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COMPOSITION, LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF SCHILBEIDAE (SILUIRIFORMES) FROM AGBURA LANDING SITE, BAYELSA STATE, NIGERIA

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ABSTRACT

Composition, Length-weight relationship and condition factor of schilbeidae from Agbura landing site was investigated for three months (May-July 2018). Schilbeidae (a total of 431) landed catch was procured twice a month from artisanal fishers at the landing site. Species composition was determined with simple percentages. Length-weight relationship and condition factor, (k) were determined using the equations: $W=aL^b$ and $K= W*100/L^b$ respectively. Results showed that Agbura landing site consist of 5 species (*Pareutropius buffei, Schilbe intermedius, Schilbe uranoscopus, Parailia pellucida* and *Siluranodon auritus.* The dominant species was *S. intermedius* (*n*=160) representing 37.12% while *S. auritus* (*n*=3) showed the less dominance of the total Schilbeidae sampled. There were no overall statistical differences in the monthly b-value for the each species. The b-value and Pearson's correlation coefficient, r (in bracket, 2 decimal places) of the pooled data (May-June) were 2.89 (0.99) for *P. buffei;* 2.94 (0.88) *S. intermedius;* 2.56 (0.98) *P. pellucida* and 3.24 (0.99) *S. uranoscopus.* The results indicated negative allometric growth pattern for all the species apart from *S. uranocuspus* which showed positive allometric growth pattern at the end of the three months. There were significant variations in the monthly condition factor. The condition factor for *P. pellucida* increased (0.55-1.25) while *S. intermedius* decreased (2.00-0.34) from May-June. The highest condition factor (*K*=0.59) for *S. uranoscopus* was in June. The result has provided baseline information on Schilbeidae in the study area.

KeyWords: allometric growth pattern, b-value, species composition, condition factor, length-weight relationship, Schilbe intermedius, Yenegoa

INTRODUCTION

It is widely established that freshwater biodiversity and habitats are increasingly being affected by human activities (Stiassny, 1999), making inland water species among the most threatened of all taxa (Ciruna *et al*., 2004). From available data, around 30% of the world's freshwater fish species are threatened (IUCN Red List of Threatened Species, Khlaphake *et al*., 2001); and approximately 20% of fish species are at risk of extinction (Moyle and Leidy, 1992). Like most countries, fish yields of most Nigerian waters are generally on the decline (Jamu and Ayinla, 2003). This was attributed to a wide range of causes ranging from inadequate management of the fisheries resources to environmental degradation of the water bodies through pollution, flooding and aquatic weed infestation of the aquatic environment (Kigbu *et al.,* 2014; Lawson and Olusanya, 2010). Apart from human activities, increasing fish demand has also impacted on most fish stocks. One major aspect of fisheries biology is the management of fish stocks with the goal to obtain maximum sustainable yield (Bone *et al.*, 2004). Some of the useful tools in obtaining data for management of fish stock includes length-weight relationship (LWR), condition factor (e.g., Ezekiel and Abowei, 2014). Also, since fish stocks (at least in rivers) are generally replenished from their adjacent flood plains after each flood season (Fapohunda and Godstates, 2007) assessing the composition of fish species is useful (Galactos *et al*., 2004).

The family Schilbeidae, commonly called glass fish or African butter fish is a family of catfishes native to Africa and Asia. In Africa, five genus (I*rvineia, Parailla, Schilbe, Pareutropius* and *Siluranodon)* are known to be present (De Vos, 1992 and 2007; www.fishBase.org). In the study area, schilbeidae has great value as it serves as delicacy for many low income earners (*personal communication*). There are a lot of studies on Nigerian Freshwater ichthyofaunal (e.g., Ita 1993; Odo *et al*., 2009; Abiodun and John, 2017); length-weight relationship and condition factor of different fish species e.g., *Parachana obscura* (Olanrewaju *et al*. 2017); *Chrysichthys nigrodigitatus* (Uneke, 2015); *Mugil cephalus* (Ezekiel and Abowei, 2014; Alfred-Ockiya and Njoku, 1995); *Illisha Africana* (Abowei 2009); *Chana chana* (Alfred-Ockiya 2000). These results show both isometric (b=3) and allometric (negative b<3 and positive b>3) growth pattern as well as good condition (K>0.5) and poor condition (K<0.5). Unfortunately, to the best of our knowledge, there are only few studies on the family Schilbidae in Nigerian waters (e.g., Idodo-Umeh, 2003; Kumolu-Johnson and Ndimele, 2010; Kareem *et al.,* 2015), but none on the composition, length-weight relationship and condition factor of Schilbeidae from Agbura landing site, Bayelsa, Nigeria.

