

Food and Feeding Habit of *Petrocephalus bane* (Lacepede 1803) in Daberam Reservoir, Katsina

¹Abdulaziz M. , *¹Babatunde, T. A.,
¹Abdulkarim B., Lawali Alkali Argungu²
¹Department of Biology,
Umaru Musa Ya'radua University,
P.M.B. 2218, Katsina State, Nigeria
²Department of Fisheries and Aquaculture,
Usmanu Danfodiyo University,
Sokoto.
E-mail: attaofeeq@gmail.com

Abstract

The genus *Petrocephalus* is one of the most abundant among the family of Mormyrids in Daberam reservoir fisheries. The feeding habit of *P. bane* was studied during the period of May 2017 to April 2018. Out of 325 specimens collected during the study period, 251 were found to contain an identifiable food items in their stomach. The species was found to feed mainly on zooplanktons. The percentage frequency of occurrence of identified food items were: Rotifera (21%), Crustaceans (12.3%), Diatoms (6.8%), Cnidarian (5.9%), Diptera (4.9%), Platyhelminthes (3.4%), Annelids (2.5%), Nematodes (2.4%), Desmids (2.4%), fish eggs (17.1%), Dinoflagellates (0.5%), and Debris/mud (7.8%). Difference in the stomach fullness indicated that 23% of the total stomachs studied were empty. Stomachs were commonly full during the rainy season (June through October) while empty stomachs were more in the rest of the month. This research utilized small size fishes with total length 11.71 ± 2.07 cm and total weight 55 ± 15.70 (mean \pm SD) as this was the only available size in the catches. There is need to enforce compliance with fisheries edict particularly as it relates to use of fishing gears in the reservoir to encourage sustainable fish resource exploitation.

Keywords: Daberam reservoir, Food, Feeding habit, *Petrocephalus bane*.

INTRODUCTION

Mormyrids are increasingly becoming important in aquaculture and the knowledge on their biology is still scarce despite its contribution to catches in the area. *Petrocephalus bane* is a freshwater fish belonging to the family of Mormyrids (Mormyridae) often called "elephantfishes" in the order Osteoglossiformes (Froese & Daniel, 2017). It is the largest family in the order having about 200 species. Members of the family Mormyridae have rudimentary electric organs situated on each side of the terminal portion of the tail and they possess extraordinarily large brains (Ladich, & Tanja, 2016; Holden & Reed, 1972). They are nosy looking fish, highly variable in the shape of their head and the extent of their unpaired fin. They are reported to be bottom dwellers feeding on insect larvae (Babatunde & Raji, 2004).

Despite being of commercial importance, *Petrocephalus bane* have no documented research on any aspect of its biology in Daberam reservoir, hence the need for a research on the aspects of the biology of the species. The knowledge of some aspects of the biology of *Petrocephalus* species will provide a basis for comparative studies and also for the proper management of

