

Length-Weight Relationships of Four Fish Species from Qinzhou Harbor, Guangxi, China

Juan Lei^{1,*}, Jianyong Su¹, Yongyan Liao¹, Guorong Cao¹, Dong Xie², Teng Wang³

¹College of Marine Sciences, Beibu Gulf University, Qinzhou, China

²Co-Innovation Center for Sustainable Forestry in Southern China, Nanjing Forestry University, Nanjing, China

³South China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences, Guangzhou, China

Email address:

leijuanhb@163.com (Juan Lei)

*Corresponding author

To cite this article:

Juan Lei, Jianyong Su, Yongyan Liao, Guorong Cao, Dong Xie, Teng Wang. Length-Weight Relationships of Four Fish Species from Qinzhou Harbor, Guangxi, China. *Agriculture, Forestry and Fisheries*. Vol. 8, No. 2, 2019, pp. 45-47. doi: 10.11648/j.aff.20190802.13

Received: March 20, 2019; **Accepted:** April 26, 2019; **Published:** June 12, 2019

Abstract: This study determined the total length-weight relationships of the four fish species, *Inegocia japonica*, *Gerres decacanthus*, *Sillago asiatica*, and *Eynniss cardinalis*, belonging to four families. Fishes were collected using commercial trawls from Qinzhou harbor, China. Samples were collected quarterly from March to December 2017. Total length and weight of each specimen were recorded with an accuracy of 0.1cm and 0.1g, respectively. During the sampling period, a total of 111 fish individuals were collected and measured. The allometric coefficient (b) of length-weight relationship varied from 3.08 for *Eynniss cardinalis*, 3.17 for *Inegocia japonica*, 3.18 for *Sillago asiatica* and 3.19 for *Gerres decacanthus*. Growth was found as isometric for this four fish species.

Keywords: Length-Weight Relationships, *Inegocia japonica*, *Gerres decacanthus*, *Sillago asiatica*, *Eynniss cardinalis*

1. Introduction

The length-weight relationship (LWR) is often used to evaluate the standing stock biomass and is also used to analyze the ontogenetic changes and is also used in the assessment of fish in population dynamic [1]. There are very high number and endemic species of fishes in Chinese Sea [2]. However, biological characteristics of some fish species have seldom been researched. The length-weight relationship (LWRs) is an important tool for management and conservation of fisheries [3-4]. This study provides the first LWRs reports for these four fish species from Qinzhou harbor of China.

2. Materials and Methods

Fish samples were collected quarterly from March to December 2017 using commercial trawls from Qinzhou harbor of China. After captured, all specimens were stored on ice and transferred to laboratory. The species were identified according to studies by Lai (2016) [5], Liu (2016) [6] and He (2013) [7]. For each specimen, the total length was recorded

with an accuracy of 0.1 cm, and body weight was measured with 0.1g accuracy in Laboratory. The total length was measured with a Vernier caliper from the end of snout to the base of tail. For each species, the length-weight relationships were determined by the function, $W = aL^b$, where W is the weight (g) and L is the total length (cm), was fitted with a simple linear regression model using log-transformed data. The 95% confidence interval (CI) was determined for parameters “a” and “b” [8]. “a” is the intercept of the regression curve and “b” is the regression coefficients. The best appropriate model was selected based on R² value [9]. The observed differences were evaluated statistically using SPSS 13.0 and Statistical Analysis System [10].

3. Results and Discussion

During the sampling period, a total of 111 fish individuals belonging to four species was collected and measured. Mean total length and weight in four fish species from the Qinzhou harbor is summarized in Table 1. In this study, the total length varied from 88.0 cm to 196.0 cm and weight between 3.5g to

55.5g, mean total length as 153.5 cm and weight as 28.7g for *Inegocia japonica*. The total length ranged from 53.0 cm to 124.0 cm and weight from 1.6g to 28.6g, mean total length as 91.8 cm and as 12.1g in weight for *Gerres decacanthus*. The total length oscillated from 78.0 cm to 178.0 cm, weight from

3.7g to 36.0g, mean total length as 128.5 cm and weight as 17.1g for *Sillago asiatica*. For *Eynn timer cardinalis*, the total length ranged from 73.0 cm to 124.0 cm and weight from 7.5g to 41.6g, mean total length as 109.2 cm and weight as 28.7g.

