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Short Communication

Length-weight relationships of five fish species in Epe lagoon, Nigeria

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Length-weight relationship (LWR) of 320 fish populations covering 3 families, 4 genera and 5 species inhabiting Epe Lagoon, were studied. The fishes (*Clarias gariepinus* (Burch), *Illisha africana* Bloch), *Chrysichthys nigrodigitatus* (Lacepede), *Chrysichthys walkeri* (Gunther) and *Ethmalosa fimbriata* (Bowdich)) were obtained from fish landing site at Epe market from November 2001 to October 2002, and January to December 2003. The parameters *a* and *b* of the length-weight relationship of the form $W=aL^b$ and condition factor (c.f.)=$W100/L^3$ are presented for the five fish species. The c.f. values significantly (P<0.001) range between 0.64 and 1.99, while the *b* values varied between 2.790 and 3.210 with the mean *b* = 3.0072 at P<0.001. This indicates a nearly isometric relationship with 60% of the variation in body weight being accounted for by changes in length.

Key words: Length-weight, fish species, Epe Lagoon, condition factor.

INTRODUCTION

Length-weight relationship (LWR) is of great importance in fishery assessments (Garcia et al., 1998; Haimovici and Velasco, 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 production (Beyer, 1987; Bolger and Connoly, 1989; King, 1996a and b; Diaz *et.al*., 2000).

Length-weight relationships data for fresh water and brackish water fish resources of Nigeria are limited and the present contribution is aimed at compensating for this. Also, the fact that most of these fish species (such as *Chrysichrhys* spp. and *Clarias* spp.) are in high demand in the country, the use of LWR for assessment of their maturity, growth and production is important. Therefore, this study examines the LWR of *Clarias gariepinus* (Burch), *Illisha africana* (Bloch), *Chrysichthys nigrodigitatus* (Lacepede), *Chrysichthys walkeri* (Gunther) and *Ethmalosa fimbriata* (Bowdich)) in Epe Lagoon, Lagos State, Nigeria.

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MATERIALS AND METHODS

A total of 10,015 fish samples (1,944 *Clarias gariepinus,* 2,508 *I. africana,* 2,151 *Chrysichthys nigrodigitatus,* 1,560 *Chrysichthys walkeri* and 1,852 *E. fimbriata*) belonging to three families (Bagridae, Clupeidae and Clariidae) were collected randomly from the main landing centre at Epe from November 2001 to October 2002, and January to December 2003. Fishes were caught by a number of gears such as gill net, dip net, fishing basket and pole and line fishing boats. The samples were transported to the research laboratory in polythene bags containing ice blocks to prevent spoilage and then stored in a deep freezer to avert posthumous deterioration. Prior to length and weight measurements the fishes were taken out in batches from the freezer and allowed to thaw.

Total length (cm) of each fish was taken from the tip of the snout (mouth closed) to the extended tip of the caudal fin using a measuring board. Body weight was measured to the nearest gram using a top loading Metler balance, while sex was recorded for all the fishes of the sample collected.

The LWR was estimated by using the equation $W = aL^b$ (Ricker, 1973). The values of constant *a* and *b* were estimated from the log transformed values of length and weight i.e. *log* W = *log a* + *b log L,* via least square linear regression (Zar, 1984). The condition factor was calculated by usual formula c.f. = $100W/L^3$ (Pauly, 1983); where W= weight in grams; L= total length (cm). All data on LWR of the different fish species were subjected to t-test analysis at P<0.001.

Table 1. Length-weight relationship of five species of brackish water fishes collected from Epe Lagoon, Nigeria.

Family	Species	a	b	Sex		r	Mean TL (range, cm)	Mean Wt (range, g)	c..f.
				M	F				
Bagridae	*Chrysichthys nigrodigitatus*	0.0079±0.0011	3.042±0.003	1070	1081	0.979	21.75±7.55 (14.2-29.3)	85.5±69.5 (16-155)	0.81±0.2.
	Chrysichthys walkeri	0.0074±0.0036	3.114±0.001	887	673	0.729	13.5±6.5 (7.0-20.0)	66.95±58.05 (8.9-125)	1.15±0.96
Clupeidae	*Ethmalosa fimbriata*	0.0101±0.0036	3.210±0.013	947	905	0.998	19.1±2.8 (16.3-21.9)	33.1±25.8 (7.3-58.9)	1.0±0.16
	Ilisha africana	0.0131±0.0024	2.790±0.011	1167	1341	0.978	16.15±4.95 (11.2-21.1)	19.6±14.3 (5.3-33.9)	1.27±0.62
Clariidae	*Clarias gariepinus*	0.0160±0.0021	2.880±0.15	938	1006	0.974	15.5±8.5 (7.0-24.0)	143.0±132.0 (11-275)	0.79±0.15

c.f. = condition factor; *a*, *b* = regression coefficients; TL = total length; r = correlation co-efficient; N= number of fish; Wt = weight; M=male; F=female; parentheses =range values.

