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ABUNDANCE OF BOSTRYCHUS AFRICANUS FROM THE NEW CALABAR RIVER NIGERIA.

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Abstract

A study on the abundance of *Bostrychus africanus* (n=3103) from the Upper New Calabar River was carried out within a twenty month sampling period. *B africanus* was obtained using bamboo traps and crushed *Uca tangeri* (West African Fiddler Crab) as bait. The size distribution was normal with a modal length of 10.05cm, and an overall sex ratio of 1:0.89 (M: F). Catch was higher in the dry season (55.23%) than the rainy season (44.7%). More males were caught in the dry season (31.55%) as against 19.82% for the wet season, while female were caught more in the wet season (24.97%) which was 1.29% higher than the values obtained for the dry season. Correlation results for abundance and physio-chemical parameters were strong and positive (P>0.01) with salinity, temperature, pH, and electrical conductivity but negative strong correlation (P>0.01) was observed with turbidity.

Key words; Abundance, Seasonal, *Bostrychus africanus*, Distribution.

Introduction

Eleotrids can be found in most places around the world especially within the tropical and subtropical regions. They occur on five continents including Africa (Allen and Robertson, 1994; Berra, 2001). Two species of eleotris where reported by Idodo-Umeh, (2003) in Nigerian rivers and estuarines, namely; *Eleotris senegalensis* and *Bostrychus africanus.*

Generally, oceanographic variables affecting plant and animal life include; temperature, winds, currents, salinity, and other physic-chemical parameters. Fish distribution is generally affected by the environment, with most species being restricted to narrow zones of preference or of reproduction ability. Since forecasts of global warming indicate that water temperatures will increase least at the equator and more toward the poles, it is expected that migration towards the poles will occur. High latitude warming should lead to greater fish production in those regions due to longer growing periods, increased growth rates, and greater overall productivity. Some species cannot tolerate the increased warmth during critical parts of their life cycle and their abundance can be expected to decline (Everett *et al.*, 1995, Everett, 1997, Everett and Bolton 1996).

Similarly, environmental changes cannot be considered in the absence of human impacts, such as pollution and fishing. However, heavy fishing pressure that had led to a small biomass and few older productive fish together with the other factors that has caused the stock to become vulnerable to collapse remains culprits in this situation. Climate change is happening at a time when many stocks are under heavy fishing pressure. For those stocks where the climate impact may be negative, resource managers should be particularly vigilant (Everett et al., 1995, Everett, 1997, Everett and Bolton 1996). This study is meant to provide the seasonal variations in abundance of *Bostrychus africanus* in the estuarine environment of New Calabar River considering the prevailing physiochemical conditions.

Materials and Methods

The samples were collected from the New Calabar River which lies at 4.4167^o N, and 7.0333^{o}E (Figure 1). *Bostrychus africanus* samples were collected from four stations. These stations were apart at approximately one kilometer within 4.4167^{o}N and 7.0333^{o}E. Samples were collected bi-weekly for each month from January 2015 to August 2016. The fish were caught using traps made from bamboo. They were 45cm long and had a diameter of 12cm. The traps were placed in the intertidal mudflats at ebb tide and half submerged with *Uca tangeri* (West African fiddler crab) as bait. Five traps were used and left for about 3hours. Samples from the traps for each station were pooled together and preserved in 10% formaldehyde solution.

The CPUE (Catch per unit effort) for traps in each station was estimated as the number of fish caught divided by traps-specific soak time, yielding an estimate of number of fish caught per hour (Juha *et al.,* 2013). In order to estimate relative abundance, the catch per unit effort method (CPUE) was used for monthly and stations (Bannerot & Austin, 1983). Physico-chemical parameters were measured in situ with the use of appropriate meters, for Biochemical oxygen demand (BOD) samples were incubated for 5 days and Dissolved oxygen content measured, BOD was then determined by the difference between initial and final dissolved oxygen after incubation. Regarding data analysis, Pearson's correlation coefficient was adopted in order to detect relations of fish relative abundance with the water physicochemical parameters (Chartfield, 1975, Emmanouil *et al.,* 2000).

