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LENGTH-WEIGHT RELATIONSHIP IN *POMADASYS MACULATUM* (BLOCH) FROM KARACHI COAST, PAKISTAN

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ABSTRACT

The regression parameters for intercept (a) and slope (b) of the length (L)-Weight (W) relationship for the model $W = a.L^b$ were determined in *Pomadasys maculatum* (Bloch 1797) (family: Pomadasyidae). Data on fish size was gathered for 221 male and 231 females fishes collected from Karachi coast and analyzed with correlation and regression to determine relationship of fish weight with standard (SL) and total (TL) lengths in male, female separately and with pooled data for the two sexes. The magnitude of exponents (b) varied only slightly in the regression equations. The t-test for various pairs (male vs. female, male vs. pooled sexes and female vs. pooled sexes) for SL or TL as independent variables indicated the differences among the values of b statistically insignificant at $p < 0.05$. The regression lines were therefore parallel in this species. The magnitude of b was in all cases near 3 which indicated that that this fish grew symmetrically and isometrically.

Keywords: *Pomadasys maculatum*, Length- Weight relationship, Sex specific variation.

INTRODUCTION

Grunts (*Pomadasys Maculatum* (Bloch) (family: Pomadasyidae) are edible marine fishes known for their grunting sounds which they sometimes make when disturbed. In 2002 the average annual landing of *Pomadasys* sp., caught have been recorded to be 3121 metric tons from Sindh coast, 2151 metric tons from Baluchistan coast and 44 metric tons from exclusive economic zone totaling to 5316 metric tons (MFD, Pakistan, 2006).

Information on various aspects of Pomadasyidae is available from various countries of South East Asia, America, Australia, U.A.E., India, Kuwait, Taiwan, Thailand, Japan, South America, Indonesia, China, Korea etc. (LeCren, 1951; Karakar and Bal, 1960; Kanchina, 1978; Tian; 1982; Aprieto and Villoso; 1982 Abu Hakima, 1988; Deshmukh, 1973; Beyer 1991 ; Bauchot and Hureau 1990; Blaber, 1997; Al-Ghais, 1995; Brothers and McFarland, 1981; Ben- Tuvia, 1976; Ben-Tuvia and Mckay, 1986; Hussain *et al.*,, 2002; Joubert, 1981; Lee, 1985; Anon., 2002).

The species is distributed along the northwest coast of India to the southern Oman, in the south to Seychelles, Madagascar and South Africa in the coastal waters, estuaries, tidal fissures and even can tolerate fresh water. Besides forming a good recreational fishery (Smith and McKay, 1986; Mann *et al*., 2002), this has also been identified as a powerful candidate for intensive marine fish farming (Decon and Hecht, 1995; Mperdempes and Hecht, 2002).

Few *Pomadasys* species have been reported from Pakistan (Iqbal, 1989; Bianchi, 1985; Hoda, 1985; Hussain, 1992; Hussain *et al.*, 2002; Hussain and Ahmed, 1992; Imtiaz and Khan, 2004; Khan and Huda, 1993). In fishery practice, knowledge of length-weight relationship for a given species is highly useful in some ways i.e. the poundage of fish can be easily computed from data on number and fish size. The fisheries may be regulated in response to the demand in the Market for fish not less than a particular weight.

The present study determines the length-weight relationship (LWR) in *P. maculatum* in view of its ecological and economic importance. Moreover, such information may be useful for fish stock assessment.

MATERIAL AND METHODS

The present study is based on random Samples of the *Pomadasys maculatum* (Bloch, 1797) were collected fortnightly (a total of 32 collections) from commercial fish catches, landed at fish harbors of West Wharf and Korangi Creek area (latitude 24^0 48' longitude 66^o 58' E), from January 2001 to April 2002. The fishes were brought to the laboratory as fresh as possible. A total of 452 specimens of *Pomadasys maculatum* (Bloch, 1797) were collected in which 221 were male and 231 are females. Sex, number, size (total and standard length (TL, SL) and

weight of the monthly samples were recorded. The length - weight relationships of all samples collected were determined by the model, $W = a.L^b$, where W is the derived weight (g), L is the standard length (SL) or total length (TL) (in mm), 'a' is the intercept of the regression line and 'b' the regression coefficient (Tesch, 1971).

