Nwanna, L. C.; Ajani , E. K.; Omitoyin, B. O.; Magawata, I. Ayoola, S. O.; Orisasona, O.; Kareem, O. K and Abubakar, M. Y. (Eds.) (2004) ***Proceedings of the Fifth Conference of Association of Nigerian Fisheries Scientists.*** **"SUSTAINABLE FISHERIES AND AQUACULTURE PRODUCTION FOR ENHANCING LIVELIHOOD IN NIGERIAN ECONOMIC DEVELOPMENT"** 9TH – 11TH JULY, 2024 In the University of Lagos, Lagos, Nigeria

Aspects of Biology and Biometric Characteristics of Catfish, *Clarotes laticeps* from Badagry and Ologe Lagoons, South-West Lagos, Nigeria

***Aladetohun, N. F.[1], Igwegbe, A., N.[2], Okalome, S.[3], Nwadike, K.[3], Balogun, F.[3], Agoh, E.[3], Emola, A.[3]**

[1*] Corresponding author: Department of Fisheries Technology, Federal College of Fisheries and Marine Technology, Victoria Island, Lagos
[2]Nigerian Institute of Oceanography and Marine Research
[3]Department of Marine Sciences, University of Lagos, Akoka, Lagos

ABSTRACT

In this research, the growth pattern and biometrics characteristics of Catfish (*Clarotes laticeps*) sampled from Ologe and Badagry Lagoon were examined. A total of 20 individuals were collected between February and July 2019, from both lagoons. The Length- frequency distribution of *Clarotes laticeps*, three age groups were recorded for Badagry Lagoon whereas five age groups were recorded for Ologe Lagoon. The length-weight relationship of *Clarotes laticeps* exhibited positive allometric growth (b = 3.097 in Badagry, and negative allometric b = 0.816 in Ologe lagoon. The K-values ranged from 1.68 to 2.06 for Badagry Lagoon while the K-values for Ologe Lagoon ranged from 1.71 to 2.39. The mean K values were 1.84 and 2.02 for Badagry and Ologe Lagoons respectively. Showed. There was a significant difference ($p<0.05$) in the comparative racial study of the meristic features of *Clarotes laticeps* from Badagry and Ologe Lagoons.

Keywords:
Growth, Biometrics, Catfish, Lagoon

Introduction

Clarotes laticeps play a significant role in the ecology and fisheries of inland waters and lakes of Africa. They are usually common in the catches of artisanal fishermen in these areas. Distribution includes the Nile River basin and most of west and central Africa south to the tropic of Capricorn, including the East African lakes. Family Claroteidae was created out of the traditional Bagridae which reflect a monophyletic group of African catfishes. *Clarotes laticeps* (RUPPEL, 1829) also known as wide head catfish, are pelagic bagrids belonging to the family; Claroteidae found in Africa. Despite being a commercial fish, *Clarotes laticeps* has a status of Least Concerned (LC) and Harmless to human on the International Union of Conservation of Nature Red List (Emmanuel *et al*., 2020). There are still gaps in the current knowledge of the biology of species of high commercial importance such as *Pseudotolithus typus* in low brackish waters as Badagry and Ologe Lagoons. Study on the fish length frequency distribution is essential so as to have knowledge about the composition of size and fish population structure. A knowledge of length-weight relationships (LWR) is an important tool for the

adequate management of any fish species which have been applied in the assessment of fish stocks and populations (King, 2007). LWR is used to obtain information about the condition of fishes in order to determine whether somatic growth is isometric or allometric (Ujjania *et al.*, 2012). Condition factor (K) is an important biological parameter, which indicates the suitability of a specific water body for growth of fish and an index of species average size (Alam et al., 2014). Morphometric and meristic data are used to delineate and understand the critical adaptive traits of species' phenotypes. This information will help in management and conservation of such species in changing ecosystems (Oyebola *et al*., 2024). Therefore, the present research aims to examine biometrics characteristics and growth pattern of *Clarotes laticeps* in two low brackish water lagoons of south-west Nigeria, thus help in contributing to the knowledge of the species in the region

Due to over exploitation and inadequate management of inland waters in the country, fisheries resources are on the decline in Nigeria. Claroteidae was carved out of the traditional Bagridae to reflect a monophyletic group of African catfishes. For sustainability of these resources, an adequate knowledge of species composition, diversity and relative abundance of the water bodies must be understood and vigorously pursued.
The specific objective of this research is to study the growth pattern and biometrics characteristics of *Clarotes laticeps*, from Badagry and Ologe Lagoons