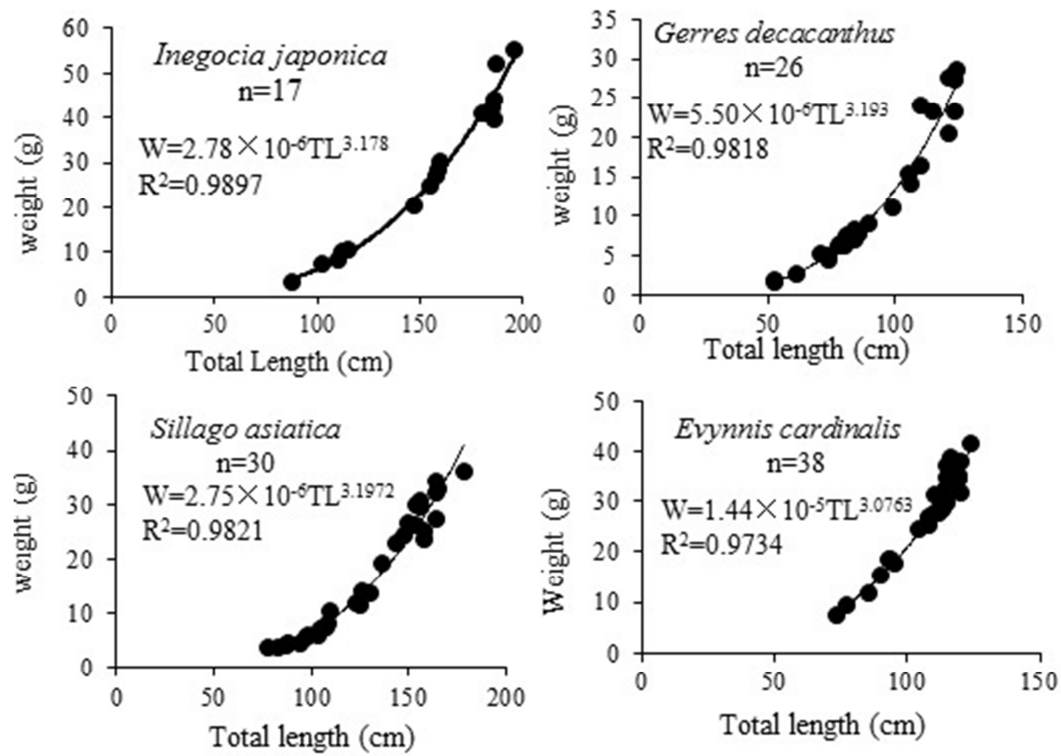


Figure 1. Length-weight relationships of four fish species collected in the Qinzhou harbor.

Table 1. Total length, weight characteristics in four fishes from the Qinzhou harbor.

| Family | Species | n | Total Length (cm) | | Weight (g) | |
|-----------------|---|----|-------------------|-----------|------------|----------|
| | | | Min-Max | Mean±SE | Min-Max | Mean±SE |
| Platycephalidae | <i>Inegocia japonica</i> (Cuvier, 1829) | 17 | 88.0-196.0 | 153.5±8.5 | 3.5-55.5 | 28.7±4.0 |
| Gerreidae | <i>Gerres decacanthus</i> (Bleeker, 1864) | 26 | 53.0-124.0 | 91.8±4.3 | 1.6-28.6 | 12.1±1.7 |
| Sillaginidae | <i>Sillago asiatica</i> McKay, 1982 | 30 | 78.0-178.0 | 128.5±5.6 | 3.7-36.0 | 17.1±1.9 |
| Sparidae | <i>Eynn timer cardinalis</i> (Lacepède, 1802) | 38 | 73.0-124.0 | 109.2±1.9 | 7.5-41.6 | 28.7±1.3 |

Note: n, number of individuals; SE, standard error; Min, minimum; Max, maximum.

Figure 1 shows the relationship between total length and weight of four different fish species sampled during the study, and the regression parameters “a” and “b”, and the correlation coefficient (R²) are shown in Table 2.

The allometric coefficient “b” of LWRs varied from 3.08 for *Eynn timer cardinalis*, 3.17 for *Inegocia japonica*, 3.18 for *Sillago asiatica* and 3.19 for *Gerres decacanthus*. The values of parameter “b” remained within the expected range of 2.5–3.5 (Froese, 2006). Comparing our results with the Bayesian

LWRs predictions in Fishbase, the “b” values of these four fish species fell within the 95% confidence intervals of the prediction and were thus not significantly different. Length-weight relationships may change among individuals in different species can be affected by many factors, such as small juvenile specimen, the sample size, size-weight distribution, sampling time, sex, gonad maturity, habitat, season, stomach fullness, diet, the length ranges used, and ecological conditions [11-12].

