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Length-Weight Relationship of Three Fish Species of Cyprinidae in Tajan River, Iran

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Abstract: The aim of this study was to record the length-weight relationship, amount of b value and other parameters of growth for three species of Tajan River. A total of 896 fish samples (363 *Capoeta copoeta hertansis*, 247 *Barbus lacerta* and 286 *Alburnoides bipunctatus*) belonging to Cyprinidae were collected from November 2010 to October 2011 and January to December 2011. Fishes were caught by electric fishing. The b value was 2.67 for *Barbus lacerta*, 2.90 for *Alburnoides bipunctatus* and 2.91 for *Capoeta copoeta hertansis*. The coefficient of determination (r2) was very significant for all the species. For the all species in this study b value was <3 that it indicate growth was negative allometric ($b<3$, $P<0.05$).

Key words: Length-Weight Relationship % Negative Allometric % Cyprinidae % Electric Fishing % Tajan River

INTRODUCTION

Length-weight relationship (LWR) is of great importance in fishery assessments [1, 2]. Length and weight measurements in conjunction with age data can give information on the stock composition, age at maturity, life span, mortality, growth and production [3-7]. Length-weight relationships data for fresh and brackish water fish resources of Iran are limited and the present contribution is aimed to compensate this.

The relationship between the length (L) and weight (W) of a fish is usually expressed by the equation $W = aL^b$. Values of the exponent 'b' provide information on fish growth.

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). This parameters (a, b) are important in stock assessment studies [8-10].

MATERIALS AND METHODS

The sampling was carried out in Tajan River. The Tajan River is one of the Caspian Sea rivers that carry a great deal of freshwater flow to Caspian Sea. This river located in north of Iran and in south of Caspian Sea.

A total of 896 fish samples (363 *Capoeta copoeta hertansis*, 247 *Barbus lacerta* and 286 *Alburnoides bipunctatus)* belonging to Cyprinidae were collected from November 2010 to October 2011 and January to December 2011. Fishes were caught by electric fishing. The samples were transported to the research laboratory in polythene bags containing ice blocks to prevent spoilage and then stored in a deep freezer to avert posthumous deterioration. Prior to length and weight measurements the fishes were taken out in batches from the freezer and allowed to thaw. Total length (cm) of each fish was taken from the tip of the snout (mouth closed) to the extended tip of the caudal fin using a measuring board.

The values of constant a and b were estimated from the log transformed values of length and weight to $\log W = \log a + b \log L$, via least square linear regression.

RESULTS

The sample size, minimum and maximum lengths and weights, length-weight relationships, ±95% CI of b values, coefficient of determination (r^2) and statistical analysis of the relationship between the sexes for each species are summarized in Table 1.

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Table 1: Descriptive statistics and estimated parameters of the length-weight relationships for the 3 fish species collected in Tajan River during 2010-2011

Family	Species	n	Min	Max	a	b	r^2
Cyprinidae	*Capoeta copoeta hertansis* (Lortet in Barrois, 1864)	363	3.1	19	0.0138	2.9123	0.9683
Cyprinidae	*Barbus lacerta* (Heckel,1843)	247	4.1	19.6	0.0202	2.6787	0.9606
Cyprinidae	*Alburnoides bipunctatus* (Bloch, 1782)	286	4	14	0.014	2.901	0.9032

n, sample number; *min.* and *max.*, the minimum and maximum lengths in cm; *a* and *b*, the parameters of the length-weight relationship; *r2*, the coefficient of determination

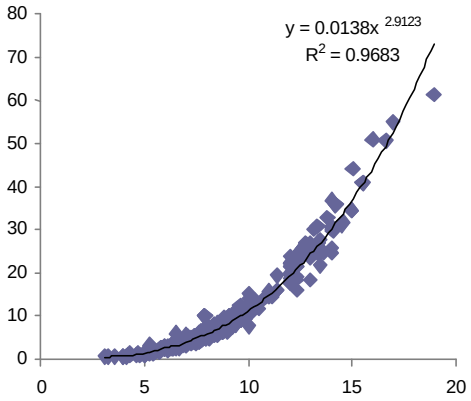

Fig. 1: Length-weight relationship in *Capoeta copoeta hertansis*.

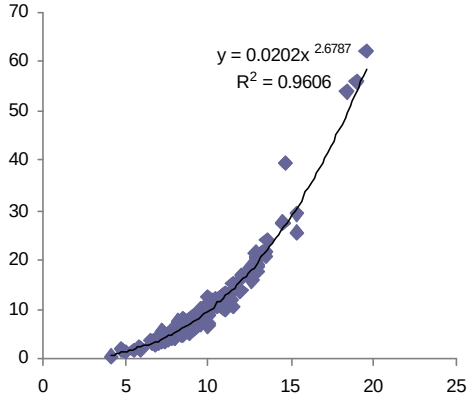

Fig. 2: Length-weight relationship in *Barbus lacerta*.

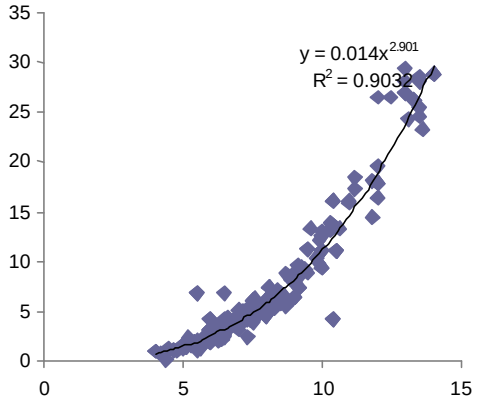

Fig. 3: Length-weight relationship in *Alburnoides bipunctatus*.

DISCUSSION

Length-weight relationships may present and temporal variations due to water temperature, food availability and reproductive activities [11].

Even though the change of b values depends primarily on the shape and fatness of the species, various factors may be responsible for the differences in parameters of the length-weight relationships among seasons and years, such as temperature, salinity, food (quantity, quality and size), sex and time of year and stage of maturity [12].

To the best of our knowledge, no information was available for *Capoeta copoeta hertansis*, *Barbus lacerta* and *Alburnoides bipunctatus* in the Tajan River. The comparison of the *b* values obtained in our study and some of previously reported results in other basins of Caspian Sea indicate variation in the *b* values. However, 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*.

For the all species in this study b value was lower than 3 that it indicate growth was negative allometric ($b<3$, $P<0.05$) negative allometric (Table 1).

The obtained results from this study are useful to fisheries scientists. In summary, this study updates length-weight parameters for 3 species of Cyprinidae in fresh water.

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