

Studies on length-weight relationship of *Mugil cephalus* (Linnaeus, 1758), east coast of Andhra Pradesh, India

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ABSTRACT

*The present study is the report of the length-weight relationship of striped grey mullet (*Mugil cephalus* L.) at Krishna Estuarine region, Andhra Pradesh, India. For this 287 specimens 132 females in length range 13.4 to 30.5cm, and 155 males in the length range 13.4 to 37.0 cm were collected from the fish market at Bantumilli village. The relationship was calculated by using the formula $W = aL^n$. The regression values of Juveniles (2.16), adults (2.81), males (2.66), and females (2.74). There was a significant difference in regression value for Juveniles and adults, there was no significant difference between males and females.*

Keywords: *Mugil cephalus*, regression value, Juveniles, and Estuary

INTRODUCTION

Analysis of length – weight data of a fish stock constitutes an important study since the growth of the fish is continuous and is dependent on both the genetic and environmental factors. Fish stocks growing under different environments are likely to show different growth rates. Within a stock differences in length-weight relationship between males and females and between juveniles and adults are exhibited. The relationship between length and weight is primarily used for conversion of length to weight [1], as length is an easily measurable parameter in the field. Based on this relationship deviation in weight from the theoretically derived weight is useful in the interpretation of the condition of the fish. The overall share of Aquaculture was 2.6% in the total production of Marine fishes and it was contributed substantially by striped/flathead grey mullet as one of the species [2]. Morphological differences exist between juveniles and adults with early maturity in males throughout the family [3]

It is an economically important euryhaline and eurythermal species contributing to sizable fisheries of estuarine and coastal regions in many countries including China [4], Egypt [5], India [6 and 7], Israel [8] Italy [9], New Zealand [10], Nigeria [11], Sri Lanka [12], Taiwan [13], Tunisia [14].

The length - weight relationship is useful for setting up of yield equations for fish stocks (Ricker, 1958) and also in differentiation of smaller taxonomic units [1].

Generally the relation between the length and weight in species of fish is relatively uniform until first maturation (juveniles) and changes become more and more pronounced in adult male and female fish [15, 16 and 17]. Large disparity in the length - weight relation between spawning and non-spawning females is also noticed [18 and 17]. The regression coefficient value is often higher for the females than for the males [18 and 19]. In *M. cephalus* [20 and 21] and in *M. parsia* and *M. cunnius* [22], no marked differences were observed in the length-weight

relationship between males and females. Generally, the weight of grey mullet of the same age living in lakes (lagoons) and estuaries is higher than that of the fish living in the sea (except for mature females) [21].

Studies on the length-weight relationship of Indian mullets include those of Pillay [16], Sarojini [23], Luther [24] and Rangaswamy [25]. The length - weight relationship in the stocks of flathead grey mullet, *M. cephalus* in the Krishna estuarine region is studied and presented.

MATERIALS AND METHODS

The present study is based on the length and weight data of 287 specimens (132 females in length range 13.4 to 30.5 cm TL. and 155 males in the length range 13.1 to 37.0 cm TL). The specimens were collected from the fish market at Bantumilli village near the Interu mangrove swamp. Each individual was examined for the sex and stage of maturation by examining the gonad externally to separate the juveniles, adults and males and females for calculation of functional regression. Weight and length data in juvenile individuals (less than 13.0 cm) and adults (13.0 to 37.0 cm) were collected. Among adults data on males and females were collected separately. The total length of the fish is measured to the nearest mm and its corresponding weight in gms.

These data were utilized for calculation of the relationship between total length and body weight of juveniles and adults. The regression values of the length-weight relationship in juveniles and adults and among adult fish between males and females were tested for significance using 't' test.

ANALYSIS OF THE DATA

Data on length and weight of the individual fish when plotted on arithmetic co-ordinates showed a curvilinear relationship (fig.1 to 4). The relationship between length and weight is calculated by using the formula (Le Cren, 1951).

$$W = aL^n$$

Where,

W = weight of the fish in grams,

L = length of fish in cm,

'n' is the exponent and

'a' is a constant.

