

Length-Weight Relationship in *Terapon puta* (Cuvier, 1829) Collected from Karachi Fish Harbour

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Received: June 13, 2015

Accepted: September 1, 2015

ABSTRACT

In the present study 96 fish samples of *Terapon puta* of variable sizes ranging from 73 - 96 g weight and 135 - 183 mm in fork length (FL) in all individual were sampled from Karachi Fish Harbour. The largest (183 mm) and heaviest (96 g) were collected in moonsoon. Condition Factor (CF) of *Terapon puta* varied from 1.57 to 2.97 in all individuals. The lowest mean condition (2.10 ± 0.28) was measured in moonsoon. The relationship between length and weight of *Terapon puta* was given by an equation $W = 0.76416090 \times L^{0.9328}$ 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 *Terapon puta* length, weight and condition factor were insignificant in all seasons ($p > 0.05$).

KEYWORDS: Length-Weight Relationship, *Terapon puta*, Small-scaled terapon, Karachi Fish Harbour.

INTRODUCTION

Length-length relationships are also important for comparative growth studies (Moutopoulos and Stergiou, 2002). 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). The condition factor also expresses the physical and environmental conditions of fish (Le Cren, 1951). It is used for comparing the condition, fatness, or well-being of fish (Tesch, 1968).

Karachi Harbour is the most important fishing area in Pakistan (Siyal et al., 2013). *Terapon puta* belong to the family Teraponidae is a medium size food fish which inhabits the sea, backwater and estuaries in Pondicherry coast (Nandikeswari and Anandan, 2013). *Terapon puta* are lived Indo-West Pacific: northern Indian Ocean and the Indo-Australian Archipelago. A lessepsian migrant, now prevalent in the Mediterranean (Golani; 2002) and Adults inhabit coastal waters, entering brackish estuaries (Allen and Swainston, 1988) and mangrove areas (Paxton et al; 1989). *Terapon puta* could be in also in fresh waters (Sommer et al., 1996). They are feed on fishes and invertebrates.

The some properties of *Terapon puta* was investigated by researchers (Saad, 2005, Mehanna, 2007; Sichum et al. 2013; Karna and Panda, 2012; Nandikeswari and Anandan., 2013; Pauly et al., 1998).

The objective of the present research is to provide length and weight relationship data for *Terapon puta* from the Karachi Harbour, Pakistan.

MATERIALS AND METHODS

This study was carried out on 96 collected in Karachi Fish Harbour. Samplings were done every seasons (32) from January 2012 to December 2012. The Karachi coastline is between latitude $24^{\circ}50' 55''$ 'N and longitude $66^{\circ} 58' 39''$ E, and lies in the Northern boundary of Arabian Sea. Samples of *Terapon puta* were collected seasonally (pre-monsoon, monsoon and post-monsoon) from Karachi coast, Fish Harbour (Figure 1).

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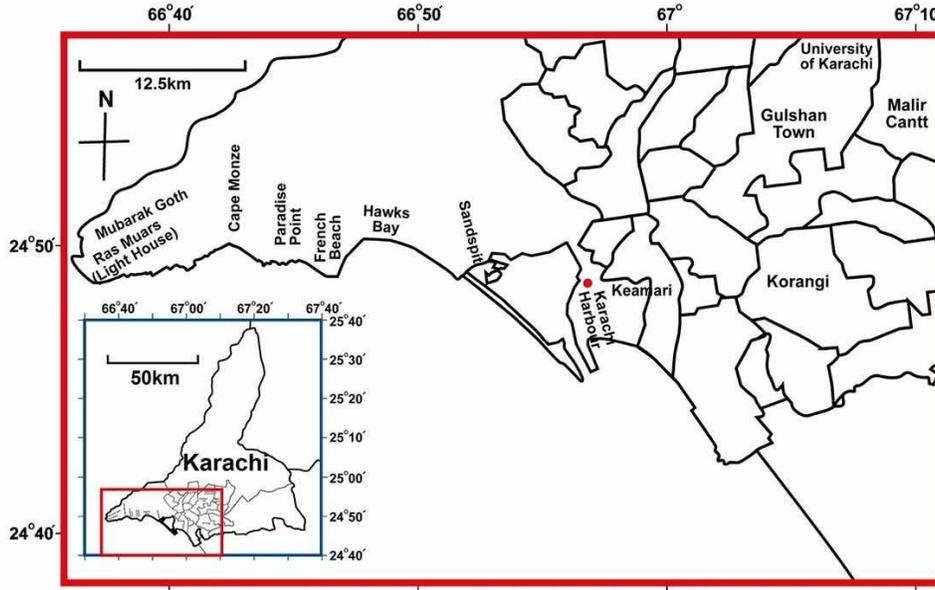