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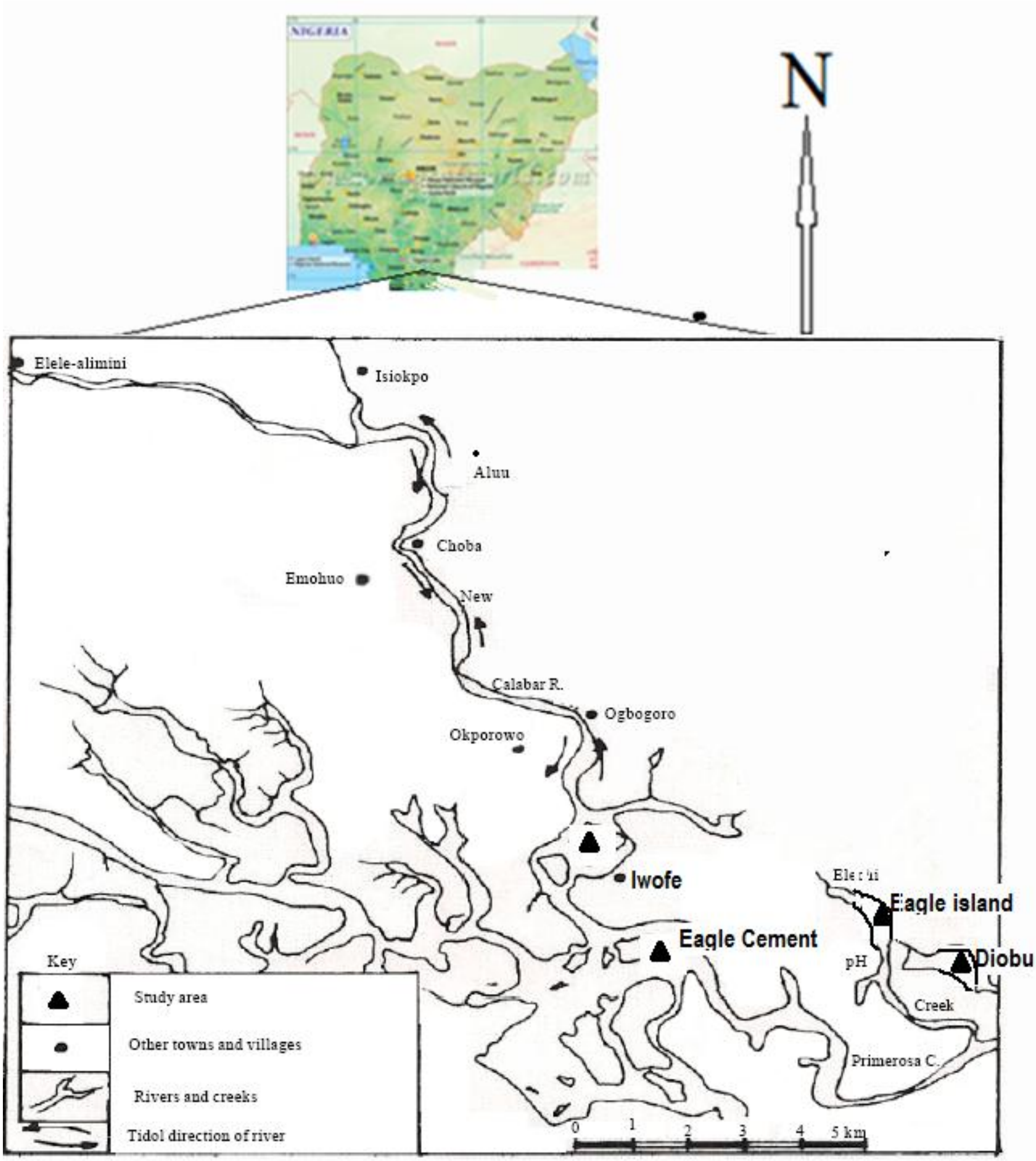

