2017). *Macrobrachium species* as tropical species are influenced by these dynamics as it helps to determine the average weight of aquatic organisms at a certain length class, which are widely utilised in fish population study which is needed in management (Kumar *et al.*, 2014; Ibrahim, 2017; Omobepade and Ajibare, 2015). In length-weight relationship studies of fish or shrimp, the body weight has an exponential relationship with its length.

This study examines the length-weight relationship and condition factor of *Macrobrachium felicinum*. at Igbedi Creek Bayelsa State, Nigeria. It is a large drainage system in the State: an important water body due to the increasing level of fishing, waste disposal, sand mining and transportation. Few studies on the life and environment of the species have been carried out by different researchers, but none to the best of my findings at Igbedi Creek on the length-weight relationship and condition factor of the species in Bayelsa State. The objective of this studies is to investigate if the length-weight relationship and condition factor show good growth of the shrimp.

MATERIALS AND METHODS

The Study Area

The study was carried out at Igbedi Creek which is a tributary in Bayelsa State of the Niger Delta, Nigeria. Bayelsa State lies at latitude  $4^{\circ} 39' 50''$  North and longitude  $6^{\circ} 2' 13.15''$  East. The stations which were sampled for *Macrobrachium felicinum* were Amassoma and Otuan. Amassoma (Station 1) is a community on Wilberforce Island, located within latitude  $4^{\circ} 58' 15''$  N and longitude  $6^{\circ} 06' 32.94''$  E along Igbedi Creek. Otuan (Station 2) is located at

latitude 4° 52' 27" N and longitude 6° 07' 18" E downstream from Amassoma in Southern Ijaw, Local Government Area of Bayelsa State (Figure 1).

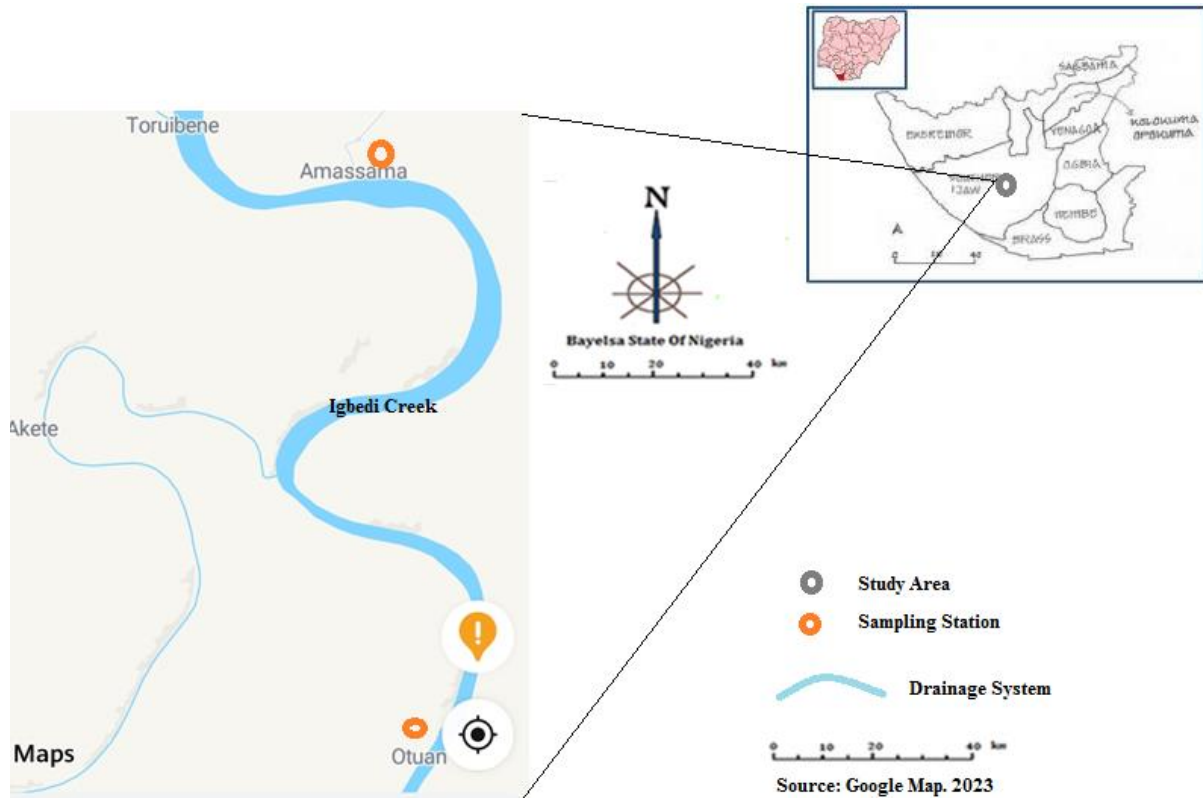


Figure 1. Map of Study Area, Igedi Creek, Bayelsa State

### Collection of Shrimp Samples

Fresh live specimens of *M. felicinum* was obtained from fishers for a period of one month, from a twelve calendar months' biweekly research at Amassoma and Otuan. The shrimps were caught with traps and hand-push nets. Specimens were kept and preserved in 10% formalin and taken to the Laboratory.