The objectives are to:

- estimate the growth pattern of *Clarotes laticeps*, from Badagry and Ologe Lagoon
- estimate the length weight relationships and condition factors of *Clarotes laticeps* from Badagry and Ologe Lagoon
- investigate variations of the morphometric and meristic features of *Clarotes laticeps* from Badagry and Ologe Lagoon

Materials and Methods

Description of Study Sites

Badagry and Ologe Lagoons

Badagry lagoon is part of a continuous system of Lagoons and creeks along the coast of Nigeria from the border with the Republic of Benin to the Niger delta. The Lagoon is approximately 60 km long and 3 km wide, it lies between longitudes $3^0 0'$ and $3^0 45'$ E and between latitudes $6^0 25'$ and $6^0 30'$ N. Its water depth ranges from 1 m to 3 m. The Lagoon experiences two broad seasons: the dry season (December-May) and the wet season (June-November). The Ologe Lagoon is part of the continuous system of Lagoons and creeks linked with the Lagos Lagoon and is close to the Badagry Lagoon. The Lagoon is located between latitudes $6^0 26'$ N and $6^0 30'$ N, and longitudes $3^0 03'$ E and $3^0 07'$ E.

Sample Collection

The Fish specimens used for this study were purchased from local fisher-folks on landing at Badagry and Ologe fish jetty, Lagos state from February 2019 to July 2019. The specimens were preserved in an ice cooler containing ice cubes in the field and later transferred into a deep freezer (-20^0C) in the Department of Marine Sciences and subsequently taken to the Marine Research Laboratory of the University of Lagos, for further analysis.

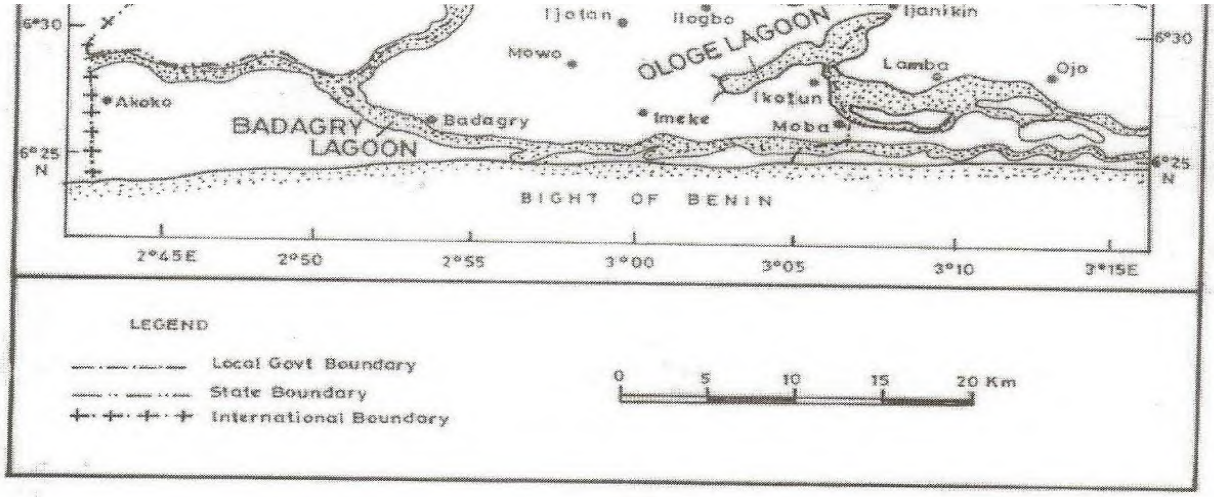

Fig. 1: Map showing Badagry and Ologe Lagoons in south-western Nigeria; Source: Soyinka and Ayo-Olalusi (2009)

Fig 2. *Clarotes laticeps* (Wide head catfish); Source: Factsheet (2015)

Laboratory Procedures

The specimens were allowed to thaw and filter paper was used to mop off the water before being examined. The fish specimens were arranged and labeled for proper identification.

