

LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF *Citharinus citharus* (GEOFFROY SAINT-HILAIRE, 1809) FROM LAKE AKATA, BENUE STATE, NIGERIA.

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ABSTRACT

The Length-weight relationship and changes in the condition factor of *Citharinus citharus* of the Lake Akata, an ox-bow Lake of River Katsina-Ala, a tributary of River Benue was studied. A total of five hundred and five (505) fish samples were collected from May 2008-April 2009. Length-weight relationship of fish was estimated from the equation: $W = a.L^b$ which was transformed to base 10 logarithm, and condition factor, (k) was determined using the equation: $K = \frac{100W}{L^3}$. Both sexes of *C. citharus* in Lake Akata exhibited negative allometric growth pattern. The combined length weight relationship of *C. citharus* sexes was $\text{Log}W = -1.7738 + 2.9044 \text{Log}L$ ($r^2 = 0.9527$). The coefficient of determination for the Length-Weight relationship for both sexes of *C. citharus* in Lake Akata was strongly positive. The mean condition factor for the combined sexes was 1.37 ± 0.02 , but individually, female *C. citharus* were in better condition (1.44 ± 0.03) compared to the males (1.29 ± 0.02). The condition factor of *C. citharus* in dry season (1.37 ± 0.03) was not significantly higher than that (1.36 ± 0.03) in wet season ($p > 0.05$). This means the fish species are living well in the lake as the 'K' value are greater than one.

Keyword: growth pattern, seasonal condition, *C. citharus*, Lake Akata

INTRODUCTION

The family Citharinidae includes twenty genera and ninety-eight species (Nelson, 1994). Citharinids are of considerable economic importance in Lake Kainji and Lake Oguta (Nwadiaro, 1989). *C. citharus* is found in Africa, Sudanian form is found in Senegal, Gambia, Niger, Volta, Ouïmi and Chad. They are frequently found in swamps, especially where these have large areas of shallow water covering grassy banks. Large specimens are abundant in the rivers and open waters of lakes during the dry season (Daget and Gosse, 1984). The length-weight relationship of fish is an important fishery management tool. Its importance is pronounced in estimating the average weight at a given length group (Beyer, 1987) and in assessing the relative well being of a fish population (Bolger and Connolly, 1989). Among the freshwater fishes, length-weight relationship of different fishes has been studied by many researchers. Notable reports include that of (Shenouda *et al.* 1994), for *Chrysichthys spp* from the Southern most part of the River Nile (Egypt), (King, 1996) for Nigeria fresh water fishes, (Hart, 1997) for *Mugil cephalus* in Bonny Estuary. (Ogbe *et al.*, 2008) for *Hydrocynus forskalli* and *Alestes nurse* in Lower River Benue, (Ikongbeh *et al.*, 2012) reported length-weight relationships of *Chrysichthys nigrodigitatus* from Lake Akata, Benue State, Nigeria. Condition factor compares the wellbeing of a fish and is based on the hypothesis that heavier fish of a given length are in better condition (Bagenal and Tesch, 1978). The study of condition factor is important to understand the life cycle of fish species and contribute to an adequate management of the species and to the maintenance of the ecosystem equilibrium (Haruna and Bichi 2005). Condition factors of different species of cichlid fishes have been reported (Hart and Abowei, (2007) ten fish species from the lower Nun River, (Ogbe and Ataguba, 2008) *Malapterurus electricus* from the Lower Benue River, (Abowei and Davies, 2009) *Clarotes laticeps* from the fresh water reaches of the lower Nun river and (Ikongbeh *et al.*, 2012) reported *Chrysichthys nigrodigitatus* from Lake Akata, Benue State, Nigeria. Accurate fisheries statistics in the lake; and its adjoining flood plains is vital for the formulation of a sound fisheries management programme in the Lake. But, this is completely lacking. It is therefore necessary to carry out a comprehensive study on the biology of fishes of this very important recreational lake aimed at good management. The present study thus examines the length-weight relationship and condition factor to fill a gap in the current knowledge of the species.

MATERIALS AND METHODS

Study area

The study area, Lake Akata is an ox-bow lake of the River Katsina-Ala and lies between longitude $9^{\circ}16'$ and $9^{\circ}17'$ East and latitude $7^{\circ}11'$ and $7^{\circ}13'$ North (Figure 1).

