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Seasonal Numerical Abundance and Determination of Size Distribution of *Bagrus docmac* From Lake Akata, Benue State, Nigeria

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Abstract: Seasonal numerical abundance and determination of size distribution of *B. docmac* in Lake Akata was conducted between May, 2008 and April, 2009. The result revealed that *B. docmac* was most numerous (14.7%) in November and also well represented in December (14.4%) and February (17.9%) but had low percentage abundance in June (9.7%) and July (7.3%). Details of species abundance show that *B. docmac* constituted 13.2%. *B. docmac* are fairly common throughout the year. The monthly mean sizes of *B. docmac* showed that the highest monthly mean standard length (31.00±3.00 cm) and mean weight (475.0±8.6 g) were obtained in the month of October, respectively.

Key words: Abundance, size, distribution, *B. docmac*, Lake Akata

INTRODUCTION

Bagrid fishes are commonly known as naked catfishes. The family Bagridae is represented by 30 genera and 210 species. Bagrids have four pair's of well-developed barbels; these four pairs of barbels are covered by a layer of taste bud-enriched epithelium (Zhang *et al*., 2006). Large Bagrids are important as food fish. Some species are kept as aquarium fishes (Nelson, 2006). This family is of considerable commercial importance. Bagridae are a family of catfish that originate from African and Asia from Japan to Borneo (Nelson, 2006). *B. docmac* are found in Benin, Congo Democratic Republic, Egypt, Mali, Ghana, Guinea, Kenya, Sudan, Nigeria, Tanzania and Uganda. Wide spread in African rivers and lakes the Nile, Niger, Senegal, Congo, Volta lake, Chad Basins and East African Rift lake.

B. docmac is fairly common throughout the year. Inhabit lakes, swamps and rivers (Olaosebikan and Raji, 1998). Wide spread in both shallow and deep water (Witte and de Winter, 1995) and is probably associated with rocky bottoms/coarse substrates (Lock, 1982). Some aspects of the biology of some members of this family and other fish species have been studied by various scholars (Fagade, 1980; Ezenwa and Ikusemiju, 1981; Enstna-Mensah *et al*., 1995; Ogbe and Fagade, 2002) reported the abundance of *Clarotes laticeps* and *Clarotes macrocephalus* in lower River Benue, Makurdi, Nigeria. Ogbe and Fagade (2002) reported the abundance of 4 Mormyrid species in lower Benue River. Ogbe *et al*., (2006) reported the trend in numerical abundance for some Bagrids in the lower Benue River. Lawson *et al*. (2011) reported the seasonal abundance in Frill Fin Goby *Bathygobius soporator* from Badagry Creek, Lagos, Nigeria, Abowei (2009) reported the abundance of *Cynoglossus senegalensis* from Nkoro River, Niger Delta, Nigeria. Abowei (2010) also reported the abundance of *Ilisha africana* from Nkoro River, Niger Delta, Nigeria.

Catch Per Unit Effort (CPUE) is a useful index in the assessment of abundance of fish species (Gulland, 1975). It is essential in the determination of Maximum Sustainable Yield (MSY) and potential yield. Tobor (1992) reported that the inshore waters of most parts of the West African coast are rich in fish resources in quantities that can support commercial exploitation on a sustainable basis. However, later developments in fisheries studies have pointed to the depletion of the fish stocks (Okpanefe, 1987).

Accurate fisheries statistics in the lake and its adjourning flood plains is vital for the formulation of a sound fisheries management programme in the Akata Lake and similar water bodies. But, this is completely lacking. There are no reliable data on the abundance of *B. docmac* from Lake Akata. It is, therefore necessary to carry out a comprehensive study on the biology of fishes of this very

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important recreational lake aimed at good management. It is based on this ground that studies on the seasonal numerical abundance and determination of size distribution of ecologically and commercially important fish species were undertaken in Lake Akata.

The objective of this study is to make information available on the numerical abundance and size distribution of *B. docmac* from Lake Akata.

MATERIALS AND METHODS

The fish specimens used for the study were obtained from fishermen operating along Lake Akata between April, 2008 and May, 2009. These fishermen use various fishing gears including hand nets, cast nets and gill nets of various standard mesh sizes (20.2, 25.4 and 30.5 mm), as well as canoe were used as fishing craft. Fish species were randomly sampled monthly for 1 year and usually in the mornings between 7:00-9:00 a.m. and in the evenings between 4:30-6:30 p.m. and transported in an ice chest with ice cubes to reduce posthumous digestion to the minimum to the Fish Laboratory of the University of Agriculture, Makurdi. Mean monthly length and weight were computed and length frequency histograms were plotted using 1 cm length class for both sexes. Length and weight measurements were taken directly from the landing sites. Fish samples were collected and identified in the field according to Olaosebikan and Raji (1998) and FAO (1992).

The total and standard lengths were measured with a meter rule on measuring board according to Olatunde (1977). In fish with forked tail like *B. docmac* and *C. nigrodigitatus*, the 2 lobes were pressed together to give the maximum length measurement. These data obtained when pooled together were used to determine numerical abundance and size distribution of *B. docmac* from Lake Akata (Fig. 1).