Figure 1: Map of Lower New Calabar River Showing Sampling Stations

Results

The size distribution of *B africanus* (n = 3103) in the New Calabar River followed that of a normal distribution, with 9.1- 11.0 being the modal class (Figure 2). A total sex ratio of 1:0.89 (M:F) showed a slight male dominant population. This is also reflected across the stations for the first and second year of the study. The percentage catch from the stations indicated that the species was evenly distributed across the study area (Table 1). Monthly abundance data for the period of the study showed that there was increased catch from November to February across the stations. This indicated better catch for the dry season over the rainy season (Figures 3 to 6). The total catch for the dry season was 55.23% and 44.77% for the wet season. There was higher catch for males in the dry season (31.55%) over the wet season (19.82%). The abundance for female was 23.68% for the dry season and 24.97% for wet. There were no significant differences between monthly and seasonal abundance. Abundance and physiochemical parameters correlation presented strong positive correlation for salinity, temperature, pH and electrical conductivity (P>0.01), while Turbidity recorded a strong negative correlation at P>0.01 (Table 2).

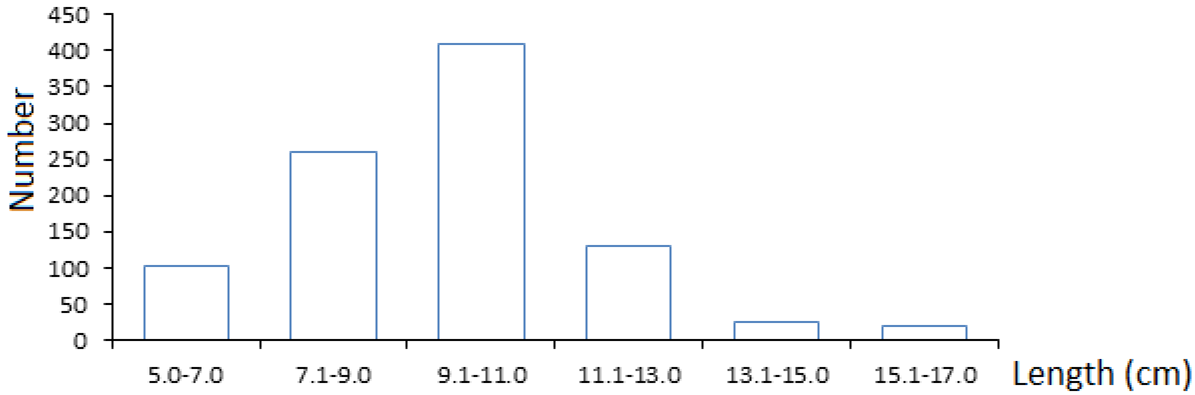

Figure 2: Size distribution of *B africanus* in New Calabar River.