MATERIAL AND METHODS

The Study Area

This work was carried out in Agbura landing site, along Ekole creek, Yenagoa Local Government Area, Bayelsa State. Ekole Creek lies between latitudes 5º.1 N and longitude 6º.4 E in the Niger Delta Area of Nigeria. The Creek is a tributary of the River Nun which arises from Southern Ijaw Local Government Area, Bayelsa State. Vegetation is made up of submerged macrophytes such as *Lemma erecta, Utricularia spp*, *Commelia spp* etc. Human activities include fishing, dredging and logging of timber.

Fish Sample collection, Fish Identification and Morphometric Measurement

Schilbeidae landed catch was procured twice a month from May to July 2018 from artisanal fishers at the landing site. Thereafter, samples were immediately fixed in 10% formaldehyde and transported to the Department of Fisheries and Aquatic Environment laboratory, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt for further analysis. The Schilbeidae samples were identified to species level with the aid of keys and descriptions according (De Vos, 1992; De Vos, 2007; Idodo-Umeh, 2003). The total length (TL, was from the tip of the snout to the extreme of the caudal fin) was measured on a measuring board to the nearest centimeter (cm), while the fish body weight was taken to the nearest grams (g) on a weighing balance after blot drying excess water with a clean napkin (Ezekiel and Abowei, 2014). The length-weight relationship and condition factor were calculated with the formula: $W=aL^b$ and $K=W*100/L^b$ respectively. Where: W=Weight of fish (g); a=Intercept of the regression; L=Total length of fish (cm); b=Slope of the regression and K=Condition factor. Note the value for ‘’b’’ in the condition factor equation was obtained from the length-weight equation as suggested by Lima-Junior *et al* (2002) since according to Bolger and Connolly, (1989) isometric (b=3) growth pattern is rare in fish and is not a real representation of the length-weight relationship for the majority of fish species.

Statistical Analysis of Data

Statistical analyses were performed using Minitab for windows version 16. The data for length and weight were transformed (log10) and subjected to Microsoft Excel for regression analysis. The b (slope) and a (intercept) values were obtained from the linear regression equation (LogW=Log a + bLogL). Pearson’s correlation coefficient, r and coefficient of determination, r^2 were also determined. Condition factor (k) and b-value were tested for monthly variations by one-way analysis of variance (ANOVA, $p<0.05$). The Tukey’s post-hoc test was used at 95% confidence limit to provide specific information on which means are significantly different from each other.

RESULTS

Species Composition

The results (Fig.1) showed that Schilbeidae landed catch at Agbura landing site consist of 5 species (*Pareutropius buffei,* Gras, 1960*; Schilbe intermedius,* Rüppel 1832*; Schilbe uranoscopus,* Rüppel 1832*; Parailia pellucida,* Boulenger, 1901; *Siluranodon auritus,* Geoffroy Saint-Hilaire 1809) from 4 genus (Pareutropius, Schilbe, Parailia and Siluranodon). All the species were present during the sampling periods, apart from *P. pellucida* and *S. auritus* which occurred only in May. For species composition in terms of numbers, *S. intermedius* showed highest dominance (*n*=160) representing 37.12 % followed by *P. buffei* (133; 30.86%), while *S. auritus* is the less dominant (*n*=3) representing 0.70% of the total landed catch (Fig. 1).

