The Length-Weight Relationship And Condition Factor Of *Lates Calcalifer* In West Godavari And Krishna Districts Of Andhra Pradesh

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ABSTRACT: The paper deals with the length-weight relationship and condition factor of Lates calcalifer collected from west Godavari and Krishna districts of Andhra Pradesh during 2009-2011. The length of the sampled specimens of Lates calcarifer varied from 11 cm to 70 cm. The total length ranged between 14 cm and 64 cm with a mean varies from 16.58 to 64, and weight ranged between 280g and 3000 g and corresponding mean varied between 324.34 and 2940 in 2009 - 2010 While the total length ranged between 14 cm and 65 cm with a mean varies from17.14 and 63.9, and weight ranged between 280g and 3700 g and corresponding mean varied between 339.38 and 3400 in 2010 - 2011.

Key words: *Lates calcalifer*, condition factor, length-weight relationship, fish culture.

INTRODUCTION

Length-weight relationship is of great importance in fishery assessments. The relationship indicates the taxonomic differences and events in the life history, such as metamorphosis and the onset of maturity. It also denotes the fatness and general well-being of a fish or groups of fishes. To obtain the relationship between total length and other body weight are also very much essential for stabilizing the taxonomic characters of the species [1]. Length-weight relationships are important in fisheries science, notably to raise length frequency samples to total catch, to estimate biomass from underwater length observations, to evaluate fish growth and body condition *etc.* Length and weight data are a useful and standard result of fish sampling programs. [2] Observed that Culture of Asian sea bass *Lates calcarifer* (Bloch) in brackish water tide-fed ponds growth and condition factor based on length and weight under two feeding systems.

MATERIAL AND METHODS

All length-weight relationships presented here are the product of field studies conducted during 2009-2011 in and around Bhimavaram ponds in West Godavari district of Andhra Pradesh, and are consistent with the format suitable for inclusion in fish base. Measurement of the length and weight of the fish were resorted to immediately after the specimens were procured and brought to the laboratory. The fish were first wiped with a blotting paper to remove excess wetness. Then lengths of the fishes were taken on a measuring board with 0.1 cm gradation and weighed individually on a weighing scale of 0.5 gr sensitivity. Monthly length data were organized into various groups with 1.0 cm class intervals.

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Numbers of fish in each size group were expressed in terms of length as well as percentage, separately. Length and weight data of 102 specimens, 21 females measuring 34.3 cm to 65 cm in length and 81 males measuring 14 cm to 61.7 cm in length were made use of in the present study. Data on each sex was noted and analysed separately, following Peterson's frequency method. During the present investigations, length-weight relationship of either sex of the fish, *Lates calcarifer* was calculated separately using the formula:

$$W = aL^b \text{ or } W = aL^n$$

Where,

W - Weight of the fish

L-length of the fish

a - constant and

b or *n* - exponent

The expressions were later on transformed to logarithmic form using the expression

$$\text{Log } W = \log a + b \log L$$

Where, *a* - intercept of the line on Y- axis and

b - slope of the regression line

Subsequently, the identity of regressions between the males and females was found out from the Student's't' test. Coefficient of correlation (r) between the measures of length and weight were also determined. The regression coefficient of each group was tested for significance of difference from 'Cube' relation employing Students't' test .

t= B-b/standard error of 'b'

Where, B - cube value (3) and

b – regression coefficient

The following equation was adapted to calculate the Relative Condition Factor *(K_n)*.

$$Kn = W/aLn$$

Where, W - weight of fish,

L - length of fish,

a - constant and

n – exponent.

The common computer programme of Microsoft Excel was used for all statistical analyses and graph plotting.

RESULTS

Fifty eight samples of *Lates calcarifer* were weighed and measured to estimate length-weight relationships in 2009-2010 and forty four samples in 2010 to 2011. The length–weight relationships for one hundred and two specimens is computed. (Table: 1 and 2)

Table: 2 Descriptive statistics and estimated parameters of length-weight relationship for *Lates calcarifer* 2009-2010

