FOOD AND FEEDING HABITS OF *SCHILBE MYSTUS* FROM THE LOWER RIVER BENUE AT MAKURDI

Comment [WU1]: FOOD AND FEEDING HABITS OF *SCHILBE MYSTUS* FROM THE LOWER RIVER BENUE AT MAKURDI

ABSTRACT

Comment [WU2]: You can explore with analize

A study on food and feeding habit of *Schilbe mystus* in the Lower River Benue at Makurdi,was carried out. Two hundred (200) fish samples were examined for stomach content. Result revealed the following food items; insects (64.42%), fish (20.2%), crustaceans (10.6%), detritus (15.4%) and unidentified materials (50.1%).Insects recorded the highest percentage in the stomach both on frequency of occurrence and gastro-somatic index methods while crustacean recorded the least percentage in both frequency of occurrence and gastro-somatic index. Smaller fish within the length range of 10.1-15.0cm weighing between 0.1-50g were more of empty stomach (65.0% and 67.2%) than those with food (35.0% and 32.8%). Fish within the length range of 25.1- 30.0cm and 35.1- 40.0cm weighing 100.1- 200.0g and 200.1- 350.0g were found to contain stomach with full diet components, particularly insects, fish and crustaceans. Length weight relationship (LWR) and Length- length relationship (LLR) indicated that values of correlation coefficient (r^2) are highly correlated, $r^2 > 0.7$ and $r^2 > 0.8$ at $p < 0.05$. Therefore, *Schilbe mystus* tropical features in the lower River Benue showed that it is a carnivorous and the pray type is influenced by their availability.

Key Words: ***Food, Feeding Habits, Schilbe Mystus And River Benue***

1. INTRODUCTION

Comment [WU3]: Good concept

Unlike other organisms, fish needs food for their growth and reproduction (Madusari *et al.,* 2022). The study of the food and feeding habits of freshwater fish species is a subject of continuous research because it constitutes the basis for the development of a successful fisheries management programme on fish capture and culture (Oronsaye and Nakpodia, 2005; Oso *et al.,* 2006). The diet of cultured fish species does not provide precise and reliable information on the food and feeding ecology (Iyabo, 2016) and condition factor of such species. Hence, studies aimed at obtaining such information are based on the analysis of gut contents of fish caught from their natural habitats (George *et al.,* 2013). The natural habitats offer a great diversity of organisms that are used as food by fish, which differ in sizes (microscopic and macroscopic) and taxonomy groups (Ariadi and Wafi, 2020). The dietary analysis of fish in their natural habitats enhances the understanding of the growth, abundance, productivity and distribute on of organisms (Ekpo *et al.,* 2014).

Schilbe mystus belongs to family Schilbeidae and is a siluroid catfish of commercial importance (Ariadi *et al.,* 2022). The schilbeid catfish are salient components of the ichthyofauna of many freshwater bodies and like other catfishes are heavily exploited (Iyabo, 2016). Therefore the knowledge of the stomach content of *Schilbe mystus* from lower River Benue at Makurdi will help to evaluate its feeding behaviour and as such provide better opportunity for more reliable details in the explanation of the feeding biology of the fish.

2. MATERIALS AND METHODS

Study Area

The study was carried out in the Lower River Benue at Makurdi, in Benue State. Benue State is located in the middle belt region of Nigeria. Its geographic coordinates are longitude $7^o47`$ and $10^o0`$ East; Latitude $6^o25`$ and $8^o8`$ North, and shares boundaries with five other states namely;Nassarawa to the North, Taraba to the East, Cross-River to the South, Enugu to the South-West and Kogi to the West respectively. It occupies a land mass of 32, 518 square kilometers. The River Benue which is the second largest River in Nigeria flows all year round, though the water volume fluctuates with season. The river overflows its banks during the rainy season (May-October), but decreases drastically in volume leaving tiny island in the middle of the river during the dry season (November-April). The river contains several species of freshwater fishes of different families such as *Schilebdae, Clariidae, Mormyridae,* and *Synodontidae* etc (Obande *et al.,* 2010; Ayuba *et al.,* 2016).

Sample Collection

A total number of Two hundred (200) fresh samples of *Schilbe mystus* were collected from fishermen in Wadata landing site for a period of two months (November and December, 2017; Ariadi *et al.,* 2019c)). The samples collected were preserved in coolers chilled with ice blocks and transported to the University of Agriculture, Makurdi for Laboratory examination.