Fish Identification

According to Risch **(**2003), *Clarotes laticeps* has a rather uniformly brownish color, but often 2 dark bands along body extending unto the caudal-fin lobes. The head is much depressed, snout broad, nasal

barbels present, pelvic fins with 1 unbranched and 5 branched soft rays, anal fin with 4-6 unbranched and 7-9 branched soft rays, Adipose fin in adults has a stiff spine, and Caudal fin is deeply forked.

Length and Weight Measurement

The total length (distance from the snout of the fish to the tip of the tail fin); standard length (distance from the snout of the fish to the tip of the caudal peduncle) and forked length (distance from the snout of the fish to the tip of the forked end of the tail fin) of the specimens were taken on a measuring board and recorded in nearest 0.1 centimeters. The weight of the specimen was taken on an Electronic LCD digital weighing scale (SF-400A) to the nearest gram.

Length-Frequency Distribution

The specimens were grouped into different sizes, the percentage frequency and total length were used for length-frequency distribution.

Growth Pattern

Length-Weight Relationship

The length-weight relationship was estimated by using the equation below

$W = aL^b$

Where, W = Weight in gram

L = Length in centimeter

a = Regression constant

b = Regression coefficient

The equation can also be transformed into a logarithm form to give: $\log W = \log a + b \log L$

If b = 3, the fish is said to grow isometrically. If b is less than 3 or above 3, the fish is said to grow allometrically. It can be positive or negative.

Where, b = 3, isometric growth, b < 3, negative allometric growth, b > 3, positive allometric growth, in logarithm form, the equation gives a straight-line graph.

Where, a = intercept on the straight-line graph, b = slope on the straight-line graph

Condition Factor

The growth in fish was measured with the use of condition factor also. The condition factor indicates the "state of wellbeing" or condition of the fish that is how lean or fat the fish is. It is represented by the equation:

$$K = \frac{100W}{L^3}$$

Where, K = condition factor, W = weight in gram, L = length in centimeter b = growth exponent. Condition factor is usually useful for investigating effects of seasonal and habitat differences in fishes.

Biometric Characters

Meristic Count

The meristic features were counted using a magnifying lens. The meristic characters counted include: First dorsal fin spines, first dorsal fin rays, Second dorsal fin rays, Pectoral fin spines, Pectoral fin rays, Pelvic fin spines, Pelvic fin rays, Anal fin spines, Anal fin rays, Caudal fin rays.

Statistical Analysis

SPSS 11.0 Window application and Microsoft Excel were used for the bio statistical analyses.

Results

Age and Growth Pattern

Length-Frequency Distribution.

A total of 20 species of *Clarotes laticeps* were studied and analyzed from Badagry Lagoon. The total length of *Clarotes laticeps* from this lagoon ranged from 15.30cm to 29.20 cm. The standard length from Badagry Lagoon as shown in Fig 3 and ranged from 11.9cm to 21.5cm with a mean value of 16.75cm while a total of 20 species of *Clarotes laticeps* were studied and analyzed from Ologe Lagoon. The total length of *Clarotes laticeps* from this Lagoon ranged from 15.6cm to 27.6cm. The standard length from Ologe Lagoon as shown in Fig 4 and ranged from 11.3cm to 20.2cm with a mean value of 13.74cm. Three age groups of *Clarotes laticeps* were recorded for Badagry Lagoon while five age groups of *Clarotes laticeps* were recorded for Ologe Lagoon.