The total body weight was determined using the mettler tabletop loading electronic weighing balance (model 59174). The sex of each fish sample was determined by visual observation using genital evidence.

RESULTS

Abundance: *B. docmac* are fairly common throughout the year. *B. docmac* was most numerous (14.7%) in November and also well represented in December (14.4%) and February (17.9%) but had low percentage abundance in June (9.7%) and July (7.3%). The relative monthly percentage abundance of *B. docmac* is presented in Fig. 2. Field observation showed that *B. docmac* had a seasonal trend in abundance. *B. docmac* constituted 13.2%.

Size and weight distribution: Figure 3 illustrates the standard length-frequency histograms for males and females of *B. docmac*. The standard lengths of males ranged from 16-20 cm with frequency of 42 which is 16.4% of the total. The females whose standard length ranges from 41-45 cm occur at frequency of 49 which represent 18.5%.

Figure 4 and 5 illustrates the monthly mean variation in standard length and weight of *B. docmac*. The monthly mean sizes of *B. docmac* show that male specimens had a

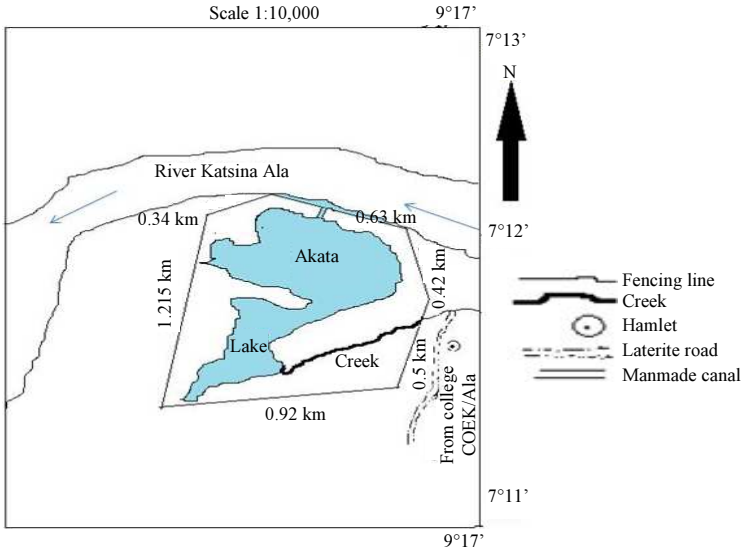

Fig. 1: Map of Lake Akata: Ministry of Agriculture and Natural Resources, Makurdi, Benue State

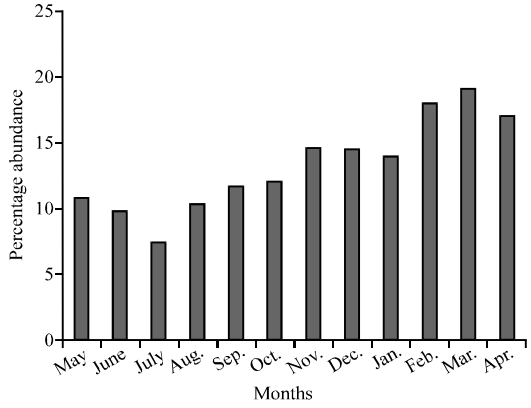

Fig. 2: Monthly percentage abundance of *Bagrus docmac* from Lake Akata

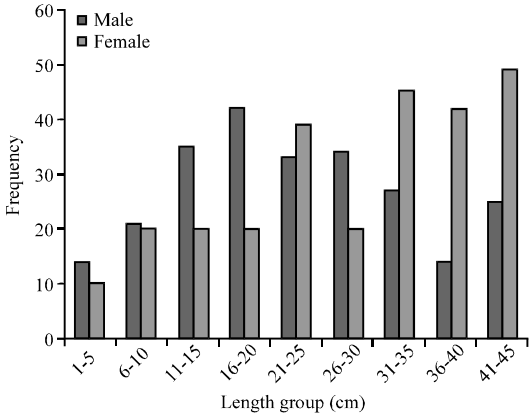

Fig. 3: Length frequency distribution of *Bagrus docmac* from Lake Akata

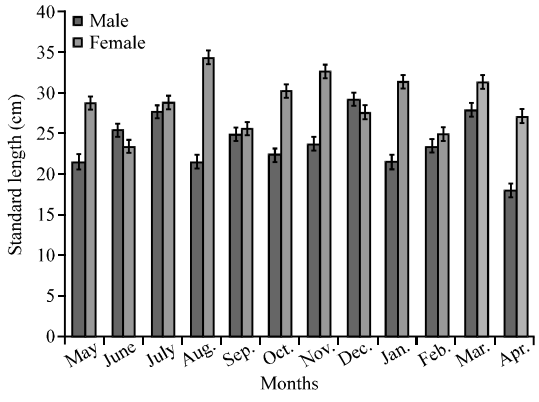

Fig. 4: Monthly mean variation in standard length of *Bagrus docmac* from Lake Akata

mean standard length and weight of 23.47±0.74 cm and 320.4±18.3 g, respectively. The highest monthly mean standard length 31.00±3.00 cm and mean weight 475.0±8.6 g were obtained in the month of October,