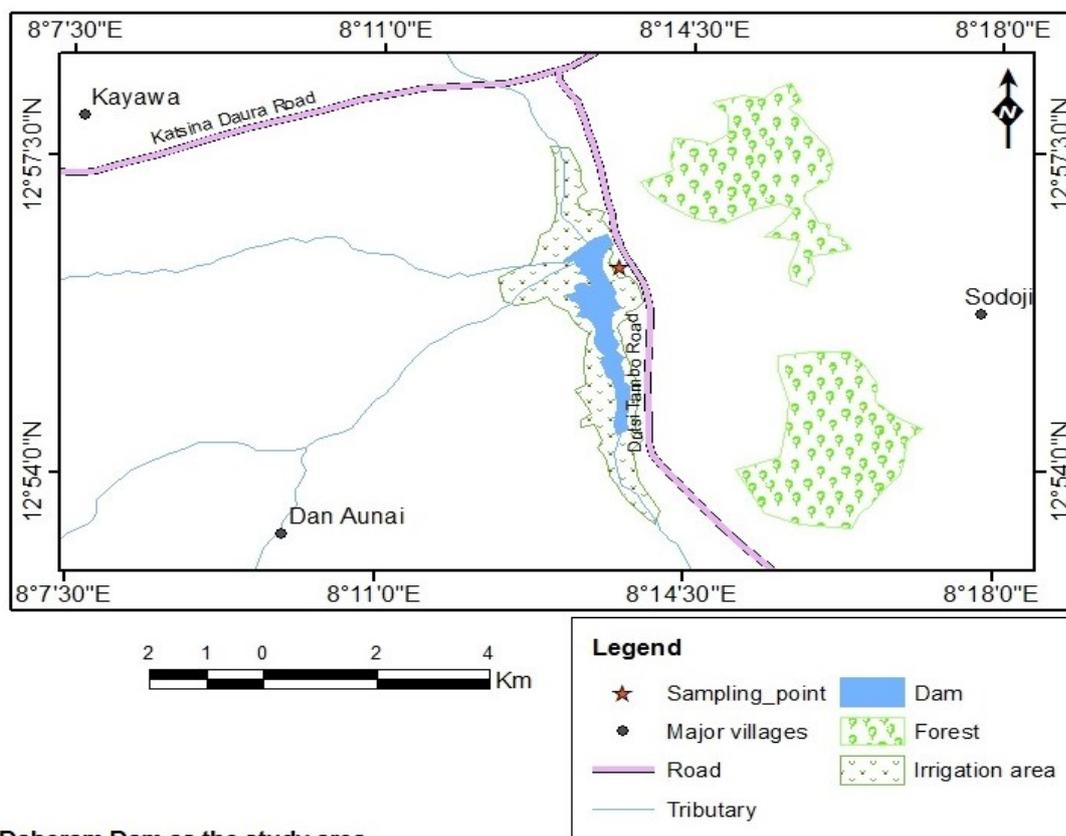
*Author for Correspondence

the species in culture for maximum yield. Study of feeding is one of the important aspect of the biology of any fish, the food and feeding habits of different fishes often differ widely. Thesame fish may show a preference for different types of food as it grows or at different times of the year (Maar *et al.*, 1983). The stomachs of many tropical fishes have been studied to ascertain their feeding habits in natural habitats and the relationship between the fishes and their biotic environments (Ugwumba *et al.* 1990; Nadeem *et al.* 2019).

MATERIALS AND METHODS

Study Area

The research area is Daberam Reservoir which is located, at latitude 13°21'N and longitude 8°21'E in Dutsi Local Governments area of Katsina State. According to Bala *et al.* (2009), the dam have river Kigo and Riniyal which are seasonal rivers, as its sources of water and River Dan-nakola as one of its tributaries. The reservoir lies in northern Sudan savannah zone. The climate is characterized by distinct wet and dry seasons with an annual rainfall of about 600 – 640mm. The reservoir has a capacity of 12.5million cubic meters covering about 400 hectares of land. The depth of the reservoir is 42.6meter with a crest length of 2377.44 meters.



Daberam Dam as the study area

Source:- National Aeronautic and Space Administration Spot Image 2018

Figure 1: Map of Daberam reservoir

Sampling Procedure

Samples were collected from fishermen catches in the study area and then transported to the Biology laboratory of Umaru Musa Yaradua University, Katsina in ice-cooled containers in order to prevent fish from spoilage.

Fish Identification

The fish samples were identified in the laboratory using fish and fisheries of Northern Nigeria (Reed *et al.*, 1967) and a field guide to Nigerian freshwater fishes (Babatunde and Raji, 2004).

Gut content analysis

Each fish was dissected and the stomach was removed while the contents of each stomach were emptied into the petri dish. Stomach fullness was recorded using the empirical scale (full, 3/4 full, 1/2 full, 1/4 full and empty) adapted from Chrisafi *et al.* (2007). 5% formalin solution was added to the gut content to preserve it to make a volume of 20 ml. 2 ml of the gut contents were taken and spread on a counter slide. Then food items were identified with the aid of a plankton identification guide (Jeje and Fernando, 1986; Kolb, 1986). Each food item was identified to the lowest possible taxonomic level. Frequency of occurrence of each identified food item was recorded and expressed in percentage while numerical abundance of identified food items was estimated using:

$$\text{Number of food item} = \frac{\text{number of organism in the subsample} \times \text{total volume of the sample}}{\text{volume of the subsample}}$$

(Hyslop, 1980).

RESULTS AND DISCUSSION

The results of the study of the stomach content of *Petrocephalus bane* in the study area shows that the species feeds maximally on zooplanktons. Table 1 shows the food items, percentage frequency of its occurrence in stomachs and its percentage numerical abundance. The present research showed that *Petrocephalus bane* mainly feed on Rotifera (21%), fish eggs (17.1%), Crustaceans (12.3%), Ochrophyta (Diatoms) (6.8%), Cnidaria (5.9%), Chaetognatha (4.9%), Platyhelminthes (3.4%), Annelids (2.5%), Nematods (2.4%), Desmids (2.4%), Debris/ mud (7.8%) and Dinoflagellates (0.5%). This clearly indicates that the species depends more on zooplanktons for food.