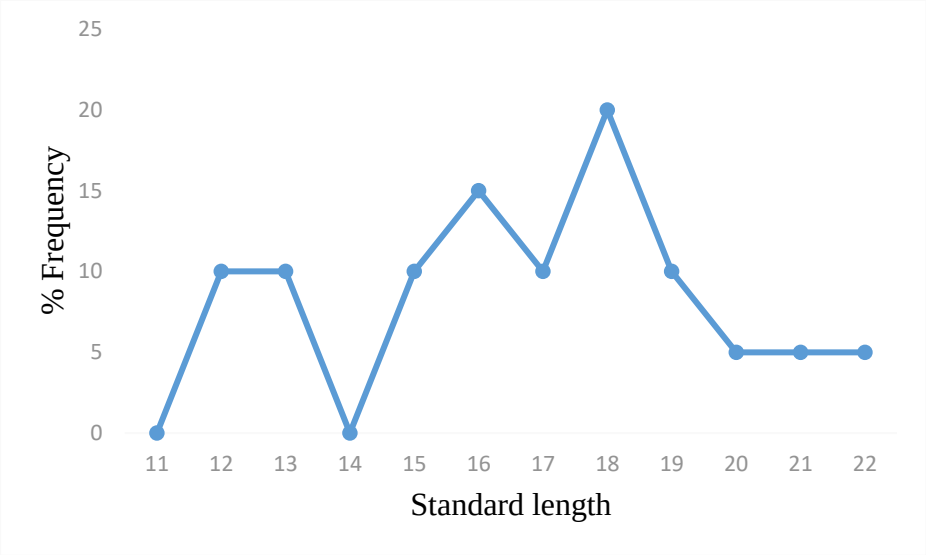

Fig. 3: Length-frequency distribution of *Clarotes laticeps* from Badagry Lagoon

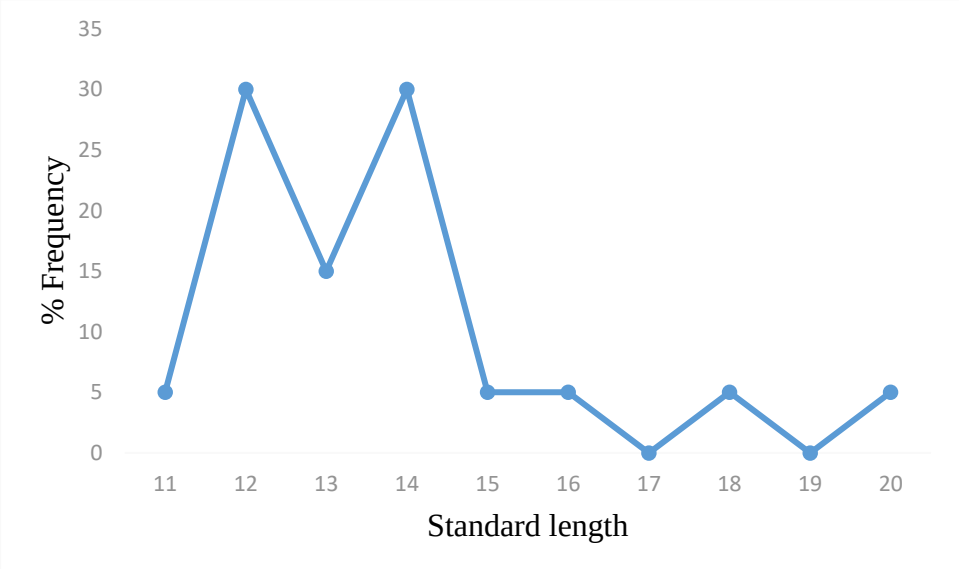

Fig. 4: Length-frequency distribution of *Clarotes laticeps* from Ologe Lagoon

Length-Weight Relationship

The standard length of *Clarotes laticeps* from Badagry Lagoon as shown in Fig 5 and Appendix 1 ranged from 11.9cm to 21.5cm with a weight range of 27g to 184g while *Clarotes laticeps* from Ologe Lagoon as shown in Fig 6 with a standard length ranging from 11.3cm to 20.2cm with a weight ranged of 32g to 159g.

The relationship between log standard length and log weight of *C. laticeps* for both Lagoons *are* presented in the regression equations shown below.

Badagry Lagoon

Log W = -1.872 + 3.097 Log L

(n = 20, r = 0.942)

b = 3.097

b > 3 = positive allometric growth (the species grow faster in weight than in length)

Ologe Lagoon

Log W = 0.798 + 0.816 Log L

(n = 20, r = 0.603)

b = 0.816

b < 3 = negative allometric growth (the species grow faster in length than weight).

