

**DISTRIBUTIONS AND HABITATIONS OF
AFRICAN PIKE *HEPSETUS ODOE* (BLOCH, 1794),
IN OBA RESERVOIR, OGBOMOSO, NIGERIA
(ACTINOPTERYGII: HEPSETIDAE)**

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[Adedokun, M. A. & Fawole, O. O. 2012. Distributions and habitations of African Pike *Hepsetus odoe* (Bloch, 1794), in Oba Reservoir, Ogbomoso, Nigeria (Actinopterygii: Hepsetidae). *Munis Entomology & Zoology*, 7 (2): 708-713]

ABSTRACT: Population size structure of *Hepsetus odoe* was investigated during the rising and falling water levels in Oba Reservoir, Ogbomoso, Nigeria. The species was common in grassy, middle and open water microhabitats. The studied fish exhibited a wider size distribution in terms of space and time; the size of adults *H. odoe* changed from rising water means of 220.7 mm (S.D=28.2) to a falling water means of 216.9 mm S.D=51.6, t (long-transformed S.L)=30.32, D.F=132, $P < 0.0001$. Also, all variables pertaining to males and females in microhabitats were significantly different ($p < 0.05$). The sex ratios for inshore and offshore catches deviate from the same pattern as the deviation was significant in inshore and insignificant in offshore. Majority of the sampled fish inhabited inshore (56.4%), 46.62% occupied middle part and the total mean catch in micro habitats (grassy, middle and open waters) was less than 500 kg. The total mean catch for gillnets selectivity based on mesh sizes was less than 600 kg. Catch per unit effort (CPUE) increases with increased in fish size which correlates with increased net mesh size.

KEY WORDS: *Hepsetus*, Population size structure, microhabitats, inshore and offshore.

The geographical range of *H. odoe* covers the tropical region West and Central Africa. It is found in most rivers in West Africa from the Senegal Southwards to Botswana. The Southern limit of its distribution is the Okavango Delta in Northern Botswana (Merron et al., 1990). Moriarty (1983) reported abundance of *H. odoe* in Kanji Lake, Nigeria. It is usually found near the banks of rivers in heavy vegetation, but also can be found in swampy environments, lagoons etc. in areas where one of its major predators is historically absent (tiger fish) *H. odoe* will venture into more open waters (Jackson, 1961). *Hepsetus odoe* (Bloch) is one of the characins of Nigerian inland water bodies. Characins are economically important fishes of tropical African freshwaters (Olaosebikan & Raji, 1998).

H. odoe form an important component of the subsistence catch of local fisherman in the upper Zambezi (Zambia), Kafue (Zambia) and Okavango Delta (Botswana) flood plains, (Merron et al., 1990) but it is a major part of commercial fisheries in Ogbomoso Reservoir (Nigeria). *Hepsetus* is one of the teleost that are of most diverse group of animals and dominated both marine and freshwaters (Nelson, 1994).

The most striking feature of *H. odoe* is its dentition. Both upper and lower jaws are filled with sharp pointed teeth, but the lower jaw has two rows while the upper only has one. There are also two large canines in each jaw. Two pairs of dermal flaps can be found on the upper and lower jaws (Barnard, 1971). It has elongated body, pronounced snout and well fitted adipose fin behind the anal fin.

For capture fisheries subsector to continue to be a source of food and income for future generations, it is increasingly regarded as necessary first to monitor the state of the aquatic ecosystem and then to manage human intervention within that ecosystem. Any shortfall in fish availability will affect animal protein intake of people in the country (Amao et al., 2006).

There is paucity of information on the distribution in most cases, and on some other aspects of the ecological biology of *H. odoe* by researchers. Moriarty (1983) documented *H. odoe* as one of the Nigerian freshwater fishes in Kanji Lake. The knowledge of fish distributions and habitation is needed in establishing the distribution pattern of *H. odoe*, pressure of human intervention/exploitation on *H. odoe* and its ecological consequences in the aquatic ecosystems. This work aims at establishing population size structure and habitat affinity of *H. odoe* in the Oba reservoir.

MATERIALS AND METHODS

Study Area

The study area was Oba Reservoir, which was impounded in 1964 (Ojo, 2002). The major tributaries are Idekun, Omoogun, Eguno, Akanbi and Yakun streams (Fig. 1). The Reservoir has a catchment area of about 321km² (8°05'N to 8°10'N, 4°10'E to 4°15'E) in Oyo State, Nigeria. The minimum depth is 0.83 m while the maximum depth is 16.4 m.

Sampling procedures

Sampling for *H. odoe* began in April, 2009 and extended till March, 2010. The fishing methods employed was gillnetting. During gillnet setting in each fishing ground (grassy, middle and open locations) measurements were obtained for water depths for each location with 2-4 m, 5-8 m and 9-16 m respectively. The total catch for each gillnet was taken. The gillnet used was 200 m long with four different mesh sizes (4, 3, 2 and 1 inches) of 16.7 m each and 1.32 m depth. In the laboratory, each specimen was measured, weighed and split open. The sex was determined by visual inspection.