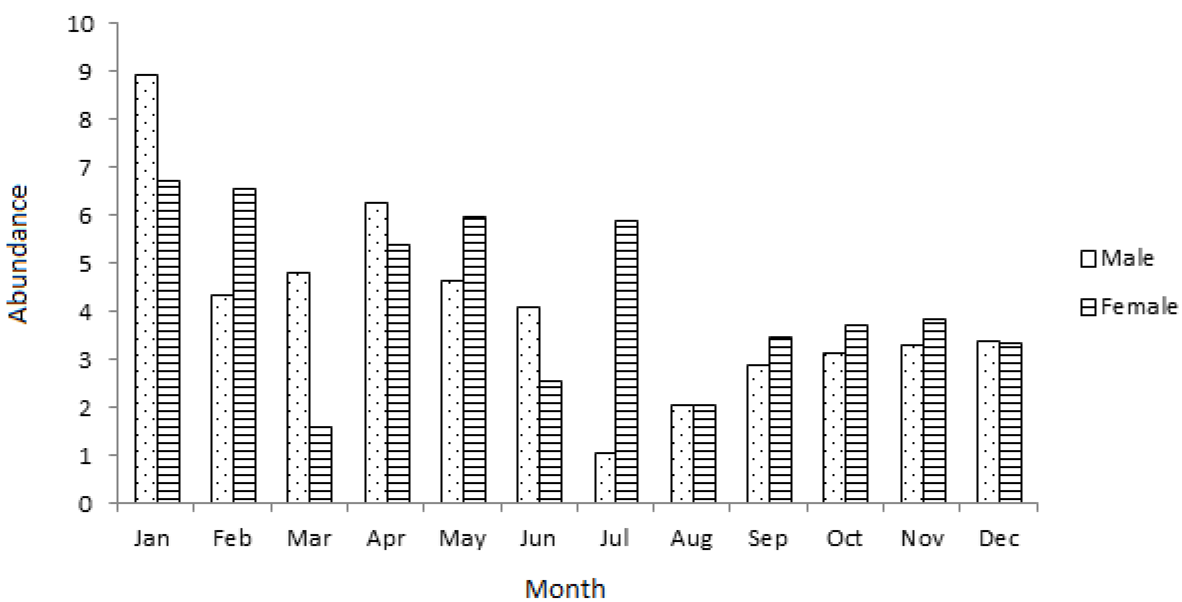

Figure 3: Abundance *B africanus* in station one

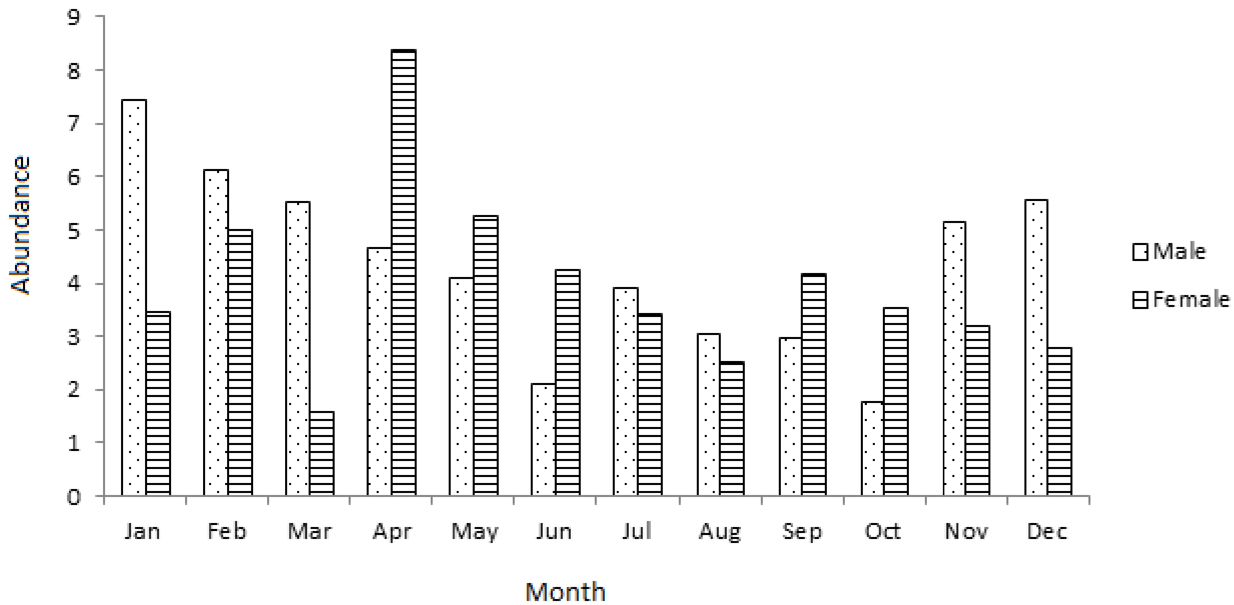

