

Length-Weight Relationship and Condition Factor of *Clarias anguillaris* (Family: Claridae) in Kontagora Reservoir, Niger State, Nigeria

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ABSTRACT: Length – weight relationship of *Clarias anguillaris* (Fam: Claridae) in Kontagora Reservoir, Niger State, Nigeria, was studied from January, 2007 - December, 2007. The fish species was obtained using a fleet of graded gill nets comprising of nine multi filament gill nets mesh sizes. The parameters a and b of the Length – weight relationship of the form $W = aL^b$ and Condition factor $C.F. = W / 100 / L^3$ are presented for the fish species. The mean monthly condition factor values were high during the rainy season than the dry season, and the b value obtained was 3.477. The b value indicates positive allometric relationship, with the weight of the fish increasing as the fish grow in length. The high mean monthly condition factor of the fish species indicating their well being, shows that Kontagora Reservoir has favourable environment for the survival and growth of the species.

Keywords: Length – weight relationship, Condition factor, *Clarias anguillaris*, Kontagora Reservoir.

INTRODUCTION

Freshwater of Nigeria including the wetlands was estimated at 743,100 ha, representing about 3.4% of the total area of Nigeria (Ita, 1993). According to Ita (1993), an estimated total of 230 fish species inhabit various fresh water ecosystems, indicating the potentials and fish species diversity in the rivers, lake and reservoirs in Nigeria.

In Kontagora Reservoir, *Clarias anguillaris* is a common species of family Claridae. It is a highly priced fish of considerable economic importance and available throughout the year. However, in spite of the abundance and commercial value of *Clarias anguillaris* in Kontagora, little information is available on its biology, which is important in the production and management of the fish. Therefore, this study examines the length and weight relationship and the condition factor of *Clarias anguillaris* in Kontagora reservoir, Niger State, so as to establish its well being in the reservoir.

Length–weight relationship is of great importance in fishery assessment (Gracia *et al.*, 1998; Haimovici and Valesco, 2000). Length and weight measurements in conjunction with age data can give information on the stock composition, age at maturity, life span, mortality, growth and reproduction (Fafioye and Oluajo, 2005).

MATERIALS AND METHODS

Monthly samples of *Clarias anguillaris* were obtained from Kontagora Reservoir, in Niger State, Nigeria, from January, 2007 – December, 2007 using fleets of graded gill net made up of nine multifilament nets of 25.4mm, 38.1, 50.8, 63.5, 76.2, 88.9, 101.6, 127.0 and 177.8mm stretched mesh sizes. The nets were used to sample the shore, surface and bottom waters at three sampling stations I, II and III on the reservoir, located between latitude 8° and 11° 3' North and longitude 3° 20' and 7° 40' East (Figure 1).

A total of fifty four samples of the fish sampled were caught during the study period. Total length (cm) of each fish was recorded from the tip of the snout to the extended tip of the caudal fin using a measuring board. Body weight (g) was measured using a spring balance (20g).

The length-weight relationship was calculated using the formula described by Le-Cren (1951):

$$W = aL^b \quad (1)$$

The logarithm transformed data will give the linear regression equation. Thus, equation (1) was transformed into:

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$\text{Log}W = \text{Log } a + b \text{ Log } L$ (2)

Where: W = Weight of fish (g); L = Total length of fish (cm); a = Constant and b = an exponent (Regression coefficient)

The Fultons condition factor (K) was calculated for the fish species using the relationship described by Ikomi and Odum (1998):

$K = \frac{100W}{L^3}$ (3)

Where: K = Condition factor; W = Weight of the fish (g) and L = Total length of the fish (g)

