Some Morphometric Parameters of *Pomadasys Jubelini* in the New Calabar – Bonny River, Porthacourt, Nigeria

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Abstract: The morphometric parameters of *Pomadasys jubelini* were studied using 413 specimens from June 2011 to May 2013 using different fishing gears. The length of fish ranged from 9.60 – 55.3cm (TL). Positive allometric growth (J>1) was obtained for the length - girth relationship with growth rate values J = 1.21 and 2.28 for males and females respectively. Correlation coefficients (r) for male and female were 0.91and 0.82 respectively. "r" was positive for both sexes studies. The standard – pectoral fins' length relationship showed positive proportionate growth rate (b = 0.27) and r = 0.994. Positive proportionate growth was also obtained for total – pelvic fin's length relationships were b = 4.49 and r = 0.947. The relationship between the girth and head length was positive where b = 4.35 and the correlation coefficient r = was 0.678.

Introduction

The grunter *Pomadasys jubelini* belongs to the family Pomadasyidae. They play an important role in the ecology and fisheries of West Africa and other inland waters. It is a good source of nutritive protein with many essential nutrients required by the body (Eyo and Olatunde 2001). The relationship between morphometric parameters is an important fishery management tool. It is used in evaluating the growth of fish and the design of fishing gears (King 1996 and Sikoki *et al.*, 1998).

The length-weight relationship of fish is an important fishery management tool. Its importance is pronounce in estimating the average weight at a given length group, and in assessing the relative well being of a fish population (Bolger and Connoly, 1989). Studies on the length - weight relationships on fish are extensive. Notable among these are the reports of Alfred – Ockiya (2000) for *Chana chana* in fresh water swamps of Niger Delta, Abowei and Davies (2009) on *Clarotes laticeps* of the fresh water reaches of the lower Nun River.

The adoption of the length-girth relationship for assessing and evaluating fish stock has been made by Abowei and Hart (2009) on the morphometric parameters of ten finfish species from the lower Nun River and Abowei and Davies (2009) on *Clarotes laticeps* of the fresh water reaches of the lower Nun River.

However, data on many tropical fish species and especially of *P. jubelini* is still lacking.

The New Calabar – Bonny River is one of the most important river systems in the Niger Delta providing good nursery ground for a large variety of fish. The intensive fishing activities in the river and along the shores reduces the catch per unit effort, speedy industrialization and other human activities increases the possibilities of the river becoming degraded. Therefore, data on the biology and morphometric parameters of fish has to be known. The objective of this study is to provide statistical information on the relationships between some morphometric parameters of the fish *P. jubelini* using its weight, pectoral fin, pelvic fin, head, total and standard length relationships.

Materials and methods

Pomadasys jubelini were collected from catch landings of fishermen using hooks, gill net, traps and calabashes monthly, from June 2011 to May 2013 from the New Calabar-Bonny River. The fish were transported in an insulated box containing ice chips to the fisheries laboratory of Department of Fisheries and Aquatic environment, Rivers State University of Science and Technology, Porthacourt, where the fish were identified and the weight(g) taken.

Total length of each fish (cm): From tip of snout to maximal extent of caudal fin.

Standard length (cm): From tip of snout to posterior end of caudal fin base.

Body depth (girth- length): This is taken round the deepest point of the fish exclusive of fleshy or bony structures.

Head length: This is measured with the mouth closed, from the tip of the snout to the posterior edge of the opercular bone.

Head width: This is the greatest dimension form one gill cove to the other in closed position

The lengths of the pectoral and pelvic fins were measured to the nearest cm using a measuring tape.

The length - weight relationship of the fish was estimated by the equation $W = aL^b$; where W= weight (g), L= length of fish (cm), a and b = regression coefficient and slope respectively. The logarithm-transformed data will give the linear regression equation

$$\text{Log } W = \log a + b \log L$$

Length – Girth Relationship

Length – girth relationship was determined by adopting the general power function used by King (1997)

$$M = a(TL)^j$$

Where: M = Girth, a = initial growth constant, j = growth rate exponent, TL = Total length. Coefficient of a and j shall be estimated by using Pauley (1983) after logarithmically transforming all data into form Log M = log a + J log TL

The relationships of pectoral and pelvic lengths, total and standard lengths, head and girth lengths were determined by the adoption of the length weight relationship formula of Bagenal and Tesch (1978).

Results

The variety of morphometric parameters taken for the fish sampled are given in table 1. The total length of fish had a range of 9.60cm to 55.30cm, gape width had a range of 1.30cm to 8.10 and the inter-orbital distance with a range of 2.30cm to 6.80cm.