### Length-Weight Relationship

The species of prawns were identified using identification key (Fransen, 2014). The length of the prawns was measured with a rule to the nearest 0.1 cm. The weights were taken on a sensitive balance to the nearest 0.1g using G & G Electronic Scale Model J J2000. The relationship between the prawn's standard length and weight were determined using the equation below:

$$W = a + b L \quad \dots \text{equation (1)}$$

where W = weight of prawn in grams, L = standard length of prawn in cm, a = regression constant (intercept) and b = regression coefficient (slope) This relationship would be transformed into a linear form by the equation.

$$\text{Log } W = \text{log } a + b \quad \dots \text{equation (2)}$$

Degree of association between weight and length variables was calculated by determination variables (R). The correlation ( $r^2$ ) is the degree of association between the length and weight and was computed from the linear regression analysis:

$$R=r^2 \quad \dots\text{equation (3)}$$

### Fulton's the Condition Factor

The Fulton's condition factor 'K' determines the general well-being of species and the condition factor 'K' for *Macrobrachium felicinum*, was calculated using the equation below:

$$K = 100w / L^3 \quad \dots\text{equation (4)}$$

where: L = Length in centimetres (cm); W = Weight in grams (g); K = Condition factor.

## RESULTS AND DISCUSSION

### Length-Weight Relationship and Condition Factor

The result of this studies showed that a total of 134 specimens were caught by fishers at Amassoma and Otuan. The standard length and weight of *Macrobrachium felicinum* were 2.7 to 8.0cm and 0.8 to 10.7g at the sampling stations (Table 1 and Table 2). The average length and weight were  $5.014 \pm 1.557$ cm and  $3.436 \pm 2.596$ g;  $5.108 \pm 1.234$ cm and  $3.254 \pm 2.200$ g at Amassoma and Otuan respectively (Table 1 and Table 2). This is comparable with Deekae *et al.* (2016), which reported *Macrobrachium macrobrachion* at Ekole Creek to have an average length and weight  $6.33 \pm 0.05$ cm and  $3.76 \pm 0.09$ g.

The length-weight relationship provides data on the relative wellbeing of fish or prawn population, determines whether body growth is isometric or allometric (Amachree and Chigeru, 2019). The parameter b is a parameter to express somatic shape of the fish or shrimp species. The b exponent is hypothetically expected to have a value of '3' because the volume of a 3-dimensional object is roughly proportional to the cube of length for a regularly shaped solid. *M. felicinum* showed negative allometry at the two locations at Igbedi creek. This is in agreement with Deekae *et al.* (2016), which reported b values of *M. macrobrachion* at Ekole Creek to be 1.94. The value of b showed deviation from cube law as deviation from b value of 3 is a deviation from the cube law (Olanrewaju *et al.*, 2017). This indicates decreased girth (thinner somatic form) with corresponding increase in length for negative allometry.

The correlation coefficient obtained from the length-weight relationship of the species for the location at Igbedi creek on (Table 1; Table 2 and Figure 2; Figure 3) showed that there was significant positive correlation between total lengths and weights. This is similar to findings by Deekae *et al.* (2016), which reported a significantly positive correlation for *M. macrobrachion*.

Fulton's condition factor, K is a measure of the wellbeing of species. Amachree and Chigeru (2019), stated that for a good condition ( $K > 0.5$ ) and poor condition ( $K < 0.5$ ). *M. felicinum* catch showed K value to be greater than 0.5 in both Amassoma and Otuan (Table 1 and Table 2). This result is similar to Deekae *et al.* (2016), that reported K value to be above one. This indicates that *Macrobrachium felicinum* was in good condition at Igbedi creek.

**Table 1: Length-weight relationship and condition factor analysis of male and female *Macrobrachium felicinum* at Amassoma during the research period of 12 calendar month 2020**