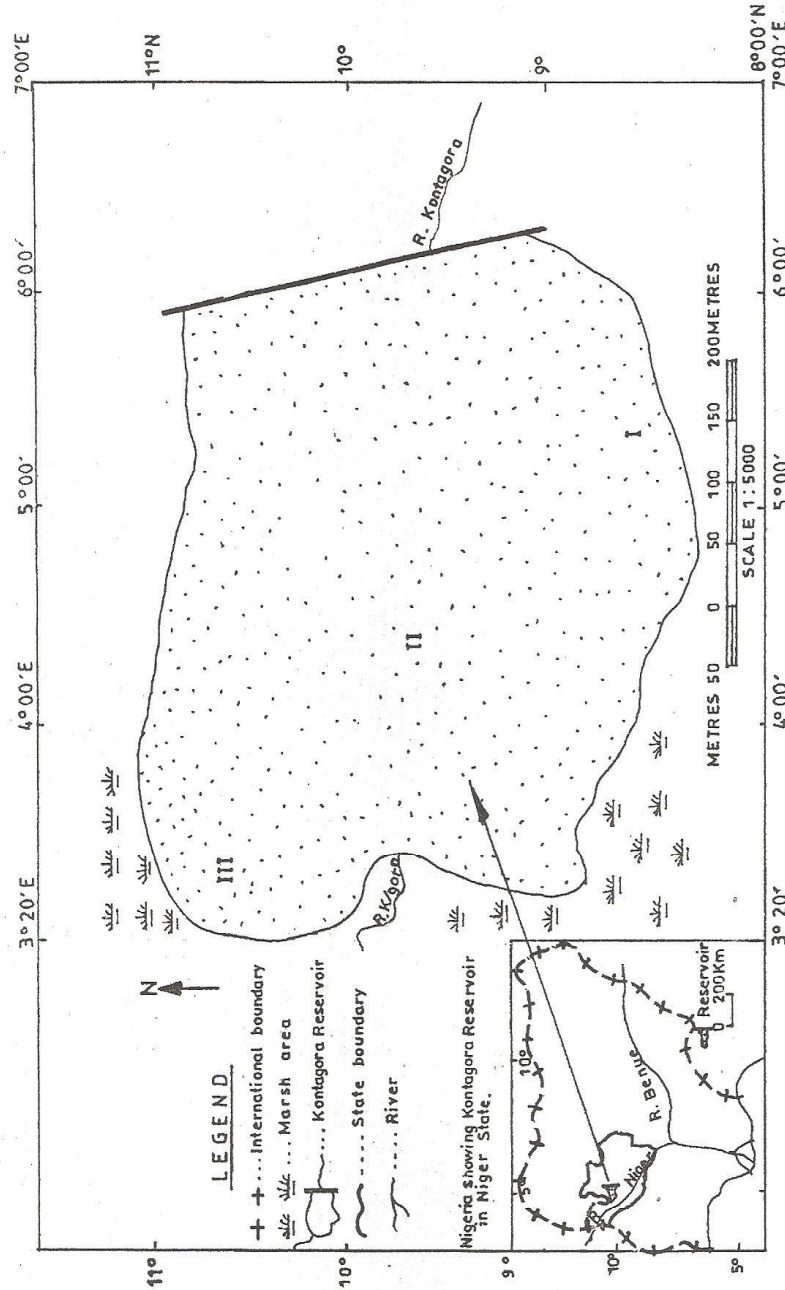


Fig.1:Map of Kontagora Reservoir at Tunga Kawo (Source: Niger State Ministry of Land and Survey Kontagora Area Office).

RESULTS

Length and Weight Distribution

Table 1 shows the mean monthly length and weight ranges of the 54 fish samples (*Clarias anguillaris*) caught during the sampling period. The total length of the fish range from 16.0cm – 26.30cm, with the mean total length of 23.08cm, and the weight range from 44.0g – 272.50g, with the mean weight of 154.28g. The high value obtained for the mean total length and the mean total weight shows that the fish species were relatively matured.

Length – Weight Relationship

The length – weight relationship parameters a, b and r of *Clarias anguillaris* are presented on Table 2. The value of b = 3.4053 recorded

showed that the rate of increase in body length is proportional to the rate of increase in body weight. This is positive allometric growth. Graph of the length – weight relationship using log conversions was presented in Figure 2, and it indicated that as the fish grow in length, the weight also increases.

Condition Factor

The mean monthly condition factor for *Clarias anguillaris* were presented on Figure 3. The result shows fall in condition from October to February i.e. dry season, were as in the rainy season the values were higher. This indicates that the fish were generally in good condition during the rainy season.

