AFM -10

Length-Weight Relationship and Condition Factor of *Farfantepenaeus notialis* (Pérez Farfante, 1967) Caught with Cast Net from New Calabar River, Nigeria

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Abstract
The present work estimates length–weight relations of *Farfantepenaeus notialis*(Pérez Farfante, 1967) from New Calabar River, Rivers State, Nigeria. A total of one hundred and seventy shrimps were caught by cast netsat different parts of the River. Values of the exponent b in the length-weight regression were 1.68 and the calculated correlation coefficient (0.7980) showed a positive correlation between length and weight of the shrimp. The condition factor varied from 0.55 - 2.16 in the populations and with a mean value of.1.04 indicating robustness or well-being of *Farfantepenaeus notialis.*

Keywords: Growth pattern condition factor, *Farfantepenaeus notialis, New Calabar River*

Introduction

Penaeidae is a family of marine crustacean and they are also widely distributed brackish. It is found off the east coast of South America from Quintana Roo, Mexico to Rio de Janeiro, Brazil, and the west coast of Africa, from Mauritania to Angola (Pérez-Farfante, 1967) Penaeid shrimps are fast growing and generally live only about a year, rarely two or three years. (Gulland and Rothschlid 1984). *Penaeus notialis* now *Farfantepenaeus notialis* popularly called southern pink shrimp can be distinguished from other families of shrimp due to their antennae, which are longer than their body lengths (Amos and Amos, 1997). It has high mortality rates and due to fishing pressure, determination of the best size at which to capture shrimps are critically sensitive to thedetermination of mortality and growth rates.

Estimates of length-weight relationships are necessary for stock assessment and are also useful for fishery conservation and management (Koutrakis and Tsikliras, 2003).Length-weight relationships can be used to predict weight from length measurements made in the yield assessment (Pauly, 1993).Hence, in order to effectively manage and conserve a fish population, the estimation of growth pattern in each stock in all seasons are needed.

Against this background, an attempt was made in this study to elucidate the length-weight relationship and condition factor in *Farfantepenaeus notialis.*

Materials and Methods

The study area is the section of the New Calabar River. The entire river course is situated between longitude 7º60'E and latitude 5º45'N in the coastal area of the Niger Delta and empties into the Atlantic Ocean. Three sampling stations (S1 Aluu, S2 Choba, and S3 Iwofe) were established along the main course of the river. Pink shrimps were collected monthly for 4 consecutive months (May to August, 2017) from the three sampling stations with the assistance of local artisanal fishers using different cast nets (1.5 and 2.5cm) mesh sizes. The specimens were immediately preserved inicedpacked cooler and transferred to the Fisheries Laboratory, Faculty of Agriculture, University of Port Harcourt, Choba where all shrimps sampled were measured, weighed and sexed. Total Length measured to the nearest centimetre was obtained by stretching out the curved shrimp and taking lengths from the telson to the base of the eyestalk (Cole and Mistakidis, 1953).Total weight of each specimen was measured to its nearest 0.01g using Ohaus electronic weighing balanced. The determinationof length-weight relationship was made by applying the log transformation equation w = aLb to the data (Pauly, 1983; Parsons, 1988) Where, W = Total weight of the fish in grams. L = Total length of the fish in centimetre. a = Initial growth constant and. b = Regression co-efficient.Condition factor was calculated by using the formula K = W X 100/ L3. Where K= condition factor, W= Shrimp weight in grams, L= total length of shrimp in centimeter.The sex-ratio was expressed in this study as a percentage of females .It was calculated according to the following formula Kartas and Quignard (1984): SR = (F × 100) × (1/ (F+M)). (F = female; M = male). The fish were grouped into different size groups based on total length and frequency of fish that belonged to each size group was recorded. The percentage frequency and total length were used for analysing length frequency distribution. Data

were expressed as mean ± standard error of mean. A histogram was used to analyse the length frequency distribution.

Results and Discussion

One hundred seventy shrimps were examined for the study; the total length ranged from 8.6 - 20.5 cm with themean of 14.60 cm and weights were between 12-72g. The length frequency showed unimodal distribution. The modal length was 18.5cm (Figure I). The study revealed that the females constituted 55.7% (n = 112) and males 44.3% (n = 58) with an overall sex ratio (male: female) of 1:1.2.