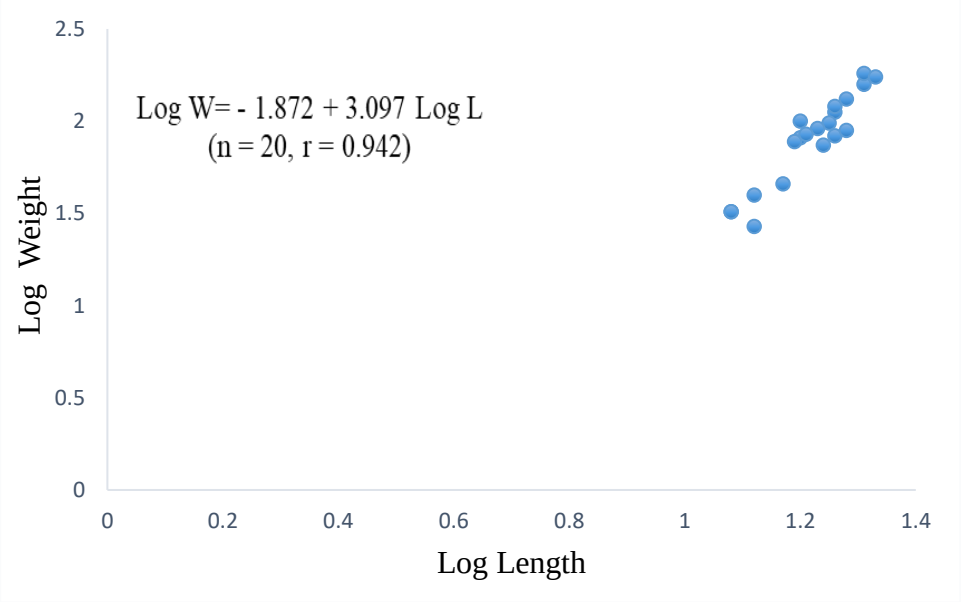

Fig. 5: Length-weight relationship of *Clarotes laticeps* from Badagry Lagoon.

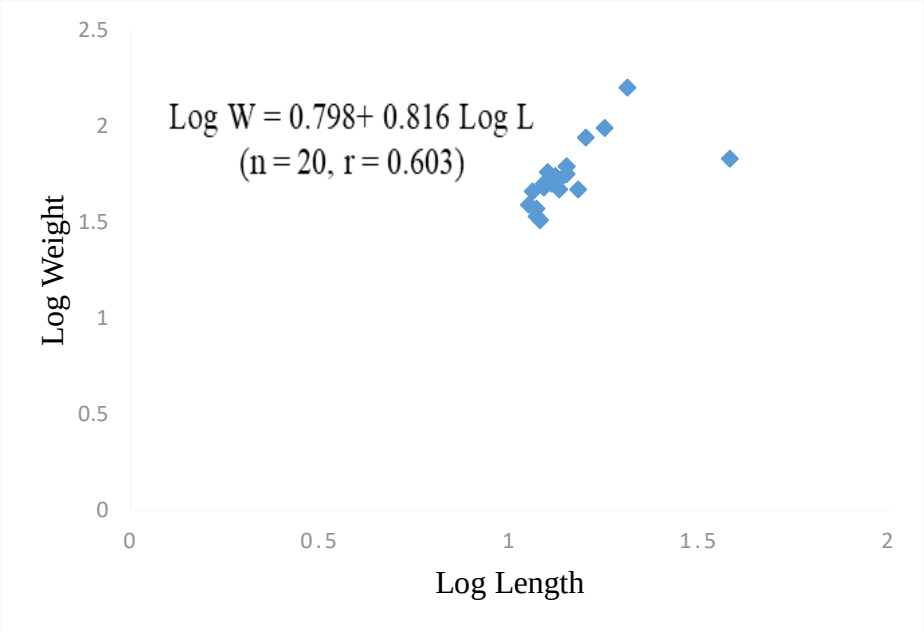

Fig.6: Length-weight relationship of *Clarotes laticeps* from Ologe Lagoon.

Condition factor

The summary of the variations in the condition factor of *Clarotes laticeps* was calculated and examined in relation to size. The K-values of *Clarotes laticeps* ranged from 1.68 to 2.06 for Badagry Lagoon as shown in Table 1(a) while the K-values for Ologe Lagoon ranged from 1.71 to 2.39 as shown in Table 1(b). The mean K values were 1.84 and 2.02 for Badagry and Ologe Lagoons respectively.