The data on length and weight are converted in to the corresponding logarithmic values and when plotted yielded a straight line relation. The length-weight relationship is calculated by using the following equation:

$$\log W = \log a + b \log L$$

RESULTS

Juveniles

In juvenile fish the relationship between length and weight is expressed by the equation:

$$\log W = - 2.52 + 2.16 \log L$$

Adults

In adult fish the relationship between length and weight is expressed by the equation:

$$\log W = - 4.08 + 2.81 \log L$$

Adult males

The relationship between length and weight in adult males is expressed by the equation:

$$\log W = - 3.65 + 2.66 \log L$$

Adult females: The relationship between length and weight in adult females is expressed by equation:

$$\log W = -3.80 + 2.74 \log L$$

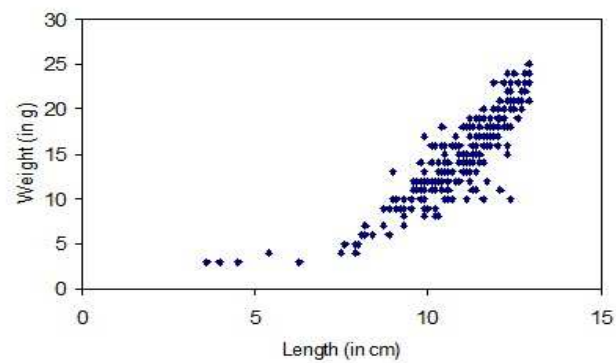


Figure. 1. Relationship between length and weight in Juveniles

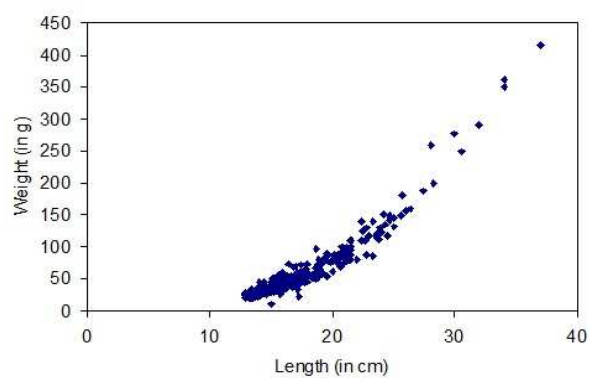


Figure. 2. Relationship between length and weight in adults

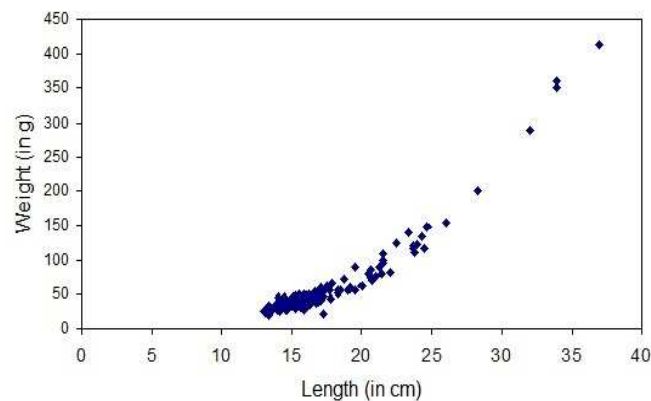


Figure. 3. Relationship between length and weight in Males

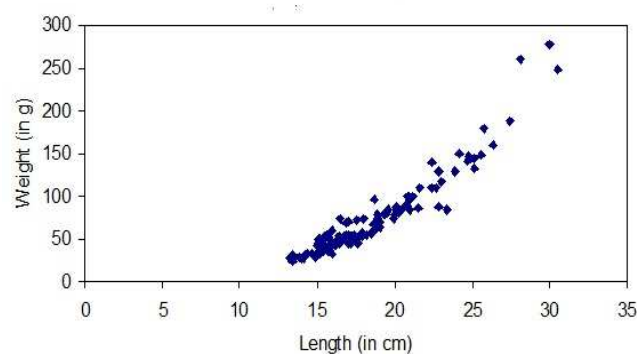


Figure. 4. Relationship between length and Weight in Females

DISCUSSION

Hora and Pillay [26] studied the length-weight relationship of grey mullet *M. cephalus* from Hooghly – Matlah estuary and gave the regression value as 2.8779. Rangaswamy [25] studied the length-weight relationship of *M. cephalus* from Pulicat lake and reported the regression value as 2.9128. He did not observe any significant difference in length-weight relationship between males and females. The longest *S. stellatus* specimen encountered at 30.5 cm TL in Shimoni was near the upper end of growth ranges (40cm TL) reported for this species [27]

During the present study the regression values obtained are 2.16 (Juveniles), 2.81(adults), 2.66(males) and 2.74(females). The regression value of juveniles and adults shows significant difference between them. However, there is no significant difference between regression value of males and females. When compared to the regression values given by Hora and Pillay [26] and Rangaswamy [25] the regression values obtained in the present study for juveniles, adults, adult males and females are lower.

CONCLUSION

The length-weight relationship of striped grey mullet (*Mugil cephalus* L.) at Krishna Estuarine region, Andhra Pradesh, India, was the study area and the current study represented that there was a significant difference in regression values for adults (2.81) and Juveniles (2.16), there was no significant difference between males (2.66) and females (2.74).

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