

Length-Weight Relationship and Condition Factor of *Hyperopisus bebe occidentalis* (Mormyridae) in Kontagora Reservoir, Niger State, Nigeria

Ibrahim Baba Usman

Department of Biological Sciences, Faculty of Applied and Natural Sciences,
Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria

Abstract: The length-weight relationship and condition factor of *Hyperopisus bebe occidentalis* from Kontagora reservoir, Nigeria was investigated. About 836 fish samples ranging from 8.10-12.20 cm total length and weighing between 8.40 and 30.40 g, collected from January to December, 2007 were analyzed. The values of a, b and r were 0.0036, 3.320 and 0.893, respectively while the condition factor (K) values ranged from 1.20-2.0 with a mean value of 1.62. *Hyperopisus bebe occidentalis* exhibited positive allometric growth and the condition of the reservoir is favourable for the survival of the fish species.

Key words: Condition factor, *Hyperopisus bebe occidentalis*, Kontagora reservoir, length-weight relationship, fish, Nigeria

INTRODUCTION

The length-weight relationship of fish is of great importance in fisheries management. It is used for the estimation of mean weight of fish of a given body length and determination of the condition factor (which indicates the relative well being of the fish) (Bolger and Connolly, 1989; Diaz *et al.*, 2000; Adikwu and Zaki, 2001). Studies on the length-weight relationship of fish are extensive and published by various researchers such as King and Udo (1996), Alfred-Ochkiya (2000), Fafioye and Oluajo (2005) and Yem *et al.* (2007).

This study examined the length-weight relationship and condition factor of *Hyperopisus bebe occidentalis* in Kontagora reservoir, Niger state, Nigeria to aid its management in the reservoir in terms of its maturity, growth and production.

MATERIALS AND METHODS

Hyperopisus bebe occidentalis were collected monthly from January to December, 2007, using a fleet of graded gill nets made up of nine multifilament nets of 25.4, 38.1, 50.8, 63.5, 76.2, 88.9, 101.6, 127.0 and 177.8 mm stretched meshes.

The nets were used to sample the shore, surface and bottom waters at three sampling stations (I-III), on Kontagora reservoir (latitude 3°20' and 7°40' East and longitude 8° and 11°3' North) Niger state, Nigeria (Fig. 1). A total of 130 fish specimens were caught during the

study period. The fish were identified, total and standard length measured to the nearest cm using measuring board and weighed to the nearest gram with a spring balance.

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

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

The data were transformed into logarithms before the calculations were made. The logarithm-transformed data will give the linear regression equation. Thus, Eq. 1 was transformed into:

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

Where:

W = Weight of fish (g)

L = Total length of fish (cm)

a = Constant

b = An exponent (Regression coefficient)

Fulton's condition factor (K) was calculated using the relationship described by Ikomi and Odum (1998) as follows:

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

Where:

K = Condition factor

W = Weight of the fish (g)

L = Total length of the fish (g)