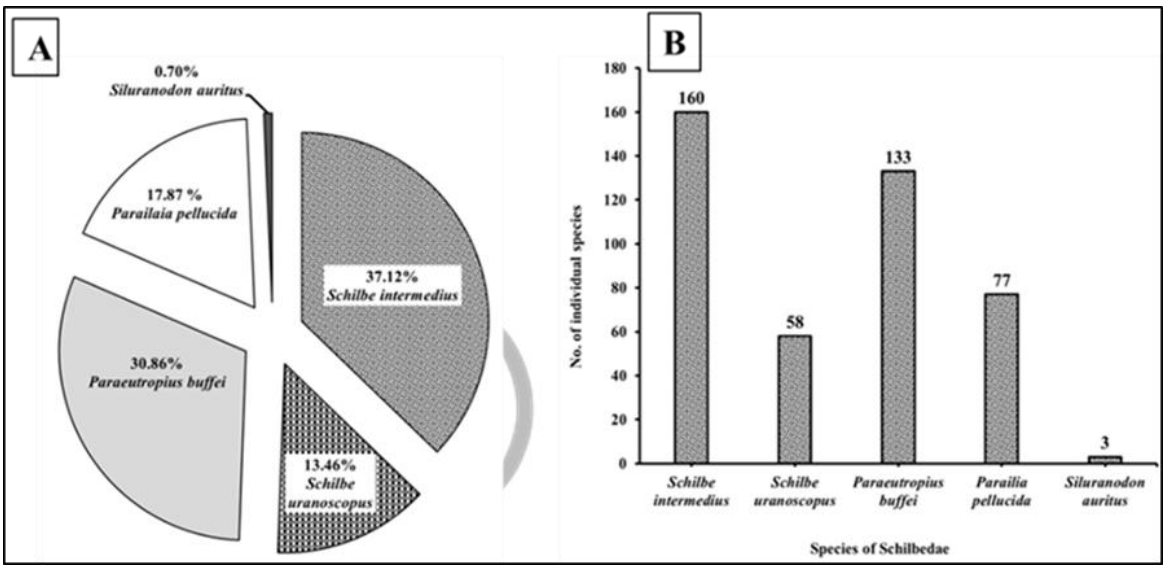

Fig. 1 Showing (A) Percentage composition and (B) Number of individual species of Schilbeidae from Agbura landing site for three months (May-July) sampling period.

Length-Weight Relationship (LWR) and Condition Factor (K)

The results of the monthly length-weight relationship, condition factor (k), number of samples and percentage species composition of Schilbeidae from Agbura Landing site for three months (May-July 2018) sampling period are shown (Table 1). There were no statistical difference (ANOVA $p<0.05$) for the monthly b-value as well as for Pearson's correlation coefficient (r) between the months for all the species sampled (Table 1). However, there were statistical significant difference in the monthly condition factor. For example *P. buffei* condition factor increased significantly with month (mean±SD), from 0.55±0.05 in May to 1.25±0.14 in July while *S. intermedius* condition factor decreased significantly with months. *Schilbe uranoscopus* had good condition factor (0.59±0.07) only in June. The b-value and Pearson's correlation coefficient, r (in bracket, 2 decimal places) of the pooled data is shown in Fig. 2. The values were 2.89 (0.99) *P. buffei;* 2.94 (0.88) *S. intermedius;* 2.56 (0.98) *P. pellucida* and 3.24 (0.99) for *S. uranoscopus.* The result indicated negative allometric (b<3) growth pattern for all species apart from *S. uranoscopus* which showed positive allometry (b>3).

Table 1: Monthly length-weight relationship, condition factor (k), number of samples and percentage species composition of Schilbeidae from Agbura Landing site for three months (May-July 2018) sampling period.

Species	Months	Mean Length (cm)	Mean Weight (g)	b	a	r	r^2	k	Number of samples	Species composition (%)
Paraeutropius buffei	May	10.79±2.65	8.71±8.57	3.02 ±0.13	-2.26	0.99	0.98	0.55 ± 0.05^{a}	72	32.00
	June	13.33±3.59	16.33±12.51	2.93±0.31	-2.17	0.99	0.97	0.69 ± 0.10^{b}	23	26.13
	July	11.55±3.17	10.44±7.89	2.69±0.07	-1.91	0.99	0.98	1.25 ± 0.14^{c}	38	32.20
Schilbe intermedius	May	17.43±3.22	39.38±19.27	2.64±0.80	-1.72	0.88	0.77	2.00 ± 1.20^{a}	60	26.67
	June	18.32±2.93	46.03±26.98	3.15±0.61	-2.35	0.94	0.88	0.45 ± 0.07^{b}	46	52.27
	July	17.74±3.33	38.95±22.33	3.21±0.04	-2.49	0.91	0.74	0.34 ± 0.07^{b}	54	45.76
Schilbe uranoscopus	May	14.85±3.17	17.13±14.81	3.21±0.00	-2.60	0.99	0.98	0.25 ± 0.02^{a}	13	5.78
	June	18.42±3.76	36.76±21.54	2.96±0.37	-2.23	0.98	0.96	0.59 ± 0.07^{b}	19	21.59
	July	16.40±4.35	27.67±24.74	3.28±0.06	-2.65	0.95	0.98	0.22 ± 0.03^{a}	26	22.03
Parailia pellucida	May	8.49±1.23	3.21±1.11	2.56	-1.89	0.98	0.95	1.28 ± 0.10	77	34.22
	June	-	-	-	-	-	-	-	0	0
	July	-	-	-	-	-	-	-	0	0
Siluranodon auritus	May	10.40±0.79	6.83±1.40	2.46	-1.68	0.93	0.87		3	1.33
	June	-	-	-	-	-	-	-	0	0
	July	-	-	-	-	-	-	-	0	0
Total number of samples									431	