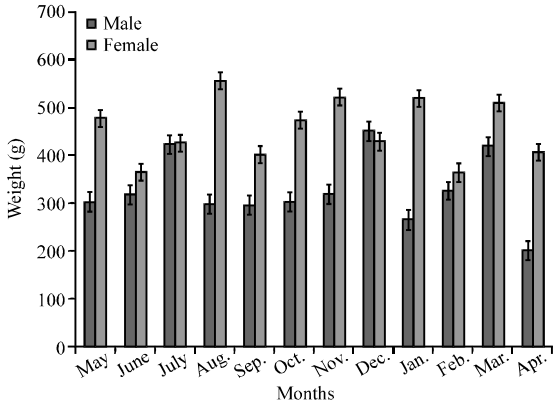

Fig. 5: Monthly mean variation in weight of *Bagrus docmac* from Lake Akata

respectively while the least standard length 21.45±2.91 cm and weight 297.2±66.8 g and 21.45±2.44 cm and weight 266.8±60.2 g were recorded in August and January. Months that also had high mean sizes were July, December and March. Standard length 27.61±2.84 cm and weight 422.9±72.7 g, standard length 26.90±2.50 cm and weight 451.6±66.2 g and standard length 27.75±2.24 cm and weight 420.0±56.5 g. The mean standard length and weight for the females were 28.61±0.74 cm and 450±17.5 g, respectively. The mean monthly standard lengths and weights for the females ranged from 34.24±2.85 cm and 555.8±73.3 g in August to 25.50±2.37 cm and 401.7±50.0 g in March. The variation in the monthly mean standard lengths was not significant in males ($p>0.05$) and females ($p>0.05$). Male specimens had slightly bigger mean sizes than females in the months of June, September, October, December and March. While the females were slightly bigger in May, July, August, November to April.

DISCUSSION

B. docmac caught from Lake Akata showed changes in the monthly abundance mostly exhibiting peaks in the dry months. *B. docmac* had peak abundance in March. This trend in abundance agrees with the findings of Ogbe and Fagade (2002) and Ogbe *et al.* (2006), reported the trend in numerical abundance for some Bagrids caught in lower Benue River throughout the year and were numerically more abundant dry season than in the rainy season. This could be due to low water level that makes the fish more vulnerable to capture. Olaosebikan and Raji (1998) reported that *B. docmac* are fairly common throughout the year; inhabit lakes, swamps and rivers. Wide spread in shallow and deep water (Witte and de Winter, 1995) and is probably associated with rocky

bottoms/coarse substrates (Lock, 1982). The month of May marks the beginning of the rainy season. During the peak of rainy season, the river flood and merges with the lake. The month of November marks the beginning of the dry season. During the dry season period, the lake is cut-off from the river due to reduction in the water level. Fish moves with the receding water to the main river channel. However, some remain trapped in cut-off flood pools and become vulnerable to fishing by baskets, nets and hooks. This is because fish migrate from the lake and swamps into the river. The movement could be associated with environmental changes brought about by rainfall and spate conditions. It shows that the abundance of *B. docmac* in Lake Akata was influenced by the rise in water level of the river, this helps in the biological productivity of the lake with optimal light penetration. The slight differences in the period of peak abundance for *B. docmac* in Lake Akata and those obtained from other lakes could be due to the difference in the geo-hydrological factors of the 2 water bodies, especially the flooding regime, rain distribution pattern and the nature of the water body.

Variation in the total estimate values in Lake Akata could be attributed to differences in fishing activities in the lake and fishing activities around the lake. The reason for the low estimates in Lake Akata could be as a result of high mortality of both juveniles and brood stock of various fish species as a result of predatory activities and use of agro-chemicals which is typical of the study area.

Factors affecting fish distribution and abundance have already been reported by different researchers. Availability of food, spawning rates, breeding grounds coupled with shelter, presence of current, vegetation, depth of water, breeding habits, migration and low predation have been suggested as major limiting factors affecting the distribution and abundance of various fish families in Kainji Lake (Ita, 1978).

CONCLUSION

In this study, it was observed that the mean standard lengths and mean total weights of the females of *B. docmac* were higher than the males. In the analysis of size ranges in some catfishes the female's exhibit faster growth rate than males (Olatunde, 1979).

The mean lengths with respect to the months of the year of *B. docmac* were not significant. While the mean weights of *B. docmac* was significant. The comparatively large sizes of *B. docmac* observed in this study is similar to the findings of Froese and Pauly who reported that *B. docmac* attains a maximum size of 50.00 cm (male/unsexed). It could be suggested that these fish stocks have remained stable over the years due to rational exploitation. The reason could be attributed to a fishing strategy that gives the highest steady yield year after year. Robins *et al.* (1991) reported that *B. docmac* attained maximum weight of 35.0 kg. This could be attributed to the fact that the females are carrying eggs and have more extended and spacious abdomen. The variations in fish sizes indicate that the fish population ranged from immature specimens to fully matured ones. This also suggests differences in their growth (Frota *et al*., 2004).

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