Seasonal Variations of Length-Weight Relationship

**Pampus chinensis** (Euphrasen, 1788) Chinese Silver Pomfret Collected from Karachi Fish Harbour

Quratulan Ahmed, Semra Benzer

**Abstract**

The present study was carried out to assess length-weight and condition factor of *Pampus chinensis* (Euphrasen, 1788) from Karachi Fish Harbour. The largest (360 mm) and heaviest (230 g) were collected in post-monsoon. Condition Factor (CF) of *Pampus chinensis* varied from 0.4908 to 0.9621 in all individuals. The lowest mean condition (0.6615 ± 0.04) was measured in monsoon. The lowest mean length (276.46±5.53) was measured in pre-monsoon. The maximum mean weight of fish, 184.54± 2.97 was obtained in monsoon. The lowest mean weight of 160.71± 4.57 was recorded in pre-monsoon. The relationship between length and weight of *Pampus chinensis* was given by an equation W = 0.4943253 × L^{1.438} for all individuals. Statistical analysis (ANOVA) was performed to test the differences between seasons to determine the differences. The relationship between length and weight of *Pampus chinensis* length, weight and condition factor were insignificant in all seasons (p > 0.05).

**Keywords:** Length-Weight Relationship, *Pampus chinensis*, Chinese Silver Pomfret, Karachi Fish Harbour.

1. Introduction

*P. chinensis* is benthopelagic and amphidromous fish (Riede, 2004) \(^{[17]}\). They occur seasonally singly or in small schools over muddy bottoms and prey on mainly ctenophores, salps, jellyfish, zooplankton and small benthic organisms (Last, 1997) \(^{[6]}\). Therefore it may be suggested that *P. chinensis* is also a very good bio-indicator for monitoring heavy metals in coastal waters.

As fish is an important and high protein source of food for people all over the world (Pawar and Sonawane, 2013) \(^{[15]}\), this in itself imposes a need for detailed investigation of metal pollution and control of their levels (Patin, 1982) \(^{[13]}\). *P. chinensis* is carnivour fish (Last, 1997) \(^{[6]}\) and plays important role in food chains. Chinese silver pomfret are consumed in fresh (Last, 1997) \(^{[6]}\).

Length–length relationships are also important for comparative growth studies (Moutopoulos and Stergiou, 2002) \(^{[9]}\). The length-weight relationships of fish are important for converting length observations, obtained for example from underwater visual census methods, into weight estimates for, for example, biomass estimates (Froese, 1998) \(^{[2]}\). The condition factor also expresses the physical and environmental conditions of fish (Le Cren, 1951) \(^{[7]}\). It is used for comparing the condition, fatness, or well-being of fish (Tesch, 1968) \(^{[19]}\).

Karachi Harbour is the most important fishing area in Pakistan (Siyal et al., 2013) \(^{[18]}\). In addition, the numerous industrial, sewage and agricultural wastes reach the Karachi Coastal area through some rivers that are heavily polluted in several places. The dumping of wastes in the coast provides a significant source of heavy metal input (Khattak et al., 2012; Mukhtar and Hannan, 2012) \(^{[5,10]}\).

The some properties of *Pampus* species was in investigated by researchers (Mustafa, 1999; Pauly, 1996; Dutta et al., 2012; Lee et al., 1992; Hussain et al., 1997) \(^{[11,14,1,8]}\). The objective of the present research is to provide Length – Weight relationships data for *Pampus chinensis* from the Karachi Harbour, Pakistan.

**Materials and Methods**

The 72 sample was collected from Katrachi Fish Harbour during Pre-monsoon, monsoon, and post-monsoon seasons in the year of 2013. Twentyfour sample was selected in each season.
The Karachi coastline is between latitude 24°53’N and longitude 67°00’E, and lies in the Northern boundary of Arabian Sea.

The fish samples were measured the fork length (FL) to the nearest 0.1 cm and body weight (BW) to the nearest 0.1 g. The relationship between FL and BW was calculated separately with log10-transformed data (Le Cren, 1951) [7]. The condition factors (CF) of fish was determined using the formula (W x L-3) x 100 (Ricker, 1975) [16], where W= body weight and L= body length. The values of constant ’a’ and ’b’ were estimated from the log transformed values of length and weight for equation, log W = log a + b log L. or power model, W = a.L b, to test the cube model of fish growth (Le Cren, 1951) [7].

Statistical analysis (ANOVA) was performed to test the differences between seasons to determine the differences.

Results

The length, weight, condition parameters and the length-weight relationships of the selected species are shown in Table 1 and Table 2 according to seasons. Mean FL (mm, min-max) were founded 276.46 (240-325) for pre-monsoon. Mean BW (g, min-max) and mean CF (value, min-max) were founded 160.71 (132-204), and 0.77 (0.59-0.96) for pre-monsoon. Mean FL (mm, min-max) were founded 303.5 (290-340) for monsoon. Mean BW (g, min-max) and mean CF (value, min-max) were founded 184.54 (168-218), and 0.66 (0.55-0.69) for monsoon. Mean FL (mm, min-max) were founded 285.0 (260-360) for post-monsoon. Mean BW (g, min-max) and mean CF (value, min-max) were founded 167.25 (146-230), and 0.73 (0.49-0.83) for post-monsoon.

