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Food of the African snake head (*Parachanna obscura*) in a protected area

J.B. Olasunkanmi *, M.O. Ipinmoroti

Department of Fisheries and Wildlife Management, College of Agriculture, Ejigbo, Osun State University, Osogbo

Abstract

The food habit of the African snake head (*Parachanna obscura*) from upper river Ogun was investigated using two methods of stomach analysis, namely numerical abundance and frequency of abundance. Results showed that the fish fed on alternative food items with a preference for food items of animal origin especially, fish (36.1% numerical abundance and 32.7% frequency of occurrence) and crustaceans (24.1% by number and 26.6% by volume). Other food items which are probably incidental found in the stomach of the fish include protozoan, diatoms, desmids and green algae.

Keywords: Food habit; Snakehead; River Ogun; Food item

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* Corresponding author. *E-mail address:* bunmi.olasunkanmi@gmail.com

1. Introduction

The diversity of feeding habits that fish exhibit is the result of evolution leading to structural adaptation for getting food from equally great diversities of situations that have evolved in the environment (Lagler et al., 1977). Determination of food habits is crucial to the domestication of any animal. Ipinmoroti et al. (2008) opined that studies on food habits of fish for the purpose of culture should be based on identifying the food most preferred by the fish because the survival of fish species in culture is a function of how close environmental factors in the culture system are to those of their natural habitat. Inland fish species are known to have access to many kinds of food items in their natural environment and this has led to food selectivity among the species (Komolafe and Omosola, 2011).

Parachanna obscura belongs to the family Channidae. It has its origin in West Africa (Whenu and Fagade, 2012). It is commonly found in vegetative swamps in great abundance after the raining season when water level has decreased. Holden and Reed (1972) identified only one species of the family in West African waters. However, Adesulu and Sydenham (2007) reported that there are two species, namely, *Channa obscura and C. Africana* (syn. *Ophiocephalus obscurus and O. africanus* respectively). The fish is strictly carnivorous while Bardach (1972) described it as voracious and predatory (Chen, 1976; Holden and Reed, 1972). The juveniles were reported to have fed on prawns, copepods, and aquatic insect larvae whereas adults fed only on fishes in some Southern Nigeria freshwaters (Adebisi, 1981). Holden and Reed (1972) identified *P. obscura* as a culturable species with a very delicious taste and acceptable flavour. A report monitored at www.aquaworld.nefirms.com (2013) claimed that juveniles will eat live and frozen food while older fish will only accept meat and live food such as worms and fish when cultured. However, literature on the culture of this fish species is scanty or non-existent and there is paucity on its nutrient requirement.

The objective of this work is to determine quantitatively the principal food of the fish in Upper Ogun River. The upper Ogun River falls under reserved section (Old Oyo National Park) the study will therefore provide information on the kind of food the species most preferred and give a better understanding of its food biology in its undisturbed natural habitat.

2. Materials and methods

2.1. The study area

Old Oyo National Park is located in the North-Western part of Oyo State in Nigeria, sharing border with ancient towns and villages in the area. The Park is situated within longitude 8.5^{o}E and latitude 3.5^{o}N to 4.5^{o}N covering an approximate total area of 2,512km^{2}. The major access road is a 27km road from the nearest town Sepeteri to Ibuya base camp. The major drainage is the upper reaches of River Ogun that run through the southern part of the Park. River Ogun increases its width during the rainy seasons (March/April- October) as a result of seasonal flooding which makes it completely in accessible but in dry season (November-March), it

breaks into pools and brooks which provide habitat for aquatic organisms and drinking water for all wildlife population in the Park.

2.2. Collection of specimen

Specimens for this study were caught between the months of November and March (dry season periods) because the river is completely inaccessible during the rains. Specimens were collected from three sections (upper, middle and lower courses) of the river within the National park using six (6) monofilament fleet of gill nets consisting of two 50mm, two 60mm and two 85mm stretched meshes. Each net was hung at 50% hanging ratio and measured 10m in length and 3m deep giving an area of 30m2. They were set at different sections of the river. Fish were collected at intervals of four hours round the clock and nets were relocated daily. This ensures that most of the specimens for this research were collected live, identified and the stomach contents were removed. Both the fish specimen and stomach contents were immediately preserved in labeled bottles of 4% formalin respectively pending the laboratory analysis of the guts. Fish based on the description given by Reed (1967), Holden and Reed (1972) and Olaosebikan and Raji (2004). A total of 360 fish were used.

2.3. Laboratory analysis

2.3.1. Condition factor

The condition factor which is a measure of the state of the well being of fish species was estimated according to Bagenal and Tesch (1978) using the equation:

$$\mathrm{K} = \frac{100w}{l^3}$$

where, K = Condition factor, w = Weight of individual fish, l =length

2.3.2. Length-weight relationship

The lengths and weights of the species were measured in grams and centimeters respectively. The length – weight relationship was determined using the logarithmic transformation of the regression equation:

$$\mathrm{y} = \mathrm{a}\mathrm{l}^{\mathrm{b}}$$

$$\mathrm{Log.\,W} = \mathrm{a} + \mathrm{b\ Log.\,l}$$

where, y= weight of fish, l = length of fish, a = regression constant, b regression coefficient.

The regression coefficient was calculated to determine how change in length affects weight. The length and weight of the species were also correlated.Statistical analysis was based on SPSS 11.0 for Microsoft windows.