Data are mean ± Standard Deviation (SD). Different letters between months for a species indicates statistical significant difference (ANOVA, $p < 0.05$).

DISCUSSION

Species Composition

The result for the present study showed that 5 species from 4 genus are present at Agbura landing site. The result is in conformity with De Vos (1992 and 2007) and www.Fishbase.org which recorded 4 genus in Africa. Schilbeidae has also been recorded in some freshwater bodies in Nigeria. For example, Idodo-Umeh (1987) reported in addition to those recorded in the present study, *S. mystus* in River Ase. Ayamre and Ekelemu (2016) found *S. uranscopus* (*n*=45) and *S. mystus* (*n*=3) in their study on three water bodies in Asaba metropolis, Delta State. Also, Abiodun and John (2017) recorded 86 *Eutropius niloticus* and 179 *S. mystus* in the Lower Niger River at Idah in Kogi State. Moreso, *Schilbe intermedius* dominated the in terms of percentage composition with 37.12% leaving *S. auritus* the least populated at 0.70% (Fig. 1). The absence of *P. pellucida* and *S. auritus* in the months of June and July is unclear. However, Idodo-Umeh (1987 and 2003) reported occasional abun-

dance of *S. auritus* in River Ase. Moreso, there are very few information especially on the biology of the Schilbeidae in the literatures. It is important to note that the species previously term *Schilbe (Eutropius) niloticus* and *Schilbe mystus* are now *Schilbe intermedius*, Rüppel 1932 (De Vos, 2007).

