OBSERVATIONS ON THE ECOLOGY OF *Hepsetus odoe*, Bloch, 1794 (Pisces: HEPSETIDAE) IN EPIE CREEK FLOODPLAIN, NIGER DELTA, NIGERIA

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ABSTRACT

The distribution, abundance, age and growth, the food and feeding habits, condition factor and reproduction of *Hepsetus odoe* in the Epie Creek Floodplain was studied. *H. odoe* was found to occur in the creek, swamp channel and lake. They are very common, abundant and of major commercial importance. A total of 457 specimens weighing 76.90kg were caught during the period of investigation. The catches were more abundant in the dry season than in the wet season. The total length ranged from 10cm to 46cm while the weight varied between 50g and 900g. Six distinct components or year classes were observed by Bhattacharya's method. A growth exponential value 'b' was 3.35 with condition factor 'k' values ranging from 0.69 to 0.83. The main diets of *H. odoe* were fish, including the crustaceans (shrimps) and insects. The mean fecundity was 6060 ± 358 eggs (range 2,769 to 6.667 eggs). The ova diameter of *H. odoe* was found to range from 2.2mm to 2.6mm with overall mean = 2.4 ± 0.1).

INTRODUCTION

The Niger Delta is endowed with much diversity of ichthyofauna which support a major fishery and serve as a source of protein for many riverine and non-riverine tribes.

The floodplains of large rivers represent major spawning and nursery areas for fluvial fishes, not only because of their habit diversity, but also because they provide greater amounts of small particular food, shelter, from strong currents and much organic structure for protection from predators (Coop and Penaz, 1988).
Very little research work has been done on the numerous freshwater swamp forest ponds and lakes in the Niger Delta. Few studies on the floodplain in the South-East of Nigeria with regards to their ecology, fish communities and fisheries have been conducted by Awachie and Hare (1978) and Moses (1987) on the Anambra and Cross River floodplain ecosystems respectively. The dearth of published information on the composition, biology and ecology of the ichthyofauna of South-East and Delta areas of Nigeria have been reported (Nwadiaro, 1984a,b, Nwadiaro and Okorie 1985 and 1986; Teugels, 1986; Nwadiaro, 1987; and Akiri, 1987; King, 1988 a, b, 1989; King and Nkanta, 1991 and Alfred – Ockiya and Otobo; 1990 Teugels *et al.*, 1992);.

Considering the great importance of the floodplains and the diverse fish fauna in fresh water swamp, its poor ecology and biology, it became imperative that ecological studies of relatively less perturbed natural rivers and lakes of the floodplain systems such as the Epie creek be carried out.

MATERIAL AND METHODS

STUDY AREA:

The study area is located between latitude 5°00'N and 5°15'N and longitude 6° 15'E and 6° 30'E in the freshwater swamps of the Epie Creek and Orashi river (Fig. 1). The climatic condition is typically tropical as the area lies within the rain forest belt. The rainy season begins in March/April and lasts till October/ November while the dry season spans from November to March.

FISH SAMPLING:

Fish specimens were collected between January 1997 and January 1998.

Fish sample collection was done with set gill nets consisting of 25mm, 38mm, 51mm, 64mm, 76mm, 89mm, 102mm, 114mm, and 127mm stretched mesh sizes. Fish specimens were also collected by using hooks of various sizes (Nos, 12; 13, 14 and 15) and various kinds of fish traps, fish fences, cast nets and spears.

RESULT:

Hepsetus odoe commonly known as the African Pike, is recognized by the dark spots on the membrane between the rays of the dorsal, anal and caudal fins. A small adipose dorsal fin is also present. Another striking

feature is the jaws with a formidable array of large canines interspersed with smaller canical teeth (Reed *et al.*, 1967) (plate 1)

a. **Distribution and Abundance:**

H. odoe of the family Hepsetidae are well distributed in the creek, swamp channel and lake. The juveniles were absent in the catches from December to June (fig 2) and were present in July till October. They were seen in groups, in the shallow margin of the lake while the adults stayed in the deep open water and make occasional visits to the shallow margin to prey upon other young fish species.