Table 1: Condition factor in relation to size of *Clarotes laticeps* collected from Badagry (a) and Ologe (b) Lagoons from February to July 2019

(a)

Standard Length (cm)	N	SL (cm)	W (g)	K
11.00-13.90	4	12.48	32.75	1.68
14.00-16.90	5	15.56	77.60	2.06
17.00-19.90	8	18.13	100.25	1.68
20.00-22.90	3	20.73	172.64	1.94

(b)

Standard Length (cm)	N	SL (cm)	W (g)	K
11.00-13.90	12	12.41	45.75	2.39
14.00-16.90	6	14.63	63.50	2.03
17.00-19.90	1	17.90	98.00	1.71
20.00-22.90	1	20.20	159.00	1.93

KEY:

N = Number SL = Average Standard length (cm)

W = Average weight (g) K = Condition factor

BIOMETRIC FEATURES

Meristic Count

The summary of the meristic characters of *Clarotes laticeps* from the two locations during the month of February to July 2019 is given in Table 2. The first dorsal fin spines count from Badagry Lagoon had a constant value of 1 while those from Ologe Lagoon ranged from 1-2 with a mean of 1.67± 0.49. There was a significant difference observed from the two locations (t = -4.690; p = 0.001 therefore, p<0.05).

The first dorsal fin rays count from Badagry Lagoon ranged from 6-7 with a mean of 6.08± 0.29 while those from Ologe Lagoon ranged from 5-6 with a mean of 5.42± 0.52. There was a significant difference observed from the two locations (t = 3.912; p = 0.001 therefore, p<0.05).

The Pectoral fin spines count had a constant value of 1 from the two locations. The Pectoral fin rays count from Badagry Lagoon ranged from 8-9 with a mean of 8.33± 0.49 while those from Ologe Lagoon ranged from 7-8 with a mean of 7.33± 0.49. There was a significant difference observed from the two locations (t = 4.975; p = 0.000 therefore, p<0.05). The Pelvic fin rays count from Badagry Lagoon had a constant value of 6 while those from Ologe Lagoon ranged from 6-7 with a mean of 6.33± 0.49. There was a significant difference observed from the two locations (t = -2.345; p = 0.039 therefore, p<0.05).

The Anal fin rays count from Badagry Lagoon ranged from 11-12 with a mean of 11.92± 0.29 while those from Ologe Lagoon ranged from 11-12 with a mean of 11.67± 0.49. No significant difference was observed from the two locations (t = 1.517; p = 0.147 therefore, p>0.05). The Caudal fin ray counts from Badagry Lagoon ranged from 19-21 with a mean of 19.58± 0.67 while those from Ologe Lagoon ranged from 18-20 with a mean of 19.42± 0.67. No significant difference was observed from the two locations (t = 0.611; p = 0.548 therefore, p>0.05).

Table 2: Meristic data of *Clarotes laticeps* from Badagry and Ologe Lagoons during the month of February to July, 2019. Result of t-test comparing each parameter from the two locations is also shown: indicates significant difference (p<0.05)

	BADAGRY LAGOON			**OLOGE LAGOON**				
Meristic Characters	**Max.**	**Min**	Mean	Max	**Min**	**Mean**	**t.**	**P**
DIFs	**9**	**9**	9.00± 0.00	9	**9**	9.00± 0.00	---	-----
D1fS	1	1	1.00± 0.00	2	1	1.67± 0.49	-4.690	0.001
D1fR	7	6	6.08± 0.29	6	5	5.42± 0.52	3.912	0.001
PecfS	1	1	1.00± 0.00	1	1	1.00± 0.00	-------	------
PecfR	9	8	8.33± 0.49	8	7	7.33± 0.49	4.975	0.000
PelfR	6	6	6.00± 0.00	7	6	6.33± 0.49	-2.345	0.039
AfR	12	11	11.92± 0.29	12	11	11.67± 0.49	1.517	0.147
CfR	21	19	19.58± 0.67	20	18	19.42± 0.67	0.611	0.548

Discussion

Length-Frequency Distribution

Clarotes laticeps from Badagry Lagoon displayed three distinct age groups, whereas those from Ologe Lagoon exhibited five age groups. Soyinka and Ayo-Olalusi (2009) reported that the *Tilapia maria* from Badagry Lagoon were of one age group while those from Ologe lagoon were of two age groups.

Clarotes laticeps specimens from Badagry Lagoon demonstrated a positive allometric growth pattern, with weight increasing faster than length, while those from Ologe Lagoon exhibited a negative allometric growth, with length increasing faster than weight. Studies by Soni and Kathal (1979) on *Cirrhinus mrigala* and *Cyprinus carpio* reported "b" values of 4.36 and 3.75, respectively, in their length-weight relationships, attributing these values to the feeding habits of the fishes. Abdallah (2002) obtained a "b" value ranging between 2.50 and 3.44 for fishes from various marine water bodies.