S. No.	Number of fishes	Sex	Length (cm) Min-max	Weight (gm) Min-max	a	b	Correlation Coefficient ®	Length Mean TL (cm)	Weight Mean Wt (gm)	Condition factor (K)	T-test
1.	5	M	20-Nov	280-349.6	1.256	1.03	0.979	16.58	324.34	7.11618	8.644
	0	F	20-Nov	-	-	-	-	-	-	-	-
2.	12	M	21-30	481-678	1.07	1.21	0.959	25.525	592.0167	3.55	10.82
	0	F	21-30	-	-	-	-	-	-	-	-
3.	11	M	31-40	780-1040	1.044	1.28	0.9662	35.69	892.5455	1.9631	11.72
	2	F	31-40	930-1020	0.058	0.99	1	36.35	975	2.02	6.554
4.	10	M	41-50	1120-1392	0.577	1.53	0.965	43.7	1230.2	1.474	10
	4	F	41-50	1260-1560	0.216	1.75	0.8805	47	1385.5	1.334	2.72
5.	3	M	51-60	1716-1752	0.207	2.88	0.17	52.133	1739.333	1.227	0.177
	6	F	51-60	1876-2215	0.072	1.86	0.978	54.85	1994.17	1.208	8.86
6.	3	M	61-70	2684-2790	2.416	0.57	0.587	62.1	2748.667	1.147	0.73
	2	F	61-70	2880-3000	-0.02	1.01	1	64	2940	1.121	6.554

Table: 2 Descriptive statistics and estimated parameters of length-weight relationship for *Lates calcarifer* 2010-2011

S. No.	Number of fishes	Sex	Length (cm) Min-max	Weight (gm) Min-max	a	b	Correlation Coefficient (r)	Length Mean TL (cm)	Weight Mean Wt (gm)	Condition factor (K)	T-test
1.	7	M	11-20	280-395	1.079	1.18	0.898	17.14	339.38	6.73	4.56
	0	F	11-20	-	-	-	-	-	-	-	-
2.	8	M	21-30	481-676.8	1.018	1.24	0.9603	26.562	614.625	3.279	8.92
	0	F	21-30	-	-	-	-	-	-	-	-
3.	10	M	31-40	880-1040	0.689	1.46	0.9613	37.03	943.3	1.857	9.73
	0	F	31-40	-	-	-	-	-	-	-	-
4.	6	M	41-50	1140-1370	0.828	1.38	0.969	43.46	1235	1.503	9.734
	2	F	41-50	1465-1620	0.044	1	1	45.5	1542.5	1.637	6.554
5.	6	M	51-60	1730-2300	0.075	1.86	0.573	53.33	1990	1.294	7.704
	3	F	51-60	1780-2560	-2	3.06	0.987	55.2	2121.67	1.261	7.605
6.	0	M	61-70	-	-	-	-	-	-	-	-
	2	F	61-70	3100-3700	-0.5	1.04	1	63.9	3400	1.303	6.554

DISCUSSION

The values obtained for the weight – length relationship showed that *Lates calcarifer* was isometric in their growth, while positively allometric. Several authors have reported both isometric and allometric growth for different fish species from various water bodies. According to [3], when the parameter *b* is equal to 3, growth is called isometric and when it is less or greater than 3 it is allometric. [4] more specifically stated the growth to be positive allometric when animal weight increases more than length ($b>3$) and negative allometric when length increases more than weight ($b<3$). Except for *E. aeneus*, the correlation coefficient (r) for the length-weight relationship of the fishes is high which indicate increase in length with increase in weight. This agreed with earlier studies involving fish species from different water bodies[5&6]. Length-weight relationships give information on the condition and growth patterns of fish [7]. The regression co-efficient for isometric growth is '3' and values greater or lesser than '3' indicate allometric growth [8]. Values of the length component in the length-weight relationship being isometric imply that the fish species did not increase in weight faster than the cube of their total length. In the present study, regression coefficient of 0.979 compares favourable with the 0.86 and 0.84 obtained by [9] for *P. annectens* male and female respectively which suggest that the findings of this study is valid [10]. The mean 'b' value of 1.17 reported for this study is not significantly different from the value of 2.80 reported by [11]. Several authors have reported both isometric and allometric growth for different species from various water bodies [7]. The variation in the *b* exponents for a same species could be attributed to differences in sampling, sample size or length ranges. In addition, growth increment, food, environmental conditions, such as temperature, salinity, seasonality, as well as differences in age and stage of maturity can also affect the value of *b* [12]. Here the *b* values obtained were found to be in between the values reported earlier for *L. calcarifer* captured from wild (b = 2.66) [13] and reared under the laboratory condition (b = 3.03) [14]. In the present study, the mean condition factors 3.693 and size wise condition factor ranging from 1.121 – 7.11. [15] found similar results in demersal fishes from the upper continental slope off Colombia. The relative condition factor value (0.95) of sea bass captured from south east coast of India [13] .From the above assertions we could conclude that the species in this work lowest K values

recorded at the matured stages between November to December and February to March. These findings correlated with [16] confirmed that lowest K values during the more developed gonadal stages might mean resource transfer to the gonads during the reproductive period. [17], through other authors, showed that values of the condition factor vary according to seasons and are influenced by environmental conditions. The same may be occurring in the environment under study since the floodplain is influenced by many biotic and abiotic factors, which favor the equilibrium of all the species in the ecosystem.

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