Short Communication

Length-weight relationships of nine fish species from Ologe Lagoon, Lagos, Nigeria

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This study describes the length-weight relationships of (LWR) of nine fish species from Ologe Lagoon, Lagos, Nigeria. A total of 1635 specimens were collected by local fishing gears from January, 2007 to December, 2007. The slope (b) values obtained for the nine fish species ranged from 2.5 to 3.2, and deferred significantly (p < 0.005) from 3, which indicates that the fish species have allometric growth. The condition factors (K) of the fish species ranged from 0.91 to 8.46.

Key words: Length-weight, Ologe Lagoon, allometric growth, condition factor.

INTRODUCTION

The morphometric relationships between length and weight can be used to assess the well-being of individuals and to determine possible differences between separate unit stocks of the same species (King, 2007). In addition, length-weight relationships are also important in fisheries management for comparative growth studies (Moutopoulos and Stergiou, 2002). Pauly (1993) stated that length-weight relationship (LWR) provides valuable information on the habitat where the fish lives while Kulbicki et al. (2005) stressed the importance of LWR in modeling aquatic ecosystems.

There is dearth of information on the length-weight relationships of fresh water and brackish water fish resources of Nigerian waters (Fafioye and Oluajo, 2005). The fish species of Ologe Lagoon in particular have not been studied in this regard. Therefore, this study is aimed at providing length-weight data required for the manage-ment of the Ologe Lagoon fisheries. Apart from this, some of the fish species (*Sarotherodon melanotheron, Oreochromis niloticus,* and *Chrysichthys nigrodigitatus*) studied are of high economic value in Nigeria (Fafioye and Oluajo, 2005) and the use of LWR for assessment of their maturity, growth and production is important. Therefore, this study examines the length-weight relation-ship of nine fish species collected from Ologe Lagoon, Lagos, Nigeria.

MATERIALS AND METHODS

The study area is the Ologe Lagoon situated between longitude $3°02'E$ to $3°07'E$ and latitude $6°27'N$ to $6°30'N$, and has a surface area of 9.4 km^2 (Anetekhai et al., 2007). This lagoon forms part of the continuous lagoon that stretches from Lake Nokoue in Benin Republic to Lagos, emptying into the Atlantic Ocean (Agboola and Anetekhai, 2008).

A total of 1,635 fish samples (Cichlidae; 121 *Hemichromis fasciatus,* 187 *Tilapia zillii,* 220 *Sarotherodon melanotheron,* 137 *Oreochromis niloticus,* 63 *Oreochromis aureus,* 82 *Tilapia mariae,* 76 *Sarotherodon galilaeus,* Claroteidae; 316 *Chrysichthys nigrodigitatus,* and 433 *Chrysichthys auritus longifilis*) were collected randomly from Otto Jetty (fish landing site) between January, 2007 and December, 2007. The fisher folks operating in this lagoon deploy surface and bottom-set gillnets, cast nets, ring nets, drift net and fishing baskets for their catches. 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 (Fafioye and Oluajo, 2005). Parameters of the length-weight relationship of identified fish species were estimated using the equation:

$$W = aL^b \text{ (Rickter, 1973)} \qquad (1)$$

Where W = weight of fish (g), L = length of fish (cm), a = y-intercept

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Table 1. Length – weight relationships of nine fish species collected from Ologe Lagoon, Lagos, Nigeria.

Species	N	a	b	95% CI for b	r	K	Mean L (cm)	Mean W (g)
Cichlidae								
Hemichromis fasciatus (Peters, 1857)	121	0.039	2.981	2.974 - 2.988	0.92	3.75	15.4	129.6
Tilapia zillii (Gervais, 1848)	187	0.022	2.693	2.681 - 2.705	0.78	3.76	17.5	82.9
Sarotherodon melanotheron (Rüppell, 1852)	120	0.025	3.094	3.088 - 3.100	0.81	2.38	16.1	127
Oreochromis niloticus (Linnaeus, 1758)	137	0.019	2.772	2.763 - 2.781	0.88	2.99	15.5	59.2
Oreochromis aureus (Steindachner, 1864)	63	0.015	2.733	2.718 - 2.748	0.91	4.27	19.2	136.1
Tilapia mariae (Boulenger, 1899)	82	0.012	2.941	2.931 - 2.951	0.95	2.48	13.8	55.6
Sarotherodon galilaeus (Linnaeus, 1758)	76	0.029	2.513	2.498 - 2.528	0.76	8.46	16.3	93.3
Claroteidae								
Chrysichthys nigrodigitatus Lacepède, 1803)	316	0.011	2.892	2.871 - 2.913	0.98	2.07	17.3	78.5
Chrysichthys auritus longifilis (Pfaff, 1933)	433	0.015	3.164	3.157 - 3.171	0.91	0.91	17.9	82.6