Sample Collection

A total of 645 individuals of *C. citharus* were randomly sampled monthly for one year and usually in the mornings between 7.00am – 9.00am and in the evenings between 4:30pm – 6:30pm. The period of the study was from May, 2008 to April, 2009. The fish specimens used for the study were obtained from fishermen operating on Lake Akata. These fishermen use various fishing gears including hand nets, cast nets and gill nets of various standard mesh sizes

(20.2, 25.4, and 30.5mm). Canoes were used as fishing craft. Length and weight measurements were taken directly from the landing sites.

The total and standard lengths were measured with a meter rule on measuring board according to (Olatunde, 1977). The sex of each fish sample was determined by visual observation using genital evidence. Length-weight relationship of fish was estimated from the equation: $W = a.L^b$ (Pauly 1984). The relationship was transformed into a linear form using the logarithm equation: $\text{Log}W = a + b\text{Log}L$. Where, W = weight of fish (g), L = standard length of fish (cm), a = regression constant and b = the allometric coefficient.

For males and females and both combined sexes by least square regression method.

The condition factor, (k) was determined using the equation: $K = 100.W/L^3$ after (Ricker, 1975). Where, K = the condition factor, W = Weight of fish in (g) and L = Standard Length of fish (cm).

According to (Wootton, 1992), fish in good condition will have high K-value greater than 3, than those in poor condition.

RESULTS

Length-Weight Relationship

Length-Weight Relationship and related parameters of combined sexes of *C. citharus* in Akata Lake is shown in Figure 2. The "a" value for the combined sexes was - 1.7738 while "b" value for both sexes is 2.9044. Both sexes exhibited isometric growth pattern. The combined length weight relationship for both sexes is expressed by the regression equation: $\text{Log} W = - 1.7738 + 2.9044 \text{Log}L$. ($r^2 = 0.9527$). There was a higher correlation coefficient value in the length-weight for both sexes of *C. citharus*. The correlation coefficient was all positive and highly significant.

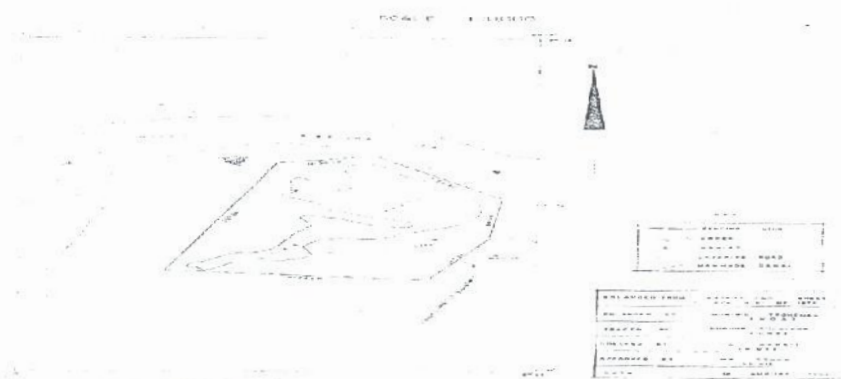


Figure 1: Map of Lake Akata

Source: Ministry of Agriculture and Natural Resources, Makurdi, Benue State.

Condition Factor

Figure 3 show the seasonal variation in mean monthly condition factor (k) of *C. citharus*. The maximum values for *C. citharus* males, obtained in wet season was 1.43 in August, and females 1.79 in August. Least values obtained for males *C. citharus* in the dry season were 1.48 in November, and females 1.53 in April. The condition factor of *C. citharus* in dry season (1.37 ± 0.03) was not significantly higher than that (1.36 ± 0.03) in wet season ($p > 0.05$).

