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# Length-Weight Relationship of Parrotfish *Scarus ghobban*, Forsskal 1775 from Nagapattinam, South East Coast of India

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**Abstract:** The length-weight relationships of the parrotfish, *S. ghobban* were analyzed in the present study. Linear regression equation in the form obtained in the present study is log W = -0.7151+2.5377 log L ($r^2$ 0.9533), The exponent value for parrotfish were around the hypothetical value (3) 'b' value was 2.5377 and the correlation co-efficent was greater than 0.9. In the length - weight relationship of *S. ghobban,* the weight increase in length in male and female, thus it is clear that these fishes maintains its shape throughout its life.

**Key words:** Parrotfish · Length · Weight · Systematic · *S. ghobban*

## INTRODUCTION

The parrotfishes (family Scaridae) are easily recognized by the fusion of their teeth to form beak-like dental plates and by the bright coloration of most species, particularly the more colorful terminal males. Their sturdy dental plates and strong jaws enable them to scrape into algal-covered limestone and utilize algae no longer available to herbivores like surgeonfishes (Acanthuridae) and sea chubs (Kyphosidae) that can only graze directly on the thalli. They grind the limestone fragments and algae with their unique pharyngeal dentition, thus making the algae more digestible [1]. Because of their more efficient use of algae when cropped to low levels by other herbivores, they occupy an otherwise unused niche on the coral reef. The abundance of parrotfishes on coral reefs is an indication of their success in exploiting this niche. As a result of the digestive process, these fishes void large quantities of sand and are therefore a major producer of calcareous sediment in coral-reef areas [1].

The identification of the 40 Indo-Pacific species of *Scarus* can be difficult, especially for preserved specimens that have largely lost their distinctive life color. Meristic data are of limited value in species identification. Heavy reliance has been placed on life color in the classification of *Scarus,* but sexual dichromatism and the different color of the juvenile stages [2, 3] greatly complicate species identification. Many of the species of parrotfishes have been described more than once because of the variation in color with growth and with sex change. Only in recent years have most of the color phases of adults been properly linked as one species [ 4 - 9]. In the present study, the similar observations were noticed in the colour pattern of the parrotfish, *S.ghobban*.

## MATERIAL AND METHODS

Nagapattinam (Lat. 10° 45' 31"N; Long: 79° 51' 02"E) is one of the major fish landing centres in Tamil Nadu, Southeast coast of India and is a district head quarter. The distance between here and Chennai, the capital of Tamil Nadu, is about 340kms. There are four rivers from Cauvery, namely Kaduvaiyaru, Odampochiyar, Vedharanyam Canal and Uppanar. All of them mix together and form as Uppanar estuary, which finally join the Bay of Bengal. The local people mainly depend on the fishing and its related activities. Akkaraipettai and Keechankuppam are the main fishing villages. The tidal amplitude of this region is 0.5 to 2.5m.

**Length-Weight Relationships:** To determine the length-weight relationships, the specimens comprising 78 parrotfishes, *S.ghobban were* studied (Size range: 15- 82 cm TL)

The total length of the fish was measured (mm) from the tip of the snout to the distal end of the caudal fin and the fish was weighed (g) after draining the water from the buccal cavity and blot-drying excess water in the body.

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The relationship between length and weight for fish in a given population can be analysed either by measuring the length and weight of the same fish repeatedly throughout its life span, or by measuring the weights and lengths of a sample of fish taken at a particular time. The relationship between length, L and weight, W typically takes the form:

$$W = aL^b$$

**Or in the linear form:**

$$\log W = \log a + b \log L$$
$$\text{(i.e) } y = a + bx$$

Whereas,

a =intercept; y = log W;

x = log L b = slope.

## RESULTS AND DISCUSSION

**Length-weight Relationships (Lwr) of the Parrotfish, *S. ghobban***: The parameters of the length-weight relationships for the selected species are given in Tables 1-3, together with the regression coefficient (r) the range and the number of specimens measured (n). The values for the exponent (b) remain mostly within the expected range of 2.5-4.0 and the parameters can be used safely within the indicated length range. The regression line derived from the data for the parrotfish showed a linear relationship between the two variables of length and weight (Fig. 1).

To understand the length-weight relationship of parrotfish, the data for the monthly samples collected were pooled and the linear regression equation obtained was:

The correlation coefficient ($r^2$) value for the parrotfish is 0.9533 ($P < 0.001$).