N = Number of sample size; a and b = regression coefficients; CI = confidence interval; r = correlation coefficient; K = condition factor; L = total length; W = weight.

or the initial growth coefficient, and b = Slope or the growth coefficient.

The values of constants a and b were estimated after logarithmic transformation of equation (1) using least square linear regression (Zar, 1984) to give:

$$logW = loga + blogL \qquad (2)$$

Prior to regression analysis of logW on logL, log-log plots of length and weight values were performed for visual inspection of outliers (Froese, 2006). Only extreme outliers attributed to data error were omitted from analyses. The 95% confidence interval, CI of b was computed using the equation:

$$CI = b \pm (1.96 \times SE)$$

Where SE is the standard error of b.

In order to confirm whether b values obtained in the linear regressions were significantly different from the isometric value of $\pm$ 95% CI of b at α = 0.05, t-test was applied as expressed by the equation according to Sokal and Rohlf (1987): t_s = (b-3) / SE, where t_s is the t-test value, b the slope and SE the standard error of the slope (b). All the statistical analyses were considered at significance level of 5% (P < 0.05).

The condition factor was calculated by the formula:

$$Condition\ factor\ (K) = \frac{100W}{L^3} \quad (Pauly\ 1993)$$

RESULTS AND DISCUSSION

The length-weight relationships of nine fish species are presented in Table 1. The 95% confidence interval of b for all the nine fish species ranged from 2.5 to 3.2. This is similar to the observations of previous studies of Agboola and Anetekhai (2008), and Fafioye and Oluajo (2005). Agboola and Anetekhai (2008) studied the length-weight relationships of 35 fish species in Badagry creek, Lagos, Nigeria and reported b values that ranged from 2.6 to 3.4 for Badagry creek, which has a direct link to Ologe Lagoon. Fafioye and Oluajo (2005) investigated the length-weight relationships of five fish species in Epe Lagoon, which is also one of the lagoons in Lagos. The study revealed b values that ranged from 2.79 to

3.21. The results of the slope (b) values of the nine fish species investigated in this study is within the expected range of 2.5 < b < 3.5 (Carlander, 1969), indicating that the cubic law could be safely applied within the indicated length range.

The slope (b) values obtained for the nine fish species in this study is significantly different (p < 0.05) from 3, which shows that the growth of the fish species is allometric. Seven of the fish species investigated showed negative allometric growth; *H. fasciatus* (2.98)*, T. zillii* (2.69), *O. niloticus* (2.77), *O. aureus* (2.73), *T. mariae* (2.94), *S. galilaeus* (2.51), and *C. nigrodigitatus* (2.89). However, two species showed positive allometric growth; *S. melanotheron* (3.09), and *C. auritus longifilis* (3.16). The negative allometric b values obtained in this study in *H. fasciatus*, *C. nigrodigitatus* agrees with the study of Agboola and Anetekhai (2008) but the positive b value of *S. melanotheron* disagrees with the observations of Agboola and Anetekhai (2008). The condition factors (K) of the nine fish species ranged

between 0.91 and 8.46. A closer examination of the condition factors revealed that 56% (5 out of 9 fish species) of the fish species had their K values outside the range (2.9 – 4.8) recommended as suitable for matured fresh water fish by Bagenal and Tesch (1978). There would be need for more studies on the condition factors of other fish species in Ologe Lagoon to be able to establish the suitability of the lagoon for fish survival.

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