

Short Communication

Length-weight relationships of 14 fish species from Tajan River, Southern Caspian Sea basin, Iran

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Abstract: The length-weight relationships, (LWRs) were calculated for 14 fish species belonging to five families (Cyprinidae, Cobitidae, Nemacheilidae, Salmonidae, and Gobiidae) collected from the Tajan River, north of Iran. Significant length-weight relationships with high correlation coefficients were found for all species.

Keywords: LWRs, Caspian Sea, Biomass Estimations.

Introduction

Length-weight relationships (LWRs) parameters are important in environmental monitoring programs especially for stock/ecological assessments, biomass estimations and environmental managements (Froese 1998; Ozen et al. 2009; Radkhah & Eagderi 2015; Ghanbarifardi et al. 2014; Esmaili et al. 2014; Ghanbarzadeh et al. 2015). Despite the high diversity of freshwater fish in rivers, little is known about the biology of most of them especially in Iranian water bodies.

The present study investigates LWRs for 14 fish species from Tajan River, including *Alburnoides tabarestanensis*, *Barbus cyri*, *Capoeta capoeta*, *Cyprinus carpio*, *Hypophthalmichthys molitrix*, *Luciobarbus capito*, *Luciobarbus mursa*, *Pseudorasbora parva*, *Squalius orientalis* (Cyprinidae), *Cobitis keyvani* (Cobitidae) *Paracobitis hircanica* (Nemacheilidae),

Oncorhynchus mykiss, *Salmo trutta* (Salmonidae), and *Ponticola cyrius* (Gobiidae).

Materials and Methods

Study area: Tajan River is one of the important freshwater ecosystems in Mazandaran province located in the north of Iran, with a hydrographic basin area of 4700 Km² between 53°0'12" N to 53°06'34" N and 36°20'48" E to 36°27'50" E. The river is 140km long and originates from forested mountains and continues through the different land uses especially agricultural areas of the coastal plain, where rice is extensively cultivated. It eventually drains into the Caspian Sea. Other information of this river have well-documented already by Aazami et al. (2015a, b).

Fish sampling: The electrofishing (200-300V) and Blank net (6mm) were used for fishing in September 2013 and repeated in September 2014 based on Rapid

Table 1. Descriptive statistics and estimated parameters of length-weight relationships for 14 fish species, Tajan River, Iran.

Family	Species	N	Length (Cm)		W= aL ^b				r ²	G
			Min	Max	a	95% CL of a	b	95%CL of b		
<i>Cobitidae</i>	<i>C. keyvani</i>	64	6.31	12.27	0.0039	0.0028-0.0071	3.17	2.98-3.24	0.93	I
<i>Cyprinidae</i>	<i>A. tabarestanensis</i>	1867	3.98	11.09	0.0187	0.0012-0.0201	3.12	2.77-3.49	0.99	I
	<i>B. cyri</i>	96	2.93	7.14	0.0001	0.0001-0.0079	2.72	2.51-2.88	0.99	A ⁻
	<i>C. capoeta</i>	295	3.97	33.12	0.0121	0.0097-0.0217	2.83	2.69-2.97	0.98	A ⁻
	<i>C. carpio</i>	28	5.88	36.97	0.1299	0.1102-0.1402	3.21	3.27-3.13	0.96	A ⁺
	<i>H. molitrix</i>	6	3.37	5.09	0.042	0.0319-0.0551	3.05	2.84-3.59	0.97	I
	<i>L. capito</i>	94	3.18	8.09	0.0019	0.0006-0.0125	2.99	2.74-3.02	0.99	I
	<i>L. mursa</i>	77	4.08	9.55	0.287	0.0077-0.0334	2.91	2.81-3.01	0.96	I
	<i>P. parva</i>	5	4.6	7.5	0.0091	0.0047-0.0109	3.1	3.01-3.12	0.98	A ⁺
	<i>S. orientalis</i>	642	5.73	21.18	0.0108	0.0008-1.0139	3.09	2.78-3.18	0.98	I
<i>Nemacheilidae</i>	<i>P. hircanica</i>	7	4.21	7.79	0.0071	0.0037-0.0101	2.88	2.52-2.97	0.97	A ⁻
<i>Salmonidae</i>	<i>S. trutta</i>	80	8.07	20.88	0.0123	0.0069-0.0247	2.93	2.78-3.15	0.99	A ⁻
	<i>O. mykiss</i>	23	16.66	34.12	0.0089	0.0073-0.0115	3.23	3.14-3.39	0.99	A ⁺
<i>Gobiidae</i>	<i>P. cyrius</i>	1333	7.79	13.43	0.0670	0.0573-0.0876	2.54	2.49-2.68	0.97	A ⁻

Bioassessment Protocol, EPA (Barbour et al. 2007). Most of the fish samples were identified, measured, and released in situ. Seventeen fish species were fixed in 10% formalin and transferred to the laboratory for correct identification. Finally, total length (TL) to the nearest 0.1cm and total weight (TW) to the nearest 0.01g of each fish specimen were recorded.

The LWRs were calculated using linear regression analysis, $\log(TW) = \log(a) + b \log(TL)$, where a is the intercept of the regression curve (coefficient related to body form) and b the regression coefficient (exponent indicating isometric growth) (Oliva-Paterna et al. 2009; Froese 1998). To demonstrate the significant differences of the obtained b values from the expected isometric value i.e. $b=3$, t-test was used (Sokal & Rohlf 1987). Statistical analysis of the data was performed using Excel and SPSS software version 19 (Licensed by Tarbiat Modares University, Iran).

Results and Discussion

Overall, 4653 specimens of 14 different species belonging to five families were collected. Descriptive statistics and estimated parameters of LWRs for 14 species in seven families are presented in Table 1. All LWRs were significant for these species ($P < 0.001$), with r^2 values greater than 0.92.

In our study, the results showed a suitable estimation of LWRs, whereas parameter b lied between the expected ranges of 2.5-3.5 (Froese 2006). LWRs are not constant over the year and may vary significantly due to biological, food availability, temporal and sampling factors, health and sex and none of which were considered for in this study (Hasankhani et al. 2013, Esmaeili et al. 2014).

Three collected species had positive allometric growth; the rainbow trout (*Oncorhynchus mykiss*) and Stone moroko (*Pseudorasbora parva*) were farmed and exotic fish, respectively. Also, the common carp (*Cyprinus carpio*) is a widespread freshwater fish of eutrophic waters (Jackson et al. 2010).

In conclusion, this study provides basic information on LWRs for 14 species that would be useful for fishery biologists and managers. However, more studies on fish population biology are needed for better understanding of the factors effecting fish growth especially for Iranian rivers.

Acknowledgements

We would like to thank our friends that have given us any help in the sampling period especially S. Pakzad, A. Kazemi, R. Ghosi, H. Malvandi, and E. Khaki. In fact, the report is part of the PhD thesis of Jaber Aazami entitled "Usability of Fish and

Macroinvertebrate Indices in Ecological Integrity Assessment of Tajan River” and is supported by Tarbiat Modares University, Iran.

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