TECHNICAL CONTRIBUTION

Length-weight relationships for three zoarcoid fish species from the coastal waters of the northern Yellow Sea, China

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Summary
Length–weight relationships (LWRs) were determined for three zoarcoid fish species: Zoarces elongatus Kner, 1868, Pholis fangi (Wang & Wang, 1935) and Chirolophis japonicus Herzenstein, 1890. Samples were collected from the coastal waters of the northern Yellow Sea (near Dalian City) using bottom trawl nets (20 mm stretched mesh size in the cod-end) for Zoarces elongatus and Pholis fangi and set gill nets (mesh size 15.6 mm) for Chirolophis japonicus. Samples were taken from mid-March to early April 2017. Parameter b values in the fitted LWRs were 3.119, 3.440 and 3.423 for Zoarces elongatus, Pholis fangi and Chirolophis japonicus, respectively.

INTRODUCTION

The length–weight relationship (LWR) is a critical tool in fishery resources research and management (Froese, 2006; Pauly, 1983). It has been widely used to calculate condition factors (Froese, Tsikliras, & Stergiou, 2011; Petrakis & Stergiou, 1995), estimate biomass through length observation (Andrade & Campos, 2002). Moreover, comparing LWRs among different fish species or populations could better gain insight into their life history and morphological characteristics (Gonçalves et al., 1997; Torres, Ramos, & Sobrino, 2012).

The coast sea of the northern Yellow Sea in China has abundant fishery resources, historically being an important fishing ground (Lin, Ning, Su, Lin, & Xu, 2005). However, there is still lack of biological characteristics for some commercially exploited fish species in this

<table>
<thead>
<tr>
<th>Species</th>
<th>N</th>
<th>Weight (g)</th>
<th>Total length (cm)</th>
<th>a</th>
<th>b</th>
<th>95% CI of a</th>
<th>95% CI of b</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoarces elongatus Kner, 1868</td>
<td>58</td>
<td>14.0-147.0</td>
<td>15.7-32.7</td>
<td>0.0024</td>
<td>3.119</td>
<td>0.0014-0.0041</td>
<td>2.949-3.288</td>
<td>.960</td>
</tr>
<tr>
<td>Pholis fangi (Wang &amp; Wang, 1935)</td>
<td>61</td>
<td>1.0-11.8</td>
<td>8.3-16.8</td>
<td>0.0006</td>
<td>3.440</td>
<td>0.0004-0.0010</td>
<td>3.276-3.605</td>
<td>.967</td>
</tr>
<tr>
<td>Chirolophis japonicus Herzenstein, 1890</td>
<td>48</td>
<td>12.5-175.2</td>
<td>12.8-26.8</td>
<td>0.0024</td>
<td>3.423</td>
<td>0.0016-0.0034</td>
<td>3.295-3.551</td>
<td>.984</td>
</tr>
</tbody>
</table>

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 LWRs; CI, confidence interval; R², determinant coefficient.

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area. In the present study, three commercially important zoarcoid fish species: Zoarces elongatus Kner, 1868, Pholis fangi (Wang & Wang, 1935) and Chirolophis japonicus Herzenstein, 1890, are studied to provide the first references for their LWRs.

2 | MATERIALS AND METHODS

Fish samples were collected from the coastal sea of city Dalian, northern Yellow Sea of China (38°49′N, 121°25′E) using bottom trawl nets (20 mm stretched mesh size in the cod-end) for Zoarces elongatus and Pholis fangi and set gill nets (mesh size 15.6 mm) for Chirolophis japonicus from mid-March to early April 2017. Each individual was identified to species level according to the literature (Chen & Zhang, 2015; Froese & Pauly, 2017; Liu, Chen, & Ma, 2015). The total length (TL, cm) and body weight (W, g) were measured to the nearest 0.1 cm and 0.1 g respectively.

The LWR is expressed by the equation: \[ W = a \times L^b \], where \( W \) is the body weight, \( L \) is the total length, \( a \) and \( b \) are regression parameters. Parameters \( a \) and \( b \) were estimated by the converted logarithmic expression: \[ \log W = \log a + b \log L \], where \( \log a \) represents the regression intercept and \( b \) is the regression slope (Froese, 2006; Ricker, 1973). Additionally, the 95% confidence interval (CI) for parameter \( a \) and \( b \) and the degree of association between \( \log W \) and \( \log L \) (\( R^2 \)) were also determined (Froese, 2006). All statistical analyses were conducted with Excel 2013.

3 | RESULTS

In the present study, a total of 167 individuals from three species were used to determine the LWRs. Descriptive statistics and the estimated length-weight relationship parameters for each species were given in Table 1.

4 | DISCUSSION

A new maximum TL (32.7 cm) for Zoarces elongatus was updated. In contrast, the size range for Chirolophis japonicus covered in this study is limited and included just a bit more than 50% of the known TL maximum (55.0 cm) (Novikov, Sokolovsky, Sokolovskaya, & Yakovlev, 2002). The relative small size range included may be due either to area specific growth limitations or due to mesh size restrictions of the fishing gear used. Further studies should help clarifying the issue and presently the given estimate should be considered as being tentative. Overall, the estimated parameters \( a \) and \( b \) of the equation for the other two species were within or partially overlapping with their corresponding Bayesian range estimates (Froese & Pauly, 2017).

In conclusion, the length-weight relationships presented here provide useful information to convert length data in field fisheries studies.

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REFERENCES


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