FOOD AND FEEDING RELATIONSHIP OF THE MUGILID FISHES OF QUA IBOE RIVER ESTUARY, NIGERIA

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ABSTRACT

The gut contents of four species of Mugilids (*Liza grandisquamis*, *Mugil curema, Liza dumeri and Liza falcipinnis*) in Qua Iboe River Estuary were examined to determine their food and feeding relationships. Of 147 stomachs examined, 129 (87.76%) contained food while 18 (12.24%) were empty. They generally exhibited euryphagus benthophagy. Algae, Sediments (mud and sand), where principal food items of the species while the only mugil curema depended on algae and sediments. Inter-specific variation in food richness was obvious. The benthophagy and low tropic positions of the species could enable their classification as potential pollution indicators since most pollutants are found in river beds, muds and sediments.

INTRODUCTION

The Mugilids are one of the most widespread euryhaline species of the West Africa coastal Waters. They are very popular in the mariculture considerations and also support both subsistence and artisanal fisheries in the sub- region. They are known to accumulate heavy metals and radioactive pollutions in their tissue (Brusle, 1981) occupying a significant position in pollution studies.

The *food for fish* constitutes a limiting factor and is competed for among the various populations in a given aquatic system (Royce, 1984). Fish food is necessary because it provides the fish with the required energy for life activities. The Mugilids have been the subjects of several studies in West Africa (King, 1986, 1988a, Brusle, 1981; Adebisi, 1981; Imevbore and Okpo, 1975). Little is reported on the food and feeding biology of the population in Qua Iboe river estuary. This study was conducted to determine the diet and feeding relationship among the species in Qua Iboe River Estuary.

MATERIALS AND METHOD

The specimens used in this study were bought from artisanal fisheries landing at Mkpanak beach (Figure 1). They were eviscerated and the stomach cut open. The Average Stomach Fullness (ASF) was computed as in (King, 1989; Hyslop, 1980). The *Gonado Somatic Index* (GSI) was computed as the weight of food expressed as a percentage of fish total weight.

The stomach content of each specimen was examined microscopically (with varying magnification up to x40). The relative importance of the food items were estimated by the percentage points and relative frequency methods while the overall importance was expressed by index of food Dominance (%IFD) (King 1990). This index is scaled between 0 and 100%; items with IFD ≥ 10% were considered as primary dietaries and those with IFD = 1.0 – 9.9% as secondary and those with IFD < 1.0% as incidental.

The Gut Repletion Index (GRI) was computed as the number of non – empty guts expressed as a percentage of the total number of specimens examined. The condition factors were computed as in Ricker, (1971).