The required data collected in *Pomadasys Maculatum* was classified into female, male, and pooled sexes categories for calculating the length- weight relationship according to the method of LeCren (1951) as follows:

$W= a .L^b$ straight line regression equation applying log –log transformation model. The parameters 'a' and 'b' were estimated for male, female and combined sexes separately.

The significance of difference of slope 'b' for any arrangement i.e. male versus female, male and female versus pooled sexes was examined by t-test for $df = n_1+ n_2 – 4$, at $p < 0.05$. Our goal was to establish that the slope coefficient for different pairs is insignificant or not. It was determined whether the difference of variances of $\hat{Y}$ was significant or insignificant, so we employed F-test (df, n_1-1 and n_2-1; $p <0.05$). Zar (1996) was the reference in statistical procedures.

RESULTS AND DISCUSSION

A total of 452 specimens of *Pomadasys maculatum* were studied for their gender, length and weight as summarized in Table 1a and 1b. The weight as function of length especially in animal having stream line body, for example fish , shrimp and lobster, is an important in biological studies .The study is undertaken to calculate how the weight in fishes and allied species was affected by an increase in the body length (Khaliluddin and Haq 1998). Length-weight relationship of *P. maculatum* was determined by correlation and regression analyses for the model, $W = a.L^b$ (Table 2a and 2b) in case of male, female fishes separately and pooled data for the two sexes. The values of exponent 'b' for SL-W relationship ranged from 2.843 to 2.93 and of TL-W relationship from 2.799 to 2.86. These values were very to each other and also much closer to 3. According to Tesch (1971) the magnitude of b in such analysis may vary between 2 and 3. The closeness of values of 'b' to a quantum of 3 in the cases studied indicated that *P. maculatum* grew symmetrically and isometrically (cf. Tesch, 1971).

F-test for difference in the variances of $\hat{Y}$ was insignificant. Furthermore, application of t-test in different pairs of comparisons between sexes and also the pooled data for the combined category of sexes i.e. male versus female, female versus pooled category of sexes and male versus pooled category of sexes indicated that t-calculated was always lesser than the tabulated value of t at $p < 0.05$ and $df = n_1+n_2 -4$. That is to say that there was no statistically significant difference among the various values of regression coefficients obtained for the different sexes and the regression lines were parallel to each other.

Table 1(a). Summary of total length (mm)-weight relationship in *Pomadasys maculatum* for equation $W=a.L^b$.

Sex	Number	Size (mm)	Weight (g)	a	b	r^2
Male	221	79-220	8-136	-4.518	2.866	0.989
Female	231	89-219	9.5-146	-4.361	2.799	0.983
Combined	452	79-220	8-146	-4.485	2.853	0.988

Table 1(b). Summary of standard length (mm)-weight relationship in *Pomadasys maculatum* for equation $W=a.L^b$.

Sex	Number	Size (mm)	Weight (g)	a	b	r^2
Male	221	90-200	8-136	-4.361	2.930	0.985
Female	231	90-210	9.5-146	-4.172	2.843	0.973
Combined	452	90-210	8-146	-4.31	2.907	0.981

Table 2(a). Test for comparison of regression coefficients (bs) of equations estimating weight of fish (Yi) with TL (Xi) of *P. maculatum* $-W = a.L^b$.

Sex Combination	Pair Exponents(b_1-b_2)	t_{cal}	d.f=n_1+n_2-4	$t_{tab=0.05/2=0.025}$	Conclusion
Male vs. Female	2.866 2.799	1.5158	448	1.960	insignificant
Male vs. Combined Sex	2.866 2.853	0.3659	669	1.960	insignificant
Female vs. Combined Sex	2.799 2.853	1.2937	679	1.960	insignificant

Table 2(b).Test for comparison of regression coefficients (bs) of equations estimating weight of fish (Yi) with SL (Xi) of *P. maculatum* - $W = a.L^b$.

Sex Combination	Pair Exponents (b_1-b_2)	t_{cal}	d.f=n_1+n_2-4	$t_{tab=0.05/2=0.025}$	Conclusion
Male vs Female	2.930 2.843	1.5179	448	1.960	insignificant
Male vs Combined Sex	2.930 2.907	0.5248	669	1.960	insignificant
Female vs Combined Sex	2.843 2.907	1.2100	679	1.960	insignificant

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