RESULTS

The total catch distribution, condition factor (c.f.) and parameters *a* and *b* of the LWR of five fish species of Epe Lagoon, Nigeria are shown on Table 1. The total number of fish catch was ten thousand and fifteen which shows *I. africana* as the most abundant, followed by *Chrysichthys nigridigitatus*, *Clarias gariepinus, E. fimbriata* and *Chrysichthys walkeri*.

The values of *b* significantly (P<0.001) rose from 2.790 in *I. africana* to 3.210 in *E. fimbriata*. The mean value of *b* for all species was 3.0072. The condition factors for the species were significantly different and it ranged between 0.79 ± 0.15 in *Clarias gariepinus* to 1.37 ± 0.62 in *I. africana.* Of all the fish species examined, *Chrysichthys nigrodigitatus* recorded the highest maximum length of 29.3 cm followed by *Clarias gariepinus* (24.0 cm), *E. fimbriata* (21.9 cm), *I. africana* (21.1 cm) and *Chrysichthys walkeri* (20.0 cm).

In this study, efficient sampling was carried out to include the widest possible range of lengths, which were generally obtained with large samples and non- selective fishing techniques. The variations in fish sizes indicate that the fish population ranged from immatured specimens to fully matured ones. This also suggests differences in their growth (Frota et al., 2004). The least minimum fish TL of 7.0 cm recorded in the samples may be attributed to the selectivity of the mesh sizes of nets used in sampling, which may not trap small size fishes during the raining season.

The values of *b* = 2.790 and 2.880 recorded for *Clarias gariepinus* and *I. africana* respectively show that the rate of increase in body length is not proportional to the rate of increase in body weight, when compared with the mean exponent *b* = 3.00072. This is a negative allometric growth and it is similar to *b* values 2.911 and 2.794 recorded for *Clarias gariepinus* (King, 1996a) and *I. africana* (Marcus, 1982), respectively. The values of *b* for *Chrysichthys walkeri* (3.114), *Chrysichthys nigridigitatus* (3.042) and *E. fimbriata* (3.210) show positive allometric or approximate isometric growth when compared with the mean exponent *b* = 3.00072. Similar results were obtained for *Chrysichthys walkeri* (Ikusemiju, 1976), *Chrysichthys nigrodigitatus* (Fagade and Adebisi, 1979) and *E. fimbriata* (Ekeng, 1990; Torres, 1991). Abdurahiman (2004) obtained median 2.85 and mode 3.0 values of *b*, while Abdallah (2002) recorded *b* values of between 2.5 to 3.44 for the fishes studied in different marine bodies. According to Pauly and Gayanilo (1997), *b* values may range from 2.5 to 3.5 suggesting that result of this study is valid.

The differences in weight for all the sampled batches may be due to the individual condition factor (c.f.) as it relates to the well-being and degree of fatness (Pauly, 1983). Diaz et al., (2000) found similar results in demersal fishes from the upper continental slope off Colombia. From calculated c.f. values of between 0.79 ± 0.15 and 1.27 ± 0.62, the mean value of c.f. of *Chrysichthys nigrodigitatus* and *Clarias gariepinus* is <1.0, while for *Chrysichthys walkeri, E. fimbriata* and *I. africana* it is >1.0. These values are lesser than those values (2.9 to 4.8) documented by Bagenal and Tesch (1978) for mature fresh water fish fresh body weight. This suggests that the condition of the Epe Lagoon in comparison to either fresh water or marine bodies may be extremely unfavourable to fishes in the Lagoon irrespective of season. Therefore a call for study of physico-chemical parameters of Epe Lagoon to further analyse its sustainability of biodiversity is inevitable.

In conclusion, the composition of both sexes gave better over-view of LWR for each fish species. The brackish environment of Epe Lagoon produced fish of lower *b* value, which may be attributed to pollution status or anthropogenic activities that occur in it.

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