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Length weight relationship and condition factor of Bengal corvina, *Daysciaena albida* (Cuvier, 1830) from Vembanad Lake

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ABSTRACT: The length weight relationship of *Daysciaena albida* from Vembanad Lake showed an allometric growth as the b value was 2.916. The condition factor, relative condition factor and modified condition factor were 0.9508, 1.009 and 1.290 respectively, which suggest species is in good condition. Coefficient of determination (r^2) value was 0.993.

Key words: Condition factor, *Daysciaena albida*, Length-weight relationship, Sciaenids, Vembanad Lake

Bengal Corvina/ Two-beared croaker *Daysciaena albida* (Cuvier, 1830) is a benthopelagic amphidromous fish (Fricke *et al.,*2023) under Family Sciaenidae which primarily inhabits brackish water. Length weight relationships (LWRs) are part of biological investigations and provide vital information for stock assessment and population dynamics studies (Beverton and Holt, 1957).The importance of length weight relationship is the estimation of average weight for given length group by establishing mathematical relationship between them (Beyer, 1987; Froese, 1998).Here we have established length weight relationship and condition factor of *D. albida* from Vembanad Lake, which is one of the commercially important food fish of this region. In Asian countries flesh and swim bladder of most of the sciaenids regarded as a delicacy and are exported to various countries (Ben-Hasan *et al*., 2021). So, results of these studies will help in the management and conservation of bengal corvina.

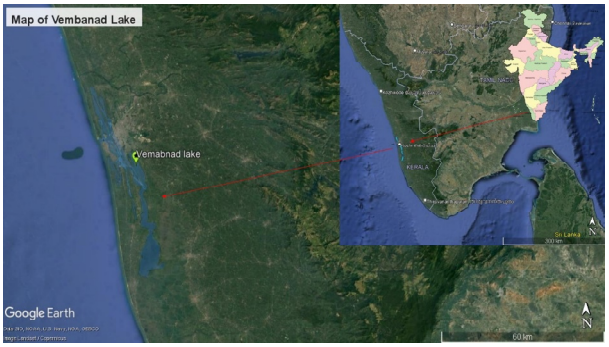
MATERIALS AND METHODS

Fresh fish samples of *D. albida* were collected from local fishermen of Vembanad Lake (Fig 1), Kerala on the west coast of India during the period of January 2019 to December 2022. The samples collected were preserved in an ice box immediately as caught. The sample was taken to the laboratory in iced condition and identified to species level using standard references (Day, 1876; FAO, 1984; Fricke *et al.*, 2023). Subsequently, lengths were measured and weights determined. Total lengths (TL) of every specimen were measured with the help of digital caliper from the tip of the snout (mouth closed) to the extended caudal fin tip to the nearest 0.1 centimeter (cm) and total weights were measured by digital weighing machine to the nearest 0.01 gram (g). The length weight relationship was determined by linear regression equation as $W = aL^b$ i.e., log W = log *a* + *b*log L where *a* is the intercept and *b* is the slope of the linear regression of the log transformed weight (g) against the total length (cm), respectively (Le cren, 1951; Froese, 2006). The statistical significance, 95% confidence intervals (CI) of the parameters a, b and coefficient of determination (r^2) were estimated using student's t-test. $t = |(b-3)|/Sb$ where, Sb = standard error of 'b' and in hypothesis testing the null hypothesis $H_0 : b = 3$ against the alternative hypothesis $H_1 : b \neq 3$. The test criterion for this statistical test was student's t statistic with (n-2) degrees of freedom where n is the total number of observations (Zar, 1984). The t-value was compared with t-table value for (n-2) degrees of freedom at 5% level of significance. The condition factor or Ponderal index was estimated using the formula $K=W^*100/L^3$ (Hile, 1936; Fulton, 1904). The relative condition factor was estimated using $Kn=W_0/W_c =W/aL^b$ (Le cren, 1951) and modified condition factor by using the formula $K=W^*100/L^b$

(Ricker, 1975).

RESULTS AND DISCUSSION

The sample size (n), total length range, weight range, regression parameters of a and b and coefficient of determination (r^2) are given in Table 1. The r^2 values of female, male, and pooled were calculated as 0.9916, 0.9933, and 0.9926 respectively which is significant as it approaches 1. The slope or 'b' value of female, male, and pooled data were 2.914, 2.914 and 2.916 respectively when the b value is 3, then it is an ideal case of the isometric growth (Allen, 1938; Ricker, 1958). When the slope or b value less than or greater than 3, it indicates allometric growth (Grover and Juliano, 1975). b value usually lies between 2.5 and 4.0 when $p<0.05$ (Hile, 1936; Froese, 2006). *D. albida* here showed a negative allometric growth and in t test we rejected H0: b =3 and accepted H_1 : $b \neq 3$ for (n-2) degrees of freedom. Functional regression "b" value represents body form and directly related to weight affected by ecological factors such as spawning conditions, food supply, temperature and other factors such as age, sex, time and area of fishing and fishing vessels (Ricker, 1973). The b values varies due to the geographical, ecological and physiological variations (Sparre *et al*., 1989). The comparison of the present study with the earlier studies on *D. albida* are given in Table 2. This shows earlier studies in of *D. albida* from Vembanad Lake (Kurup and Samuel, 1987) and from Chilika Lake (Karna and Panda, 2012; Panda *et al.*, 2016) showed an allometric growth. Slight variation for the b values from present study to earlier studies may be due to difference in sample size and geographical difference of the study area. The real relationship between length and weight varies among species according to their inherited body shape. Condition (robustness) of each fish within a species varies due to food availability and growth within the weeks prior to sampling. Individual fish within the same sample and the average condition of each population varies seasonally and annually (Kuriakose, 2017).