Figure 1. The map of Karachi Harbour, Pakistan.

The fish samples were transported to the laboratory to record 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 for each sex with log₁₀-transformed data (Le Cren, 1951). The condition factors (CF) of fish was determined using the formula $(W \times L^{-3}) \times 100$ (Ricker, 1975), 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).

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

RESULT

A total of 96 samples of *Terapon puta* were collected from Karachi Fish Harbour during January 2012 to December 2012. Length and weight (min-max) of the fishes were 135 - 183 mm and 73-96 g. The maximum mean length (161.72 ± 1.81) of *Terapon puta* was obtained in monsoon. The lowest mean length (145.69 ± 1.71) was measured in pre-monsoon (Table 1). The maximum mean weight of fish (87.69 ± 0.76) was obtained in monsoon. The lowest mean weight of fish (80.00 ± 1.01) 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 *Terapon puta* from Karachi Fish Harbour.

Seasons	N	Parameters		
		FL±SE (min.-max. mm)	BW±SE (min.-max. g)	CF±SE (min.-max.)
Pre-Monsoon	32	145.69 ± 1.71 135-170	80.00 ± 1.01 73-91	2.62 ± 0.01 1.85-2.97
Monsoon	32	161.72 ± 1.81 150-183	87.69 ± 0.76 82-96	2.10 ± 0.05 1.57-2.46
Post-Monsoon	32	156.47 ± 1.63 145-175	84.88 ± 0.91 78-94	2.24 ± 0.04 1.75-2.56
General	96	154.63 ± 1.20 135 - 183	84.19 ± 0.06 73-96	2.32 ± 0.04 1.57-2.97

DISCUSSION

Length–weight relationships were calculated using the data of all fish samples. The relationship was $W = 0.76416090 \times L^{0.9328}$ for all individual (Table 2 and Figure 2). Length–weight curves for all individual are drawn according to seasons in Figure 2. 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. Thus, measurement of change in weight may provide a more precise measure of growth over short periods of time. However, a change in weight may be a very transient indicator of growth, because weight can be both gained and lost. Thus, when fish are feeding and growing well, an individual may have a greater than usual weight at a particular length (Hart and Reynolds, 2004).

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 0.9328 for *Terapon puta* from Karachi Harbour. 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, 1968). In this study, environmental or habitat factors were not analysed. However, more research is needed including analyzing environmental or habitat factors to understand the cause of low b value in Karachi Coastal.

The male are compared to female during the peak spawning period and such pre-ponderance could be due to migration of female to relatively deeper waters therefore being less vulnerable for spawning or behavioral differences between the two sexes (Nandikeswari et al., 2013). On the other hand, male live in shallow areas from where they are easily caught. The reasons probably may be ecological or genetical or both (Lawson and Olagundoye, 2011) and may be due to the faster growth of male (Beevi and Ramachandran, 2005). It is interesting to note that during the months of September and October the ratio of male to female is 1:1 which ensures the success of spawning. The Chi-square values calculated month wise showed that the sex ratio is almost same in most of the months similar to the expected ratio of 1:1 except the months July, February and March.

CF of *Terapon puta* varied from 1.57 to 2.97 in all individuals. The lowest mean condition (2.10 ± 0.05) was measured in monsoon (Table 1). The maximum mean condition of fish 2.63 ± 0.01 was obtained in pre - monsoon.

The differences between length, weight and condition factor were insignificant in all seasons ($p > 0.05$).

