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Comparative study on length weight relationship of the grey mullet *Mugil cephalus (Linnaeus 1758)* and sickle fin *Liza falcipinnis* (Valenciennes, 1836) from Lagos Lagoon, Nigeria

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Abstract
The length-weight relationship of two mullets *Mugil cephalus* and *Liza falcipinnis* was investigated from the Lagos Lagoon, Nigeria. 505 individuals of the species comprising 305 of *M. cephalus* and 200 of *L. falcipinnis* were bought from fisher folks from Makoko landing site for this study. The morphometric and biometric parameters were recorded and the LWR was calculated. The Total length (TL) of *M. cephalus* ranged between 12.5 to 28.7cm with a mean length of 16.9±0.14, weight ranged between 20.5 to 196.4g with mean of 49.9±1.53g and that of *L. falcipinnis* ranged in total length from 12.5 to 21.5cm with a mean length of 17.06±0.13 cm and weight ranged from 20.1g to 180g with a mean weight and standard error of 81.76±2.9g. The mean condition factor (K) for *M. cephalus* and *L. falcipinnis* was 1.22 and 1.120 respectively while the LWR equation of *M. cephalus* was Log w= -1.7487+2.7745LogL (n= 360, r= 0.9427), while that of *L. falcipinnis* was Log W = -2.0564+ 3.1845 Log L, n= 200, r = 0.7079.

Keywords: mugillidae, condition factor, length-weight relationship.

Introduction
Mullets are highly commercial food fish that supports the fishery resources of Nigeria. They have high meat quality and the taste is very palatable [1]. The mullets form a high percentage of the catch from local fisher folks from lagoons and estuaries [2]. They are mostly benthic feeder which grow and thrive well on diatoms, aquatic macrophytes, benthic rotifer, larvae, fish eggs, cyclops, copepods, organic detritus and small algal cells, which the fish scoop up when swimming at an angle to the bottom, running their mouth through the sediments, hence they do not compete for food and this makes them very successful and well distributed in all tropical and temperate waters of world [3]. The family Mugillidae belongs to the order Perciformes (Perch-like). This family has 18 genera and 81 species [4]. The grey mullet *Mugil cephalus* and the sickle fin mullet *Liza falcipinnis* are good representatives of this family. They occur in fresh, brackish and hyposaline waters with depth less than 20m. They are benthopellagic, sometimes catadromous [5] and attained a maximum length of 41cm, while the maximum published weight is 262g [6].

Length-weight relationship (LWR) of fish is a very important tool in fisheries biology. As length and weight of fish are among the important morphometric characters, they are very useful for the purpose of taxonomy and ultimately for fish stock assessment. Length-weight relationship helps the fish biologist to estimate the average weight at a given length; it also helps to assess the relative well-being of a fish population [7],[8] Research on some aspects of the biology of the mullets species have been carried out in Nigeria, such as; Aspects of the Biology of Sickle fin mullet, *Liza falcipinnis* from Badagry creek, Lagos [9], [10] Aspects of the biology of grey mullet, *Mugil cephalus*, in Lagos lagoon, [11] on its trophic ecology in the Cross River estuary in Nigeria, [12] on its occurrence and distribution in Buguma creek, Niger delta. The purpose of this study is to compare the biometric parameters of *Mugil cephalus* and *Liza falcipinnis* from the Lagos lagoon.

Materials and Methods

Study Area

The Lagos Lagoon is part of a continuous system of Lagoons and creeks found along the coast of Nigeria from the border within the republic of Benin to Ondo state. The Lagoon borders the forest belt and receives input from a number of important large rivers. The Lagoon is located between latitude 6º26 and 6º38′N longitude 3º 23 and 3º 36′ E. The Lagoon covers an area of about 208km^2, with a depth range between 0.5 – 2m.