The condition factor (K) of *Clarotes laticeps* varied between 1.68 and 2.39 in Badagry and Ologe Lagoons, respectively, indicating differences in habitat conditions and nutritional status between the two locations. Similarly, Pseudotolithus typus exhibited varying condition factors, ranging from 1.16 to 1.83 in Badagry and Ologe Lagoons, respectively.

These findings differ from previous studies by Olapede and Tarawallie (2014), who reported K-values ranging from 0.77 to 0.81 for *Clarotes filamentosus* in Lake Oguta and from 0.49 to 1.48 for *Pseudotolithus senegalensis* in the Adoni River.

Meristic Count

The meristic count shows a significant difference in the number of first dorsal spines and first dorsal fin rays of *Clarotes laticeps* collected from Badagry and Ologe Lagoons. However, both locations recorded identical numbers of pectoral fin spines. Fish from Badagry Lagoon had higher counts of pectoral and anal fin rays compared to those from Ologe Lagoon, suggesting potential habitat-specific adaptations.

Conclusion

The results of the present study can be employed as baseline data for these species. The age and growth pattern, length-weight relationships and condition factor in these findings will provide useful information for fisheries management and fish population dynamic studies. And can be used as basis for comparison in further studies.

References

Abdallah, M. (2002). Length-weight relationship of fishes caught by Trawl off Alexandra, Egypt. Naga ICLARM Quart, 25: 19- 20.

Adams, A.J., Horodysky, A.Z., McBride, R.S., Guindon, K., Shenker, J., MacDonald, T.C., Harwell, H.D., Ward, R. and Carpenter, K. (2014). Global conservation status and research needs for tarpons (Megalopidae), ladyfish (Elopidae) and bonefishes (Albulidae). Fish and Fisheries, 15(2): 280- 311.

Emmanuel, O.M. Gabriel, S.S. and Offuene, A.V. (2020). Some somatic indices of Clarotes laticeps from lower river Benue, Makurdi, Nigeria. International Journal of Biology Sciences Vol. 2(2): 18-22.

King, M., (2007). Fisheries biology, assessment and management. Wiley Blackwell, 400P

Olapade, O.J. and Tarawallie, S. (2014). The length-weight relationship, condition factor and reproductive biology of Pseudotolithus senegalensis (Valenciennes 1833) (croackers), in Tombo western rural district. African Journal of Food, Agriculture, Nutrition and Development,14(6): 2176-2189.

Oyebola, O. O., Onadokun, O. and Ogboye, S. O. (2024). phenotypic variability revealed differentially heterogeneous traits in longneck croaker, Pseudotolithus typus (Bleeker, 1863), across epe and lagos lagoons, nigeria. Renewable Vol. 4 (1): 10-25.

Soyinka, O.O. and Ayo-Olalusi, C.I. (2009). Aspects of ecology and biology of cichlid, Tilapia mariae from two adjacent low-brackish water lagoons in Nigeria. African Journal of Agricultural Research, 4(5): 474-483.

Soni, D.D. and Kathal, K.M. (1979). Length-weight relationship in Cirrhinus mrigala and Cyprinus carpio. Masya, 5: 69-72.

Ujjania, N.C., Kohli, M.P.S. and Sharma, L. (2012). Length-weight relationship and condition factors of Indian major carps (Catla catla, Labeo rohita and Cirrhinus mrigala) in Mahi Bajaj Sagar, India. Research Journal of Biology, 2(1), 30-36

Risch, L.M., 2003. Claroteidae. p. 60-96 In Lévêque, C, Paugy, D. and Teugels G.G. (eds.) Fauna of fresh and brackish water fishes of West Africa, Tropical Fauna and Flora. Royal Museum for Central Africa, Tervuren, Belgium, National Museum of Natural History, and Research Institute for Development, Paris, France. 2(40), 815 p.

ANIFS 2024
© 2024
***Proceedings of the Fifth Conference of Association of Nigerian Fisheries Scientists.* "SUSTAINABLE FISHERIES AND AQUACULTURE PRODUCTION FOR ENHANCING LIVELIHOOD IN NIGERIAN ECONOMIC DEVELOPMENT"**
9TH – 11TH JULY, 2024 in the University of Lagos, Lagos, Nigeria