Sindh Univ. Res. Jour. (Sci. Ser.) 45 (4): 661-664 (2013)

SINDH UNIVERSITY RESEARCH JOURNAL (SCIENCE SERIES)

Length-weight relationship of the Silurid catfish *Sperata seenghala* Sykes 1839 (Bagridae) from Indus River, Sindh, Pakistan

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Abstract: The present investigation describes the length-weight relationship of *Sperata seenghala* from the River Indus in Sindh, Pakistan. The exponent *b* values estimated for the total length in relation to body weight were 3.00, 3.17 and 3.05 for male, female and mixed sexes, respectively, indicating the isometric growth in males and positive allometric growth for females.
To the best knowledge of the authors, this study presents the first reference on length-weight relationships of *S. seenghala* in Indus River, Sindh, Pakistan.

Keyword: Sperata seenghala, L-W relationship, Indus River

1. INTRODUCTION

The Silurid catfish *Sperata seenghala* (Sykes, 1939) is one of the largest freshwater catfish in the rivers, reservoirs and inter-connected watersheds of the Indian sub-continent (Talwar and Jhingran, 1991). It is commonly referred to as the giant river catfish (Rahman et al., 2011), and locally, as seenghari. The species is commercially important and widely distributed in south Asia and has been reported from Afghanistan, Pakistan, India, Bangladesh and Nepal (Talwar and Jhigran 1991; Jayram 2002; Saini et al., 2008). It has one of the highest market demands among the edible fishes in Bangladesh (Rahman et al., 2011) and is also considered as one of the most edible species in Pakistan (Personal observation). Due to decline in its natural stocks especially in Bangladesh, the species has been declared as endangered under the IUCN Red List species (IUCN, 1998; Rahman et al., 2005; Rahman et al., 2011). However, the status of *S. seenghala* in Pakistan waters is little known, with very few studies focused on this important species. The significance commercial and economic value of *S. seenghala* makes it also a potential candidate for the aquaculture and hence the sound management of its fisheries within Pakistan and the wider Indian sub-continent remains key to its conservation efforts. Surprisingly, studies on this species from the Pakistan waters are limited, with existing reports comprising of only one study by Sandhu and Lone (2002). Length-weight relationships are key parameters essential for the estimation of production and biomass of fish populations (Anderson and Gutreuter, 1983; Safran, 1992; Petrakis and Stergiou, 1995; Dulcic and Kraljevic, 1996). Furthermore, length-weight relationships are helpful for both applied and basic use in fisheries management (pitcher and Hart, 1982) including the estimations of weight from length observations, estimations of production and biomass of fish populations, and provision of information on stock or fish condition. length-weight relationship as a tool presents a practical index suitable for understanding the survival, growth, maturity, reproduction, and general wellbeing of fishes (Le Cren 1951). The present study was aimed at providing baseline information for the growth of catfish from Indus River, Sindh, Pakistan to advise and guide the design of sustainable fishery exploitations of this important species in Pakistan.

2. MATERIAL AND METHODS

Study site

A total of 131 fish specimens were sampled from the Indus River, near Kotri barrage, Sindh, Pakistan for the present analysis. The samples were collected from the small-scale fisheries landings at the center in Jamshoro district, during January through December, 2010.

The Kotri Barrage, straddles 25º 26' N and 68º 19' E measuring about 920 m across the River Indus, close to Hyderabad City in the southern part of Pakistan. It is the last barrage on the River Indus and the river runs about 100 km below, and merges into the Arabian Gulf near Thatta district in Sindh, Pakistan. Together with Sukkur and Thatta, Kotri is one of the major fishing centers along the Sindh course of the lower reaches of the River Indus (Bhatti, 1999).

All collected specimens were brought to the Department of Fresh Water Biology and Fisheries laboratory, University of Sindh, Jamshoro for analysis. Total length (TL), standard length (SL) were taken on a measuring board while the girth was measured using a inch tap (cm), and whole body weight including gut

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and gonads was determined using a digital weighing balance (Electronic compact scale, SF-550). The specimen were sexed based on vent sex (presence or absence of papillae) with the males exhibiting a very prominent papilla which is absent in females.

