The Condition Factor and Gonado-Somatic Index (GSI) of *Heterotis niloticus* of Kugbo-Creek in the Niger Delta, Nigeria.

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Abstract: Condition factor (C.F.) and Gonado-somatic index (G.S.I) of Kugbo Creek in the Niger Delta, of Nigeria was investigated. From the results of findings it was observed that both C.F. and GIS decreased as the fish grew older. This phenomenon was attributed to ecological factor of food shortage since the animal is omnivorous plankton feeder that depends predominantly on plankton, awfush algae and seldom on higher plant food source. Also, Variations in the condition factor of the species in the river system may indicate a period of high yield or otherwise of the species in the river system. Younger individual had high value of C.F and G.S.I as would be expected; these individuals fed vigorously and grew more plumber, preparing for reproduction by developing gonads rapidly, hence, the high condition factor value which might have been additionally induced by favorable ecological condition. Larger individuals has reached a stage in life where it only feeds for sustenance rather than for growth and development of sex organs for reproduction, hence, the low values of C.F and G.S.I observed during the study. Fresh water habitat being poor in plankton composition relative to brackish environment provides less energy than it requires per day, thus creating energy deficiency that affects both energy budget and reproduction cycle.
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1.0 Introduction

Gonad development is a very sensitive period for any fish species. It is influenced by changes in ecological factors and seasons (Jamabo and Chinda, 2011). In most fishes Development and maturation of gonad is periodic. In Nigeria, most fish gonads had been reported to commence development within the dry months of October to April and May the beginning of wet season (Kingdom and Hart, 2012; Jamabo and Chinda, 2011; Ogbe and Otaguba, 2010). Ecological factors that influence gonad development include; availability of food (Edoghotu and Hart, 2014), Salinity and temperature (Soyinka, 2011 and Ekanem, 2004). Reproductive pattern differ when considering habitat, geographical zone and species of fish. These are in turn influenced by environmental and biotic factors (Ogbe and Otaguba, 2010; Paugy, 2002).

Heterotis niloticus reproductive process is similarly influenced by such factors. The animal breed during the early rainy season of April to May, when it is observed to prepare nest and lay its eggs at the bank of shallow creek, adjoining swamp, flood plain of Kugbo Creek. The young ones are latter hatch and seen to swam in the early flood of June to August. The wellness of fish also known as condition factor (Axelrod and Untergasser, 1989), also influences the reproductive cycle of a fish species (Fagade 1979 and 1983; Sidduque, 1977; Dadze and Wangila, 1980; Arawoma, 1982; Oni *et al*., 1983). This factor decreases with increasing length of fish (Bakare, 1970; Fagade, 1979).

2.0 Material and Methods

2.1 Study Area

The creek is situated between Latitude 4°40′, 4°49′ and Longitude 6°20′, 6°35′of the Niger Delta, Nigeria. Kugbo creek is one of the Niger Delta networks of creeks. Its water is brown in late wet to early dry months due to its link with both Orashi and Nun rivers, which in turn are linked to River Niger. The water is black in early wet season due to water received from adjoining swamps and flood plains with decaying debris, but transparent or clear to bottom in shallow points of mid to late dry season due to incursion of saline water. There exist several natural resources including NTFP (NonTimber Forest Products) and TFP (Timber Forest Products). The system supports several human activities such as fishing, transport, dredging, lumbering, urbanization and oil exploration. Among the rich resources of the creek system is its fisheries, which apart from being a major source of protein food, provide income to the fisher folk and other inhabitants along the creek. In spite of these economic benefits, there is no information about the fisheries of this creek.

2.2 Collection of Samples

Samples of *Heterotis niloticus* were collected on a bimonthly basis for twenty four months (March, 2009 to February, 2011) at Kugbo creek, Port Harcourt, Nigeria respectively from the landings of hook trap and gill nets fisheries of the artisanal fishermen. A total of one hundred and fifty-seven freshly caught fish individuals belonging to all size classes (Small, medium and larger) were collected. The samples were stored in an ice crest on each day of sampling and taken to the laboratory, Nigeria for analysis.

2.3 Analysis of samples

In the laboratory, the standard lengths (beginning of snout to end of caudal peduncle) (Schineider, 1990) was taken to the nearest 0.1cm by the use of a measuring board. The wet weight of each individual was taken with an electronic weighing balance (Mettle P-1210N) to the nearest 0.1 g. The weight of each fish was matched against the corresponding length (cm). The individual fish gonad was carefully extracted by cutting-open the abdominal portion (tip of oesophagus to the end of the rectum (Lagler *et al*., 1977) of the fish with the aid of a pointed nose pair of scissors. The gonad was carefully removed by use of forceps.

2.4 Determination of condition factor (K)

Condition factor (K) (the degree of fatness or corpulence or well-being of a specimen).

$$K = \frac{W}{L^3} \times 100 \text{ (Ricker,1975)}$$

Where, K = Condition Factor

W = wet weight (g) of each specimen

L = Length (cm)

2.5 Determination of Gonado-Somatic Index

Godado-Somatic Index was determined using the formular;

$$G.S.I = \frac{GW}{FW} \times 100$$

Where, G.S.I = Gonado-Somatic Index

GW = Gonad Weight

FW = Fish Weight

3.0 Results and Discussion

The result of condition factor and gonado-somatic index are presented in table 1 below. GIS value for the fish ranged from 4.3% to 6.3%. Values increased from small individual to larger ones. This observation depicts that GSI of the fish increases with age of the fish.. The mean range value of condition factor for *H. niloticus* in the river system was from 3.4 to 4.4 with the medium fishes representing middle aged fish having higher C.F. values followed by larger sizes.

A fish is said to be in good condition when C.F. is greater than 1 (Largler, *et.al*., 1977). All three groups or sizes of *H. niloticus* studied showed mean C.F. values greater than 1, depicting healthy conditions of the fish in the River System. Decrease in C.F. values from young individuals to older ones shows that C.F. decrease with age in this fish species. This could be attributed to insufficient food as the fish is an omnivorous plantivor that depend solely on plankton, green vegetation and mostly attached algae (Edoghotu and Hart, 2014). The freshwater environment is usually not reach in plankton, therefore more energy is spent in browsing through the habitat to get barely enough food substance, as seen in the almost empty stomach content of the species in the River System (Edoghotu and Hart, 2014). Hence, it barely derive enough of energy relative to what it spend for its daily activities and in search of food, thereby losing weight, since it barely have enough energy to compensate its lost energy.

This observation was also made in the GSI values of the various groups. GSI decreased from young age group to the older ones. This could be attributed to the energy depletion due to increasing activities, which was not adequately compensated probably due to food shortage.

Table 1: Mean Condition Factor (C.F.) and Gonad-Somatic Index (GSI) of *Heterotis niloticus* of Kugbo Creek in the Niger Delta, Nigeria.

Size	Standard length SL (cm)	Weight range (g)	Number of specimen (N)	Mean-SL	C.F.	G.S.I (%)
Small	55 - 65.5	300-4800	43	58.00	4.4	6.3
Medium	65.6 - 75.5	4801 – 5800	52	65.05	4.4	5.8
Large	75.6 and above	5801-7000	62	69.50	3.4	4.3
Total			157			

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