Table 1: Percentage frequency of occurrence and numerical abundance of food items, in the stomach contents of *Petrocephalus bane* in Daberam reservoir

Food class	% Frequency of occurrence	% Numerical abundance
Dinoflagellate	0.5	3
Rotifera	19	34
Cnidaria	15	5.3
Ochrophyta	8	14
Platyhelminthes	6	22
Nematoda	4.3	8
Crustacean	12	35
Annelida	4.4	12
Molluscs	8	4.9
Fish egg	26	17.5
Desmids	6	2.4
Plant Debris/ mud	32	7.8

The percentage of fullness of guts of *P. bane* in different months (Table 2) showed that the highest number of full guts was found in the month of April through October while the lowest stomach fullness were in the month of January through May.

Table 2: Percentage of stomach fullness (%) of *P. bane* in Daberam reservoir during May 2017 to April 2018.

Months	No of species examined	%Full	3/4 full	1/2 full	1/4 full	Empty
May	30	23.0	28.4	10.3	12.7	25.6
June	30	36.7	11.0	10.5	21.4	20.4
July	27	35.0	13.8	10.5	15.5	25.2
August	25	37.0	11.8	12.5	18.5	20.2
September	28	28.0	12.0	19.0	13.0	28.0
October	30	33.6	10.5	15.7	10.2	30.0
November	30	20.0	15.1	16.2	13.0	35.7
December	30	20.0	20.0	20.0	10.0	30.0
January	30	15.0	15.0	13.1	25.0	31.9
February	30	20.0	21.0	13.2	15.0	30.8
March	30	25.0	15.0	11.0	14.0	35.0
April	30	14.0	14.0	14.6	27.0	30.4

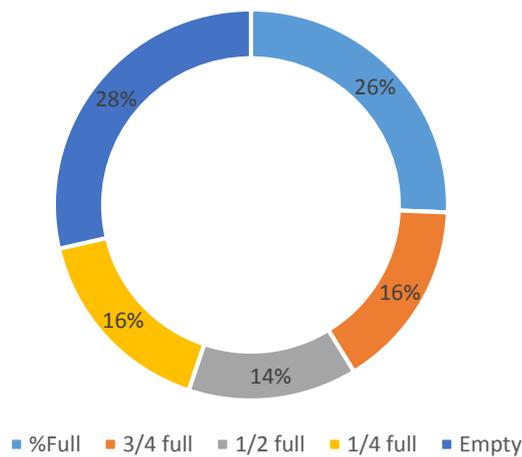


Figure 2: Overall percentage stomach fullness of 325 specimens of *P. bane* from Daberam reservoir during May 2017 to April 2018.

The present research studied the stomach content of the *Petrocephalusbane* and eleven animal phyla were identified in their guts. The species was found to mainly feed on Zooplanktonseven though plant debris and mud were mostly encountered in it stomach, which constitute about 32%. Unidentified fish egg were also frequently found (26%). Nwani *et al.*, (2004) studied the food and feeding habits of *Campylomormyrustamandua* (OsteichthyesMormyridae) in Anambra River where insect larvae (Lepidopteran) was found to have highest frequency of occurrence. In the study, mud/sand had occurrence frequency of 8.80 %. The occurrence of mud and sand in the current study was higher, this may be due to the nature of the fish habitat. River species of mormyrid may tend to have lower mud and debris in their diet as the flowing water may not allow fine particles to stay in position unlike in reservoir where water is a bit stagnant, given way for siltation of fine particles. Odedeyi & Fagbenro (2007) studied the feeding habits of another species of mormyrids *Mormyrusrume* (Valenciennes, 1846) in River Ose. This species was found to feed mainly on insects and crustaceans as dominant food. Plant parts and detritus were also present in all