Figure 4: Abundance *B africanus* in station two

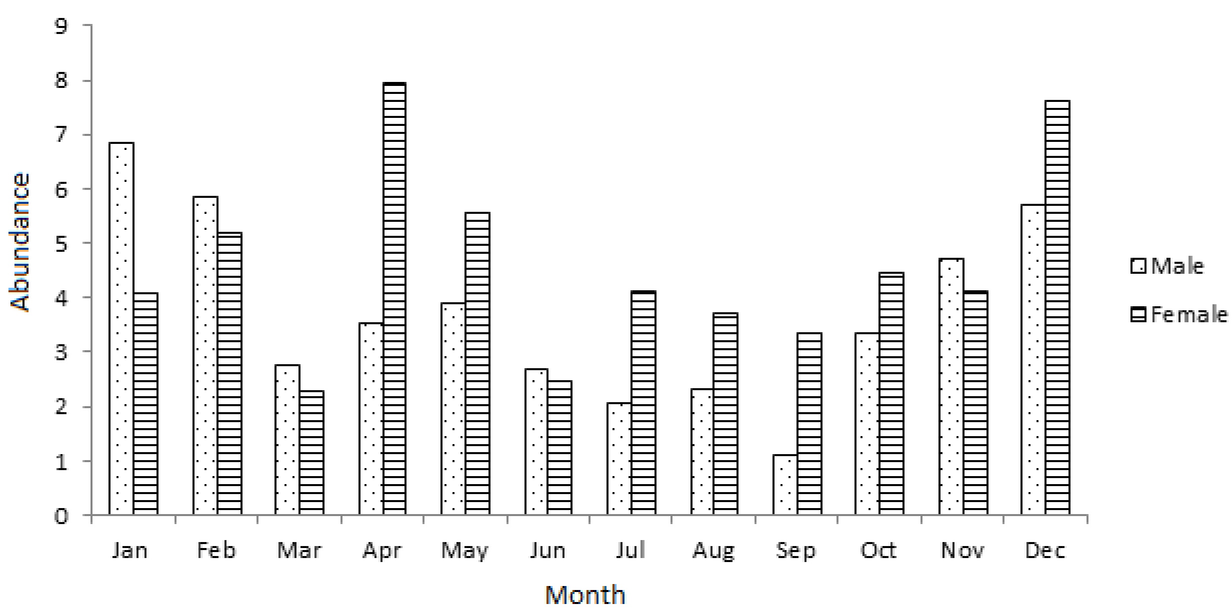

Figure 5: Abundance *B africanus* in station three.