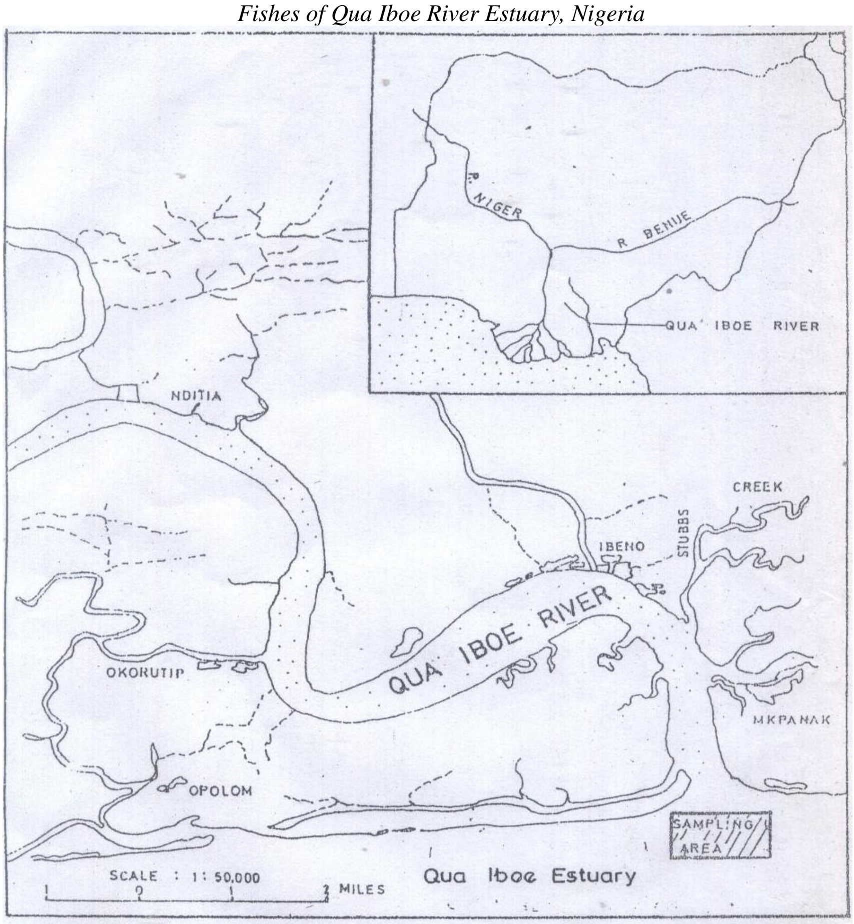

Figure 1: Map of Qua Iboe Estuary Showing Sampling Area

RESULTS

The Mugilid under study were of two genera and four species, identified as *Liza grandisquamis, Mugil curema, liza dumeri and Liza falcipinnis*.

Species size

The size ranges and corresponding mean sizes and condition indices of the specimens examined are shown in Table 1. Maximum size ranged between 17-25cm (TL), but with smallest mean size of 13.25cm (TL). The *Liza* species exhibited larger maximum size ranges than *Mugil* species.

Table 1: The mean total length (TL), condition factor (K), and indices of feeding intensity of the four mugilid species in Qua Iboe estuary, Nigeria.

Species	N	Total Length (cm) (ẋ)	Total Weight (g) (ẋ)	Condition Factor (k)	GSI (%)	AGF (%)	GRI (%)
Liza grandisquamis	62	10.9 – 24.7 (14.5)	11.0-130.2 (30.5)	0.9	1.0	11.0	86.5
Mugil curema	15	10.8 – 17.0 (14.88)	11.0-37.5 (28.9)	0.9	0.3	5.8	40
Liza dumeri	30	10.5-25.0 (14.6)	8.0-99.5 (26.9)	0.8	1.4	12.6	100
Liza falcipinnis	40	9.5-21.0 (13.2)	1.0-60.9 (20.4)	0.8	3.9	14.5	100

GSI = Gastrosomatic index (%); AGF = Average Gut Fullness;
GRI = Gut Repletion Index (%).

Feeding Intensity

All the stomachs of *L. falcipinnis* and *L. dumeri* examined contained food whereas 53.3% of *M. curema* and 80.65%of the stomachs of *L. grandisquamis* contained food. There was remarkable inter- specific variation in AGF in *Mugil curema*, 5.8 and 14.5 in *Liza falcipinnis.* Inter – specific variation in GSI was high and ranged between 1.0% in *L. grandisquamis* and 3.9% in *L. falcipinnis*. The highest and lowest feeding intensity were observed in *L. falcipinnis* and *M. curema* respectively while *L. grandisquamis* and *dumeri exhited* intermediate feeding activities.

Diet Composition

The food compositions of the *Mugilid* species are presented in Table 2. The species exhibited some preferences in the order of importance of their primary dietaries. The diet richness varied among the species. The highest food richness was observed in L. *falcipinnis* followed by *L. grandisquamis*, then *L. dumeri* and lastly *M. curema*. However, similar items were eaten by the Mugilid despite variation in terms of quality. All the Mugilids fed primarily on algae with high frequency in L. *falcipinnis* and *L. grandisquamis*. Invertebrates, macrophyte fragments and fish scales where of secondary importance in the species diet. The indices of feeding activity revealed all the species as active feeders except *M. curema* but their condition factor were generally low.