Table 1: Size ranges of *Clarias anguillaris* from Kontagora Reservoir, Niger State, Nigeria (Jan. – Dec. 2007)

Month	Number of fish	Mean weight (g)	Mean length (cm)
January	---	---	---
February	2	272.5	30
March	2	150	22
April	8	127	19.6
May	---	---	---
June	8	157.5	26.3
July	6	265	29.1
August	4	250	30.4
September	3	102	19.4
October	12	70.3	16.9
November	5	44	16
December	4	104.5	21.1
Total	54	1542.8	230.8
Mean	5.4	154.28 (8.26)	23.08 (1.46)

Table 2: Length – Weight relationship parameters of *Clarias anguillaris* from Kontagora Reservoir, Niger State, Nigeria. (Jan. – Dec. 2007)

Month	a	b	r
January	---	---	---
February	0.0034	3.341	0.9229
March	0.0032	3.332	0.9322
April	0.0030	3.321	0.8721
May	---	---	---
June	0.0028	3.462	0.8621
July	0.0031	3.477	0.9321
August	0.0033	3.356	0.9210
September	0.0026	3.468	0.8612
October	0.0032	3.421	0.9340
November	0.0029	3.423	0.9260
December	0.0032	3.452	0.8521
Mean	0.0031	3.4053 (1.26)	0.9016 (1.05)

a – Regression intercept

b - Regression coefficient

r – Correlation coefficient

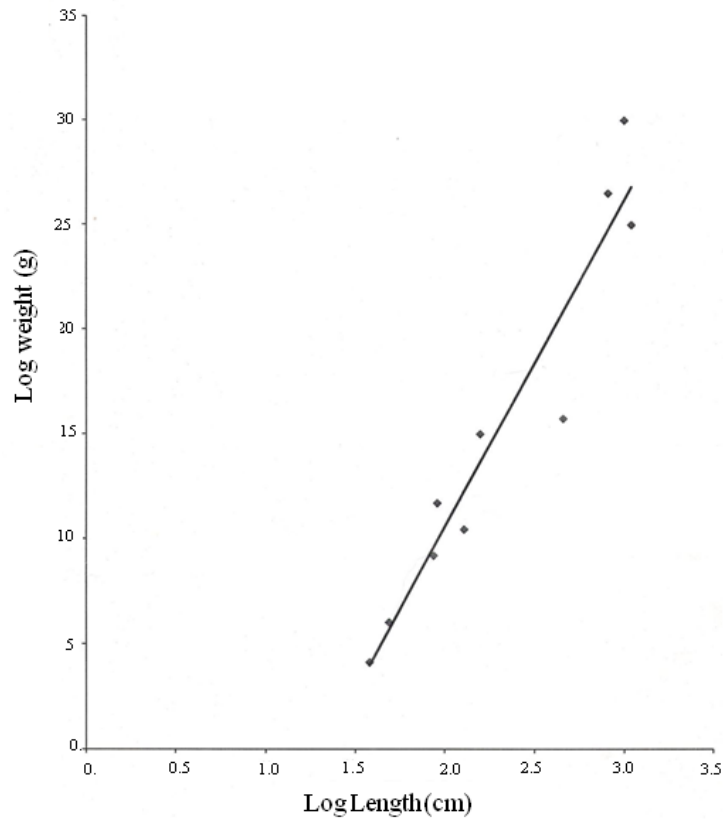


Figure 2: Length-Weight relationship of *Clarias anguillaris* in Kwantagora Reservoir (January-December 2007)

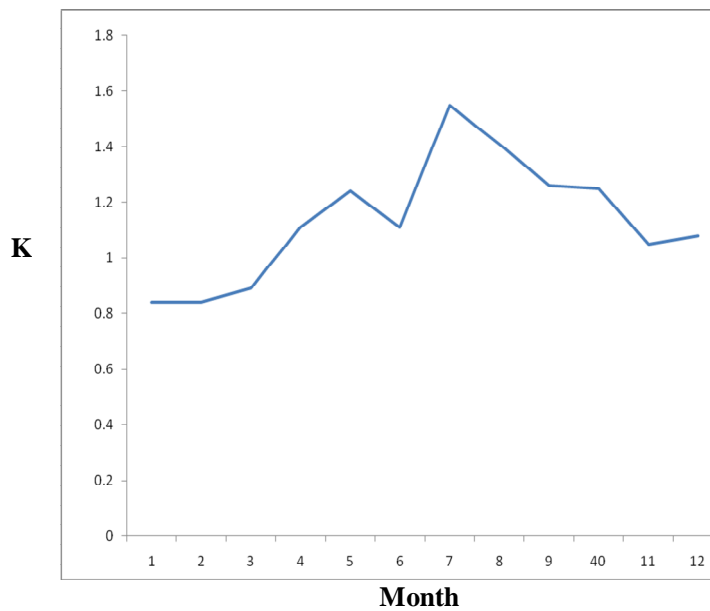


Figure 3: Mean monthly condition factor of *Clarias anguillaris* (Fam: Claridae) in Kontagora Reservoir (Jan. -Dec. 2007)