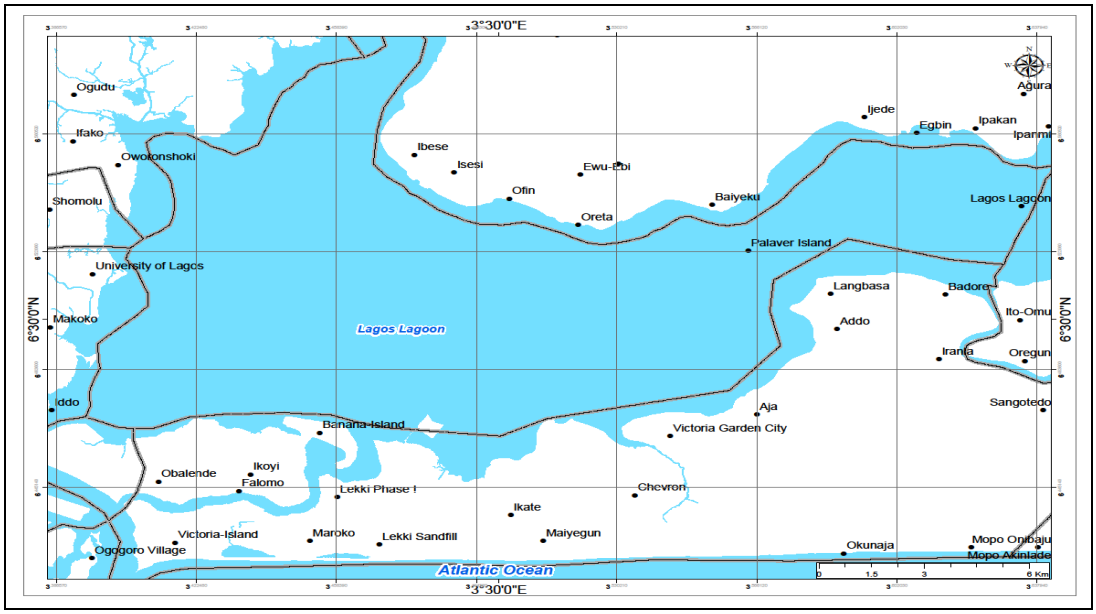

Fig 1: Map of Lagos Lagoon showing the study area

Collection of Samples and Field Studies

505 fish samples were used for this study comprising of 305 *Mugil cephalus* and 200 *Liza falcipinnis*. Fishes were purchased from local fisher-folks from landing site in Makoko in the Lagos from January 2013 to October 2013. The specimens were caught with cast and gill nets of various mesh sizes (31, 67 and 76 mm) in the Lagos lagoon. The specimens were preserved in an ice-chest, containing ice cubes in the field and later transferred into a deep freezer in the Marine Biology Laboratory of Nigerian Institute for Oceanography and Marine Research.

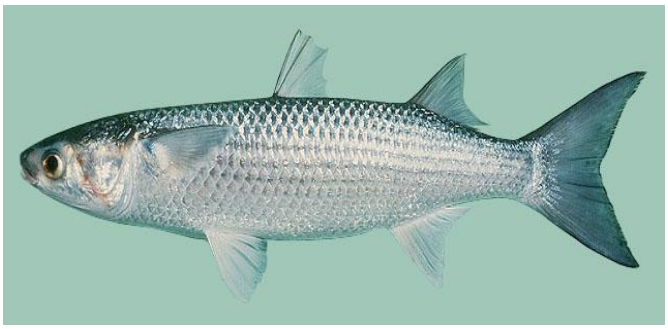

Plate 1: picture of *Mugil cephalus* (Source: FAO 2014)

Plate 2: picture of *Liza falcipinnis* (Source: FAO 2014)

Laboratory Studies

Identification was carried out using [4] Fish guide. Biometric data (such as total length, (TL); standard length (SL), Head length (HL) of individual fish was measured using measuring board graduated in cm and recorded. Body weight (BW) was measured with a table top weighing balance (Sartorius model) to the nearest gram, Eye diameter (ED), Body depth (BD) was measured using a tape rule graduated in one cm. All data obtained were recorded.

Data Analysis

The length-weight relationships (LWR) was expressed as: $W=aL^b$ and represented linearly by logarithms transformation: LogW = Loga+b LogL. Parameters 'a' and 'b' were estimated by the least squares regression method, [13]. Where W = weight of fish in grams, L = Total length of fish in centimeter, a = constant / intercept, b = an exponent / gradient.