Table 2: Overall diet composition of the Mugilids examined in Qua Iboe River Estuary, January – December 2014

Food Items			Idex Of Food Dominance (%Ifd)	
Algae	*Liza*	*Mugil grandisquamis*	*Liza Dumeri curema*	*Liza* Falcipinnis
Bacillariopgyceae	-	-	-	0.10
Biddulphia	0.14	10.75	0.65	0.03
Licmophora	-	-	0.45	0.33
Rhizosolenia	0.23	3.23	0.73	0.40
Coscinodiscus	0.07	2.15	2.59	0.10
Skeletonema	0.14	2.15	3.38	4.05
Navicula	3.55	8.60	-	0.10
Thalassionema	0.18	-	0.89	0.19
Nitzschia	0.28	15.05	1.21	2.33
Gyrosigma	2.25	6.45	1.47	1.80
Pleurosigma	2.45	-	-	0.06
Cytodinium	0.33	-	0.39	-
Cyclotella	0.09	-	-	-
Bascillaria	0.07	-	-	0.04
Myxophyceae	0.57	-	-	-
Clasdesphora	0.02	-	-	0.53
Spirulina	-	-	-	-
Anabaena	-	-	1.69	0.04
Microcytis	-	-	-	-
Spirotaenia	-	-	0.46	-
Oscillatoria	-	-	0.65	-
Dinophyceae	-	-	0.53	0.01
Dinophysis	-	-	-	0.10
Peridium	-	-	-	0.20
Gymnodium	-	-	-	0.20
Ceratium	0.13	2.15	1.07	0.49
Isochrysis	-	-	0.29	0.03
Chlorophyceae	0.05	-	-	-
Spirogyra	0.27	-	1.37	0.40
Closterium	-	-	-	0.03
Isochrysis	-	-	-	-
Cladophora	-	-	1.26	0.04
Sub Total	10.91	48.38	19.06	11.40

Table 2 contd.

FOOD ITEMS	IDEX OF FOOD DOMINANCE (%IFD)			
Algae	*Liza*	*Mugil grandisquamis*	*Liza dumeri curema*	*Liza* falcipinnis
MACROPHYTE: MATERIALS				
Leaf fragment	10.11	-	10.65	2.07
INVERTEBRATES:				
Gastrosaccus	-	-	0.07	0.22
Chironnomid larvae	-	-	-	019
Harpaticoid copepods	0.33	-	-	-
Conchoecia	0.21	-	-	0.80
Nematodes	0.16	4.03	0.03	-
Tintinnopsis	0.32	-	-	-
Dictyocysta	0.80	-	-	0.33
Acanthychaiasma	-	-	-	-
Stenosomella	-	-	-	0.06
Globigeria	0.18	-	-	0.04
Temora	-	-	-	0.19
Candacia	-	-	-	-
Sub Total	1.40	4.30	0.10	1.83
FISH				
Scale	0.20	-	0.46	1.42
DETRITUS:				
Fine Detritus	10.16	6.46	2.59	16.84
Coarse Detritus	3.99	2.15	9.19	-
Sub Total	14.15	8.61	11.78	0.50
SEDIMENTS:				
Mud	42.79	4.31	10.16	4.44
Sand Grains	20.55	34.40	47.79	62.92
Total Sediments	63.34	38.71	58.84	67.36
Grand Total	100	100	100	100

DISCUSSION

The food items in the stomach of the Mugilids from Qua Iboe river estuary suggest that they are euryphagous (ie feeding on a wide range of organisms). This is similar to earlier finding in West Africa (Brusle, 1981; King, 1986, 1988a, King, 1989). The species can also be termed omnivorous feeders as the diet covers a wide spectrum of food ranging from various types of plankton to invertebrates and plants they also exhibit overlapping in food and feeding habits in order to avoid inter and intra specific competition for available food. This is an important strategy for survival and an advantage over the fish species competing for a specific food item. This thus, explains the availability of the Mugilids all year round (King, 1988, 1986; Fagade & Olaniyan, 1973).

The overall picture of the diet of the Mugilids that emerges from this study is that of a group which is largely unspecialized in its feeding habits. Unspecialized and flexible dietary habits are an optimal strategy for survival in habits where food source are subject to fluctuation (Welcom, 1979). Similarly, the inclusion of large amount of detritus in the diet is of survival value. It is derived from the surrounding terrestrial habitats. The ability of the Mugilids to feed at different trophic levels based on the food items observed in the study revealed its importance for consideration as agriculture candidate.

CONCLUSION

The benthophagy and low trophic position of the Mugilids reveals their potential as possible pollution indicator organisms in environment studies.

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