Source: Google Earth

Fig 1: Map of Vembanad Lake

Table 1: Estimated parameters from length weight relationships of *Daysciaena albida* from Vembanad Lake

Sex	Number of sample (n)	Total length range (in cm)	Weight range(in g)	Intercept (a)	95% CL of a	Slope (b)	95% Confidence limit of b	Coefficient of determination (r^2)	Standard error (b)
Female	332	12.5 to 80.93	21 to 5400.32	0.0135	0.0121 to 0.0150	2.914	2.8844 to 2.9427	0.9916	0.0148
Male	340	12.6 to 60.69	16.49 to 4270	0.0123	0.0112 to 0.0136	2.914	2.8880 to 2.9394	0.9933	0.0131
Pooled	697	9.2 to 80.93	10 to 5400.32	0.0128	0.0119 to 0.0137	2.916	2.8969 to 2.9343	0.9926	0.0095

The Fulton's condition factor(K), relative condition factor (Kn), modified condition factor are given in Table 3. Relative condition factor above 1 is considered as benchmark of well-being and values above 1 is considered to be in good condition (Bennet, 1970; Sajeevan and Kurup, 2015 and Jisr *et al*., 2018). The condition factor (K) is another parameter used to describe the "condition" of a fish (Froese, 2006). The condition factor(K) or Ponderal index, relative condition factor (Kn) and modified condition factor were 0.9508, 1.009 and 1.290 respectively. This suggests species is in good condition. The Kn values depends on physiological factors like age, sex, size at maturity, spawning duration and environmental factors like availability of food (Brown, 1957; Anibeze, 2000). K value is also attributed to many other reasons (Hickling, 1945). Kn values were not only influenced by sexual cycle and

Table 2: Length weight relationship studies of *Daysciaena albida*

Authors	Area of study	Sex (Male/Female)	Sample size(n)	Intercept (a)	Slope (b)	Coefficient of determination (r^2)
Kurup and Samuel, 1987	Vembanad Lake, Kerala	Male	162	0.2219	2.8618	0.9804
		Female	167	0.3961	2.4089	0.9624
		Indeterminant	97	0.1793	3.0616	0.9872
Karna and Panda,2012	Chilika Lagoon, Odisha	Male	78	0.00001	2.9772	0.980
		Female	123	0.000005	3.1216	0.959
		Both	245	0.000004	3.1686	0.997
Panda *et.al,*2016	Chilika Lagoon, Odisha	Male	103	0.0118	2.95	0.96
		Female	236	0.0099	3.01	0.98
		Unsexed	5737	0.0078	3.06	0.99

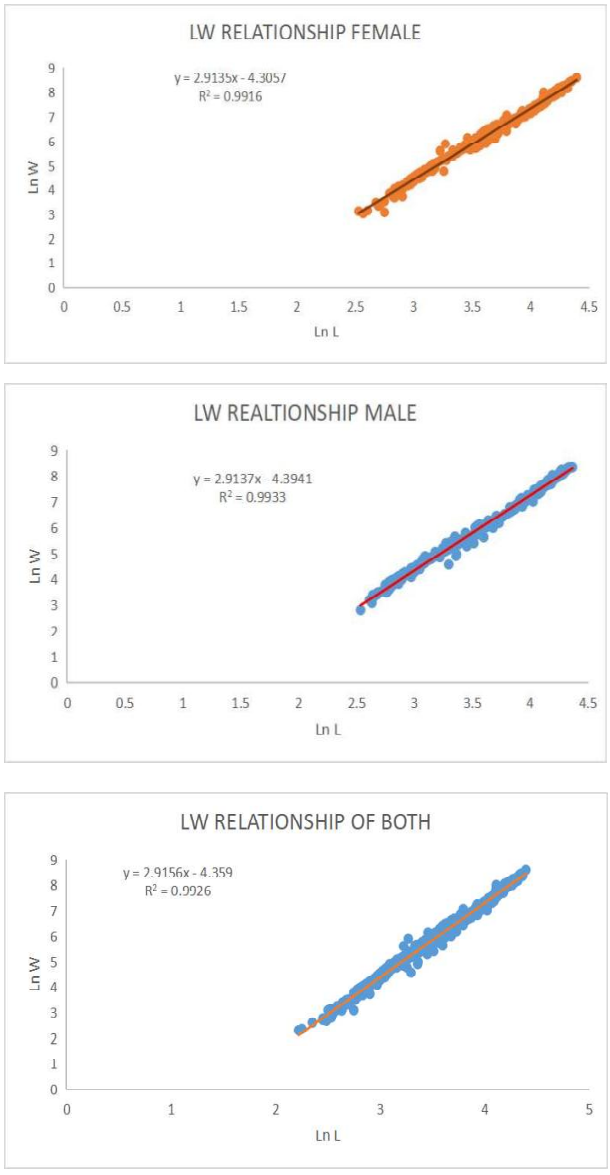


Fig 2: Length weight relationship of *Dayscieana albida* from Vembanad Lake

Table 3: Condition Factor of *Daysciaena albida*

Sex	Fulton's condition factor(K)	Relative condition factor (Kn)	Modified condition factor
Female	0.9927	1.0082	1.3601
Male	0.9062	1.0072	1.2439
Pooled	0.9508	1.0087	1.2902

feeding intensity but also due to some other unknown factors (Kurup and Samuel,1987).

CONCLUSION

The length weight relationship of *D. albida* from Vembanad Lake showed a negative allometric growth pattern. The condition factors indicate that the species is in good condition. The condition factor should be considered for improving and maintaining the conditions for the well-being of this species. LWR and condition factor values can be used for stock assessment of the species and deriving conservation measures for ensuring sustainable exploitation.

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