The fishes continue to grow throughout their life. Rapid growth indicates abundant food supply and other favorable conditions, whereas slow growth is likely to indicate non-availability of food. The weight of the fish increased logarithmically with an increase in length, with the value lying between 2.5 and 3.5 but usually close to 3.0 . The 'b' value was calculated to find out whether the fish is growing allometrically or isometrically. If the 'b' value is 3.0 the growth is isometric and it holds good only when the density and form of the fish are constant. If it is algometric, the fish grows with weight increasing at slower (b<3.0) or faster (73.0) relative to the increase in length.

Table 1: Regression data for the length- weight relationship of male and female parrotfishes.

| Regression data | |
|---|---|
| n | 78 |
| Min X | 1.176 |
| Max X | 1.92 |
| Mean X | 1.6429 |
| Min Y | 2.397 |
| Max Y | 4.65 |
| Mean Y | 3.4543 |
| Ó X (sum of length) | 64.075 |
| Ó $X^2$ (sum of length square) | 107.33 |
| Ó Y(sum of weight) | 134.71 |
| Ó $Y^2$(sum of weight square) | 480 |
| Ó XY(sum of length x weight) | 226.58 |
| $X^{ón}$(Deviation of length) | 0.2301 |
| $X^{ón-1}$(Deviation of length) | 0.2331 |
| $Y^{ón}$(Deviation of weight) | 0.6126 |
| $Y^{ón-1}$(Deviation of weight) | 0.6206 |
| Regression coefficient (a) | -0.7151 |
| Regression coefficient (b) | 2.5377 |
| Correlation coefficient (r) | 0.9533 |
| Probability (p) | <0.001 |

Table 2: Regression parameters for length-weight relationship of *S.ghobban*

| Period | Category | n | a | b | r | p |
|---|---|---|---|---|---|---|
| July 2006 to June 2007 | Male and female | 78 | -0.7151 | 2.5377 | 0.9533 | <0.001 |

Table 3: Linear regression equation in the form of log W=log a + b log L for *S.ghabbon*

| Category | Regression equation |
|---|---|
| Male and female | log W = -0.7151 + 2.5377 log L |

Qasim [10] indicated that the value of 'a' and 'b' differed not only between different species, but also within the same species depending on sex, stage of maturities and food habits. Cubic relationship between length and weight had the 'b' value near to 3.0 A fair number of species seem to approach his ideal. The 'b' value for an ideal fish might range between 2.5 to 4.0. In the present study the 'b' values obtained for male and female are 3.0293 and 3.0158.

The exponent value for parrotfish, *S. ghobban* were around the hypothetical value (3) 'b' value was 2.5377 and the correlation co-efficent was greater than 0.9. During the present study, in the length- weight relationship of *S. ghobban* the weight increase in length in male and female, thus it is clear that these fishes maintains its shape throughout its life. Similar observations were recorded in the parrotfishes from Grear Barrier Reef: *S. frenatus:* 3.06($r^2$ 0.990) *S. niger:* 3.09 ($r^2$ 0.993) *S. psittacus:* 2.90($r^2$ 0.981) *S. rivulatus:* 3.14($r^2$ 0.982) and *S. schlegeli:* 3.12($r^2$0.992)[11].

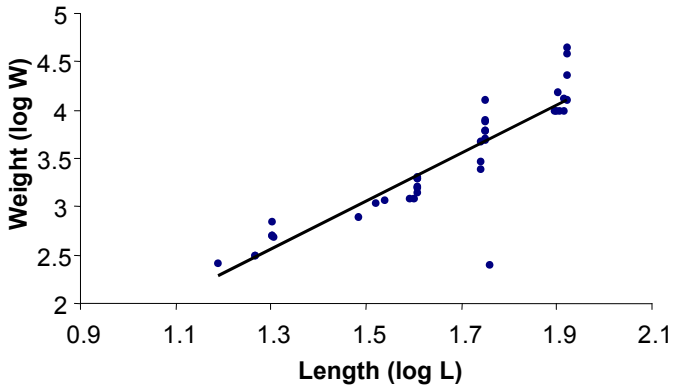


Fig. 1 Linear regression for the parrotfish, *S. ghabbon*

The length-weight relationships of the parrotfish, *S.ghobban* were analyzed in the present study. Linear regression equation in the form obtained in the present study is log W = -0.7151 + 2.5377 log L ($r^2$ 0.9533). The exponent value for parrotfish were around the hypothetical value (3) 'b' value was 2.5377 and the correlation co-efficent was greater than 0.9. In the length-weight relationship of *S. ghobban,* the weight increase in length in male and female, thus it is clear that these fishes maintains its shape throughout its life.

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