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Short Communication

Length-weight Relationships of Three Fish Species from Yellow Sea along Coastal Waters of Shandong Province, China

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ABSTRACT

In this study, length-weight relationships (LWR) of three fish species (*Lepidotrigla microptera, Liparis tanakae* and *Trachidermus fasciatus*) from the Yellow Sea along coastal waters of Shandong province, China were estimated. Ninety-one samples were collected from March to June 2019 through trawl nets in the Yellow sea area (36°27′02″N 121°08′68″E). The length-weight relationships of *Lepidotrigla microptera, Liparis tanakae* and *Trachidermus fasciatus* can be expressed as $W_{L.microptera} = 0.0123L^{2.92}$, $W_{L. Tanakae} = 0.0848L^{3.46}$, $W_{T. fasciatus} = 0.067L^{3.06}$, respectively. The values of exponent b ranged from 2.92 to 3.46 for these three species. Results from the present study indicate that the weight increase of *Liparis tanakae* and *Trachidermus fasciatus* was positive allometric during the survey period. This study provided basic information for fisheries management in Yellow Sea along coastal waters of Shandong province.

Estimating parameters of length-weight relationships (LWR) have important implication for fisheries research, fisheries management and evaluating the condition factors (Froese, 2006; Andrade *et al*., 2015). For example, length-weight relationship can be used to estimate accurate weight when calculating the production over biomass ratio. (Torres *et al*., 2012; Nie *et al*., 2013). In addition, the length-weight relationship can also be applied in deriving comparisons between different fish species in life history and morphology between different fish populations from regions (Goncalves *et al*., 1997; Petrakis and Stergion, 1995), and tracking fish growth in terms of seasonal variations. *Lepidotrigla microptera* (Günther**,** 1873), *Liparis tanakae* (Gilbert and Burke, 1912) and *Trachidermus fasciatus* (Heckel, 1837) are native species in Yellow Sea area. Although the basic biology information for most fishing species in the Yellow Sea area has been well studied, the LWR for the three given species (*L. microptera, L. tanakae* and *T. fasciatus*) in this area are still unknown. This study filled the information blank and aiming to provide basic information for fisheries management in Yellow Sea along coastal waters of Shandong province.

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Materials and methods

Ninety-one specimens of these three given fish species were collected from Yellow Sea along coastal waters of Shandong province, China through trawl nets between March and June 2019. After capture, all fishes were immediately placed on ice and then transported to laboratory for further analysis. Scientific names for each species were checked according to FishBase. The total length (L, mm) and body weight (W, g) for *L. microptera* and *L. tanakae* were measured to the nearest 1 mm and 0.1 g. The *T. fasciatus* was measured to the nearest 0.1mm and 0.001g for its small size.

The relationship between total length (L) and body weight (W) were calculated by the power regression $W = aL^b$ (PASW Statistics 19.0). Values of the exponent b provide information regarding to the fish growth. When b = 3, the increase of fish weight was isometric. When b > 3, the increase of fish weight was allometric (positive if b >3, negative if b < 3, Morey *et al*., 2003). Ln-ln plots were done to remove outliers within species. The 95% confidence limits for b and a (CL95%) were calculated

Table I. Descriptive statistics and the estimated parameters of length–weight relationships in three fish species from Yellow Sea along coastal waters of Shandong province, China.

Species		Weight (g)	Total length (mm)	Parameters of LWR				
	N	Min-Max	Min-Max	a	b	95% CL of a	95% CL of b	R^2
Lepidotrigla microptera	30	270.0-710.0	306-403	0.0123	2.92	0.0085-0.0180	2.81-3.03	0.990
Liparis tanakae	22	50.3-225.1	155-239	0.0848	3.46	0.0469-0.1534	3.01-3.92	0.953
Trachidermus fasciatus	39	0.101-0.418	25.2-38.9	0.0067	3.06	0.0050-0.0090	2.783-3.35	0.954

N, the number of individuals; Max and Min, the maximum and minimum values of the total length or weight; a and b, the estimated parameter for LWR; CI, confidence interval; R^2, determinant coefficient.

(Froese, 2006). The statistical analyses were conducted in PASW Statistics 19.0.

Results and discussion

Descriptive statistics and estimated parameters of LWR for three fish species given were shown in Table I. The R^2 values for all species ranged between 0.953 and 0.990. The length-weight relationships of *L. microptera, L. tanakae* and *T. fasciatus* can be expressed as $W_{L.microptera} = 0.0123L^{2.92}$, $W_{L.\ Tanakae} = 0.0848L^{3.46}$, $W_{T.\ fasciatus} = 0.067L^{3.06}$, respectively. The estimates for the parameter b varied from 2.92 to 3.46. The b value was similar with most Yellow sea species such as *Zebrias zebrinus* (Temminck and Schlegel, 1846), *Setipinna termuifilis* (Valenciennes,1848) and *Pampus echinogaster* (Basilewsky, 1855) which was determined by similar environmental conditions.

These data revealed that all parameters could be used safely within the length ranges given (Liu *et al*., 2013; Ma *et al*., 2017). The length ranges for *T. fasciatus* were narrow, because they were in juvenile stage in March. In the future studies, it is necessary to study a wider length range to overcome the limitation of the data.

In conclusion, these results contribute to the knowledge of the marine species from Yellow Sea in China, Where the given species had no previous estimates of LWR.

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Statement of conflict of interest

The authors have declared no conflict of interest.

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