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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Length-weight, Length-length Relationship and Condition Factor of *Synodontis robbianus* at Idah Area of River Niger, Kogi State, Nigeria

Adeyemi S. Olusegun

Department of Biological Sciences, Kogi State University, Anyigba, Nigeria

Abstract: The length-weight, length-length relationship and condition factor of *Synodontis robbianus* in the lower Niger River (Idah), Nigeria was carried out. One hundred and fourteen (114) fish samples of total length ranging from 8.8-16.0 cm and weight between 4.3 g and 43.4 g collected between January and August, 2008 were analyzed. Results showed allometric growth for the sampled fish with regression coefficient (b-value) of 2.9926, 2.7620 and 2.8355 for males, females and combined sex respectively. The regression coefficient (b-value) for the length-length relationship was 0.9418, 0.9602 and 0.9510 for males, females and combined sex while the condition factor of all the sampled population varied from 1.57-3.83. The Idah area of River Niger in Kogi State is a good environment for growth, reproduction and survival of the fish species.

Key words: Length, weight, growth, sex, environment

INTRODUCTION

Fish found in tropical and sub-tropical water system experience frequency growth fluctuations due to factors such as food composition changes, environment changes, rate of spawning to mentioned but a few, length-weight and length-length relationship can be used to assess the influence of these factors in fish. Kulbicki *et al.* (1993) and King (1996) reported that fish growth, mean weight of a given body length of fish estimation and the relative well being in fish can be known through this relationships length-weight, length-length relationships studies have been done in different water bodies and on different fishes. Notably among these are the report of King (1996) on some Nigerian fresh water fishes, Taiwo and Aransiola (2001) on *Chrysichthys* species in Asejire Lake, Fafioye and Oluajo (2005) on five fish species in Epe Lagoon, Nigeria and Laleye (2006) on *Oreochromis niloticus* in Oeume River in Benin.

Synodontis accounts for important part of the commercial catches in Northern Nigeria and according to Reed *et al.* (1967), they are available throughout the year. In the River Niger, *Synodontis* accounted for 18.00% by number and 18.68% by weight of total fish caught (Mortwani and Kanwai, 1970).

The study present information on the length-weight, length-length relationships and the condition factor of this valuable fish species in order to aid its management in the river.

MATERIALS AND METHODS

Study area: The study area (Fig. 1) is Idah area of River Niger in Idah Local Government Area of Kogi State, Nigeria. The river extends from Lokoja via Ajaokuta, Itobe

to Idah. The river is located on latitude 7°04N and longitude 6°50E. The water temperature range between 22°C and 31°C, Idah has a tropical savannah climate with two clearly marked season of wet between (April and October) and dry between (November and March). The cold harmattan wind is experienced between (November and February) when the hot season start and last until the rain begins. The highest water levels are between August and September and the lowest are between March-April.

River Niger serves as a boundary between Kogi State and Edo State. Idah town is a commercial nerve centre between the two States where fisheries and aquaculture is practiced.

Sample collection: A total of 114 fish samples were identified and collected from the fishermen catches using gill nets and Malian traps between January and August 2008. Total length (cm) and weight (g) were taken using measuring board and top loading balance. Length-weight relationship was calculated using the formula:

$$W = aL^b$$

which was transformed to logarithm of the form

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

Using instat statistics package

Where:

W = Body weight of the fish (g)

L = Total body length of fish (cm)

