

## Short Communication

# Length-weight relationship for two flounder species from Iranian waters of the Persian Gulf

Azad Teimori\*

Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, 76169-14111 Kerman, Iran.

**Abstract:** The length-weight (LWR) relationship was estimated for the first time for two flounder species viz. *Pseudorhombus elevatus* Ogilby, 1912 and *Solea elongata* Day, 1877 from Iranian waters of the Persian Gulf. Fishes were collected using fishing boat during August to December 2017. No information is available in FishBase regarding the LWRs of these species. The  $b$  values of the LWR was 2.98 for *P. elevatus* and 3.10 for *C. elongate*, and the  $r^2$  values are 0.996 and 0.989, respectively. These estimates can be used for estimation of biomass of the studied fishes employing length frequency distributions.

*Article history:*

Received 1 November 2018

Accepted 20 December 2018

Available online 25 December 2018

*Keywords:* LWR, Flounder species, Persian Gulf, *Pseudorhombus*, *Solea*.

## Introduction

Among the fish body parameters, the length is often more easily measured factor in field studies; therefore, it can be used to estimate biomass. By taking account of this issue, to date, numerous studies have addressed length-weight relationships (LWRs) as useful tool for conservation and stock assessment of freshwater and marine fishes (Hossain et al., 2014; Mousavi-Sabet et al., 2014; Esmaeili et al., 2015; Zamani-Faradonbe et al., 2015a, b; Keivany et al., 2016; Akhtar and Khan, 2018), studying comparative growth of fishes in fisheries management (Panase and Mengumphan, 2015; Rábago-Quiroz et al., 2017), and in environmental monitoring programs (Froese, 2006). This study provides length-weight data for two flounder species collected from Iranian waters of the Persian Gulf, which have not LWR information available in FishBase (<http://www.fishbase.org>).

## Materials and Methods

Fish species were collected using fishing boat during August to December 2017 from the Iranian waters of the Persian Gulf, Southern Iran. The sampling locations lie between 27°03'16.98"N 56°11'24.05"E to 27°03'32.98"N 56°20'40.06"E. Specimens were

measured to the nearest 0.05 mm total length (TL) using a vernier caliper and weighed to the nearest 0.001 g (total weight, TW). Reference specimens from each fish species were preserved in ethanol (after fixing in formalin) in the Zoological Museum of Shahid Bahonar University of Kerman (ZM-SBUK). The parameters of the length-weight relationship  $W = aTL^b$  were estimated by linear regression of the log-transformed weight and length (Koutrakis and Tsikliras, 2003), where  $W$  is the total weight (g),  $TL$  is the total length (cm),  $a$  is the intercept, and  $b$  is the slope. Prior to regression analysis, log-log plots of the length-weight pairs were performed for visual inspection of outliers (Froese et al., 2011). Extreme outliers were excluded from the analysis. The 95% confidence limits for  $b$  were calculated to see if the hypothetical value of isometry (i.e., 3) fell between these limits. All statistical analyses were performed in Excel 2018.

## Results

Totally, one hundred and eleven specimens were used to estimate the length weight relationships (LWRs) of the studied species. The results of the estimated values of LWR including; length range, weight range,  $a$ ,  $b$ ,

\*Corresponding author: Azad Teimori  
E-mail address: a.teimori@uk.ac.ir

Table 1. The length–weight relationship (LWR) for two flounder species from Iranian waters of the Persian Gulf.

Species	N	TL range (cm)	W range (g)	<i>a</i>	95% CI of <i>a</i>	<i>b</i>	95% CI of <i>b</i>	<i>r</i> <sup>2</sup>
<i>P. elevatus</i>	29	9.90–30.90	11.40–372.0	0.008	0.006–0.005	2.98	3.89–3.99	0.996
<i>S. elongata</i>	42	7.40–19.10	3.50–25.10	0.004	0.004–0.006	3.10	2.24–2.87	0.989

N, sample size; TL, total length; W, body weight; *a*, intercept; *b*, slope of the linear regression; CI, confidence intervals; *r*<sup>2</sup>, coefficient of determination.