Terapon puta (unsexed), has been reported growth ($a=0.01023$; $b = 3$) (Pauly et al., 1998) for a size range of 102-112 mm. Karna and Panda (2012) reported length and weight of *Terapon puta* in India 93-122 mm and 16.90-34.31 g. Nandikeswari and Anandan (2013) reported length and weight of *Terapon puta* in Bengal 134-219 mm and 30-78 g.

Table 2. Length and Weight relationship in *Terapon puta* from Karachi Fish Harbour.

Seasons	Length and Weight Equations	Correlation
Pre-Monsoon	$W = 0.38348739 \times L^{1.072}$ $\text{Log } W = -0.4162 + 1.072 \log L$	0.979
Monsoon	$W = 1.72496627 \times L^{0.7725}$ $\text{Log } W = 0.2368 + 0.7725 \log L$	0.991
Post-Monsoon	$W = 0.45373356 \times L^{1.0353}$ $\text{Log } W = -0.3432 + 1.0353 \log L$	0.989
General	$W = 0.76416090 \times L^{0.9328}$ $\text{Log } W = -0.1168 + 0.9328 \log L$	0.981

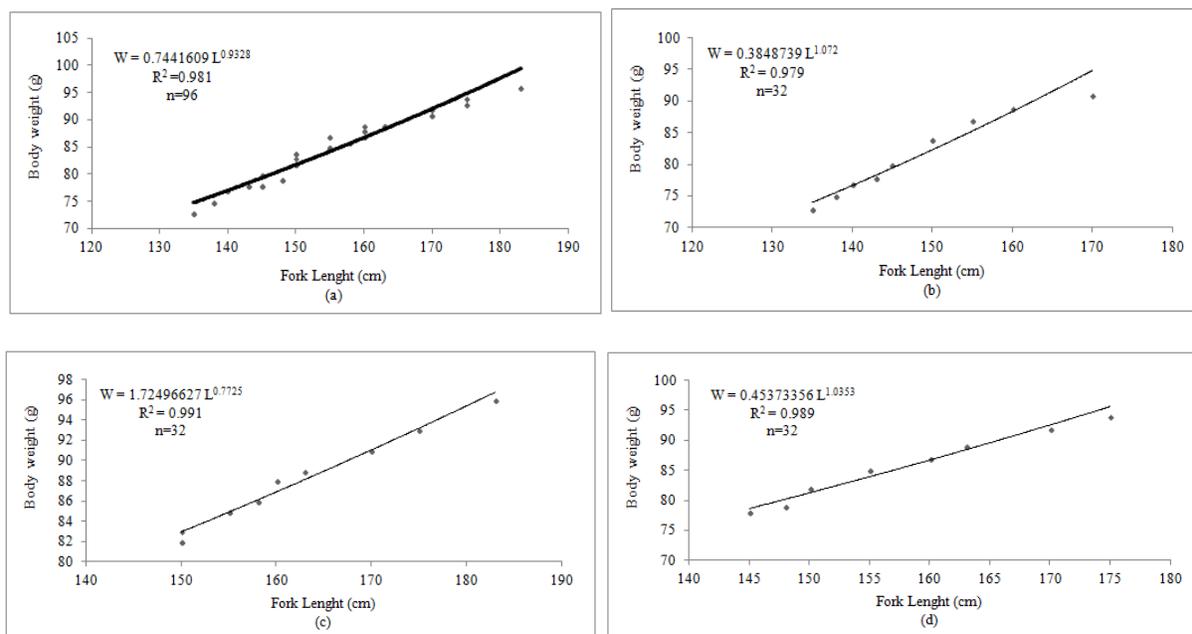


Figure 2. Length–weight relationships in (a) all season, (b) pre-monsoon, (c) monsoon and (d) post-monsoon for *Terapon puta*

Conclusions

Conclusively, it is suggested that further study should be conducted on the composition of Length–weight relationships of the caught species. There are no any literature for growth of *Terapon puta*. According to these obtained data, it should be follow the growth and length and weight relationship of *Terapon puta* from Karachi Coastal.

Acknowledgement

We would like to thank all the referees, who have added value to our paper with their thorough reviews and recommendations.

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