RESULTS

POPULATION SIZE STRUCTURE

Seasonal size distribution: The total number of individuals obtained was 133. The sampling gear collected *H. odoe* ranging in size from 140 mm-390 mm S.L a wider distribution S.L (Table 1). During high water conditions the bulk of *H. odoe* were in the 200 mm-220 mm-250 mm size classes. As flood water recede, majority of *H. odoe* remained below these intermediate size classes, but relative abundances were more widely distributed. There was significant difference in the mean sizes of *H. odoe* from rising water and falling water samples High means=220.7 mm, S.D=28.2, to a low water means of 216.9 mm, S.D=51.6, t (long-transformed S.L.)=30.32, D.F=132, P<0.0001. Throughout the year, the size distribution was more skewed towards smaller size interval during low water conditions.

Spatial distribution: The percentage compositions of each gillnet mesh size in each location between seasons were 56.39%, 27.82% and 15.79%, while the mean catch for each gillnet based on location was 201.9kg, 181.1 kg and 109.8 kg in grassy, middle and open locations with total mean catch less than 500 kg.

Vertical/ horizontal distribution: The depth distribution of *H. odoe* in relation to the gill net showed that the specimens were found at all depths. Though, majority was found to occupy middle, bottom and upper parts in the following order of percentage 46.62%, 35.34% and 18.05%, horizontally, specimens caught at the inshore were greater than those caught at the offshore area with 56.39% and 43.61% respectively.

Stationary Gillnet Selectivity: The composition of fish caught by each mesh size expressed as percentage of the total catch were 13.53%, 67.67 and 18.80 for 3, 2 and 1 inches respectively. Table 2 shows selectivity of gillnet mesh sizes in term of total fish caught, size ranges, mean total length, mean catch and catch per unit effort. It also shows the size interval of the specimens caught by different mesh sizes.

Habitats Affinity: The biological variables pertaining to males and females are significantly different at 95% confidence level in both grassy and middle micro habitats. The variation in the mean gonad weight of males and females in the open micro habitat resulted to significant difference in gonado somatic index (<0.05). Table 3 shows that all biological variables pertaining to males and females in the resident water body were significantly different (<0.05).

Sex Ratio: The result shows that of the 109 specimens in 2009/2010 that had observable gonads 46 were males while 63 were females, which amount to a male: female ratio of 1:1.36. Deviation from the expected 1:1 ratio was not statistically different. The sex ratios for offshore and inshore catches deviate from the same pattern as the deviation was significant in inshore and insignificant in offshore. Majority of females preferably occupied inshore during wet season. On the contrary, the two sexes preferred inshore to offshore during dry season (Table 4).

DISCUSSION

Jackson (1961) hypothesized that many of smaller African fish species are excluded from open waters and restricted to back waters owing to the threat of predation by their chief predators. *Hepsetus odoe* is primarily ambush predator and it frequently uses dense beds of aquatic vegetation for cover (Moriarty, 1983). This study shows that, *H. odoe* exhibits a wide distribution pattern. A pattern that shows the extent at which *H. odoe* effectively put into use the resident water body owing to the absence of its chief predator (*Hydrocynus*). Majority of *H. odoe* were found in the grassy area (56.39%). The sampled species were not restricted to a particular area of the reservoir, as middle and open waters were equally inhabited at different percentages. The sampled fish spread widely in the resident water body in terms of space and depth. This pattern of distribution may be as a result of the absence of tiger fish in the Reservoir. This result is not in line with the report of Merron, et al., (1990), Wine Miller (1994). They reported that *H. odoe* were restricted to the bed of dense vegetation (grassy area) owing to the threat of predation in the open water. However, this result is in line with the findings of Bell- Cross and Minshull (1988) who reported wide distribution of African pike in the Kafue River drainage Zambezi where *Hydrocynus* is historically absent.

The sex ratio for *H. odoe* in Oba Reservoir is approximately one male to one female in offshore as the deviation from the expected 1:1 (male: female was not significant). In the inshore of the Oba Reservoir, the result of this work shows preponderance of females of *H. odoe*. This study is in line with the findings of Fagade et al. (1984); the authors reported an overall sex ratio of 6 males to 10 females *T. galilaeus* in IITA Lake, Ibadan though of different species.

Characiform, *H. odoe* showed very high overlap in the use of offshore and inshore habitats of Oba Reservoir. The use of smaller mesh sizes than 3 inch further increases ecological consequences by making the sampled fish to be an endangered species and possibly at verge of extinction. The studied species maximally put the resident water body into effective use in term of space and time.

The introduction of the principal predator (*Hydrocynus forskahlii*) of *H. odoe* into Oba reservoir will have dominant and distribution effects on the studied species. As a result, management measures toward sustainable exploitation are required. Though, *H. odoe* specimens do not occur presently in large number in the commercial gillnets of 4 inch mesh size; the ongoing commercial exploitation of this species probably with a lesser mesh size of 8.9 cm (3 ½ inch) might enhance faster growth, improve socio- economic status of the local fishermen and help to sustain the much needed protein in man.