95% CI of *a*, 95% CI of *b* and *r*<sup>2</sup> for two species are presented in Table 1. The obtained intercept (*a*) and growth coefficients (*b*) were 0.008 and 2.98 for *P. elevatus*, 0.004 and 3.10 for *C. elongate*, respectively. The regression values were highly significant ( $P < 0.005$ ).

### Discussion

Our results indicated that “*b*” values of the LWR were 2.98 and 3.10, for *P. elevatus* and *C. elongate*, respectively. The estimated *b* values of the regression for these species were within the expected range for teleost fishes between 2.5 and 3.5 (Froese, 2006; Carlander, 1969). Like any other LWR data, the presented estimates can be used for estimation of biomass of the studied fishes employing length frequency distributions. The results of present study are useful for common fisheries investigations.

### Acknowledgments

Shahid Bahonar University of Kerman (SBUK) is acknowledged for its financial support. We also wish to thank local people in Bandar Abbas for their help during fish sampling.

### References

Akhtar N., Khan M.F. (2018). Length–weight relationships of two Nemacheilid fish species *Schistura alepidota* (Mirza & Bănărescu, 1970) and *Schistura shadiwalensis* (Mirza & Nalbant, 1981) from River Swat, Pakistan. *Journal of Applied Ichthyology*, 34(4): 1073-1074.

Carlander K.D. (1969). *Handbook of freshwater fishery biology*. The Iowa State University Press, Ames. Pp: 1-752.

Esmaeili H.R., Masoudi M., Sayyadzadeh G., Mehraban Z., Teimori A. (2015). Length–weight relationships for four *Aphanius* species of Iran (Teleostei: Cyprinodontidae). *Journal of Applied Ichthyology*,

31(30): 578–579.

Froese R. (2006). Cube law, condition factor and weight length relationships: history, meta-analysis and recommendations. *Journal of Applied Ichthyology*, 22(4): 241-253.

Froese R., Tsikliras A.C., Stergiou K.I. (2011). Editorial note on weight–length relations of fishes. *Acta Ichthyologica Et Piscatoria*, 41(4): 261–263.

Hossain M.Y., Mosaddequr Rahman M., Ahamed F., Ahmed Z.F., Ohtomi J. (2014). Length-weight and length-length relationships and form factor of three threatened fishes from the Ganges River (NW Bangladesh). *Journal of Applied Ichthyology*, 30(1): 221–224.

Keivany Y., Nezamoleslami A., Dorafshan S., Eagderi S. (2016). Length-weight and length-length relationships in populations of *Garra rufa* from different rivers and basins of Iran. *International Journal of Aquatic Biology*, 3(6): 409-413.

Koutrakis E.T., Tsikliras A.C. (2003). Length–weight relationships of fishes from three northern Aegean estuarine systems (Greece). *Journal of Applied Ichthyology*, 19(4): 258-260.

Mousavi-Sabet H., Khataminejad S., Vatandoust S. (2014). Length–weight and length–length relations of the seven endemic *Alburnus* species (Actinopterygii: Cypriniformes: Cyprinidae) in Iran. *Acta Ichthyologica Et Piscatoria*, 44(2): 157-158.

Panase P., Mengumphan K. (2015). Growth performance, Length-Weight relationship and condition factor of backcross and reciprocal hybrid catfish reared in Net Cages. *International Journal of Zoological Research*, 11(2): 57-64.

Rábago-Quiroz C.H., García-Borbón A., Palacios-Salgado D., Barrón-Barraza F. (2017). Length–weight relation for eleven demersal fish species in the artisanal shrimp fishery areas from the Bahía Magdalena Almejas lagoon system, Mexico. *Acta Ichthyologica Et Piscatoria*, 47(3): 303-305.

Zamani-Faradonbe M., Eagderi S., Shahbazi-Naserabad S.

(2015a). Length-weight relationships and condition factor of three fish species from Taleghan River (Alborz Province, Iran). *Journal of advanced Botany and Zoology*, 2(3): 1-3

Zamani Faradonbeh M., Eagderi S., Ghajoghi F. (2015b). Length-weight relationship and condition factor of seven fish species of Totkabon River (southern Caspian Sea basin), Guilan, Iran. *International Journal of Aquatic Biology*, 3(3): 172-176