

Length-weight relationship of twelve fin fish species from a Tropical Estuary

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ABSTRACT

Length-weight relationships (LWRs) of twelve fish species: *Planiliza planiceps*, *Planiliza parsia*, *Etroplus suratensis*, *Pseudetroplus maculatus*, *Oreochromis mossambicus*, *Gerres setifer*, *Scatophagus argus*, *Escualosa thoracata*, *Carangoids praeustus*, *Caranx heberi*, *Deveximentum insidator*, *Nuchequlla blochii* were examined from Cochin estuary. Fish were caught between March 2019 to February 2020 by various gears like ring seine (mesh size of 8–26 mm), smaller mesh sized drift gill net (26–90 mm), cast nets with a (15–20 mm). Fish were gathered weekly from Munambam Fisheries Harbour (Lat. 10°1029653N, Long. 76°1022583E), Cochin Fisheries Harbour (Lat. 09°5623273N, Long. 76°1527643E) and Chellanam (Lat. 09°4729503N, Long. 76°1625513E). There are significance in all LWRs with r^2 values those are ranged from 0.92 to 0.99 and b values are ranged from 2.61 to 3.37 ($p < .001$). The study provides new maximum length of *E. thoracata*.

Key words : Length, Weight, Cochinestuary, Omnivorous

Introduction

In fishery science, length weight relationships (LWRs) have been extensively used to estimate the average weight for a specified length group as well as to convert length measurement into the weight to provide the estimation of biomass. There is a technical issue exists in weight measurements in the field, on board vessel (Froese, 2006; Froese *et al.*, 2011). One of the twelve countries of mega biodiversity and twenty five hotspots of the world is India (Myers *et al.*, 2000). The largest coastal lagoon on the southwest of India is Vembanad Lake designated as a Ramsar Site (No. 1214) due to its international significance for the habitat of waterfowl (Selvam *et al.*, 2012). The present study looks into the length-weight relationships of fourteen fin fish species co-occurring in the Cochin estuary in India.

Materials and Methods

Collection of specimens was done monthly from three fishing harbours of the cochin estuary, during the session of March 2019 to February 2020; those harbours were: Chellanam (Lat. 09°4729503N, Long. 76°1625513E), Cochin Fisheries Harbour (Lat. 09°56'327"N, Long 76°15'764"E) and Munambam Fisheries Harbour (Lat. 10°1029653N, Long. 76°1022583E). The capturing of fish was conducted with divergent gears like cast nets with a (15–20 mm) along with drift gill net of smaller mesh size (26–90 mm) and ring seine (8–26 mm mesh size). The assessment of the fish in the field was the body weight to a precision of 0.1 g by utilizing an electronic balance and the total length to the imminent of 0.1 cm with the aid of vernier calipers. The calculation of the length-weight relationship of the samples was done by making use of the equation $W = aL^b$

= aL^b (Froese, 2006; Le Cren, 1951) along with logarithmically alteration into $\log W = \log a + b \log L$, and where it is expressed that L is the total length (TL, cm), W is the body weight (BW, g) and a and b are the regression parameters. The 95% confidence limits of parameters a and b (CL 95%) was inscribed. Least square linear regressions has evaluated the statistical importance level of co-efficient of determination (r^2), and with the modified equation those are performed. The removal of extreme outliers from the regression analyses was done, according to Froese (2006).

Results

The remarkable result includes the examination of the aggregation of 793 individuals attached to the twelve finfish species. Illustrative statistics are given in Table 1 including length as well as weight computations, sample sizes (n), coefficient of determination (r^2), regression parameters a and b of the LWRs and their 95% confidence limits. The maximum value of b is observed in *Carangoids praeustus* ($b=3.37$) whereas lowest value of b is observed in *Carnax heberi*, *Pseudetroplus maculates* and *Escualosa thoracata* ($b=2.61$). The coefficient of determination (r^2) demonstrated excellent fits for LWR and the values of this index were greater than 0.91. The current study has manifested all the values extremely remarkable ($p<0.001$).

Discussion

All values of parameter b for the twelve fin fishes assembled from Cochin estuary were enclosed by the expected range of 2.5–3.5 (Froese, 2006). Present study owns certain restriction as the highly biased specimens were assembled selectively from commercial vessels only. Variability in LWRs of fishes can be attributed by several factors such as gonad maturity, sample size, stomach fullness, sex, size range covered, habitat and sampling time (Froese, 2006; Hossain *et al.*, 2019), which were not contemplated in the current study. As a consequence, the survey vessel requires following an independent as well as standardized sampling methodology. This is to procure the unbiased specimens of ample numbers with everylength range to make an elaboration of the allometry of these species. The present study only considers the unsexed population, and therefore we can recommend further studies contemplating all the standardized methodologies those cover all these factors. The study provides new records of maximum length for *E. thoracata*.

The recent study provides the base line data of LWR which maintains the ecological as well as economic significance of the fourteen species of the estuary of Cochin and more studies are requisitioned to properly investigate other species. Except *P.parsia*, the first thing to report in the estuary is all LWR those are put forward in this study. The fundamen-

Table 1. Illustrative statistics and estimated length-weight relationship parameters of twelve fish species from Cochin estuary, Kerala, India

Family	Species	n	Length range (cm)	Weight range (g)	a	95% CL of a	b	95% CL of b	r^2
Mugilidae	<i>Planiliza planiceps</i>	65	23.28 – 38.28	126.42 – 498.64	0.0158	0.0084 – 0.0295	2.804	2.62 – 2.98	0.94
	<i>Planilizaparsia</i>	125	9.2 – 13.3	15.48 – 43.96	0.0276	0.0244 – 0.0312	2.84	2.79 – 2.89	0.99
Chanidae	<i>Etroplussuratensis</i>	74	7.8-14.9	7.4-52.24	0.029	0.026-0.034	2.76	2.70-2.81	0.99
Cichlidae	<i>Pseudetroplus maculatus</i>	62	4.2-9.4	2-16.68	0.052	0.0428-0.0643	2.61	2.5-2.71	0.98
	<i>Oreochromis mossambicus</i>	63	13.1-19.8	44.28-174.42	0.015	0.0117-0.02	3.12	3.02-3.23	0.98
Gerridae	<i>Gerres setifer</i>	71	6.6-13.64	4.26-35.38	0.027	0.023-0.031	2.74	2.68-2.81	0.99
	<i>Scatophagus argus</i>	53	6.4-15.7	8.8-109.84	0.056	0.048-0.066	2.74	2.67-2.81	0.99
Scatophagidae	<i>Escualosathoracata</i>	43	8.1-17	9.42-78.38	0.047	0.04-0.055	2.61	2.55-2.67	0.99
Clupeidae	<i>Carangoidespraeustus</i>	58	7-13.7	4.2-42.32	0.005	0.003-0.007	3.37	3.24-3.5	0.98
Carangidae	<i>Caranx heberi</i>	62	10.24-28.4	29.65-423.48	0.081	0.049-0.134	2.61	2.43-2.78	0.94
	<i>Deveximentum insidator</i>	63	3.64-9.9	1.24-26.78	0.029	0.027-0.032	2.95	2.9-3	0.99
Leiognathidae	<i>Nuchequulablochii</i>	54	6.5-11.1	3.42-18.92	0.0114	0.009-0.014	3.02	2.92-3.12	0.99

n - number of individuals; a -intercept; b -slope; CL- confidence limits; r^2 - coefficient of determination, bold-new maximum size

tal information on the LWRs of the fourteen fin fishes will be convenient for the planning of further research.

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Conflict of Interest

There is no conflict of interest among the author contributed to this publication.

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