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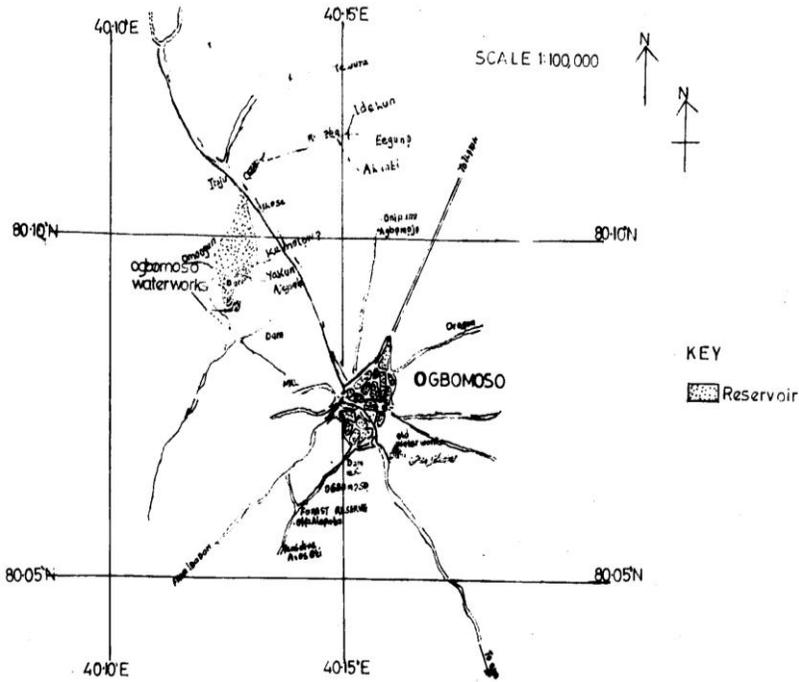


Figure 1. Catchment Area for impounding Reservoir.

Table 1. Length-frequency distribution of *H. odoe* during low and high water periods.

Low water level	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	320	330	340	350	390
Jan. 2010	-	-	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Feb. 2010	-	-	-	2	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Mar. 2010	-	-	2	4	1	1	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Oct. 2009	-	-	-	-	-	-	1	2	2	3	2	1	1	-	1	-	1	-	-	-	-
Nov. 2009	2	-	-	-	1	1	-	-	-	1	1	1	-	-	-	-	-	-	-	1	1
Dec. 2009	-	-	-	1	-	1	-	-	1	3	1	1	1	-	1	-	-	-	-	-	-
Total	2	-	3	9	4	3	1	3	3	7	4	3	2	-	5	-	1	-	-	1	1
High water level																					
Apr. 2009	-	-	-	2	-	-	-	2	-	1	1	2	2	-	1	-	-	-	-	-	-
May 2009	-	-	-	-	1	1	-	1	2	1	-	-	1	-	-	-	-	-	-	-	-
Jun. 2009	-	-	-	1	-	1	-	3	3	1	-	-	-	-	-	-	-	-	-	-	-
Jul. 2009	-	-	-	-	2	2	4	2	1	1	1	1	1	-	1	-	-	-	-	-	-
Aug. 2009	-	-	-	-	-	-	2	5	1	-	1	2	1	-	-	-	-	-	-	-	-
Sep. 2009	-	-	-	-	-	2	1	5	3	4	6	4	-	-	-	-	-	-	-	1	-
Total	-	-	-	3	3	6	7	18	10	8	0	0	5	-	2	-	-	-	-	1	-

Table 2: Size of *H. odoe* caught by different stretched mesh sizes.

	Mesh sizes			
	2.5cm	5.1cm	7.6cm	10.2cm
Fish caught	24	91	18	00
Size ranges (T.L)	16.0-22.5 (482.8)	21.9-30.0 (2391.9)	29.3-46.0 (589.1)	00
Mean Total length	20.1	26.3	32.7	00
Mean catch (kg)	58.5	167.0	369.4	00
CPUE	10.6	113.4	513.1	00
% Catch	18.8	67.67	13.53	00

Table 3. Means of some biological variables of male and female *H. odoe* in Oba Reservoir.

Sex	Fish weight	Standard length	Total length	Gonad weight	GSI	Gutted fish weight	Stomach weight
male	175.33 a	218.93 a	262.93 a	0.585 a	0.337 a	174.66 a	3.44 a
female	235.56 b	238.92 b	279.94 b	3.460 b	1.543 b	235.63 b	2.78 a

Mean having different alphabets within a column are significantly different at 5% probability level.

Table 4. Sex ratio for *H. odoe* in Oba Reservoir based on gillnet sampling.

Catch	Male	Female	Total	Male: Female
Inshore	22	45	67	1:2
Offshore	24	18	42	1.3:1
Total	46	63	109	1:1.4