THE LENGTH - WEIGHT, LENGTH - LENGTH RELATIONSHIP AND CONDITION FACTOR OF *Synodontis resupinatus* IN GBEDIKERE LAKE BASSA, KOGI STATE, NIGERIA.

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ABSTRACT

Length-weight, length-length relationships and condition factor of male, female and combined sex of *Synodontis resupinatus* Gbedikere Lake Bassa, Kogi State was studied. One hundred and forty three fish samples of total length ranging from 8.20cm to 16.60cm and weight between 2.25g and 76.05g collected between July and December 2007 were analyzed. Results showed that the isometric growth for male, females, combined sex and juveniles had regression coefficient (b-value) of 3.02, 3.23, 3.13 and 2.19 respectively. Both male and females exhibited positive allometric growth, juveniles on the other hand showed negative allometric growth. The regression coefficient (b-value) for the length-length relationship was 1.5645, 2.8050, 1.9768 and 0.9668 for males, females, combined sex and juveniles body growth respectively while the condition factor of all the sampled population varied from 1.03 to 2.55, females were in better condition than males and there was no significant difference (P>0.05) between them. Gbedikere Lake is a good environment for growth, reproduction and survival of the fish species.

Keywords: Length weight relationship, condition factor, *Synodontis resupinatus*, Gbedikere Lake, Kogi State.

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 (1966) 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 is in order to aid its management in the lake.

MATERIALS AND METHODS

STUDY AREA

Lake Gbedikere is a natural lake located between Latitudes 3^024^0 and Longitudes 5^014^E and is about 10km to the East of Oguma the Head quarter of Bassa Local Government Area of Kogi State.

Water enters the Lake from tributaries that run from River Benue during rainy or flood season. When the season is over, the Lake separates out. The Lake is about 450m north of Gbedikere village. The water body covers about 400 – 450m and a depth of 10 – 14m deep, depending on the season.

The pond water is only used for fishing; consequently most of the settlers around the Lake are fishermen (Upper Benue River Basin Development Authority, 1985). The lake experience two seasonal

periods; the rainy season starts in the month of May and last till October and is characterized by heavy down pour which sometimes have an extensive flood action. The dry season is from late October to April and is characterized by cold, dusty -dry wind followed by intense heat.

SAMPLES COLLECTION
Fish samples were identified and collected from the fishermen catches using gill nets and Malian traps between August and December 2007. 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

$$Log\ W = Log\ a + b\ log\ L$$

    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.

The condition factor (K) was calculated using the
$$K = \frac{100w}{L^3}\ (Pauly, 1984)$$

    Where K= condition factor, L=Total body length of fish (cm)
        W=body weight of fish (g).

RESULTS AND DISCUSSION
A total of one hundred and forty three species of *Synodontis resupinatus* were collected for the study. The length-weight frequency distribution of the fish species in Gbedikere Lake shown in Table 1.The standard length (cm) and weight (g) for the species are Males 8.20 and 15.00cm/9.00 to 48.00g, Females 8.70 and 16.60cm/8.75 to 76.05g, combined sex 8.20 to 16.60cm/8.75 to 76.5g and the juvenile had 4.70 to 9.30cm/2.25 to 12.00g.

Table 1: Length and weight frequency distribution of *Synodontis resupinatus* in Gbedikere Lake, Bassa, Kogi State.

Sex	Standard Length (cm)				Body Weight (g)		
	n	Min	Max	Mean $\pm$ S.D	Min	Max	Mean $\pm$ S.D
Male	42	8.20	15.00	11.42$\pm$1.77	9.00	48.00	26.44$\pm$11.81
Female	45	8.70	16.00	12.41$\pm$1.73	8.75	76.05	34.82$\pm$15.13
Combined sex	87	8.20	16.60	11.83$\pm$1.81	8.75	76.05	30.78$\pm$14.24
Juveniles	56	4.70	9.30	6.86$\pm$1.00	2.25	12.00	5.34$\pm$1.94

n=Number, Min=Minimum, Max=Maximum, SD = Standard Deviation.

The male length-weight relationship is expressed by the regression equation: Log W=0.0157 + 3.02g Log L (r = 0.9764) Fig 1.

The female length-weight relationship is expressed by the regression equation: Log W=0.0096 + 3.227 Log L (r = 0.9489) Fig 2.

The combined sex's length-weight relationship is expressed by the regression equation: Log W=-0.0121 + 3.13 Log L (r = 0.9648) Fig 3.

The juveniles' length-weight relationship is expressed by the regression equation: Log W = -0.0763 + 2.1856 Log L (r = 0.8992) Fig 4.

The total length (cm), for males, females, combined sex and juveniles ranged between 11.50 to 21.20, 11.20 to 24.20, 11.20 to 24.20 and 7.00 to 12.1 respectively (Table 2).

The length-length relationship also had a regression coefficient (b. values) of 1.5645, 2.8015, 1.968 and 0.9668 respectively. This shows that the rate of increase in body length is not proportional to the increase in body weight.

Table 2: Length-length relationship of *Synodontis resupinatus* in Gbedikere Lake, Bassa, Kogi State.