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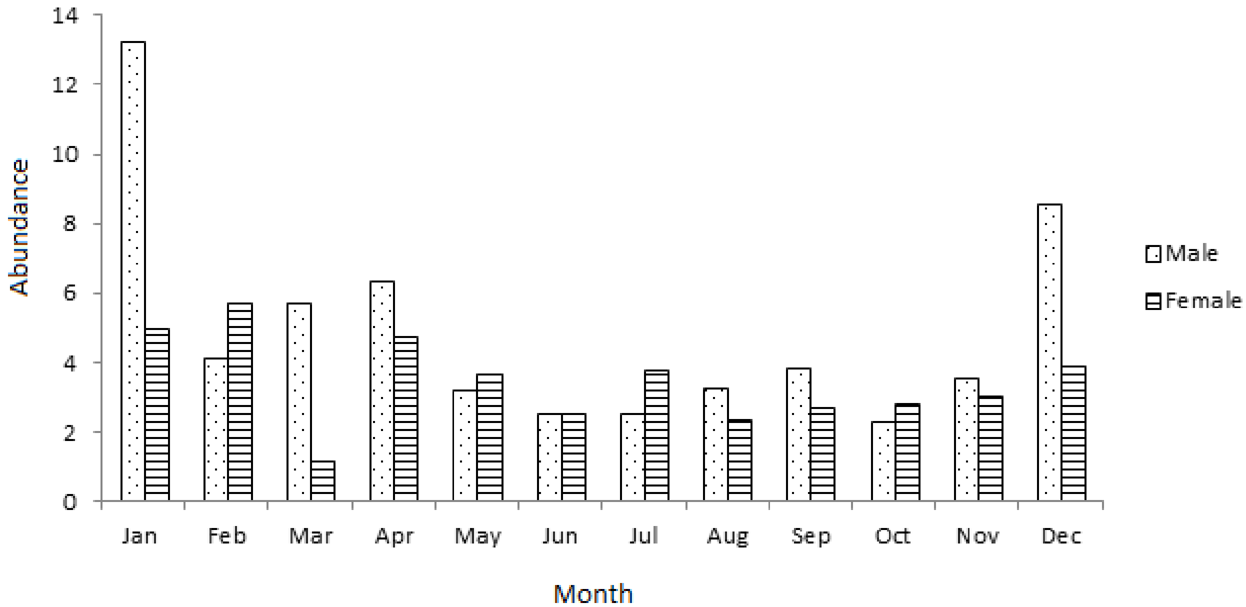

Figure 6: Abundance *B africanus* in station four

Table 1: Abundance of *B africanus* at various stations sampled in Upper New Calabar River (2015 – 2016)

	2015				2016			
Stations	Male	Female	Total	Sex Ratio(M:F)	Male	Female	Total	Sex Ratio
Station 1	239 (48.9%)	249 (51.1%)	488	1:0.88	185 (54.3%)	155 (45.7%)	340	1:0.89
Station 2	231 (52.4%)	209 (47.6%)	440	1:0.86	158 (59.0%)	110 (59.0%)	268	1:0.67
Station 3	216 (45.0%)	264 (55.0%)	480	1:1.22	164 (50.0%)	164 (50.0%)	328	1:1
Station 4	286 (60.0%)	190 (40.0%)	476	1:0.67	164 (58.0%)	164 (58.0%)	283	1:0.73
Total male	1643 (52.95%)							
Total female	1460 (47.05%)							
Total species	3103							
Overall sex ratio	1:0.89							

Table 2: Correalation between abundance and physiochemical parameters for *B africanus* from Upper New Calabar River (2015-2016)

Species	Salinity	Temperature	pH	Turbidity	Biochemical Oxygen Demand (BOD)	Dissolve Oxygen	Electrical conductivity
B africanus	0.830**	0.719**	0.679**	-0.745**	0.278	-0.303	0.619**

** = Highly Significant

Disscussion

Size distribution for the species was normal, considering that various size groups were represented in the catch using the same trap at same time and place. Certain factors that are known to bring about variations in habitat selection for different age or size classes among fishes include food, predation, swimming ability and cannibalism may not have had any place in the species population (Chande and Mhitu, 2005). Sex ratio for the species showed a male dominant population for *B africanus*. Planque and Buffaz (2008) reported that sex dependent spatial distribution could be expected when a species displays sex specific life history tactics, or when sex determination is environmentally influenced (Han and Tzeng, 2007).This could be seen in forms of specific habitat selection by certain sex of the species, this differentials in habitat selection by different sex of a species could be influenced by environmental factors.

There was increased catch in the dry season over the wet season. This could be linked to the gear type used that was usually applied either at low tide or reduced flooding, indicating that they are more effective in shallow waters (Gibson *et al*., 1993).

Physiochemical parameters have had key influence on fish abundance and distribution due to the compelling impact they make on the environment thereby affecting key life factors like food, habitat and other basic requirements for survival (Pallavi and Ajay, 2013).

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