Laboratory Analysis

Identification of fish specimen was carried out as prescribed by Holden and Reed, (1992) and Idode-Umeh, (2003). The body weight (W_T), Total Length (TL) and Standard Length (SL) of each specimen was measured to the nearest gram and centimeters using a weighing balance and tape/ meter rule on a dissection board. The length weight

relationship was determined by plotting a graph of Length-Weight. Each fish was dissected in other to remove the gut. The gut length and weight were taken using meter rule and sensitive weighing balance. Gut length verse standard length relationship was also determined. The gut was cut open using a pair of scissors and scrapped onto a grease-free glass slide and examined for stomach contents and viewed microscopically. The following methods were adopted for assessing the food and feeding habits of the fish.

Points Method: The degree of apparent fullness of stomachs was determined and points were assigned as 1.0 for full stomach; 0.75 for ¾ full stomach; 0.5 for ½ full stomach; 0.25 for ¼ full stomach; 0.1 for traces and 0 for empty stomach (Bapat and Bal, 1950).The fish was considered as active feeder, when the stomach was full and ¾ full; moderate feeder when ½ full and passive feeder when ¼ full or with traces.

Occurrence method: Analysis using frequency of occurrence was done as described by Hyslop (1980) and Costal *et al.* (1992). The number of guts containing a specific food item was expressed as a percentage of total number of guts examined.

Gastro – Somatic Index: This method is useful for estimating the feeding intensity of fishes (Desai, 1970). The stomach contents were weighed to the nearest 0.1 g to determine the gastro- somatic index which can be calculated as follows

$$\text{GSI} = \frac{Weight\ of\ the\ Gut\ content}{Total\ Weight\ of\ Fish} \times 100\%$$

Food resources were identified and divided into 5 broad categories: 1) insects - consisting of larvae, nymph, adult insects and remains not identified; 2) fish - flesh remains or whole individuals and scales; 3) crustaceans – prawns whole or remains and shrimps; 4) detritus - finely triturated material, generally containing grains of sand; 5) other - rare items and unidentified material.

Data Analysis

The data obtained was analyzed using Statistical Package for Social Sciences (SPSS) Version 21.0 and the result was presented using simple frequency distribution tables.

3. RESULTS

A total of 200 specimens of *Schilbe mystus* from the lower River Benue at Makurdi were analyzed. One hundred and four (52%) stomachs were found to contain food while Ninety six (48%) stomachs were found to be empty.

Table 1 shows the summary of the stomach contents of *Schilbe mystus.* Insects accounted for 64.4% of the content under frequency of occurrence method followed by unidentified material,with 50.0%. Fish, Detritus and Crustaceans had 20.2%, 15.4% and 10.6%, respectively. In the gastro- somatic index method, insects (41.3%) constituted the most important diet of *Schilbe mystus*followed by Fish (29.9%), Detritus (15.3%), while unidentified material and Crustaceans had (14.3%) and (4.5%).

Table 1: Summary of the stomach contents of *Schilbe mystus* in the Lower River Benue at Makurdi.

Food Item	Frequency of Occurrence		Gastro-Somatic Index (%)
	No	Percentage (%)	
Insects	67	64.4	41.3
Fish	21	20.2	29.9
Crustacean	11	10.6	4.5

Detritus	16	15.4	15.3
Unidentified material	52	50.0	14.3

Table 2 represents stomach content of *Schilbe mystus* in relation to size composition of fish sampled. Fishes with the length range of 10.1-15.0cm recorded the highest number of stomach (120) of which greater percentage 65(70) were empty while stomach with food recorded 35.0% (42). The stomach examined within the length range of 15.1-20.0cm were 50 and 74.0% (37) had food while 26.0% (13) were empty. The length range of 20.1- 25.0cm had 22 stomachs of which 77.3% (17) had food and 22.7% (5) were empty. Fishes with length range 35.1- 40.0cm recorded 5 stomachs of which all contained food (100%). And lastly the length range 30.1- 35.0cm had the least number of stomachs (1) which was with food (100%).