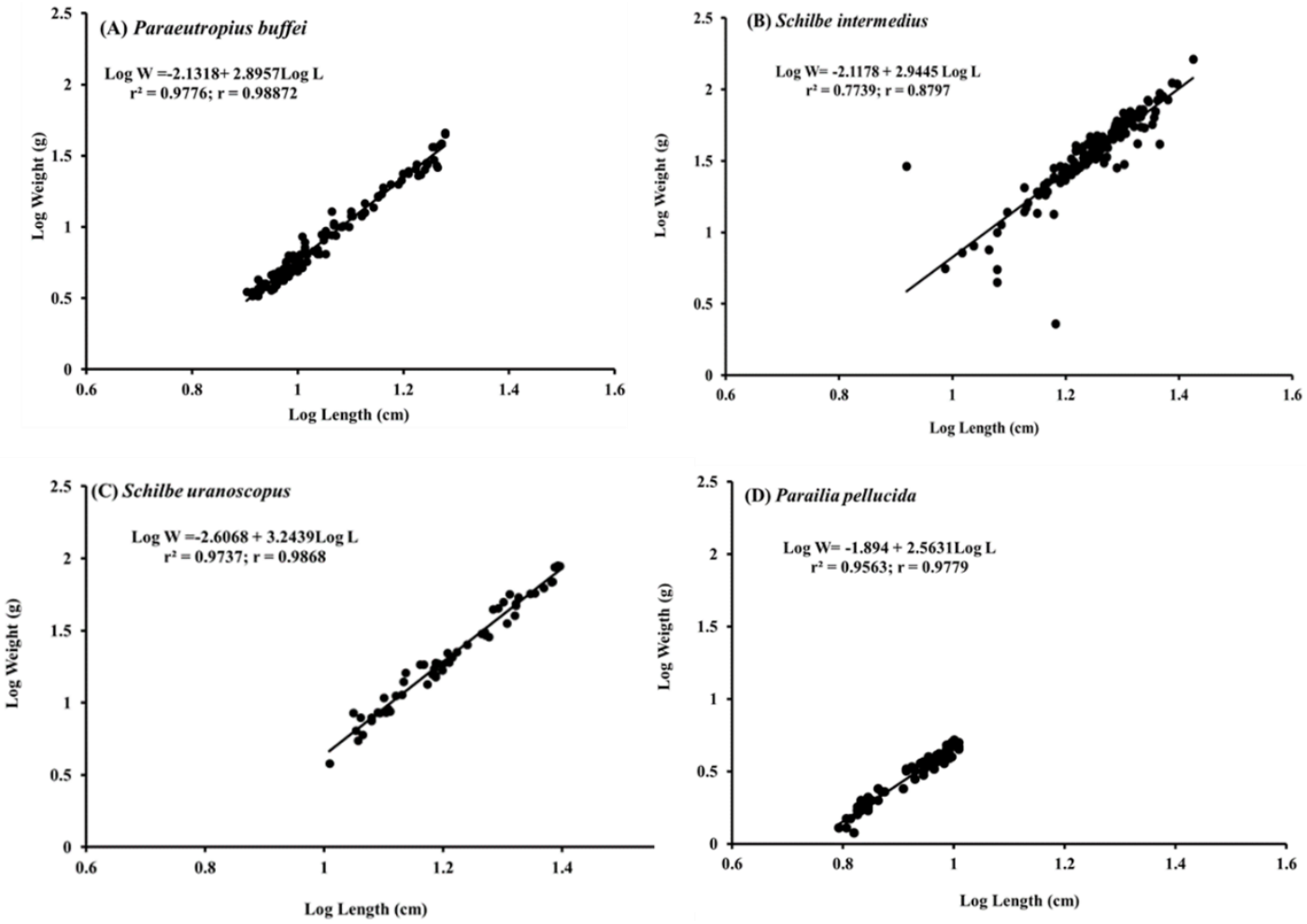

Fig. 2. Length-Weight relationship of (A) *P. buffei* (*n*=133); (B) *Schilbe intermedius* (*n*=160); (C) *S. uranoscopus* (*n*=58) and (D) *Parailia pellucida* (*n*=77) from Agbura landing site for three months (May-July 2018) sampling period.

Length-Weight Relationship (LWR) and Condition Factor (K)

Fish yield is studied using weight as a measure of size. Length-weight relationship (LWR) and condition factor (K) are important fishery management tools (Uneke 2015; Bagenal and Tesch, 1978). The LWR relationship provides information on the relative wellbeing of fish population, determines whether somatic growth is isometric or allometric (LeCren, 1951). The results of the present study showed that growth pattern were negative allometric (b<3) for all the species sampled apart from the *S. uranoscopus* which showed positive allometric (b=3.2439). There are very few information especially on the biology of the family in the literatures. However, Abobi and Ekau (2013) reported b-value of 3.4592 for *S. intermedius* from Yapei stretch of the White Volta

River, a major landing site in the Northern region of Ghana which is contrary to the result for the species (b=2.9445, Fig. 2) in the present study.

Condition factor compares the wellbeing of fish with the hypothesis that heavier fish of a given length are in better physiological condition than the less robust in relation to its welfare (LeCren, 195; Bagenal and Tesch, 1978). The present result showed significant differences in the condition factor with months for the species sampled (table 1). According to Bagenal and Tesch (1978), a fish is in good condition when k≥0.5). Only *P. buffei* showed good condition for all the three months sampling periods. Earlier reports had suggested that length-weight relationship and condition factor of fish varies due to nutrition (Abobi and Ekau, 2013), condition of life in the aquatic environment (Bashir *et al*., 1993; Ndiaye *et al*., 2015) as well as events of life cycle such as metamorphosis, growth and onset of maturity (Le Cren 1951), sex, frequency of spawning and sampling season (Sikoki *et al*., 1998).

Conclusion

In conclusion, the study revealed that five species of Schilbeidae family exist in Agbura landing site, all of the species exhibited negative allometric growth pattern apart from *S. uranoscopus* and the condition of the species varied with months. This study has provided a baseline information on Schilbeidae from Agbura landing site.

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