a and b = Values estimated by regression formula

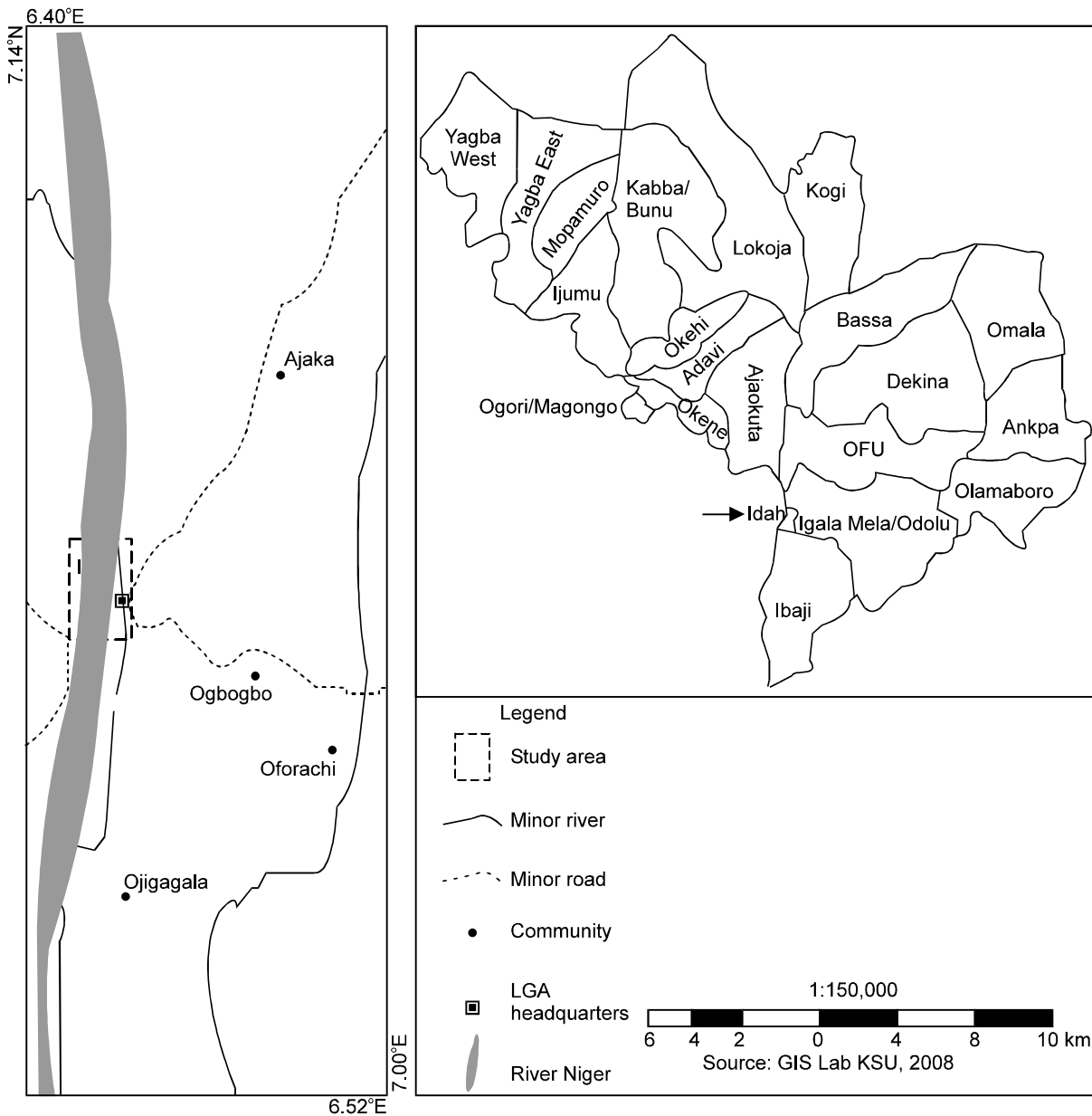


Fig. 1: The study area

The condition factor (K) was calculated using the:

$$K = 100W L^{-3} \quad (\text{Pauly, 1984})$$

Where:

K = Condition factor

L = Total body length of fish (cm)

W = Body weight of fish (g)

RESULTS

A total of one hundred and fourteen (114) species of *Synodontis robbianus* were collected for the study. The length-weight frequency distribution of the fish species

at Idah area of River Niger is shown in Table 1. The standard length (cm) and weight (g) for the species are, Males 6.0-11.3 cm/4.3-37.1 g, Females 5.3-13.5 cm/5.7-43.4 g, Combined sex 5.3-13.5 cm/4.3-43.4 g.

The length-weight relationship for the sampled fish is expressed by the regression equation: $\text{Log } W = 0.0329 + 2.8355 \text{ g Log } L$ ($r = 0.9208$) as shown in Fig. 2. Log length against log weight revealed a linear relationship hence there is a direct proportionality between the log length and log weight.