The analysis of the size ranges of *Clarias anguillaris* showed that the mean length and mean weight of the fish were high. Olatunde (1983) recorded high mean length and mean

weight for *Clarias lazera* in a similar study. The size ranges found in the samples depend on the type of fishing gears used for capture, the season of the year and other structural and

physiological adaptations which make a fish more vulnerable to catch (Olatunde, 1983).

The length-weight relationship revealed as expected that as the fish grow in length, the weight also increases i.e. the fish became heavier with increase in length. The regression analysis showed that the fish exhibited allometric growth. The value of the exponent b is 3.4053, which indicated that *Clarias anguillaris* showed positive allometric growth i.e. the fish became heavier with increase in length. This result differs from that of Fafioye and Oluajo (2005) and King (1996) who obtained b value of 2.790 and 2.911 for *Clarias gariepinus* respectively. Their value indicated a negative allometric growth. The differences could be due to location differences, size of fish studied and season of collection. Ricker (1975) reported that when $b = 3$, the growth in weight is termed isometric and the weight growth proceed in the same direction as the cube of the length. However, when b value is less than or greater than 3, the growth is allometric. Pauly and Gayannillo (1979) reported that b values may range between 2.5 and 3.5 which suggests that the result of this study is valid.

The mean condition factors showed that the fish were in good condition during the rainy season, and there was a fall in the dry season. The fall in the condition factor during the dry season might be due to several factors, which might include physiological stress due to changes in physical and chemical condition of the habitat, and, inadequate feeding (Olatunde, 1983).

CONCLUSION

In conclusion, the positive allometric growth and condition factor exhibited by *Clarias anguillaris*, indicated that Kontagora Reservoir had suitable water environment for its survival and growth. It is therefore recommended that to ensure the continuous survival and growth of this species in the reservoir, the management of the reservoir should ensure proper and constant monitoring, as well as control of the physico-chemical parameters of the reservoir, such as temperature, dissolved oxygen, Nitrate-

Nitrogen, Phosphate-phosphorus, e.t.c. so as to maintain the existing suitable condition, and, thereby ensure the continuity and the well being of the species in the water body.

REFERENCES

- Fafioye, O.O. and Oluajo, O.A. (2005). Length – Weight relationships of five fish species in Epe Lagoon, Nigeria. *African Journal of Biotechnology* **4(7)**: 749-751.
- Gracia, C.B., Buarte, J.O., Sandoval N., Von Schiller, D., Mello, N.P. (1998). Length-weight relationships of Demersal Fishes from the Gulf of Salamanca, Colombia. *Fishbyte* **21**: 30-32.
- Haimovici, M. and Velasco, G. (2005). Length – weight relationship of marine fishes from Southern Brazil. *The ICLARM Quarterly* **23(1)**: 14-16.
- Ita, E.O. (1993). Inland Fishery Resources of Nigeria. CIFA Occasional Paper No. 20 FAO, Rome 120pp.
- King, R.P. (1996). Length-Weight relationships of Nigerian fresh water fishes. NAGA: *The ICLARM Quarterly* **19(3)**: 49-52.
- Le-Cren, E.D. (1951). The Length-Weight relationships and seasonal cycle in gonad weight and condition in the Perch (*Perca fluviatilis*). *Journal of Animal Ecology* **20**: 201-219.
- Olatunde, A.A. (1983). Length-weight relationship and diets of *Clarias lazera* (Cuiver and Valenciennes), Family Claridae (Osteichthyes: Siluriformes) in Zaria, Nigeria. In: Proceedings of the 3rd Annual Conference of the Fisheries Society of Nigeria (FISON) Maiduguri 22-25th, 1983. 183 – 192pp.
- Pauly, D. and Gayannilo Jr. F.C. (1997). A Bee: An alternative approach to estimating the parameters of a length- weight relationship from length-frequency samples and their bulk weights. NAGA ICLARM Manila, Philippines. 110pp.
- Ricker, W.E. (1975). Computation and interpretation of biological statistics of populations. *Bulletin of Fish. Research Bd. Can.* **191**: 1-382.