Sex	Total length (cm)						
	Min	Max	Mean ±S.D	n	a	b	r
Males	11.50	21.20	16.07±2.66	42	0.6134	1.5645	0.9222
Females	11.20	24.20	17.54±2.85	45	0.5480	2.8015	0.9029
Combined sex	11.20	24.20	16.83±2.84	87	0.5904	1.9768	0.9172
Juveniles	7.00	12.10	9.04±1.09	56	0.8658	0.9668	0.9421

SD = Standard deviation, n=Number, a=Intercept, b=Slope, r=Coefficient of determination.

The condition factor (CF) ranged between 1.24 to 2.00, 1.20 to 2.16 and 1.03 to 2.55 for all the sex's (Table 3), showed that the females were significantly ($p < 0.05$) larger than males.

Table 3: Condition factor of *Synodontis resupinatus* in Gbedikere Lake, Bassa, Kogi State.

Sex	Minimum	Maximum	Condition factor (k) (Mean ± SD)
Males	1.24	2.00	1.66±0.17
Females	1.20	2.16	1.71±0.24
Combined sex	1.20	2.16	1.64±0.22
Juveniles	1.03	2.55	1.63±0.31

The isometric growth (b-values) obtained were 3.02, 3.23, 3.13 and 2.19. This indicates that while males and females showed positive allometric growth, juveniles exhibited negative allometric growth based on Begenal and Tesch (1978) criteria of 3. Similarly Pauly (1984) did not report that a slope value great 3 denotes allometric growth; this is similar to the findings of Entusa-Mensah *et al* (1995) that recorded b-values of 2.9 for males. Ofori-Danson *et al* (2002) did report b-value of 3.01 for females which suggest that the finding of this study is valid. The b-value of this study is also similar to the findings of Olatunde (1989) for *Synodontis schall*. This shows that *Synodontis resupinatus* obeyed the cube law of growth (Le Cren, 1951) which is not commonly obeyed by most fishes. Etim (2000) and Fafioye and Oluajo (2005) respectively reported 2.951 and 3.042 b-value *Chrysicthys nigradigitatus* combined sex which are similar to the findings of the study. The value recorded during this study were similar with 1.53 to 2.55 reported by Ekanem (2006) for *Chrysicthys nigradigitatus* (Laceped) from Cross River and also higher than 0.79±0.15 which is less than 1.0 as reported by Fafioye and Oluajo (2005) from Epe Lagoon, this could be due to difference in the condition of the habitat such as Physico-Chemical parameters, plants and animal communities. Females have better condition factor than the males during the period of this study.

CONCLUSION
The result of this study show allometric growth pattern and the condition of Gbedikere Lake is favourable for the survival of *Synodontis resupinatus*.
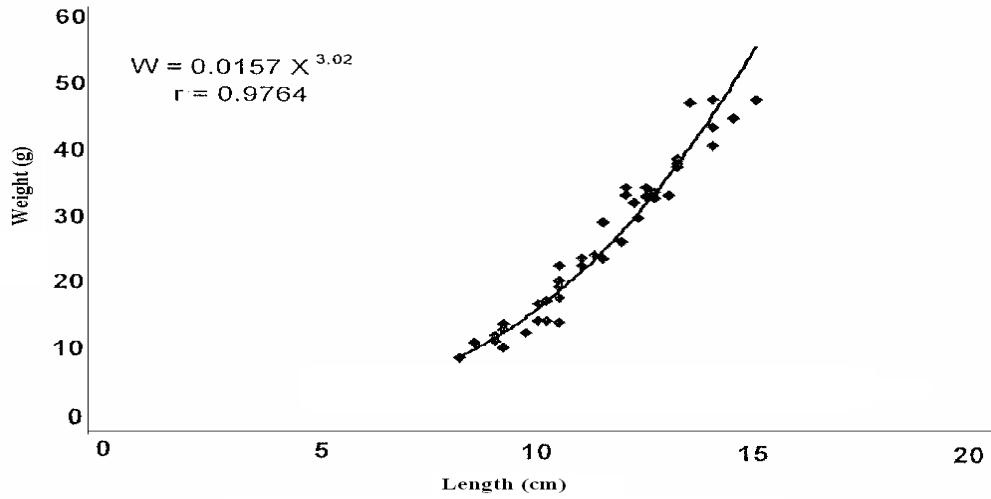
Fig 1 Length-weight relationship of male *Synodontis resupinatus* in Gbedikere Lake, Bassa, Kogi State.
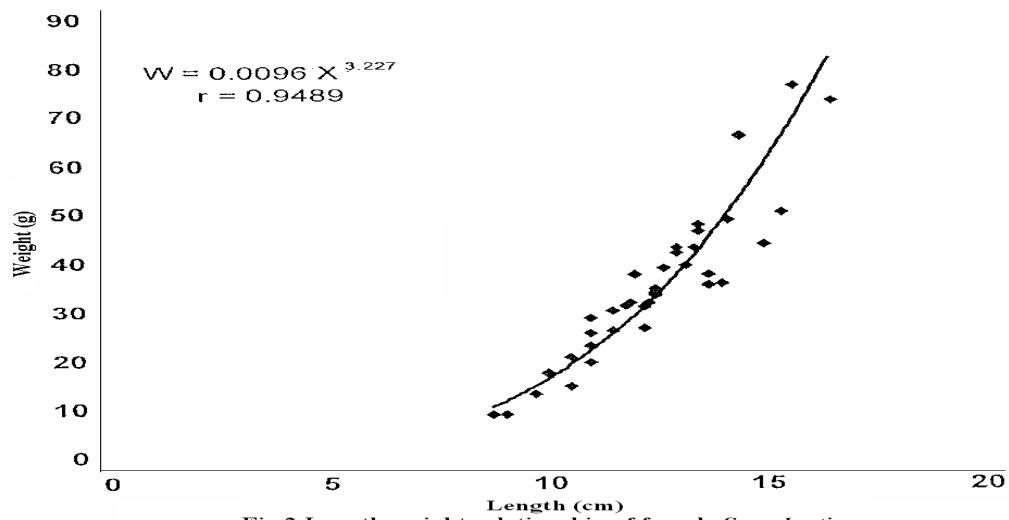