Table 2: Stomach Content of *Schilbe mystus* in Relation to Size Composition of Fish Sampled

TL (Cm)	No of Stomach Examined	Stomach with Food	% Stomach with Food	Empty Stomach	% Empty Stomach
10.1- 15.0	120	42	35.0	78	65.0
15.1- 20.0	50	37	74.0	13	26.0
20.1- 25.0	22	17	77.3	5	22.7
25.1- 30.0	2	2	100	-	-
30.1- 35.0	1	1	100	-	-
35.1- 40.0	5	5	100	-	-

TL= Total length,

Table 3 represents Stomach Content of *Schilbe mystus* in Relation to Weight Proportion of Fish Examined. Fishes with the weight range of 0.1-50.0g recorded the highest number of stomach (128) of which empty stomach accounted for 67.2% (86) while stomach with food recorded 32.8% (42). The stomach examined within the weight range of 50.1- 100.0g were 56 and 82.1% (46) had food while 17.9% (10) were empty. The weight range of 100.1-150.0g had 7 stomachs of which 100% (7) had food. Lastly Fishes with weight range 150.1- 200.0g and 300.1-350.0g recorded 5 stomachs each of which all contained food (100%).

Table 3: Stomach Content of *Schilbe mystus* in Relation to Weight Proportion of Fish Examined

Tw (g)	No of Stomach Examined	Stomach with Food	% Stomach with Food	Empty Stomach	% Empty Stomach
0.1- 50.0	128	42	32.8	86	67.2
50.1- 100.0	56	46	82.1	10	17.9
100.1- 150.0	7	7	100	-	-
150.1- 200.0	4	4	100	-	-
200.1- 250.0	-	-	-	-	-
250.1- 300.0	-	-	-	-	-
300.1- 350.0	5	5	100	-	-

Tw= Total Weight,

Figure 1 shows the graph of length- weight relationship (LWR) for *Schilbe mystis.* The results indicated that the value of correlation coefficient (r^2) is highly correlated, $r^2 > 0.7$ at $p < 0.05$.

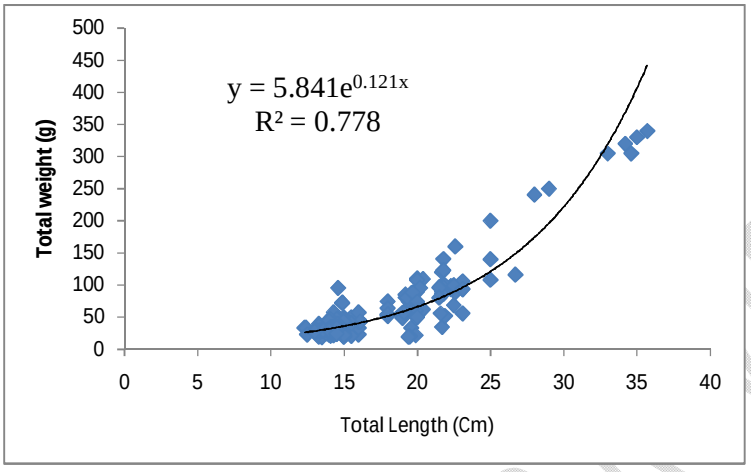

Figure 1: Length-weight relationship (LWR) of *Schilbe mystus*

Figure 1 shows the graph of Length- Length relationship (LLR) for *Schilbe mystis*. The results indicated that the value of correlation coefficient (r^2) is highly correlated, $r^2 > 0.8$ at $p < 0.05$.

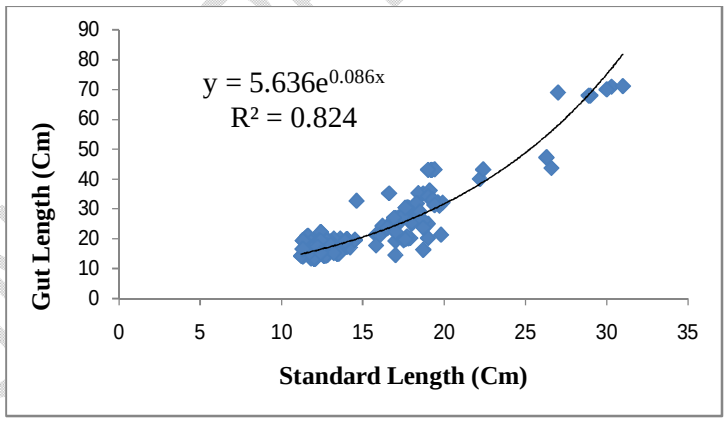

Figure 2: Length- Length relationship (LLR) of *Schilbe mystus*

4. DISCUSSION

The study of the Food and Feeding Habits of *Schilbe mystus* from the Lower River Benue at Makurdi was carried out. Two hundred (200) fish samples were analyzed, and 104 were found to contain food in their stomach while 96 were found to have empty stomach. The food items found in the stomach includes insects (64.42%), fish (20.2%), crustaceans (10.6%), detritus (15.4%) and unidentified materials (50.1%). Insects recorded the highest percentage in the stomach both on frequency of occurrence and gastro-somatic index methods while crustacean