The values of constants *a* and *b* were estimated from the log-transformed length and weight data as follows: Log W= log a + b Log L according to the least squares linear regression method by Zar (1984). The coefficient *a* is the intercept, and the regression of coefficient *b* is an exponent, indicating isometric growth when *b*= 3.0, or allometric growth if b>3 or b<3 (Bengal and Tesch, 1978).

The relative condition factor for male, female and mixed sex populations were calculated according to Le Cren (1951): adapting W/aL^b as $Kn = W/\hat{W}$, where W is the observed weight and $\hat{W}$ is the calculated weight determined from length-weight equations.

3. RESULTS AND DISCUSSIONS

A total of 131 specimen of *S. seenghala* used for the length-weight relationship studies, 68 were male while 63 were females giving a sex ratio of about 1.0:1.1. The sample size, minimum and maximum length and weight, length-weight relationship, the ±95% CI of b values, the coefficient of determination (r^2), the growth type (isometric or allometric) and statistical analysis are given in **Table 1-2.**

The results indicate isometric growth for males (BW = TL3.002, r^2 = 0.940) and positive allometric growth for females (BW= TL3.17, r^2 = 0.9251) while the combined data for both sexes also indicate the isometric growth (BW = TL3.05, r^2 = 0.9338) for the *Sperata seenghal*. All the values of coefficients *b* determined for *S. seenghal* in this study were within the expected range of 2.5-3.5; coefficient *b*-values outside of this range are generally considered to be erroneous (Carlander, 1969, 1977; Ricker, 1975; Pauly and Gayanilo, 1997). According to Sani *et al*., 2010, the coefficient *b* of *S. seenghala* was reported as negative

Table 1. Descriptive statistics and estimated parameters of length-weight relationships for male, female and combined sexes of *Sperata seenghala* from Indus River, Sindh, Pakistan.

Sex	No	Total length (cm)		Regression parameters				r^2
		Minimum	Maximum	*a*	95% CL of *a*	*b*	95% CL of *b*	
Male	68	46	100	0.0053	0.0025-0.01	3.002	2.83-3.17	0.99
Female	63	48	113	0.0026	6.93E-05-0.098	3.17	2.32-4.02	0.88
Combine	131	46	113	0.0041	0.0023-0.0074	3.05	2.92-3.19	0.99

NB: No = Number; a = intercept; *b* =slope; CL= confidence limit; r^2= coefficient of determination

Table 2. Relative condition factor (Kn) of *Sperata seenghala* in IndusRiver, Sindh, Pakistan.

Sex	No	Minimum	Maximum	Mean±SD	95. 0% CL
Combine	131	0.94	1.05	1.01±0.04	0.02
Male	68	0.91	1.1	1.0±0.05	0.03
Females	63	1.2	1.6	1.3±0.0.12	0.08

allometric (2.97) for the combined sexes from Betwa and Gomti Rivers in central India, which contradict the results of the present study. However, these differences between the two studies can be attributed to differences in ecological conditions of the habitats or variation in the physiology of animals as noted by Le Cren, 1951.

On the basis of results of *b* value it can be speculated that the availability of food and environmental condition were good for its better growth.

The results of the length-weight relationship indicate differences between males, females and for combined sexes The value of *b* for females was >3.0

indicating allometric growth. This may be because of various factors which effect the growth of fish including season, habitat, gonadal maturity, sex, stomach fullness, health, and preservation techniques for sampled specimens (Tesch 1971; Begnal and Tesch, 1978). The *b* values for male and combine sexes were close to 3.0 as shown in Table 1, indicating isometric growth.

The mean values for relative condition factor for the male and female populations were 1.01±0.04, 1.0±0.05 and 1.3±0.0.12, respectively (Table 2), suggesting that females were in better condition than males. The relative condition factor calculated for all three populations were greater than 1, suggesting that the *S. seenghala* in Indus River is in good condition (Le Cren, 1951).

The present study is first of its kind in river Indus and it will help to understand the wellbeing of *S. seenghala* in River Indus, the baseline information on LWRs for *S. seenghala*, which will also be useful for researchers and fishery managers in future.