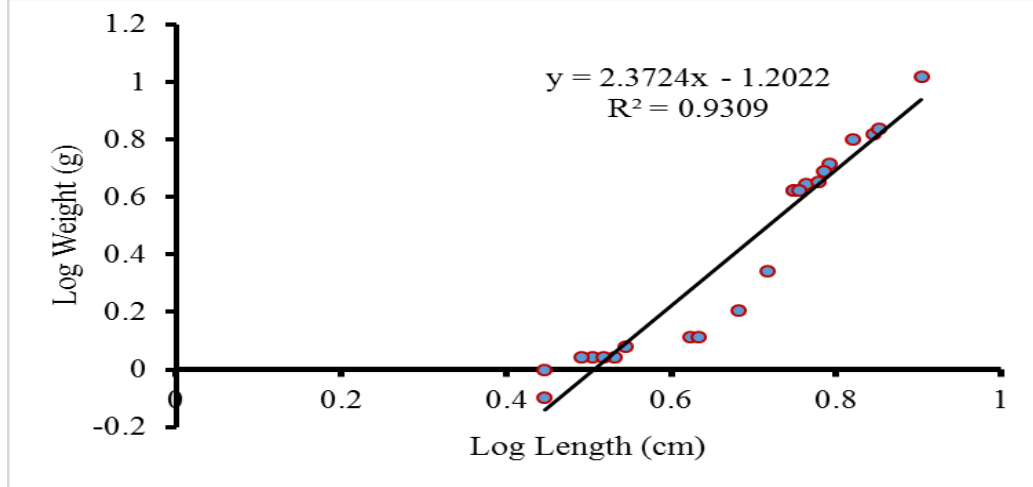
Month	Species	Sex	No.	Length range (cm)	Mean Length (cm)	Weight range (cm)	Mean Weight (g)	a	b	r	R <sup>2</sup>	k
November	<i>M. felicinum</i>	Male	9	2.8 - 7.1	4.567±1.522	1 - 6.9	2.656±2.156	-1.063	2.149	0.953	0.908	2.788
November	<i>M. felicinum</i>	Female	13	2.8 – 8.0	5.323±1.563	0.8 -10.4	3.977±2.814	-1.305	2.522	0.972	0.945	2.637
Parameter of <i>M. felicinum</i>			22		5.014±1.557		3.436±2.596	-1.202	2.372	0.965	0.931	2.596

Source: Field survey (2020)

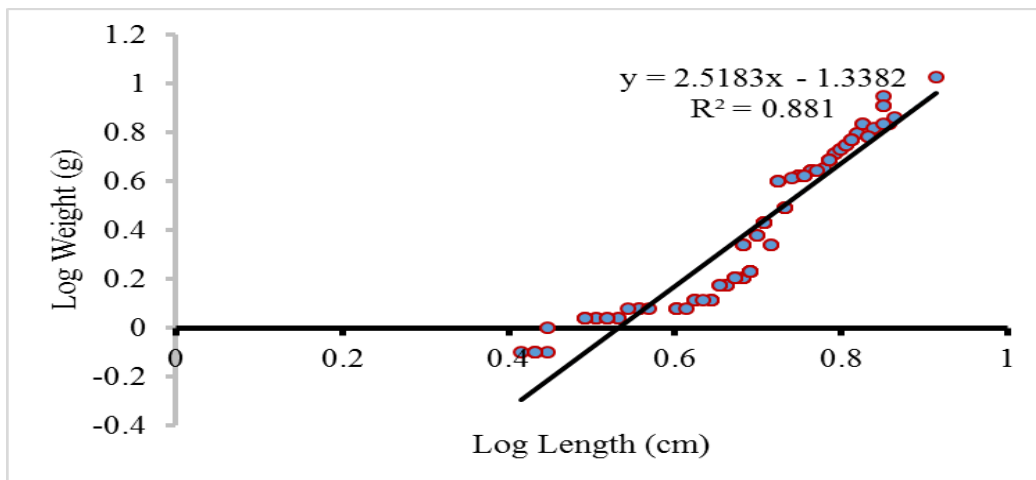
**Table 2: Length-weight relationship and condition factor analysis of male and female *Macrobrachium felicinum* at Otuan during the research period of 12 calendar month 2020**

Month	Species	Sex	No.	Length range (cm)	Mean Length (cm)	Weight range (cm)	Mean Weight (g)	a	b	r	R <sup>2</sup>	k
November	<i>M. felicinum</i>	Male	56	2.7 – 7.1	5.173± 1.265	0.8 – 8.9	3.389±2.231	-1.276	2.441	0.939	0.881	2.448
November	<i>M. felicinum</i>	Female	56	2.8 – 7.0	5.043±1.211	0.8 – 10.7	3.120±2.180	-1.401	2.597	0.940	0.883	2.433
Parameter of <i>M. felicinum</i>			112		5.108± 1.234		3.254±2.200	-1.338	2.518	0.939	0.881	2.442

Source: Field survey (2020)



**Figure 1:** The length-weight relationship of total *Macrobrachium felicinum* at Amassoma 2020



**Figure 2:** Length-Weight relationship of total *Macrobrachium felicinum* species at Otuan in the year 2020

### CONCLUSION AND RECOMMENDATIONS

The study revealed that Length-weight relationship and condition factors are indices of importance to managers as present study could be helpful in conservation and management of *M. felicinum* at Igbedi Creek. The species *M. felicinum* was caught in a single month of November, 2020 in a one-year research. There is therefore a need for more in-depth studies on the population status of the species at Igbedi Creek. Further study on length-weight relationships for 12 calendar months should be encouraged for better understanding of their biological cycles.

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