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Length-Weight Relationship of Four Native Fish Species in Yellow River of Qinghai-Tibet Plateau, China

Kemao Li [1,2]*, Yintao Jia[3], Shenglong Jian[1,2], Xiu Feng[3]

1 QingHai Provincial Fishery Environmental Monitoring Center, Xining 810012, China
2 Key Laboratory of Plateau Aquatic and Ecological Environmental in Qinghai Province, Xining 810012, China
3 Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 40070, China

ABSTRACT. *In this study the relationships Length-weight (LWR) were described for four native fish species (Triplophysa siluroides, Schizopygopsis pylzovi, Gymnocypris eckloni and Acanthogobio guentheri)belonging to one family and five genera, from upstream of the Yellow River on Qinghai-Tibet Plateau in China. All the specimens were sampled by electric fishing (12 V, 2000–3500 W) and multiple gill netting from June to July 2015. The values of parameter b for all species ranged from 2.9344 to 3.4788, and the values parameter a ranged from 0.0031 to 0.0127.*

KEYWORDS: *Yellow river, Native fish, Length-weight relationship*

1. Introduction

The Yellow River is the second largest river in China, and it flows through nine provinces before it falls into the Bohai Sea. The length of the Yellow River in Qinghai-Tibet Plateau is 1983 kilometers (Department of Water Resources of Qinghai Province, 2018). The aquatic ecosystems of the upstream of the Yellow River at Qinghai Province, as parts of the Qinghai-Tibet Plateau, characterized by high altitude and harsh environment supported distinctive fish communities (Wu & Wu, 1991). The native fish species were dominated by schizothoracine fishes and nemacheiline fishes, which accounted for 78.26% of the total native species (Qi, 2016). However, the fishes inhabiting in the upstream of the Yellow River were suffering from the intensive anthropogenic activities, such as dam construction (Li, 2007). More conservation efforts were therefore urgently needed to focus on protecting the fishes in upstream of the Yellow River (Li, Tang & Guan, 2009). Length-weight relationship parameters can be used to estimate biomass which is one of the most important information for fish conversation (Froese, 2006). Hence, this study uses the length-weight relationships parameters to calculate five native species of fish in the Yellow Rivers of Qinghai-Tibet Plateau.

2. Material and Methods

Fish were sampled 25 days at four different locations in upstream of the Yellow River in Qinghai-Tibet Plateau from June to July 2015. For wadeable sites (water depth < 1 m), electrofishing (12 V, 2000-3500 W) were used while multiple gear types were used for non-wadeable sites (water depth > 1 m) including: three sets of gillnet with stretched mesh sizes of 1-3, 5-10 and 10-15 cm respectively each measuring 20 m in length and 1.5 m in depth, trap nets (mesh size 1.5 mm)and electric fishing.Electric fishing was conducted with length equal to 20 times the channel width. Gillnets and trap nets were set overnight for (12 hours). The fresh specimens were identified and preserved in 4% formalin solution for transportation (about 4-6 hours), and then measured for body standard length(L) (the nearest 1mm) and body weight(W) (the nearest 0.1g). Parameters a and b were estimated by linear regression on ln- transformed data according to the equation: Ln(w)=Ln(a)+Ln(SL). All statistical analyses were done by SPSS (Version 19).

3. Results

The length-weight relationships (based on standard length) are given for five fish species in Table1. The value of parameter a, b and their associated information were also provided in Table 1. All regressions were highly significant ($p < 0.001$). The R2 values for all species ranged from 0.9517 to 0.9638. The values of parameter b for all species ranged from 2.4646 to 3.4788, and the values parameter a ranged from 0.0031 to 0.0672. The data are based on a snap-shot(short-term) sampling period in 2015.

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Table 1 Length-Weight Relationship (Lwrs) for Four Fish Species in Yellow Rive of Qinghai-Tibet Plateau, China Species	n	Standard Length (cm)		Body weight (g)		Length-weight relationship (LWR)				
		Min	Max	Min	Max	a	b	95% CL of a	95% CL of b	r^2
Triplophysa siluroides	23	12	28	20.7	254.5	0.0127	2.9344	0.00121-0.0134	2.9164-2.9524	0.9638
Schizopygopsis pylzovi	48	13.7	33.0	35.5	465.0	0.0031	3.4788	0.0030-0.032	3.4606-3.4881	0.9590
Gymnocypris eckloni	77	14.3	39.5	46.5	1036.8	0.0103	3.1206	0.0101-0.0110	3.1058-3.1357	0.9517
Acanthogobio guentheri	31	11	16.5	27.5	101	0.0127	3.2285	0.0124-0.0131	3.2183-3.2388	0.9546

Note: n, sample size; CI, confidence interval; r2, coefficient of correlation

4. Discussion

The data present in this study should be taken with caution because they are based on measurement done on formalin preserved specimens. Some shrinking may have affected the true species-specific LWR. Further studies should try to measure fresh specimens in order to determine whether a correction factor is needed or not. All species studied in this paper are red-listed at various categories in china and fisher on these has been totally banned in the region since the year 2018.According to the Red List of China's Vertebrates (Jiang et al., 2016), one species (A. guentheri) in our study were classified as Endangered and three of them (T. siluroides, S. pylzovi, and G. eckloni) were classified as Vulnerable. For scientific purposes we were allowed to take some samples which explains the limitation in terms of sample size and time window covered.

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