A total of 457 specimens of *H. odoe* weighing 76.96kg were caught during the period of investigation. The overall monthly abundance by number (Table 1) ranged from 2.84% in June to 12.47% in January while the overall monthly abundance by weight (Table 1) ranged from 2.79% in September to 13.51% in January. The catches were more abundant in the dry season than in the wet season. The relative abundance (by number and weigh) decreased with the increase in water level low during high water level. (Fig. 3).

b. **Age and Growth:-**

i. **Length frequency:** The total length of *H. odoe* ranged from 10 to 46cm while the weight varied between 5.0g and 900g. The monthly size – frequency distribution of *H. odoe* are as shown in fig. 2. Length – frequency histogram was plotted for both sexes combined to make for more useful information. At least three modes or peaks were observed in the months of October, November, December, January, February, March, April and May depicting the presence of six cohorts at 13cm, 21cm, 29cm, 37cm, 40cm and 46cm. New recruit of young ones was observed in July representing the youngest age group at 13cm. Only very few matured adults and young ones were observed in June and September respectively.

ii. **Bhattacharya's Methodology**

The Bhattacharya's method was plotted to the polymodal overall size frequency distribution to help split the composite distribution into separate normal distributions: each representing a cohort of fish.

Figure 4 shows six approximately straight lines with negative slopes indicating six distinct components as obtained from observed frequency. They are l_1=12.4cm, l_2=17.2cm, l_3=23.4cm, l_4=28.4cm, l_5=33.5cm, l_6=39.0cm and l_7=43.9cm.

iii. **Length – Weight Relationship**

Figure 5 shows the length – weight regression analysis of *H. odoe*. The growth exponential value 'b' was 3.35 indicating the growth was allometric. The correlation coefficient between the lengths and weight were found to be high (r = 0.94) and highly significant (p>0.01).

c. **Condition Factor**

The monthly mean condition factor are as shown in Table 2. The mean condition factor values were higher in the dry season than in the wet season. There was a fall in the mean condition factor in the month of April and it increased from the month of October.

d. Food and Feeding Habits

i. Food Composition

Table 3 shows the summary of food habits in *H.odoe*. Fish and fish remains formed the major food items. *Tilapia Mariae* and *Chromidotilapia* had high frequencies of occurrence of over 60% while *Thysochronmis* and fish remains scored over 50% in the frequency of occurrence. The next in importance were the crustaceans with shrimps and shrimp remains, having 40% frequency of occurrence each. The insects had less than 20% frequency of occurrence. The total percentage of 61.6% by numerical count for fish and fish remains was the highest. This was followed by 28.9% and 9.5% by crustaceans and insects respectively.

e. **Reproductive Biology**

Fecundity

The mean fecundity of *H. odoe* was 6060 ± 358 eggs (range 2.769 to 6.667 eggs). The fecundity was related to total weight and total length. Ova diameter of *H.odoe* was found to range from 2.2 to 2.6mm (mean = 2.4 ± 0.1).

a) Relationship to fish length

There was a significant relationship between fecundity and total length of *H. odoe* (r = 0.76, n = 18.p > 0.001) (FIG 6.) according to the exponential relationship f = 5329.6 + 3.54TL.

.....(1)

TABLE 1: MONTHLY VARIATIONS IN ABUNDANCE BY NUMBER AND WEIGHT OF *H. odoe*

MONTHS	NUMBER	%	WEIGHT (kg)	%
NOVEMBER 1997	56	12.25	9.96	12.94
DECEMBER	43	9.14	8.05	10.46
JANUARY 1998	57	12.47	10.40	13.51
FEBRUARY	41	8.97	8.21	10.67
MARCH	37	8.10	7.55	9.81
APRIL	42	9.19	8.54	11.10
MAY	34	7.44	7.25	9.42
JUNE	13	2.84	3.25	4.22
JULY	28	6.14	2.55	3.31
AUGUST	35	77.66	3.65	4.74
SEPTEMBER	28	6.13	2.15	2.79
OCTOBER	43	6.14	5.40	7.02
TOTAL	457	100	76.96	100

TABLES 2: MONTHLY MEAN CONDITION FACTOR AND ± S.D.