The Fulton's equation was used to calculate the condition factor (K) for individual fish as; $K= 100W/ L^3$ [14]. This factor was used to compare the condition, fatness or well-being of the fish. It also gives information on the condition of food abundance and duration of breeding [15].

Results

From this study, morphometric data of *Mugil cephalus* and *Liza falcipinnis* are presented in table 1 below. The Eye diameter of *Mugil cephalus* ranged from 0.4 – 1.3cm, the head length ranged from 2.5 to 5.0 cm, body depth ranged from 2.8 to 5.3 cm, the total length varied from 12.5 to 28.7cm, the weight ranged between 20.5 to 196.4g with a mean weight of 49.8g. The log transformation of the length weight relationship of *Mugil cephalus* is as follows; Log W= -1.7487 + 2.7745 log L (n= 360, r = 0.9427) Negative allometric growth 'b' existed among the fish, the correlation coefficient value b=2.77. While for that of *Liza falcipinnis*,

the Eye diameter ranged from 0.6- 1.2cm, the head length ranged from 1.7 to 4.8cm, body depth ranged from 2.1 to 5.2cm, Total length ranged within 12.5 to 21.5 cm and the weight ranged between 20.1g to 180g with a mean weight of 81.76g. The log transformation of the length-weight relationship of *Liza falcipinnis* is as follows; (Log W = - 2.0564+ 3.1845 Log L, n= 200, r = 0.7079).

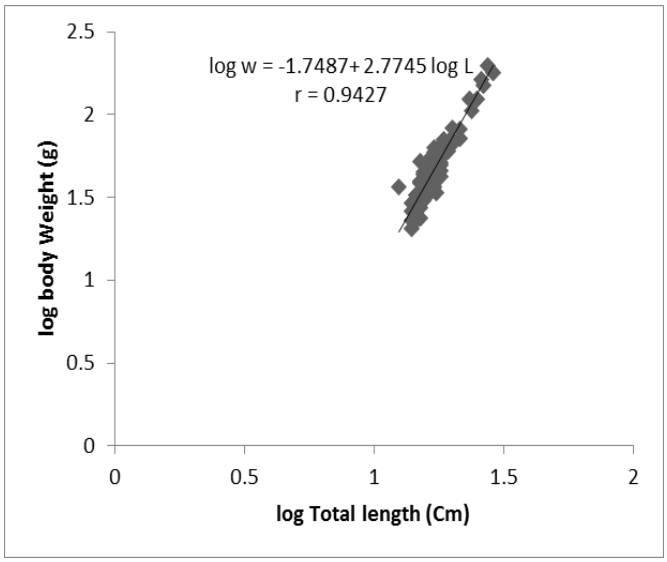

Fig 2: Length- weight relationship of *Mugil cephalus* from Lagos Lagoon

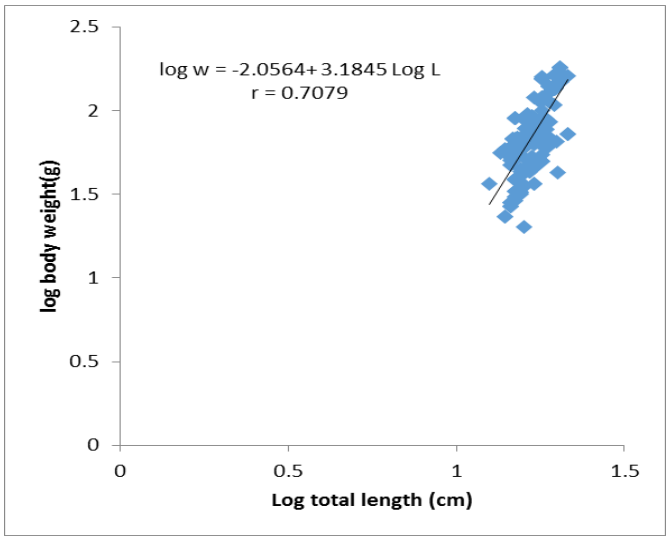

Fig 3: Length- weight relationship of *Liza falcipinnis* from Lagos Lagoon

Condition factor

The condition factor, k for the combined sexes of *Mugil cephalus* from Lagos lagoon ranged from 1.09 to 1.49 with a mean value of 1.22 while that of *Liza falcipinnis* ranged from 0.896 to 1.904 with a mean of 1.120. The results of condition factor in this study showed that *M. cephalus* have a better performance in term of growth pattern and condition factor than *Liza falcipinnis*; this could be as a result of species variation and environmental condition.