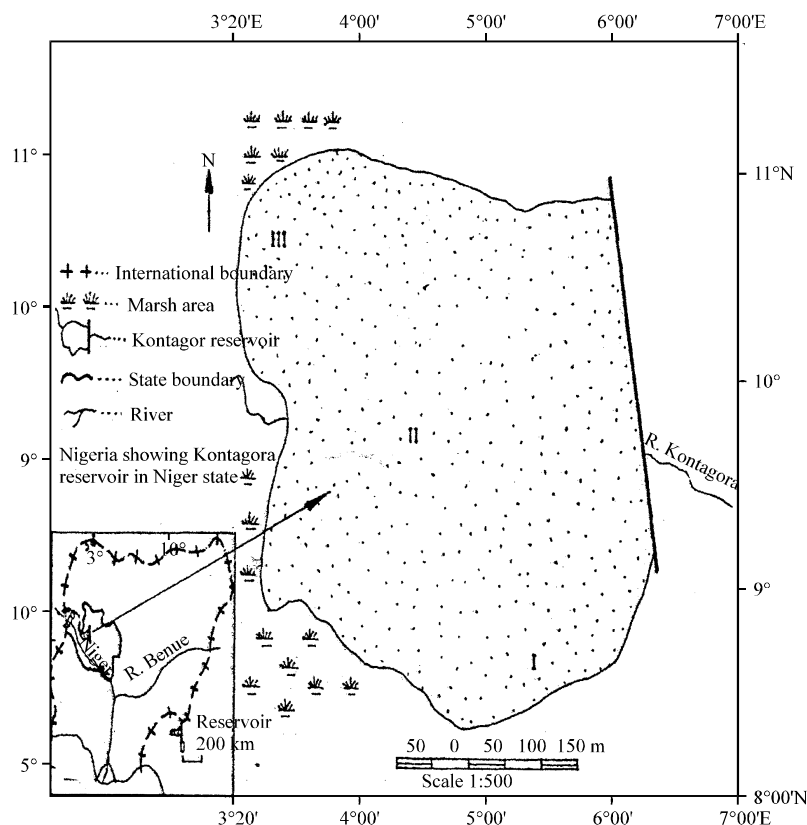


Fig. 1: Map of Kanlagora reservoir at Turga Kawo (Niger State Ministry of Land and Servay Kontagora area office)

Table 1: Size ranges of *Hyperopisus bebe occidentalis* from Kontagora reservoir, Niger state, Nigeria (January to December, 2007)

| Family/species | No. | Total length (cm) | | | Weight (g) | | |
|--------------------------------------|-----|-------------------|-------|------------|------------|-------|-------------|
| | | Min. | Max. | Mean±SD | Min. | Max. | Mean±SD |
| Mormyridae | | | | | | | |
| <i>Hyperopisus bebe occidentalis</i> | 836 | 8.10 | 12.20 | 10.25±1.64 | 8.40 | 30.04 | 19.42±12.24 |

SD: Standard Deviation

RESULTS AND DISCUSSION

A total of 836 *Hyperopisus bebe occidentalis* were caught during the sampling period. The total length of the fish ranged from 8.10-12.20 cm with the mean total length of 10.25 cm and the weight ranged from 8.4-30.04 g with the mean weight of 19.42 g (Table 1). The length-weight relationship parameters a, b and r and condition factor (K) of *Hyperopisus bebe occidentalis* are shown in Table 2. The value of the exponent b is 3.320.

It indicates that *Hyperopisus bebe occidentalis* showed a positive allometric growth, i.e., fish became heavier with increase in length. This result agrees with the research of King (1996) on length-weight relationship of Nigerian fresh water fishes. For example, King (1996) in his

Table 2: Length-weight relationship parameters and mean condition factor of *Hyperopisus bebe occidentalis* from Kontagora reservoir, Niger state, Nigeria (January-December, 2007)

| Family/species | a | b | r | K |
|--------------------------------------|--------|-------|--------|------|
| Mormyridae | | | | |
| <i>Hyperopisus bebe occidentalis</i> | 0.0036 | 3.320 | 0.8935 | 1.62 |

a: Regression intercept; b: Regression coefficient; r: Correlation coefficient; K: Mean condition factor

study of *Periophthalmus obscurus* from Cross and Imo river obtained b value of 3.088 while from Ikopa river *Periophthalmus obscurus*, he obtained b value of 3.410. In a situation where b = 3, the growth in weight is term isometric and the weight growth is proceeding in the same direction as the cube of the length (Ricker, 1975). However when b value is less than or greater than 3, the growth is allometric. Pauly and Gayanilo Jr. (1997) reported that b

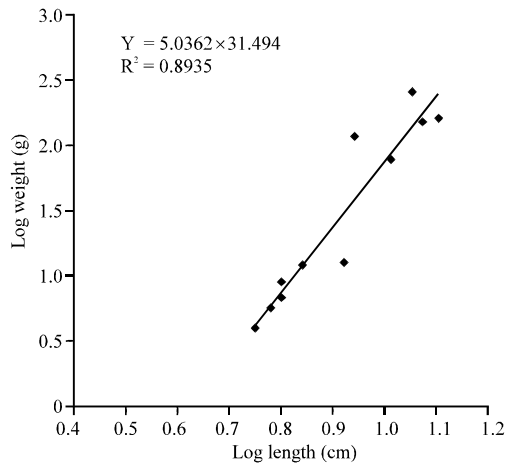


Fig. 2: Length-weight relationship of *Hyperopisus bebe occidentalis* (Family: Mormyridae) in Kontagora reservoir (January-December, 2007)

values may range from 2.5-3.5. The log weight-log length relationship is shown in Fig. 2. The length-weight relationship reflect the common general increase of weight with increasing length.