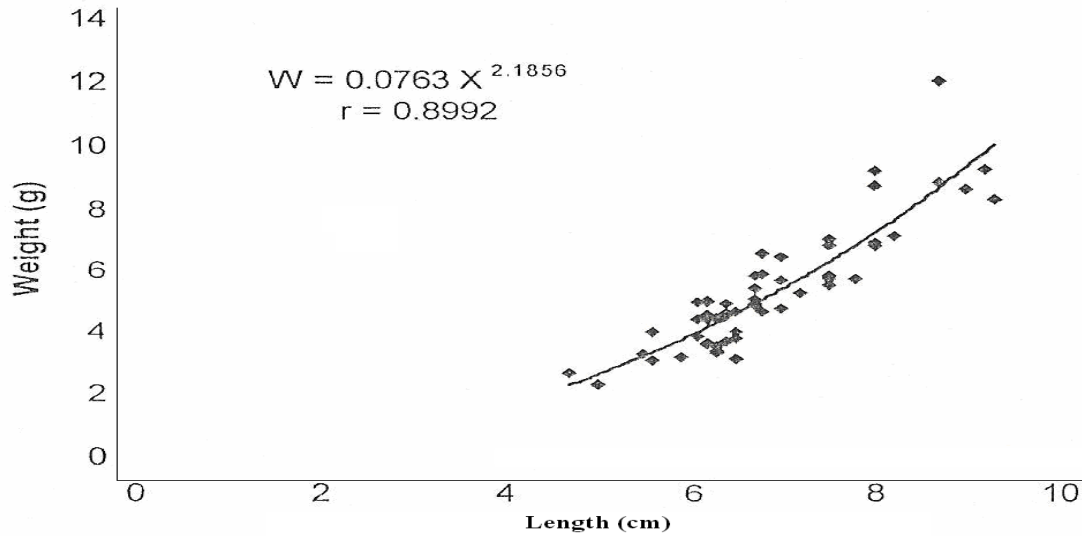Fig 2 Length-weight relationship of female *Synodontis resupinatus* in Gbedikere Lake, Bassa, Kogi State

$$W = 0.0763\, X^{2.1856}$$
$$r = 0.8992$$

Fig 3 Length-weight relationship of combine sex of
Synodontis resupinatus **in Gbedikere Lake, Bassa, Kogi State.**

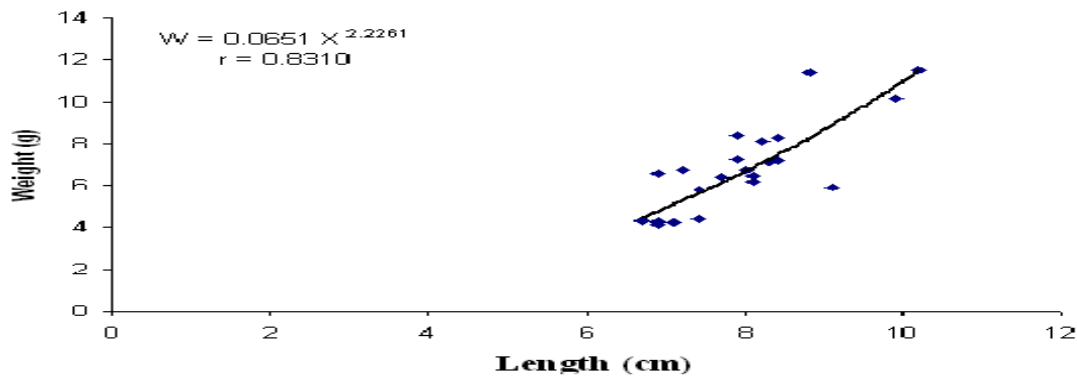$$W = 0.0651\, X^{2.2261}$$
$$r = 0.8310$$

Fig 4 Length-weight relationship of juveniles of
Synodontis resupinatus **in Gbedikere Lake, Bassa, Kogi State.**

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