2.4. Methods of stomach analysis

The stomachs were slit opened and emptied into petri dishes. 10 ml of distilled water was then added to the contents. The food items found in the stomach were identified using simple microscope with high power magnification. The stomach contents were identified to the lowest possible taxon. Utmost care was given to the identification of even small fragments. Methods of analysis of stomach content were based on relative abundance (composition by number) and frequency of occurrence as described by Windel and Bowen (1978).

The frequency of occurrence indicated the proportion of individuals that ate a particular food item among the sampled species (with food in their stomach), while relative abundance denoted the number of food items expressed as a percentage of the total number of all food items in the stomachs.

3. Results and discussion

The length weight relationship of the species was determined as Log w = -2.63 +0.07 log l (r=0.27, b=0.07), the value of b is an indication that the growth (weight) of the species can be determined with the equation at any given time. The condition factor ranged 1.56 and 1.92 showing an allometric growth.

Results of the research also revealed that food of *Parachanna obscura* consisted of six groups of food items; fish, crustacean, protozoan, diatom, desmids and green algae (Table 1). Of the total food consumed by the fish, higher animal origin accounted for 56.8% numerically and 55.5% by frequency out of the total food items consumed by the fish. The percentage contribution of fish parts was 36.1% numerically and 26.3% (225) by frequency of occurrence while crayfish parts accounted for 20.7% by number and 22.8% by frequency. The fish also fed on microorganisms (plankton) which constituted about 43.25% numerically and 32.2 by frequency. The phytoplankton (30.5%) component of these was however higher numerically than zooplankton (12.73%). The total food component of animal origin was 69.1% numerically and 73.1% by frequency. Thus showing that *P. obscura* have strong preference for food of animal origin. The fish can also be said to macrophagous. The microscopic components of the stomach contents of *Parachanna obscura* in this study were protozoan (9.3%), diatom (21.3%), desmids (6.4%) and green algae (2.8%) by numerical abundance and 13.8%, 12.9%, 6.5% and 6.8% for protozoan, diatom desmids and green algae respectively by frequency of occurrence. This finding agrees with reports of Holden and Reed (1972) and Olaosebikan and Raji (2004) who claimed that the fish is carnivorous with preference for fish. It also agrees with the work of Uwem et al. (2011) on Ophiocephalus obscura of Cross-river estuary which revealed that the species fed mostly on diets of animal origin including Polychaete worms, shrimps, shrimp parts, Copepods, fish bones, fish scales, bivalves, insects, insect parts, juvenile fish, insect larvae, daphnia and water snails. Bonou and Teugels (1985) also reported that adult fish feed on other fishes while young ones feed on copepods and insect larvae. These authors also reported that the fish is used to control the young of tilapias in aquaculture ponds in Benin Republic.

Table 1. Summary of Food Families in the Stomach of *Parachanna obscura* found in Upper River Ogun

S/N	FOODITEMS	NUMERICAL ABUNDANCE		FREQUENCY OF OCCURRENCE	
		No	%	No	%
1	Fish	35	36.1	225	32.7
2	Crustacean	30	24.1	183	26.6
3	Protozoan	11	9.3	95	13.81
4	Diatom	27	21.3	89	12.94
5	Desmid	8	6.4	45	6.54
6	Green algae	4	2.8	51	7.41
7	Total	115	100	688	100

Table 2. Summary of the Stomach content of *Parachanna obscura* found in Upper River Ogun

	FOOD ITEMS	Numerical Abundance		Frequency of Abundance	
		No	%	No	%
1	FISH	35	36.1	225	32.7
	Fish Part	35	36.1	225	32.7
2	CRUSTACEAN	30	24.1	183	26.6
	Crayfish Part	28	20.7	157	22.8
	Copepod	2	3.4	26	3.8
3	PROTOZOAN	11	9.3	95	13.8
	Spirotomum	11	9.3	95	13.8
4	DIATOM	27	21.3	89	12.9
	Pinnularia	11	15.5	42	6.1
	Nitzschia	10	5.8	35	5.1
	Amphora	6	4.3	12	1.7
5	DESMID	8	6.4	45	6.5
	Gonatozygon	8	6.0	45	6.5
6	GREEN ALGAE	4	2.8	47	6.8
	Zygnema	4	2.8	47	6.8
7	UNIDENTIFIED MATERIAL	2	1.7	1	0.1

The phytoplankton components of the food could result from incidental feeding which could occur while the fish is grazing on zooplankton or could have resulted from the undigested food components of its prey. However Lagler et al. (1997) and Chen et al. (2001) noted that animals that consume a variety of prey types will, when abundance of preferred prey is decreased increasingly take alternative prey. The diets of fish is a function of many factors which include season, habitat and size.

The presence of desmids and green algae in the stomach of the fish may be explained by the fact that animals that consume a variety of prey types will, when abundance of preferred prey is decreased increasingly take alternative prey (Lagler et al. 1997, Chen et al., 2001). Du Buit (1996) and Gysels et al. (1997) claimed that the diets of fish is a function of many factors which include season, habitat and size among other factors. This might further explain the reason for the presence of diatoms, green algae etc in the stomach of the fish despite its preference for food of animal origin. Some plant matter and detritus were also consumed. It is recommended that further study that would cover the period of marking the peak of rainy season be carried out.

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