stomachs containing food. Rotifers, diatoms, algae, nematodes, annelids, and protozoans contributed less as shown in the study. Our current finding showed that *P. bane* in Debiram dam prey mainly on zooplanktons with Rotifers and Cnidarian being dominant in the diet. Habitat diversity and species assemblage in the environment could influence the food selectivity of fishes. In addition, Odedeyi & Fagbenro (2007) utilized specimens with total length up to 50 cm while in the current study the maximum size of available specimen in the catches was 13.5 cm. Most fishes in the wild utilize Rotifers as food in the early stage. The fact that small size fishes dominate samples utilize in the current study may be a factor that account for higher abundant to zooplanktons. Activities of animal and feeding time has been reported to play role in the record of empty stomach in aquatic animals (Mili *et al.*, 2013; Maynou *et al.*, 2005). The current finding also showed that season contribute to food availability and feeding intensity in *P. bane* in Debiram reservoir, as full stomach were more in rainy season while empty stomach dominate in dry season.

REFERENCES

- Babatunde, D. O. and Raji, A. (2004). Field guide to Nigerian freshwater fishes, 2nd edition.
- Bala U. Lawal, Bolorunduro P.I., Oniye S.J., Abdullahi S.A., Bichi A.H. (2009). Study of ichthyofauna of daberam reservoir, Katsina state. *Bayero Journal of Pure and Applied Sciences*, 2(2): 172 - 174.
- Chrisafi, P., Kaspiris, P., Katselis, G. (2007) Feeding habits of sand smelt (*Atherina boyeri*, Risso 1810) in Tichonis Lake (western Greece). *Journal of Applied Ichthyology*, 23:209-214.
- Froese, R. and Daniel P. (2017). "Mormyridae" in Fish Base. April 2017 version
- Holden, M. and Reed, W. (1972). West African Fresh water fish, Longman Group Ltd. London. ISBN; 0582604265; 68.
- Hyslop, E. J. (1980). Stomach content analysis. A review of methods and their application. *Journal of Fish Biology*, 17:411-429.
- Jeje, C.Y. and Fernando, C.H. (1986). A practical guide to the identification of Nigerian Zooplankton (Cladocera, Copepoda and Rotifera). Kainji Lake Res. Inst. 142.
- Kolb, J. A. (1986). Plankton identification guide. *Marine Biology and oceanography grades 9-12*. Marine Science Centre, Poulsbo, WA.
- Ladich, F. and Tanja, S. (2016). Diversity in fish auditory systems: one of the riddles of sensory biology. *Frontiers in Ecology and Evolution* 4: 28-32.
- Maynou, F., Abelló, P., Sartor, P. (2005). A review of the fisheries biology of the mantis shrimp, *Squilla mantis* (L., 1758) (Stomatopoda, Squillidae) in the Mediterranean. *Crustaceana*, 77 (9): 1081-1099.
- Mili, S., Ennouri, R., Jarbou, O., Missaoui, H. (2013). Distribution and Abundance of the Mantis Shrimp *Squilla mantis* (Crustacea: Stomatopoda) in Tunisian Waters: Gulf of Tunis, Hammamet and Gabes. *Greener Journal of Life Sciences*, 1 (1): 1-13.
- Maar A., Mortimer M.A.E. and Van Der Lingen I. (1983). Fish culture in Central East Africa. Rome: FAO, 158.
- Nadeem, S., Waheed, K.N., Zafarullah, M., Ashraf, M., Sherzada, S. and Nadeem, H. (2019). Determination of Physico-chemical water quality parameters along with food preferences in selected Fish Species collected from River Ravi, Punjab. *International Journal of Fisheries and Aquatic Studies* 7(4): 93-100.
- Nwani, C. D., Eyo, J. E. and Udeh, E. F. (2004). Food and feeding habits of *Campylomormyrus tamandua* in Anambra River, Nigeria. *Journal of Animal Research International* 3(1): 410 - 414.

- Odedeyi D. O.; Fagbenro, O. (2007). Feeding habits and digestive enzymes in the gut of *Mormyrus rume* (Valenciennes 1846) (Osteichthyes Mormyridae) in River Ose, Southwestern Nigeria. *Journal of Tropical Zoology* **23**:75-89.
- Reed, W., Burchard, J. Hopson, A.J., Jeenes, J. and Yaro, I. (1967). Fish and fisheries of northern Nigeria, *Gaskiya Corporation, Zaria, Nigeria*. 34-56.
- Ugwumba A., Ugwumba A.A.A. and Mbu-Oben P. (1990). Food, feeding ecology of the mormyrids of Lekki Lagoon, Nigeria. *Nigerian Journal of Natural Sciences* **5** (1-2): 38-46.