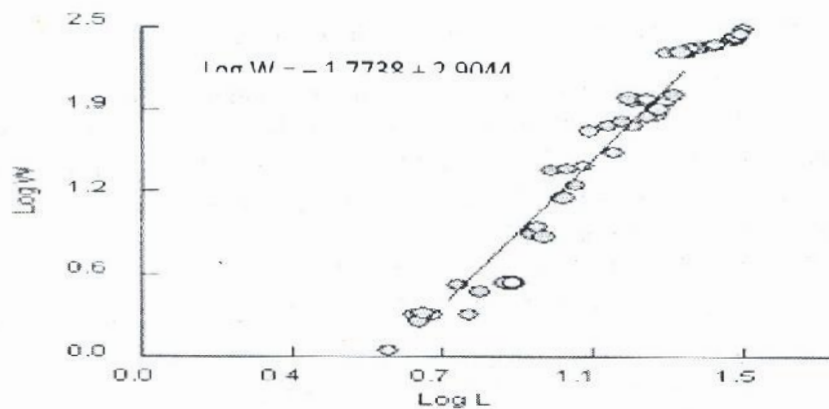


Figure 2: Length-Weight Relationship of *Citharinus citharus* (Combined Sexes) from Lake Akata, Benue State, Nigeria.

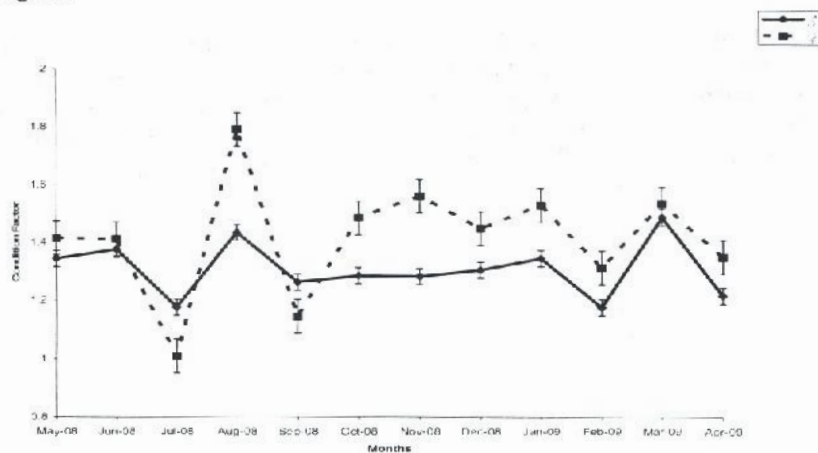


Figure 3: Monthly Variation in Condition Factor of *Citharinus citharus* from Lake Akata Benue State, Nigeria.

DISCUSSION

The value of the exponent "b" for combine sexes of *C. citharus* is 2.9044. Both sexes of *C. citharus* exhibited negative allometric growth pattern in Lake Akata. The "b" value for the combined sexes as reported in this study is similar to that reported for *C. gariepinus* 2.911 and 2.794 by (King, 1996a). This is in line with the values for the combined sexes in this study. However, the combined "b" value for both sexes as reported by the author 2.9 and 2.7 is similar with 2.9 in the present study. The slight differences could be due to the difference in the geo-hydrological factors of the two water bodies especially the flooding regime, rain distribution pattern and the nature of the water body. According to (Pauly and Gayanilo, 1997), "b" values may range from 2.5 to 3.5 suggesting that result of this study is in line. The correlation coefficient (r) was positive and highly significant which indicate that the rate of increase in body length is not proportional to the rate of increase in body weight of the fish. This is in agreement with previous studies on the different fish species from various water bodies (Layèyè, 2006), (Ayoade and Ikulala, 2007). Condition factor is one of the standard practices in fishery ecology that the individual fish species conditions is determined based on the analysis of length-weight data reflected that the heavier fish at a given length is in better condition (Bolger Connolly, 1989). The calculated mean condition factor values (k) for *C. citharus* ranged from 1.43 to 1.79 and the value are greater than 1. This is an indication that the fishes are doing well in Lake Akata. The condition factor of *C. citharus* in dry season was significantly higher than that in wet season. Seasonal variation in the condition factor of fish has been reported for *L. lepidus* and *B. nurse* by (Karabatak, 1997), and (Saliu, 2001). Condition factor is not constant for a species or population over a time interval and might be influenced by both biotic and abiotic factors such as feeding regime and state of gonadal development (Saliu, 2001).

CONCLUSION

In conclusion, both sexes of *C. citharus* exhibited negative allometric growth pattern. There was a higher correlation coefficient value in the length-weight for both sexes of *C. citharus*. The correlation coefficients were all positive and highly significant. The condition factor of *C. citharus* in dry season (1.37 ± 0.03) was significantly higher than that (1.36 ± 0.03) in wet season ($p > 0.05$).

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