Table 1: Morphometric measurements of *Mugil cephalus* and *Liza falcipinnis* from Lagos lagoon, Nigeria

Morphometric measurements	n= 360 *Mugil cephalus*			n= 200 *Liza falcipinnis*		
	Min	Max	Mean ± S.E	Min	Max	Mean± S.E
Eye diameter (cm)	0.4	1.3	0.87±0.03	0.6	1.2	0.79±0.05
Head length (cm)	2.5	5.0	3.08±0.055	1.7	4.8	3.04± 0.56
Body depth (cm)	2.8	5.3	3.85±0.484	2.2	5.2	3.47± 0.51
Total length (cm)	12.5	28.7	16.99±0.144	11.5	21.5	17.06± 0.13
Weight (g)	20.5	196.4	49.9±1.539	20.1	180	81.76± 2.9

Table 2: Parameters of length-weight relationship and coefficient of determination (r) for grey mullet *Mugil cephalus* and sickle fin mullet *Liza falcipinnis* from Lagos lagoon, Nigeria

Sample size (505)	Mean K value	a	b	R^2	R
Combined sex for *Mugil cephalus*	1.22	-1.7487	2.77	0.8887	0.9427
Combined sex for *Liza falcipinnis*	1.120	-2.0564	3.18	0.5011	0.7079

Discussion

Data on morphometric parameters of a fish is very important for taxonomic studies and characterization studies since morphometric measurements varies with species, sex, habitat and size of fish [16]. In fisheries science, length-weight relationship provides a reliable data on the relative wellness and growth pattern of the fish. From this present study, the morphometric measurement obtained for *Liza falcipinnis* was similar that of [9] on *Liza falcipinis from* Badagry creek. The relationship between total length and weight was described for *M. cephalus* from Lagos lagoon as Log W= - 1.7487 + 2.7745 log L (n= 305, r = 0.9427), while that of *L.falcipinnis* is log w = -2.0564+ 3.1845 Log L (n= 200, r = 0.7079).

In equation of the length-weight relationship ($W = aL^b$), the parameters (a, b) are important in stock assessment studies when b = 3, increase in weight is isometric. When the value of b is other than 3, weight increase is allometric (positive if b > 3, negative if b < 3). The parameter b for *Mugil cephalus* was 2.77 which is a negative allometric growth pattern, an indication that fish are lighter than their body lengths [17] which imply poor growths of length and weight respectively. While 'b' value of *L. falcipinnis* was 3.18 a positive allometric growth which implies that there was increase in body weight with corresponding increase in total length of the fish. There was also a positive correlation of r=0.7094 for *L.falcipinnis* and r = 0.9427 for *M.cephalus*. These are indication of a strong relationship between total length and body weight of both species. In populations that exhibit allometric pattern, growth may be out of proportion or the adults may appear different from the young ones [13]. Literatures of allometric growth of fishes carried out in some Nigerian waters include [9] b= 2.806 (males) -2.915 (females) in the mudskipper (*Periophthalmus papilio*) from Lagos lagoon [10] recorded b values of 2.968 in the grey mullet (*Mugil cephalus*) from Lagos lagoon. Correlation coefficient 'r' (0.930) was positive and highly significant (p = 0.05) this

indicates that the fish lengths and weights were growing proportionally. The condition factor; k for the combined sexes of *Mugil cephalus* from Lagos lagoon ranged from 1.09 to 1.49 with a mean value of 1.22 While that of *L.falcipinnis is* 1.120 indicating that the population is in good condition. The variations of K in fish according to [18] may be indicative of food abundance, adaptation to the environment, gonadal development, sample size, habitat suitability, growth increment, temperature and salinity of the environment, fishing activities, individual metabolism, age and maturity.

In conclusion, the general morphometric description and the meristic characters show distinct variations in these two species and this variation is very important for taxonomic studies.