MONTHS	TOTAL FISH EXAMINED	CONDITION FACTOR (MEAN)
NOVEMBER 1997	56	0.74±0.05
DECEMBER	43	0.77±0.12
JANUARY 1998	57	0.77±0.09
FEBRUARY	41	0.79±0.13
MARCH	37	0.83±0.15
APRIL	42	073±0.07
MAY	34	072±0.06
JUNE	13	0.73±0.15
JULY	28	0.69±0.05
AUGUST	35	0.73±0.10
SEPTEMBER	28	0.71±0.07
OCTOBER	43	0.74±0.08

TABLE 3: SUMMARY OF FOOD HABITS IN *H.odoe*

NUMBER OF FISH EXAMINED = 350

PERCENTAGE WITH FOOD = 67.1%

PERCENTAGE EMPTY STOMACH = 32.9%

	OCCURRENCE METHOD		NUMERICAL METHOD	
FOOD ITEM	NUMBER	%	NUMBER	%
INSECTA				
Odonata	14	6.0	30	1.9
Hemiptera	6	3.8	23	1.4
Hymenoptera	27	11.5	45	2.8
Insect remains	39	16.6	54	3.4
CRUSTACEA				
Copepoda	45	19.2	81	5.0
Cladocera	37	15.8	62	3.9
Shrimps 92	39.2	189	11.8	
Shrimp remains	86	36.6	132	8.2
FISH				
Tilapia mariae	146	62.1	211	13.1
Chromidotilapia guntheri	169	71.9	185	11.5
Thysochromis ansorgii	121	51.5	237	14.7
Fish remains	109	46.4	359	22.3

(b) Fish body weight/fecundity relationship

There was no clear cut relationship between fecundity and total weight

(r = 0.143), n = 18.P < 0.001) (fig 7). The regression equation for this relationship cis = F = 6025.9 + 0.7ʊ

Wt.....(2)

II Breeding season and sites

Gravid specimens of *H. odoe* (n = 18) were caught in the month of March and April. The female laid its eggs in the foamy nest on the surface of water, under shade, in between debris (broken branches of wood or raphia palms). This takes place in shallow waters normally at the littoral zone with vegetation (eg. *Pistia*). The female, after laying its eggs, guard them by staying under the foamy nest and bites ferociously at any intruder. (plate 2).

Breeding period is between late February and early April with the peak in the month of March, which coincided with the beginning of the rainy season.

DISCUSSION

Juveniles were not easily available in the catches during the period of investigation. Reason for the scarcity of Juveniles might be due to: the size of the mesh of the nets used, bias by fishermen to fish for larger specimens, slow swimming of the fish species, season/time and habitat of fish species during breeding.

Marked variations occurred in the numbers and weights of fish species. Bazigos (1972) observed a significant correlation between commercial catches and water level fluctuations while Turner (1970) also observed that the catch rate was inversely related to water level with a probable explanation that there was higher concentration of fish during low water level.

The analysis of the length frequency showed the pattern of length distributions of the various fish species found occurring in the Creek floodplain.

The Bhattacharya's method clearly separated the fish populations into definite groups or stanzas that could indicate age. The length-frequency distribution also showed normal distribution curve. Some workers have used the length – frequency singly or in conjunction with other methods of ageing (Lowe = McConnel, 1975; Willonghby and Tweddle, 1978).

The regression analysis of the fish species showed an allometric growth, LeCren (1951) noted that obedience to the cube law (isometric growth) is rare amongst a vast majority of fish species. The mean condition factors for *H. odoe* were higher during the dry season.

The feeding habit could be classified as predator. Similarly, works of Sandon and Al-Tayib (1953), Corbet (1961), Imevbore and Bakare (1970), Hopson (1972), Lewis (1974), Petri (1974), Lauzanne (1975) and 1976) and Adebisi (1981) showed *H. odoe* to be piscivorous. *H. odoe* increased its predatory teething intensity during the low water level, resulting in the concentration of more fish species which also accounts for its higher mean condition factor during the dry season.

The number of eggs produced by fishes has been shown by Nikolsky (1963) and Fryer and Iles (1972) to be related to the degree of parental care and size of egg. Thus the size of eggs, the lower the fecundity. Although the fecundity in *H. odoe* is high, the size of the eggs are large and show a degree of parental care by its floating foamy nest habit, which the female guards. A similar report has been made by Holden and Reed (1978) and Reed *et al* (1967).

The breeding season coincided with the beginning of the rainy season as reported in most tropical fishes, with a peak period in the month of March, *H. odoe* enjoyed adequate feeding with high abundance of food and high condition factor values.

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