WEIGHT-LENGTH AND CONDITION FACTOR RELATIONSHIP OF *SPERATA SARWARI* (SINGHARI), FROM MANGLA LAKE, PAKISTAN

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ABSTRACT

Fifty fresh water specimens of Singhari, (*Sperata sarwari*) ranging in total length from 24.9 - 93.7 cm and body weight from 66 - 4824 g were sampled, to study the parameters of weight-length and condition factor relationship from Mangla Lake Pakistan. Log transformed regression were used to test the growth. The value of growth coefficient (b = 3.57) indicates allometric growth in the studied specimens. Condition factor increases with increasing length or weight. The predictive equation can be used to estimate parameters investigated with a fair amount of accuracy within the size range studies.

Key words: Singhari, *Sperata sarwari*, weight-length relationship, condition factor.

INTRODUCTION

Singhari, (*Sperata sarwari*) is an Indus catfish (family: Bagridae) found in Pakistan and Indus drainage system in India (Mirza, *et al.*, 1992). It is carnivorous fish, feeds mainly on animal food (Nawaz, *et al.*, 1994, Sandhu and Lone, 2003). The relationship between weight and length for fish in a given population can be analyzed by measuring weight and length of the same fish throughout their life or of a sample of fish taken at a particular time. Weight-length relationship has been commonly used for two different purposes. Firstly, to describe the mathematical model between weight and length so as to derive one from the other (Wootton, 1998). It is highly valuable in cases where weight can be determined from known length and vice versa. Since length can be easily and accurately measured, the data on length are available in various studies (Zafar *et al*., 2003). Secondly, weight length relationship is used to compute the departure from the expected weight for length of the individual fish or a group of fishes as indications of fatness or degree of well being (Condition factor) of fish. This parameter helps to assess the experimental improvements in an environment for an existing fish and for the purpose of new stocking. The study of weight-length has its applied value in fish biology. The significance of the study in fishes is to assess the growth of fish in different environments.

In the application of the weight-length relationship to define a population, fish length is measured and predicted average weight is assigned to all fish in a given length group. This is often faster and more convenient than weighing fish individually, especially when large number of live fish is sampled. Weight-length relationship is used on commercial scales in population assessments (Steeby *et al*., 1991; Ali *et al*., 2000).

The growth is considered in terms of increase in volume. The volume is represented by weight, which is related to the cube of linear dimension (Length). It is therefore, true that a relationship exits between length (linear dimension) and weight in animals. The relationship between weight (W) and length (L) typically takes the allometric form: $W = aL^b$. This expression can be transformed logarithmically as suggested by Le Cren (1951), Log W = Log a + b Log L Where W stands for weight, L for total length, 'a' is constant and 'b' is the exponent or growth coefficient. These relationships mostly used by fishery biologist. If fish retains the same shape it grows isometrically and growth coefficient "b" has the value b = 3.0 (Ali, 1999). A value significantly larger or smaller than b = 3.0 shows algometric growth (Bagenal and Tesch, 1978). The weight- length relationship provides an opportunity to calculate an index known as condition factor (K) or "well being" of a fish. Fish with a high value of K are heavy for its length, while fish with a low "K" value are lighter (Bagenal and Tesch, 1978; Wootton, 1998; Zafar *et al*., 2000).

The status of Singhari (*Sperata sarwari*) in Pakistan is more or less endangered due to the poor knowledge of its biology, but also due to the declining stocks of this fish in natural waters. The present study is a sequence of this chain and is dealing with weight-length relationship and condition factor of *Sperata sarwari.* It is for the first time that this species is being studied from this point of view in Pakistan.