The length-girth relationship of *P. jubelini* exhibited positive allometric growth (J=1.21 and 2.28 for males and females respectively. Correlation coefficients (r) for male and female were 0.91and 0.82 respectively. "r" was positive for both sexes studies (Table 2). The standard – pectoral fins' length relationship showed positive proportionate growth rate (b = 0.27) and r = 0.994 (Table 3). Positive proportionate growth was also obtained for total – pelvic fin's length relationships were b = 4.49 and r = 0.947. The relationship between the girth and head length was positive where b = 4.35 and the correlation coefficient r = was 0.678. The relationship between the girth length and gape width was a positive allometric one with b=3.27 and the correlation coefficient r = 0.239. A positive allometric growth b = 2.45 and r = 0.89 was obtained for the relationship between the gape with and the head length. Though, negative allometric growth patterns b= -0.26, r = 0.952 and b = 1.07, r=0.622 were observed for the pectoral-pelvic fin relationship and the head-pelvic fin width relationship respectively (Table 3).

Table 1. Morphometric parameters of *Pomadasys jubelini* in the New Calabar-Bonny River

Parameters measured	Range (cm)
Total length	9.60 – 55.30
Standard length	11.8 – 48.90
Girth length	7.90 – 36.60
Pectoral fin length	3.50 – 15.60
Pelvic fin length	1.20 – 10.50
Gape width	1.30 – 8.10
Head length	3.00 – 13.50
Head width	3.00 – 32.00
Inter-orbital distance	2.3 – 6.8

Table 2: Length – girth relationship for male and female

Sex	Total length (cm)	Girth length (cm)	a	J	r
Male	9.60 – 41.80	8.90 - 33.30	0.66	1.21	0.91
Female	10.20 - 55.30	9.30 - 48.10	0.63	2.28	0.82
Combined	9.60 – 55.30	8.90 – 48.10	0.71	0.18	0.92

Table 3. Relationship between morphometric parameters

Total – girth length	a = 0.71	b = 0.18 r = 0.926
Standard – girth length	a = 0.65	b = 0.59 r = 0.601
Total - pectoral fin length	a = 3.72	b = 0.44 r = 0.992
Standard - pectoral fin length	a = 0.30	b = 0.27 r = 0.994
Total – pelvic fin's length	a = 4.61	b = 4.49 r = 0.947
Pelvic – pectoral fin length	a = 1.21	b = 1.34 r = 0.952
Girth - head length	a = 1.73	b = 4.35 r = 0.678
Girth length and gape width	a = 0.03	b = 3.27 r = 0.239
Gape with and head length	a = 1.13	b = 2.45 r = 0.891
Head - pelvic fin width	a = 0.26	b = 1.07 r = 0.622
Gape – inter orbital width	a = 0.94	b = 0.53 r = 0.751

Discussion

The length – girth relationship of *P. jubelini* showed positive allometric growth (J>1). King (1991) also observed allometric length – breadth growth in *Illisha africana* in Qua Iboe estuary. Abowei and Hart (2009) observed positive allometric growth pattern length – breadth of ten fin fish species from the lower Nun River. Studies on the length – breadth relationship of *Clarotes laticeps* exhibited positive allometric growth (J = 1.18) (Abowei and Davies, 2009). The value of the length – breadth relationship in this study being greater than 1 implies that the girth-length of the fish increases faster than its total length. Ita and Maelahili (1997) reported the existence of linear relationship between body breadth (girth) and gill net selectivity. Fish species with larger body breadth were caught in lager mesh sizes, while fish with small body breadth swim across nets with lager mesh sizes because of its small size.

The maximum length of *Pomadasys jubelini* obtained in this study (55.30cm) and weight (2320g) are much higher than the lengths of 20 – 30cm and 50cm in Lake Kianji. Length and weight of 32.10cm and 882.4g have also been reported in River Ase (Nigeria) and in Senegal, (Reed *et al*., 1967, Idodo-Umeh, 2003, and Froese and Pauly, 2013). This variation in length and weights may be related to the growth stages, the level of exploitation of the fish species in different water bodies, predation by other fish species, nature of the aquatic environment and abundance of food for the fish species. Although King (1996) stated that the maximum size attainable for a fish is generally location specific. Abowei and Hart (2007) attributed the differences in maximum size of *Chrysichthys nigrodigitatus* in the lower river to high fishing pressure, environmental pollution and degradation. The fresh water reaches of the New Calabar-Bonny River are often subjected to outboard engine operation.

The relationship obtained between the morphometric parameters measured for *P. jubelini* was linear, it was also observed that lengths taken were highly and positively correlated. For instance an almost perfect correlation (0.99) was obtained between Total length, standard length, weight, girth length, pelvic length and pectoral fish length. The correlation coefficient also reveals that the individual parameters increase at the same rate. This indicates that the growth of fish in one area of the body is co-related to growth in another area of the body. Oniye *et al*. (2006), in their study of biology of *Protopterus annectens* in Jachi Dam stated that the high regression coefficient obtained for the relationship between pectoral and pelvic fins length should be taken that the pectoral fin grows at approximately the same rate as the pelvic fin though the pectoral fin is longer than the pelvic fin. The correlation coefficient of the pectoral/pelvic fins with the total length shows that they all increase at the same rate.

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