recorded the least percentage in both frequency of occurrence and gastro-somatic index. The high percentage of occurrence ofinsects has agreed with the work of Ayoade *et al.,* (2008) on diet and dietary habits of the fish *Schilbe mystus* (Siluriformes: Schilbeidae) in two artificial lakes in Southwestern Nigeria. They concluded that insects and their appendages were encountered more frequently in contents of stomachs of *S. mystus* in both lakes than any other food items. Similarly, Omondi and Ogari (1994) found insects to be the dominant food of *Schilbe mystus* in his study on Preliminary Study on the Food and Feeding Habits of*Schilbe mystus* (Linn., 1 762) in River Nyando Kisumu, Kenya (Ariadi *et al.,* 2019a; Ariadi *et al.,* 2019b)

The least values of crustacean in this study had disagreed with the work of Iyabo (2016) that reported highest percentage of 24.4% in crustacean from the mid-course of the Cross River basin, Nigeria.

Comment [WU4]: It's not correlate with next paragraph

Smaller fish within the length range of 10.1-15.0cm weighing between 0.1- 50g were more of empty stomach (65.0% and 67.2%) than those with food (35.0% and 32.8%). This is in corroboration with the result of Adedokun and Fawole (2015) who reported that, diet components were not common in the gut of the small size of *Schilbe mystus* throughout the study months (periods). The stomach content of the smaller fish was more of detritus, insects and unidentified materials. The presence of detritus in the small size class gut of the species indicated that the fish small size inhabits aquatic vegetated banks where they easily seek support and cover against predators. The (detritus) might have been incidental diet components which were obtained alongside the main diet components eaten by the fish in the resident water body. It was also observed in the study that the diet components in the stomach of the fish sampled increased with increase in length and weight. The larger fish were found to contain high percentage of food in their stomach. Fish within the length range of 25.1- 30.0cm and 35.1- 40.0cm weighing 100.1-200.0g and 200.1- 350.0g were found to contain stomach with full diet components, particularly insects, fish and crustaceans. The high feeding intensity comparatively may be connected to the difference in foraging mode (feeding system). Feeding success depends upon adaptive features of well-developed teeth, ambushing predators, clear vision, and ability to pursue and catch prey Wine miller and Wine miller, (1994). In any aquatic ecosystem, the main feeding habits of any fish are an indicator of where such fish live (Moore and Moore, 1976) and the availability or otherwise of these diet components might be due to size selection of diet by the species.

Results for Length weight relationship (LWR) and Length- length relationship (LLR) indicated that the value of correlation coefficient (r^2) are highly correlated, $r^2 > 0.7$ and $r^2 > 0.8$ at $p < 0.05$. The correlation value obtained in this study showed that there was strong association between length and weight. This implies that as the length of the fish increase, the weight also increase in almost the same proportion. This result has agreed with the findings of Okey *et al*. (2017), Ikongbeh *et al*. (2012), Rosil and Isa, (2012) and Onah (2014). Length- Length relationship (LLR) also indicated high correlation coefficient (r^2). Therefore, LLR is important in fisheries management for comparative growth studies (Moutopoulos & Stergiou 2002).

5. CONCLUSIONS

From the present study, the trophic features of the African Butter catfish (*Schilbe mystus*) in the lower River Benue showed that it is carnivorous. The prey type consumed by this species is influenced by their availability. Insects were encountered more frequently in stomach contents of *S. mystus* than unidentified materials,fish, detritus and crustaceans. Changes occurred in food habits of *Schilbe mystus*with size. The diet components in the stomach of the fish sampled increased with increase in length and weight. Larger fish were found to contain high percentage of food in their stomach than the smaller fish. Therefore, the outcome of this research will help expand more on the biology of *Schilbe mystus.*

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