REFERENCES:

Anderson, R and S. Gutreuter. (1983) Length, weight and associated structural indices. In: Fisheries Techniques. Nielsen, L and D. Johnson (eds). American Fish Soc., Bethesda, MD, pp. 283–300.

Bengal, T. B and F. W. Tesch.(1978) Age and growth. In: Methods for assessment of fish production in fresh waters, 3rd edn. T. Begenal (Ed.). IBP Handbook No. 3, Blackwell Science Publications, Oxford, pp. 101–136.

Bhatti, M.A., 1999: Water Resource System of Pakistan: Status and Issues. Pakistan Science Foundation, Islamabad.

Carlander, K. D., 1977: Handbook of freshwater fishery biology, Vol. 2. Iowa State University Press, Ames, USA, 397Pp.

Dulcic, J and M. Kraljevic, (1996) Weight-length relationships for 40 fish species in the eastern Adriatic (Croatian waters). Fish. Res. 28, 243–251.

IUCN Bangladesh, (1998) List of threatened animals of Bangladesh. Paper presented in the special workshop on Bangladesh Red Book of Threatened Animals, 22 February 1998, Dhaka.. 13Pp.

Jayaram, K. C., (2002) The Fresh Water Fishes of the Indian Region. Narendra Publishing House, Delhi, 508Pp.

Jhingran, V. G. (1991) Fish and Fisheries of India, 3rd edn. Hindustan Publishing Corporation, Delhi, India, 727Pp.

Le Cren, E. D., (1951) The length-weight relationships and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). Jour. Ani. Ecol. 20, 201–219.

Mirza. M. R.; H. Nawaz and M. N. Javed (1992) A note on the fishes of genus Aorichthys Wu with the description of a new subspecies from Pakistan. Pak. Jour. of Zool. 24, 211-213.

Pauly D and Jr. F. C.Gayanilo (1997) A Bee: An alternative approach to estimating the parameters of a length-weight relationship from length frequency samples and their bulk weights. NAGA ICLARM, Manila, Philippines.

Petrakis, G, K. I. Stergiou (1995) Weight-length relationships for 33 fish species in Greek waters. Fish. Res. 21: 465–469.

Rahman, M. A, A. Arshad and S. M. Nurul Amin (2011) Evolution of growth and production of the threatened giant river catfish *Sperata seenghala* (Sykes) in polyculture with indigenous major carp. Afr. J. Biotechnol. 10, 2999-3008.

Rahman, M. A, K. M. Z. A. Uddin and M. Zaher (2005) Development of artificial breeding techniques for long whiskered catfish, Sperata aor and giant river catfish *Sperata seenghala* of Bangladesh. Bang. J. Fish. 9, 11–12.

Ricker, W. E. (1975) Computation and interpretation of biological statistics of fish populations. Bull. Fish. Res. Board Can. 191, 1–382.

Safran, P. (1992) Theoretical analysis of the weight-length relationships in fish juveniles. Mar. Biol. 112:545–551.

Sahini, A, A. Dua,; and M. Vindhya, (2008) Comparative morphometrics of two populations of giant river catfish (*Mystus seenghala*) from the Indus river system Integr. e Zool. 2008; 3: 219–226.

Sandhu, A. A and K. P. Lone (2003) Food and feeding habits of some catfishes of Pakistan. Pak. J. Zool. 35, 71-74.

Sani, R, B. K. Gupta, U. K. Sarkar, A. Pandey, V. K. Dubey and L.W. Singh, (2010) Length–weight relationships of 14 Indian freshwater fish species from the Betwa (Yamuna River tributary) and Gomti (Ganga River tributary) rivers. J. Appl. Ichthyol. 26, 456–459

Talwar, P. K and A. G. Jhingran (1991) Inland Fishes of India and Adjacent Countries, vol. 1. Oxford and IBH publishing Co., New Delhi, Bombay, Calcutta, India.

Zar, J. H. (1984) Biostatistical analysis. Prentice Hall, New Jersey. 718Pp.