This shows that *Hyperopisus bebe occidentalis* exhibited positive allometric growth. The correlation coefficient value (r) was 0.8935 which indicates a high positive correlation.

Ikusemiju *et al.* (1983) also reported positive allometric growth with a high correlation coefficient value of 0.9313 in *Pellonula afzeliusi* from Lagos Lagoon. In this study, the calculated condition factor of *Hyperopisus bebe occidentalis* ranged from 1.20-2.0. The values are >1. This shows that the fish species are doing well in Kontagora reservoir.

The condition factor (K) of the fish species is concerned with the well-being and degree of fitness of fish in a water body (Pauly, 1984).

However, the calculated condition factor value for *Hyperopisus bebe occidentalis* suggests that the fish were juveniles or the reservoir was over fished that is why the weights ranged from 8.40-30.40 g. Bagenal and Tesch (1978) documented condition factor of 2.9-4.8 for mature fresh water fish body weight.

CONCLUSION

The results of this study show that *Hyperopisus bebe occidentalis* in Kontagora reservoir exhibits an allometric growth pattern. The fisheries resources of the reservoir can be protected through proper education of the fishermen in using appropriate fishing gears.

REFERENCES

- Adikwu, I.A. and G.M. Zaki, 2001. Length-weight relationships and condition of the endemic fish species in freshwater bodies in Hadejia-Nguru wetlands, North-Eastern Nigeria. *J. Arid Zone Fish.*, 1: 117-134.
- Alfred-Ochkiya, J.F., 2000. The Length-weight relationships of Snake-head (*Channa channa*) from the fresh water swamps of Niger Delta, Nigeria. *J. Aquat. Sci.*, 15: 12-14.
- Bagenal, T.B. and F.W. Tesch, 1978. Age and Growth. In: *Methods for Assessment of Fish Production in Freshwater*, Bagenal, T.B. (Ed.). Blackwell Scientific Publications, Oxford, UK., pp: 101-136.
- Bolger, T. and P.L. Connolly, 1989. The selection of suitable indices for the measurement and analysis of fish condition. *J. Fish. Biol.*, 34: 171-182.
- Diaz, L.S., A. Roa, C.B. Garcia, A. Acero and G. Navas, 2000. Length-weight relationships of demersal fishes from the upper continental slope of Colombia. *The ICLARM Q.*, 23: 23-25.
- Fafioye, O.O. and O.A. Oluajo, 2005. Length-weight relationships of five fish species in Epe lagoon, Nigeria. *Afr. J. Biotechnol.*, 4: 749-751.
- Ikomi, R.B. and O. Odum, 1998. Studies on aspects of the ecology of the catfish *Chrysichthys auratus* Geoffrey st. Hilaire (Osteichthyes; Bagridae) in the River Benin (Niger Delta, Nigeria). *Fish. Res.*, 35: 209-218.
- Ikusemiju, K., A.A. Oki and M. Graham-Douglas, 1983. On the biology of an estuarine population of clupeid, *Pellonula afzelivsi* (johnels) in lagos lagoon, Nigeria. *Hydrobiologica*, 102: 55-59.
- King, R.P. and M.T. Udo, 1996. Length weight relationships of the mudskipper, *P. barbarous* in Imo River estuary, Nigeria. *NAGA. Iclarm Q.*, 19: 27-27.
- King, R.P., 1996. Length-weight relationships of Nigerian fresh water fishes. *NAGA.*, 19: 49-52.
- Le Cren, E.D., 1951. The length-weight relationships and seasonal cycle in gonad weight and condition in perch (*Perca fluviatilis*). *J. Anim. Ecol.*, 20: 201-219.
- Pauly, D. and F.C. Gayanilo Jr., 1997. A bee: An alternative approach to estimating the parameters of a length-weight relationship from lengthfrequency samples and their bulk weights. *NAGA ICLARM*, Manila, Philippines.
- Pauly, D., 1984. Fish population dynamics in tropical waters: A manual for use with programmable calculators. *ICLARM. Stud. Rev.*, 8: 325-325.
- Ricker, W.E., 1975. Computation and interpretation of biological statistics of fish populations. *Bull. Fish. Res. Board Can.*, 191: 1-382.
- Yem, I.Y., N.O. Bankole and O.M. Olowosegun, 2007. The Length-weight relationship and condition factor of *Chrysichthys nigrodigitatus* (Lacepede) from Kainji Lake, Nigeria. *J. Res. Agric.*, 4: 20-22.