Table 2. Descriptive statistics and estimated length-weight relationship parameters for four fish species from Qinzhou harbor, China.

| Species | n | a | b | 95% CI of a | 95% CI of b | R ² |
|---|----|---------|------|-----------------|-------------|----------------|
| <i>Inegocia japonica</i> (Cuvier, 1829) | 17 | 0.00419 | 3.17 | 0.00258-0.0680 | 3.00-3.35 | 0.989 |
| <i>Gerres decacanthus</i> (Bleeker, 1864) | 26 | 0.00856 | 3.19 | 0.00572-0.0128 | 3.00-3.37 | 0.981 |
| <i>Sillago asiatica</i> McKay, 1982 | 30 | 0.00420 | 3.18 | 0.00283-0.00623 | 3.02-3.34 | 0.984 |
| <i>Eynn timer cardinalis</i> (Lacepède, 1802) | 38 | 0.0174 | 3.08 | 0.0115-0.0262 | 2.90-3.25 | 0.973 |

Note: n, sample size; CI, confidence interval; r², coefficient of correlation, Bold, new maximum total length.

4. Conclusions

In terms of fisheries biology and management, it is critical for sustainable ecosystem management of continuous monitoring in nature. Therefore, it is believed that these studies should be carried out to monitor fish resource in the region. In addition, the results of this study will be an important database for future studies of fish species. In general, the study provides basic information on the LWRs of these four fish species, which could be useful for sustainable management of fishery in Qinzhou harbor of China.

Acknowledgements

This research was supported by Guangxi Key Laboratory of Beibu Gulf Marine Biodiversity Conservation, Beibu Gulf University (No. 2019ZB04) and the National Natural Science Foundation of China (No. 31702351; No. 41466003). This project was funded by the Guangxi Natural Science Foundation (GXNSFDA139016), and Guangxi Colleges and Universities Innovation Research Team. This research was also supported by the Major Science and Technology Special Project in Guangxi (AA17204074-3). We wish to thank Ling Liyu, Chen Danni, Wu Fu and Lin Meifang for their assistance during the experiment and article preparation.

References

- [1] Lagler, K. F., 1968: Capture, sampling and examination of fishes. In: Methods for assessment of fish production in fresh waters (ed. W. E. Ricker). IBP Handbook No. 3, Blackwell Scientific Publication, Oxford, pp. 7-40.
- [2] Xiong, W., Zhu, G. P., Wang, Z. L., Ye, N., 2018. Length-weight relationships of four fish species from mangrove of Zhanjiang, China. *J. Appl. Ichthyol.*, 34, 729-730.
- [3] Xiong, W., Tao, J., Zhang, D. C., Liu, C., He, D. K., Chen, Y. F., 2015. Length-weight relationships for four small fish species caught in wetland of central Yangtze River, China. *J. Appl. Ichthyol.*, 31, 219-220.
- [4] Xiong, W., Zhu, J., Jin, L., Zhang, J. Q., 2017. Length-weight relationships of seven fish species from the Yuan River of China. *J. Appl. Ichthyol.*, 33, 1240-1241.
- [5] Lai, T. H., He, B. Y., 2016: Marine Osteichthyes fishes in Guangxi Beibu Gulf of China. Science Press. pp. 1-453.
- [6] Liu, J., Wu, R. X., Kang, B., Ma, L., 2016: Fishes of Beibu Gulf. Science Press. pp. 1-444.
- [7] He, B. Y., Lai, T. H., 2013: Marine Fauna in the Mangrove Wetlands of Guangxi Beibu Gulf, China. Science Press. pp. 1-236.
- [8] Froese, R., 2006. Cube law, condition factor and weight-length relationships: history, meta-analysis and recommendations. *J. Appl. Ichthyol.*, 22, 241-253.
- [9] Ulaş, A. and Aydın, C., 2011. Length-weight relationship of *Eriphia verrucosa* Forskal (1775) from the Aegean Sea (Linneus, 1758). *J. Anim. Vet. Adv.*, 8: 1061-1062.
- [10] Düzgüneş, E., Selimoğlu, A. Ş., Mutlu, C., Şahin, C., Aydın, M., 1998: A preliminary study on the crab species existing on the Trabzon Coasts, Fisheco'98. Trabzon, pp. 520-526.
- [11] Oscoz, J., Campos, F., Escala, M. C., 2005. Weight-length relationships of some fish species of the Iberian Peninsula. *J. Appl. Ichthyol.*, 21, 73-74.
- [12] Froese, R., Tsikliras, A. C., Stergiou, K. I., 2011. Editorial note on weight-length relations of fishes. *Acta Ichthyol. Piscat.*, 41, 261-263.