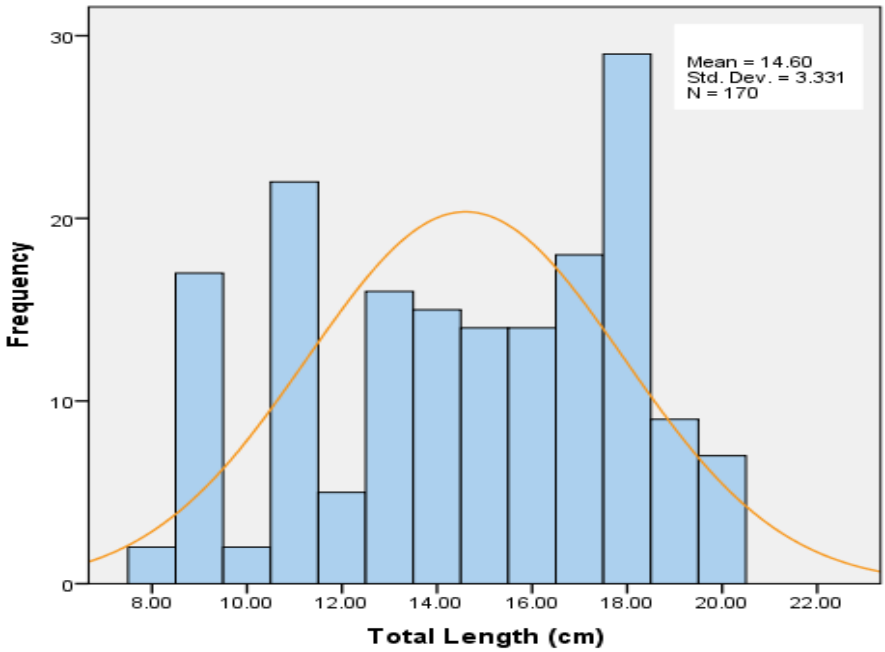


Fig. I:The length frequency showing unimodal distribution

Table 1: Value of sex-ratio of males and females

Species	N	Male	Female	Sex ratio
Farfantepenaeus notialis	170	58	112	34:66

The exponent of (b) value of 1.68 shows that *F. notialis* exhibits negative allometric growth this indicate that growth in length increase as weight increases and also the rate of increase in body length is not proportional to the increase in body weight. The calculated correlation coefficient (0.7986) showed a positive correlation between length and weight of the shrimp. The length-weight regressions (Figure II).

Table 2: Parameters of length-weight relationship of *Farfantepenaeus notialis*

Species	N	TL Range (cm)	TL Mean (cm)	W Range (g)	W mean (g)	K Range	K Mean	a	b	r^2
F. notialis	170	8.6 - 20.5	15.09±0.25	12-72	34.22±1.14	0.55-2.16	1.04±0.03	-1.04	1.68	0.7986

The values of condition factors are given in Table 2. The condition factor Ranged from 0.55 to 2.16 with a mean value of 1.04.Information on maximum length is very significant to estimate the asymptotic length and growth coefficient of fishes, also helpful for fisheries resource planning and management (Hossain et al., 2012, 2016d). In this study the total length of *F. notialis* ranged from 8.6 - 20.5 cm. The finding from this study was also closely similar to the findings of Lawal-Are and Akinjogunla (2012) with total length of 3.9cm to 19.9cm for *F. notialis* in Lagos lagoon. However, the current study was slightly higher and this could be attributed to lower salinity in the river compared with the lagoon. GIRMAC (2012) reported that during periods of high salinity, shrimp are small,

and when the salinity decreases, the shrimp increase in size. Moreover, it is also associated with other factors such as the genotype-environment interaction and factors such as quality and quantity of food, management, and health status.

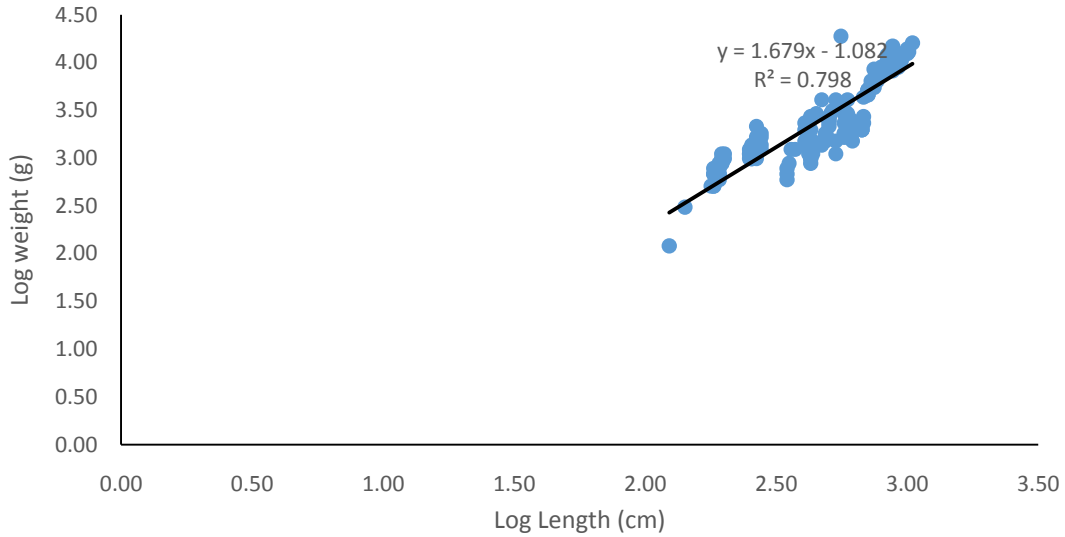


Fig. II: Length-weight relationships for *Farfantepenaeus notialis*

The b values ranging from 2.5 to 3.5 are more common (Froese, 2006) but in the present study, the calculated b valuewas 1.68. The 'b' value indicated negative allometry, which indicates that, the increase in length is not in accordance with anincrease in weight.Lawal-Are and Akinjogunla (2012) reported a negative allometric growth for *Penaeus notialis* in Lagos lagoon. LeCren (1951) pointed out that the variation in 'b' value is due to environmental factors, season, food availability, sex, life stage and other physiological factors.

The values obtained for the condition factor (K) in this study ranged from 0.55 - 2.16 with a mean value of 1.04±0.03. These values are greater than 1 and this means that the shrimp is in a good condition in New Calabar River. This agrees with Bolger and Connolly (1989) that the condition factor values of 1and above indicate that the fishes are healthy.

Conclusion

This study provides preliminary information on the length-weight and condition factor of *F. notialis* from New Calabar River. The regression coefficient b revealed that the growth pattern of shrimp populations show a negative allometric growth with the b value of 1.68 and condition factor ranged from 0.55 to 2.16 respectively.This information is vital for further study and could be used for species conservation and management of *F. notialis* from New Calabar River.

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