MATERIALS AND METHODS

Fifty Singhari fish (*Sperata sarwari*), of different body sizes with range 24.9 - 93.7 cm in total length and 66 - 4824 g in body weight were sampled from Mangla Lake, Pakistan during February to

November 2005 with the help of commercial fishermen. The fishing effort was done by using gill nets with the same length (10 m) and height (1.6 m), but with meshes varying from 15 to 110 mm, knot to knot. Fish random sampling were brought in the laboratory. Length and weight were recorded using fine scale (1mm) and electronic balance (MP-3000 Chyo, Japan) sensitive up to 0.01g. All measurements were made from the tip of the maxilla to the longest caudal fin ray. Parameters "a" and "b" were determined by method of least square regression.

$$\text{Log a} = \frac{\Sigma \log W.\ \Sigma (\log L)^2 - \Sigma \log L.\ \Sigma (\log L.\ \text{Log } L .W)}{N.\ \Sigma(\log L)^2 - (\Sigma \log L)^2}$$

With the value of 'log a' in hand, find 'b'

$$b = \frac{\Sigma Log\ W - (N.\ Log a)}{\Sigma Log\ L}$$

Condition factor "K" was calculated by the formula $K = 100W.L^{-3}$ (Weatherly and Gill, 1987; Wootton, 1998).

RESULTS AND DISCUSSION

The value of constant a = 0.000448 and growth coefficient b = 3.57 were determined. Condition factor "K" when analyzed against total length and body weight, it was found to increase with increasing length or weight (0.34 –0.67).

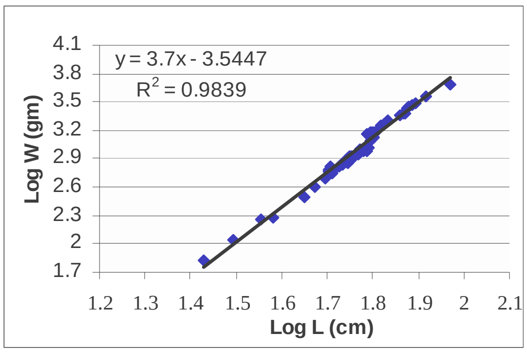

Fig. 1: Relationship between Log total length (cm) and Log wet body weight (gm)

In the present study, *Sperata sarwari* have value of growth coefficient b = 3.57. This value is significantly greater than the b = 3 showing that weight of this fish increases more than cube of its length (Positive growth coeffient) and not confirm the cube law. Apart of present study, many workers have reported growth pattern in other fish species (table 1) indicating that some fishes do not confirm the cube law because they change their shape with growth (Javaid and Akram, 1972; Sinha, 1975) and may be held in some cases (Naeem *et a.l*, 1992; Salam *et al*, 1994; Ali *et al*., 2000). The value of "b" may vary with feeding (Le Cren, 1951), state of maturity (Frost, 1945), sex (Hile and Jobes, 1940) and further more between different populations of a specie (Jhingran, 1968) indicating taxonomic differences in small populations.

When growth coefficient b = 3, condition factor 'K' would remain constant. The value of K may vary when average weight of the fish is not increasing in direct proportion to the cube of its length (Wootten, 1998), Abbas, 2000). If however, the weight increases more rapidly than the cube of length, K would increase with increase in length. When the weight increases less than the cube of length, K would tend to decrease with the growth of the fish (Javaid and Akram, 1972). In the present study conditions factor (K) appear to increase with increasing length or weight of the fish. It means that *Sperata sarwari* weight increases more rapidly than the cube of its length.

Table: 1. Length weight relationship for different fish species from different localities.

Fish Species	Exponent/ Growth coefficient (b)	Reference
Cirrhina mrigala	4.56	Javaid and Akram, 1972
Clarias batrachus	3.3	Sinha, 1975
Labeo rohita	3.17	Chatterji *et al.* 1977
Labeo rohita (Immature)	3.06	Salam and Janjua, 1991
Oreochromis nilotica	2.99	Naeem *et al*; 1992
Oncorhynchus mykiss	2.98	Salam *et al*; 1994
Channa punctata	2.9	Ali *et al*., 2000
Oncorhynchus mykiss	3.12	Naeem *et al*; 2000
Tor putitora	3.05	Zafar *et al.*, 2001
Catla catla	3.02	Zafar *et al.*, 2003
Sperata sarwari	3.57	Present Study

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