Length and weight (min-max) of the fish was 240-360 mm and 132-230 g. The maximum mean length of (303.50±2.91) Pampus chinensis in monsoon. The lowest mean length (276.46±5.53) was measured in pre-monsoon (Table 1). The maximum mean weight of fish, 184.54± 2.97 was obtained in monsoon. The lowest mean weight of 160.71± 4.57 was recorded in pre-monsoon (Table 1).

Table 1: Mean fork length (FL, mm), mean Body weight (BW, g), mean condition factor (CF) for seasons of Pampus chinensis from Karachi Fish Harbour.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>FL±SE (min.-max., mm)</th>
<th>BW±SE (min.-max., g)</th>
<th>CF±SE (min.-max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Monsoon</td>
<td>276.46± 5.53</td>
<td>160.71± 4.37</td>
<td>0.77± 0.04</td>
</tr>
<tr>
<td>Monsoon</td>
<td>303.5± 2.991</td>
<td>184.54± 2.97</td>
<td>0.66± 0.06</td>
</tr>
<tr>
<td>Post-Monsoon</td>
<td>285.0± 6.33</td>
<td>167.25± 5.35</td>
<td>0.73± 0.02</td>
</tr>
<tr>
<td>General</td>
<td>288.3± 3.22</td>
<td>170.83± 2.78</td>
<td>0.72± 0.01</td>
</tr>
</tbody>
</table>

Table 2: Length and Weight relationship in Pampus chinensis from Karachi Fish Harbour.

<table>
<thead>
<tr>
<th>Seasons</th>
<th>Length and Weight Equations</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Monsoon</td>
<td>W = 0.06448330 × L1.3907</td>
<td>0.997</td>
</tr>
<tr>
<td>Monsoon</td>
<td>W = 0.01596722 × L1.6366</td>
<td>0.969</td>
</tr>
<tr>
<td>Post-Monsoon</td>
<td>W = 0.05871858 × L1.4067</td>
<td>0.998</td>
</tr>
<tr>
<td>General</td>
<td>W = 0.04943253 × L1.438</td>
<td>0.993</td>
</tr>
</tbody>
</table>

The Condition Factor of Pampus chinensis varied from 0.4908 to 0.9621 in all individual. The lowest mean condition (0.66 ± 0.06) was measured in monsoon (Table 1). The maximum mean condition of fish 0.77 ± 0.04 was obtained in pre-monsoon.

The differences between length, weight and condition factor were insignificant in all seasons (p < 0.05). The differences between length, weight and condition factor were insignificant in pre-monsoon – post-monsoon (p < 0.05).

Length–weight relationships were calculated using the data of all fish samples. The relationship was W = 0.04943253 × L1.438 for all individuals. The relationship was W = 0.06448330 × L1.3907 for pre-monsoon. The relationship was W = 0.01596722 × L1.6366 for monsoon. The relationship was W = 0.05871858 × L1.4067 for post-monsoon. (Table 2 and Figure 1). Length–weight curves for all individual are drawn according to seasons in Figure 1. The b value is often 3.0 and generally between 2.5 and 3.5. As the fish grows, changes in weight are relatively greater than changes in length, due to approximately cubic relationships between fish length and weight. The b values in fish is species specific and varies with sex, age, seasons, physiological conditions, growth increment and nutritional status of fish (Bagenal and Tesch, 1978). The slope (b) values of the length–weight relationship in both gender is found as a 1.438 for Pampus chinensis from Karachi Harbour.
Discussion
Some previously reported results in other location of the world mostly indicate variation in the b values. Mustafa (1999) [11] also reported Pampus chinensis in the Bay of Bengal as $a = 0.03120, b = 2.983$ for all individuals; Pampus argentus in the Bay of Bengal $a = 0.04230, b = 2.929$ for all individuals. Pauly (1999) also reported Pampus argentus in Kuwait $a = 0.01660, b = 2.503$; Dutta et al. (2012) [1] reported Pampus argentus in Northern Bay of Bengal $a = 0.02770, b = 2.840$; Lee et al. (1992) [8] reported Pampus argentus in Korean waters $a = 0.03450, b = 3.000$; Hussain et al. (1977) reported Pampus argentus in Kuwaiti waters $a = 0.03930, b = 3.058$. Pati (1981) [12] reported $W = 0.007345 \times L^{2.82}$ for Pampus chinensis and Pati (1981) [12] reported $W = 0.01340 \times L^{2.53}$ (mature male) and $W = 0.009523 \times L^{2.69}$ (mature female) for Pampus argentus. This variation can be affected by sex, gonad maturity, health, season, habitat, nutrition, environmental conditions (such as temperature and salinity), area, degree of stomach fullness, differences in the length range of the caught specimen, and fishing gear (Tesch, 1971; Froese, 2006) [13].

Conclusion
According to these obtained data, it should be followed the growth and length and weight relationship of Pampus chinensis from Karachi Coastal. This study can be of help to fishery managers of the Karachi Coastal, because of the lack of documentation about length-weight relationship of the selected species of the Karachi Coastal.

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