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Length–Weight Relationships of Indigenous Fish Species *Salmostoma boopis* from Bhima River, India

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Abstract: *Salmostoma boopis* is small indigenous fish native to Indian fresh water. It is found abundantly in the catch of fishermen from Bhima river of Maharashtra throughout the year. The present study included length-weight relationships of *Salmostoma boopis* from Bhima river at Hatwalan site. 131 specimens were sampled during the period of April 2021 to March 2022 for analysis of their length–weight relationships (LWRs). The intercept ('a' value) was found to be 0.009, whereas the slope ('b' value) was 2.84. The LWRs analysis of the species revealed that *S. boopis* has b value less than 3 indicating negative allometry, while these values are in expected range (2.5 to 3.5). The R^2 value in the present study was found to be greater than 0.80 for the species, which indicated the proper fitness of the model for growth and good health status.

Keywords: Length-weight relationship, *Salmostoma boopis*, Conservation, Bhima river

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Introduction

The Maharashtra has about 3,007 sq km of wetland area of which 216 sq km is natural wetlands and rest is man-made (Ministry of Environment and Forests, 1989). Bhima river is a tributary of Krishna river. It is having a catchment area of 14,856 km (Das and Singh, 2012). *Salmostoma boopis* is endemic to Indian freshwater resources (FishBase). Morphometric measurements and length weight relationship of fishes are important factor for assessment of both fish biology and taxonomic studies (Mustafa and Brooks, 2008; Alam *et al.,* 2014). Length-weight relationship provides information about the condition and growth patterns of fish (Oscoz *et al.,* 2005; Alam *et al.,* 2014). Length-weight relationship (LWR) study is considered to be a regular research practice of fish biologists as it helps to understand fish population dynamics and the growth pattern on fish stocks (Froese, 2006). Length and weight measurements give information on the fish stock composition, life span, mortality rate, growth and production (King, 1996; Moutopoulos and Stergiou, 2000; Diaz *et al.,* 2000). One of the most commonly used analyses of fisheries data is length- weight relationship (Mendes *et al.,* 2004). Length-weight regressions

Table 1: Descriptive statistics, estimated parameters of LWRs ($W= aL^b$) for *Salmostoma boopis*

Fish Name	Total length (cm)			Weight		LWR regression parameter			
	N	Min	Max	Min	Max	a	b	r^2	P
Salmostoma boopis	131	9.44	14.3	6.19	19.14	0.009	2.84	0.84	<0.0001

N: No. of fish sample; TL: Total Length; W: Weight; Min: Minimum: Max: Maximum; a: intercept; b: slope; r2: coefficient of determination; P: level of significance

have been widely used for estimation of weight from length because direct weight measurements on field can be time-consuming (Sinovcic *et al.,* 2004). Length weight relationship is useful parameter for assessing the health status of the individuals and for determining possible variations among different stocks of the same species (King, 2007; Ranjit *et al*., 2020).

In view of the importance of length and weight parameters and lack of fisheries study from the Bhima river, an attempt has been made in this study to investigate length-weight relationship of *Salmostoma boopis* which has not been reported earlier from this ecosystem.

Materials and Methods

A total of 131 samples of *Salmostoma boopis* fish were collected through local fishermen at Hatwalan (18.533823, 74.442409) of Daund, Pune, India. Fishes were caught using three types of gears; cast nets, gill nets and drag nets of varied mesh sizes. After collection, specimens were preserved in 10% formalin solution and brought to the research laboratory for identification and measurements. Fishes were identified based on Jayaram (1999) and Talwar and Jhingran (1991). Measurements of total length (TL) were done by using Digital Calliper (Mitutoyo, Japan) to the nearest 0.1cm and body weight (W) were measured using weighing machine closest 0.01 g (CONTECH – CB Series). Length-weight relationships were estimated by formula: $W= aL^b$, where 'L' denotes total length (cm), 'W' represents body weight (g), 'a' is intercept and 'b' denotes the slope of log-transformed linear regression (Le Cren, 1951; Froese 2006). r^2 is coefficient of goodness of fit estimation. Some outliers from the length-weight plots were identified and removed.

Results and Discussion

Sample (N), Total length (Maximum and Minimum), Weight (Minimum and Maximum), LWRs parameter like a: intercept, b: slope, r^2: coefficient of determination, P: level of significance is presented in Table 1 and Figure 1. Maximum total length is 14.3 cm while minimum total length is 9.44 cm. The intercept (a) having 0.009 while slope (b) was 2.84, The slope value for *S. boopis* is significantly lying within the recommended value of b i.e. 2.5 – 3.5 (Carlander, 1969; Froese, 2006).

Roshith *et al.* (2021) reported r^2 value for *S. boopis* as 0.95 while b value was 2.76 which also shows negative allometric relationship. The b value less than 3 indicated the negative allometries, b value more than 3 indicated positive allometries while b = 3 indicated the isometric growth pattern (Torres *et al*., 2012; Ranjit *et al*., 2020). Variation in the "b" value of fishes could be caused by factors like fishing pressure, mesh size, geographical and environmental factor, sampling gear, sampling season, length range used, gonadal maturity, sex, diet, stomach fullness (Karna, 2017; Karna *et al*., 2018). According to Railsback et al. (1999), fish with ideal growth shows the R^2 value between 0.8 and less than 1.0 which indicates the good fitness of the model for growth and good health status of investigated fish species. The r^2 value for *S. boopis* in this study is 0.84.

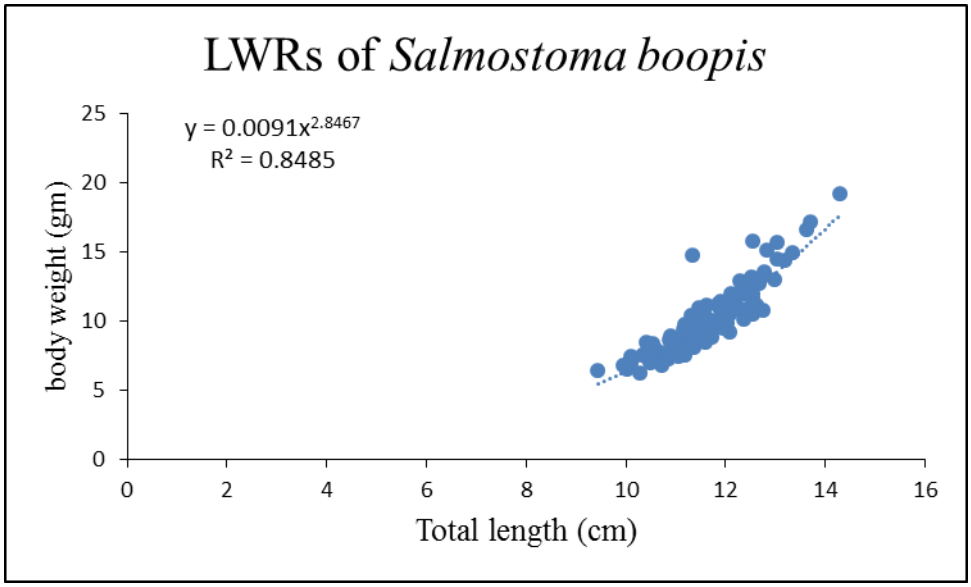

Fig. 1: LWRs for *Salmostoma boopis.*

Conclusion

This study provided the baseline information on the LWRs of *Salmostoma boopis*. This freshwater fish species would be important for monitoring its populations and operative implementation of protection of species and other conservation policies.

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