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Length-weight relationship and condition factor of *Schilbe mystus* in Dadin kowa reservoir

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Abstract

A study on length-weight relationship and condition factor of *Schilbe mystus* in Dadin Kowa Reservoir was carried for a period of three months. The results obtained showed that the growth pattern of the fishes were negatively allometry (when $b<3$ i.e the fish grows faster in length than in weight) with b values of 2.5 obtained at $P<0.001$. There was perfect correlation between the length and weight of all the species. The condition factor was 0.8, an indication that the fish were thriving well in the reservoir. The length-weight relationship and condition factor determined from this study indicated the productivity level of the researvoir for sustainable fish conservation.

Keywords: Lenthy-weight, Dadin Kowa, Growth, Correlation

Introduction

African butter catfish (*Schilbe mystus*) is a species of fish in the *Schilbeidae* family. It is native to many major river systems in Africa. Other common names for the fish include Butter barbel, African glass catfish, Lubangu, Mystus catfish and Silver barbel. It was originally described as *Silurus mystus* by Carl Linnaeus in 1758 (Zengeya and Tsungai, 2014). The African butter cat fish can grow up to 40 centimetres (16 inch) total lenght and has been reported up to a maximum weight of 250 grams (Froese and Pauly, 2016). It generally appears brownish on the head and dorsal surface and silvery-white on the underside (Zengeya and Tsungai, 2014). The fins are usually colourless (Pauly *et al*., 2016). It is commonly found in stagnant or slow flowing open waters of lakes, ponds, rivers, and shallow swamps where vegetation is present. It is most active at night or in subdued light (Zengeya and Tsungai, 2014). It feeds from surface waters on fish, insects, crustaceans, ostracods, snails, seeds, leaves, roots, diatoms, algae, and fruit (Ayoade and Ikulala, 2007). It may spawn in multiple locations, depositing eggs on vegetation. The lifespan of *Schilbe mystus* is estimated at 6 to 7 years (Froese and Pauly, 2016).

Studies about fish biology and ecology are important in order to improve fishery management and conservation. In this sense, studies about length-weight relationship

(LWR) are of great importance in fishery assessments and management. The length-weight relationship can give information on the stock composition, growth rate, life expectancy, mortality and production of fish species and it is an important tool in fish biology, stock composition, physiology, ecology and fisheries assessment (Oscoz *et al*., 2005). Moreover it is useful in determining weight and biomass when only length measurements are available, as indicator of condition, to assess the relative well-being of a fish population. Length-weight relationship is also important for statistical comparisons of species growth between different populations.

Condition factor (K) is a parameter of the state of well-being of the fish based on the hypothesis that heavier fish of a particular length are in a better physiological condition (Imam *et al*., 2010). In fisheries science, the condition factor is used in order to compare the "condition", "fatness" or wellbeing of fish. The condition of a fish reflects recent physical and biological circumstances, as it is strongly influenced by both biotic and abiotic environmental variables, and fluctuates by interactions among feeding habits, parasitic burden and fish physiological conditions. The objective of this study is to measure the state of physiological wellbeing of *Shilbe mystus* in Dadin kowa reservoir. Results from this research will provide baseline information towards enhanced fisheries development.

Methodology

A total of 58 fish samples were collected from local fishermen at the landing site of the reservoir and transported to the laboratory by packing ice around the fish in a plastic bag. The total and the standard length were taken using measuring board to the nearest 0.1cm. Body weight of individual fish was measured to the nearest 0.1g with an electric balance. The taxonomical key for Identification of fish by Idodo Umeh (2003) was used for identification of the species.

Length-weight relationship was calculated using the equation $W = aL^b$, where; W = weight of fish in grams, L = Total length of fish in centimeter, a = constant, b = an exponent. The 95% confidence interval, CI of 'b' was computed using the equation: CI = b ± (S.E), where SE is the standard error. Condition factor (K) was calculated for the fish species for each month using $= \frac{W \times 100}{L^3}$, where: K = the condition factor, W = weight of fish in grams, L = total length of fish in cm.

Result

Table 1 shows the length weight relationship of *Schilbe mystus* in Dadin kowa reservoir. The species exhibited negative allometric growth pattern at 95% confidence interval, values of the exponent '*b*' in the relationship varied between 3.1cm and 2.0g for March, 2.9cm and 1.1g for April, 3.4cm and 2.2g for May respectively. There was a good correlation (Table 1) between the length and weight relationship of the species

in the reservoir. Condition factor for the months of March, April and May were 0.75, 0.86 and 0.78 respectively with the mean as 0.8 (Table 2).