The length-length relationship also had a regression coefficient (b-values) of 0.9418, 0.9602 and 0.9510 respectively. This shows that the rate of increase in body

Table 1: Length-weight relationship of *Synodontis robbianus* in the lower Niger (Idah), Nigeria

Sex	Standard length (cm)			Weight (g)			n	a	b	r
	Min	Max	Mean±SD	Min	Max	Mean±SD				
Males	6.0	11.3	8.50±1.16	4.3	37.1	15.25±6.96	45	0.0237	2.9926	0.9369
Females	5.3	13.5	8.81±1.17	5.7	43.4	16.56±7.54	69	0.0383	2.7620	0.9835
Combined sex	5.3	13.5	8.68±1.17	4.3	43.4	16.05±7.31	114	0.0329	2.8355	0.9208

n = Number of fish examined, a = Intercept, b = Slope, r = Correlation coefficient of determination, SD = Standard Deviation

Table 2: Length-length relationship of *Synodontis robbianus* in the Lower Niger (Idah), Nigeria

Sex	Total length (cm)			Standard length (cm)			n	a	b	r
	Min	Max	Mean±SD	Min	Max	Mean±SD				
Males	8.8	16.0	12.02±1.48	6.0	11.3	8.50±1.16	45	0.8066	0.9418	0.9126
Females	9.3	18.8	12.64±1.66	5.3	13.5	8.81±1.17	69	0.7734	0.9602	0.9199
Combined sex	8.8	18.8	12.40±1.61	5.3	13.5	8.68±1.17	114	0.6999	0.9510	0.9273

n = Number of fish examined, a = Intercept, b = Slope, r = Correlation coefficient of determination, SD = Standard Deviation

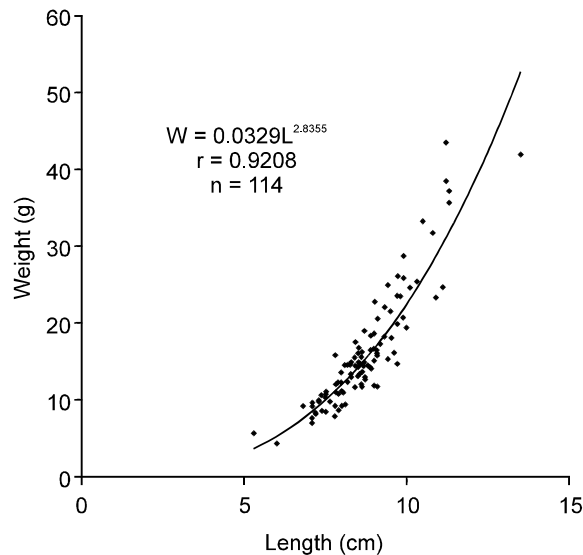


Fig. 2: Length-weight relationship of *Synodontis robbianus* in the lower Niger (Idah) Nigeria

Table 3: Condition factor of *Synodontis robbianus* in the Lower Niger (Idah), Nigeria

Sex	Condition factor (K)		
	Minimum	Maximum	(Mean±SD)
Males	1.60	3.23	2.36±0.35
Females	1.57	3.83	2.32±0.40
Combined sex	1.57	3.83	2.34±0.38

K = Condition factor, SD = Standard Deviation

length is proportional to the increase in body weight (Table 2). The Condition Factor (CF) ranged between 1.60-3.23, 1.57-3.83 and 1.57-3.83 for all the sex's (Table 3). The result showed that the males were significantly ($p < 0.05$) larger than females.

DISCUSSION

The relationship between the length and weight of the sampled fish species were found to be curve-linear (Fig.

2). These showed that even though there were corresponding increase in weight with increase in length, at certain stages of the fish growth, increase in weight were no longer directly proportional to the increase in length as served in some fish species.

The LWR of *S. robbianus* revealed negative allometric growth in the water body. Similar relationships have been reported for other fishes (Olatunde, 1989) for *S. schall*, Fafioye and Oluajo (2005) for *Clarias gariepinus* and *Ilisha africana* respectively.

The wellbeing or robustness of the fish determined as condition factor (K) ranged from 1.57-3.83 with mean 'K' value of 2.34±0.38. These values were comparable with those documented by Bagenal and Tesch (1978) for mature fresh water fish body weight. This suggested that the condition of the lower Niger (Idah) Nigeria in comparison with other fresh water bodies might be favorable for *Synodontis robbianus* species.

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