References

1. Asuquo Philomena E, Eyo VO, Ikechukwu CC. feeding ecology, Length - weight relationship and condition factor of *Mugil cephalus* (Pisces: Mugilidae; Linnaeus, 1758) from Cross River Estuary, Nigeria. *European Academic Research*. 2015; 11(12):15276-15294
2. Isangedighi IA, Udo PJ, Ekpo IE. Diet composition of *Mugil cephalus* (Pisces: Mugilidae) in the Cross River Estuary, Niger Delta, Nigeria. *Nigerian Journal of Agriculture, food and Environment*. 2009; 5(2-4):10-15.
3. Rhema S, Islam ML, Shah MM, Mondal S, MJ. Observation on the fecundity and Gonadosomatic index (GSI) of Grey mullet, *Liza Parisa* (Ham). *Online Journal of Biological Sciences.* 2002; 2(10):690-693
4. Food and Agriculture Organization of the United Nations, 2014 Species Identification Guide for Fishery Purposes, Rome, FAO, 2350.
5. Chang CW, Lizuka Y, Tzeng WN. Migratory environmental history of the grey mullet, *Mugil Cephalus* as revealed by Otolith Sr: Ca rations. *Marine Ecology progress Series*. 2004; 269:277-288.
6. Dankwa HR, Blay Jr J. Food and feeding habits of grey mullets (Pisces: Mugillidae) in two estuaries in Ghana. Ghana Journal of Science. 2005; 20:62-80
7. Diaz LS, Roa A, Garcia CB, Acero A, Navas G. Length-weight relationship of demersal fishes from the upper continental slope off Colombia. The ICLARM Quarterly. 2000; 23(3):23-25.
8. Montoupolos DK, Stergious KI. Weight-length and length-length relationships for 40 fish species of the Aegean Sea (Hellas). Journal of Applied Ichthyology. 2000; 21:23-45
9. Lawson EO, Akintola SO, Olatunde OA. Aspects of the Biology of Sickle fin mullet, *Liza falcipinnis* (Valenciennes, 1836) from Badagry Creek, Lagos, Nigeria. *Nature and Science*. 2010; 8(11):168-182.
10. Lawson EO, Jimoh AA. Aspects of the biology of grey mullet, *Mugil cephalus*, in Lagos lagoon, Nigeria AACL *Bioflux*. 2010; 3(3):181-193
11. Akpan AW, Ubak RG. Aspects of the trophic ecology of (Valenciennes 1836) (Pisces: Mugilidae) in the Cross River Estuary (Nigeria). Journal of Aquatic Sciences. 2005; 20(1):53-62
12. Akinrotimi OA, Abu OMG, Bekibele DO, B Uedeme-Naa B. Occurrence and Distribution of Grey Mullets *Liza falcipinnis* and *Liza grandisquamis* from Buguma Creek, Niger Delta, Nigeria. Research Journal of Biological Sciences. 2010; 5(1):1-5.
13. Bagenal TB, Tesch FW. Age and Growth in Methods of Fish Production in Fresh water, Bagenal TB ed), *Blackwell* Scientific Publication, Oxford, London, Edinburg Melbourne, 1987, 101-106.
14. Le Cren ED. The Length –Weight relationship and seasonal cycle in gonad weight and condition in perch (*Perca fluviatilis*). Journal of Animal Ecology. 1951; 20:201-219
15. Ikomi RB, Odum O. Studies on aspects of the ecology of the catfish *Chrysichthys auratus* Geoffrey St. Hilare (Osteichthyes; Bagridae) in the River Benin (Niger Delta, Nigeria). *Fisheries Research*. 1998; 26:187-198
16. Lawson EO. Biology of the Grey mullet, Mugil cephalus, L. in Lagos lagoon, Nigeria. M.Sc dissertation, University of Lagos, Nigeria. 1991, 88
17. Wootton RJ. Ecology of Teleost fishes. 2nd Edition. *Springer* Verlag, New York, USA, 1998, 24, ISBN10:041264200X. 386
18. King RP. Length-Weight relationships of Nigerian Coastal Water Fishes. *NAGA ICLARM* Quarterly. 1995; 1996; 19(4):53-58