Table 1: Length-weight relationship of *Schilbe mystus* in Dadin kowa reservoir

Parameters	N	a	B	R^2	S.D	95 % CI at b
March	20	1.7066	2.5591	0.6659	2.4234	3.1010-2.0174
April	18	1.8279	1.9965	0.6160	3.6588	2.8589-1.1341
May	20	1.6776	2.8009	0.9552	2.6475	3.3929-2.2089
Mean		1.7374	2.4522			

* N = Number of sample size; a = intercept; b = slope; R^2 = correlation; S.D = standard deviation. CI = confidence interval.

Table 2: Condition Factor of *schilbe mystus* in Dadin kowa reservoir

Parameter	N	Mean K	Mean TL(CM)	Mean W(G)	S.D	S.E
March	20	0.7464	25.215	115.45	2.4234	0.542
April	18	0.8642	23.93	115.07	3.6588	0.863
May	20	0.7803	25.08	117.85	2.6475	0.592
Mean		0.8				

*N = Number of sample size; K= Condition factor; TL = total length; W= weight; SD = standard deviation; SE = standard error

Changes of *b* values depend primarily on the shape and fatness of the species, various factors may be responsible for differences in the observed *b* value for the length-weight relationships of the sample in the reservoir.

These factors may include seasons, water temperature, salinity, food (quantity, quality and size), sex and stage of maturity. Values obtained for the length-weight relationship showed that the entire sample exhibited negative allometric growth, meaning that length increases as weight increases but the rate of increase in body length was not proportional to the increase in body weight. Similar results on negative allometric growth were recorded by several researchers for *Schilbe mystus* elsewhere such as Agboola and Anetekhei (2008) and Niyonkuru and Laleye (2012).

Variations in length-weight relationship recorded in this study was influenced by many biotic and abiotic factors such as phytoplankton abundance, predation, water temperature and dissolve oxygen concentrations among others which may or may not favor the survival of all the species in the reservoir. These variations in growth pattern shows that this species passed through stages in its life history which were defined by different length-weight relationship. Juvenile and adult stages of a fish may exhibit differences in the length-weight relationships owing to the changes in the body form with size, feeding habits and factors related to reproduction, Khan *et al*., (2012).

The condition factor was approximately 0.8 which is greater than 0.5 indicating that the fish were in good condition or high nutrition. Several authors such as Oribhabor *et al.,* (2009) noted that 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.

Conclusion

The results indicated that the fish grows faster in length than in weight and were in good condition responding well to the various ecological factors in the reservoir.

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References

Agboola, J.I. and Anetekhai M.A. (2008). Length-Weight Relationship of Fish. *Journal of Applied Ichthyology*, 24(1): 623-625.

Ayoade, A.A. and Ikulala, A.O.O. (2007). Length Weight Relationship, Condition Factor and Stomach Contents of *Hemichromis bimaculatus*, *Sarotherodon melanotheron* and *Chromidotilapia guntheri* (Perciformes: Cichlidae) in Eleiyele Lake, SouthWestern Nigeria. *Journal of Tropical Biology.* 55(1): 3-4.

Froese, R. and Pauly D. (2016). "*Schilbe mystus*". Fish base. Retrieved 15 October 2016.

Idodo-Umeh G. (2003). Freshwater fishes of Nigeria (Taxonomy, Ecological notes, Diet and Utilization). Idodo-Umeh Publishers Ltd. Benin City, Edo State, Nigeria, 11- 218.

Imam, T.S., Bala U., Balarabe M.L. and Oyeyi T.I. (2010). Length-Weight Relationship and Condition Factor of six fish species. *African Journal of General Agriculture*, 6(3): 125-130.

Khan A., Khan. M.S and Miyan K. (2012). Length – Weight Relationship of Giant Snakehead, *Channa marulius* and Stinging fish, *Heteropneustes fossilis* from the River Ganga India. *Journal of Applied Ichthyology***,** 28(2): 154 – 155.

Niyonkuru, C. and Laleye, P. (2012). Length-Weight Relationship of Fishes. *International Journal of*

Business, Humanities and Technology, 2(3): 41-50.

Oribhabor, B.J., Mokayi, P.K. and Akinrotimi A.O. (2009). Length-Weight Relationship and Condition Factors of fishes. *Nigerian Journal of Agriculture, Food & Environment*, 5(2-4): 1-4.

Oscoz, J., Campos F. and Escala, M.C. (2005). Length-Weight Relationship of Fish Species. *Journal of Applied Ichthyology*, 21(2): 73-74.

Pauly, D., Moreau, J. and Abad, N. (2016). Comparison of the age- structured and length converted catch curves of Brown trout *Salmon trutta* in two French Rivers. Fisheries Research, 22(2): 197-204.

Zengeya, A. and Tsungai, T. (2014). "*Schilbe mystus* (African butter catfish)". Invasive Species Compendium. Wallingford, UK: CAB International. Retrieved 15 October 2016.