

LENGTH-WEIGHT RELATIONSHIP AND RELATIVE CONDITION OF GREY MULLET, *MUGIL CEPHALUS* L.

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ABSTRACT

The length-weight relationship and the relative condition were studied in the grey mullet, *Mugil cephalus* L. The relationship between length and weight was found to be like that of a parabola and did not change significantly as the fish grew. The fluctuations in the relative condition gave an indication of the size of fish at first maturity and the commencement of breeding season. The seasonal and other fluctuations in the relative condition are greatly influenced by the changes in weight. The increase in K values in both the sexes during January to March probably show high feeding intensity during the post-spawning period. Similarly, the decrease in K values in both the sexes from September to December indicates the spawning season of the fish.

INTRODUCTION

Length-weight relationship of the grey mullet *Mugil cephalus* L. from Palk Bay has been studied by Luther (1963) based on 422 specimens, ranging from 77 mm to 302 mm in length and Marquez (1975) based on 166 specimens from Tamiahua lagoon, Mexico. The present study was carried out as a part of the biology of grey mullet from the Goan waters.

MATERIAL AND METHODS

In all 1550 specimens, 522 males in the size range from 100 mm to 320 mm, 486 females from 101 mm to 319 mm and 542 unsexed measuring 40 mm to 98 mm were taken for the study. The samples were collected during the period January to December 1976 from the beach seine and cast net catches and included fishes from the sea, lagoon and estuaries of Goa. Fishes were brought to the laboratory, measured, weighed and then grouped at 10 mm size interval in case of male and female specimens and 5 mm

length group in case of smaller fishes (O group).

The length-weight relationship was determined using the equation $W = aL^n$ (Le Cren, 1951) or its logarithmic form $\log W = \log a + n \log L$, where W is the weight of fish, L the length, a and n are the values obtained by the usual method of least squares. The observed values of length and weight of individual fish were transferred into logarithmic values and the equations were calculated by the method of least squares. The three groups were treated separately and the data analysed by the analysis of covariance.

In the relative condition factor, the K values for 522 males and 486 females were calculated by adopting the usual formula $K = 100 W/L^3$, where K is the condition factor, W is the weight of fish and L is the total length. With a view to studying the variations in K values in relation to growth of the fish, the available data for both the

sexes were divided into 10 mm length group and the K value for each group was calculated separately. Similarly, fluctuations in the K values during different months, were calculated for both the sexes. To find out the spawning season of this species, the K values for male and female during different months irrespective of size, were pooled together and average values were obtained and plotted separately.

Length-weight relationship

The logarithmic regressional equations obtained are as follows:

- Males: $\log W = -4.9697 + 2.9604 \log L$
- Females: $\log W = -5.2196 + 3.0716 \log L$
- O-Groups: $\log W = -3.6768 + 2.4420 \log L$

The corresponding parabolic equations may be represented as:

- Males : $0.00001073 L^{2.9604}$
- Females : $0.000006032 L^{3.0716}$
- O-Groups : $0.0002105 L^{2.4420}$

Hence it may be said that the increase in weight in relation to length is 2.96 times for males, 3.07 times for females and 2.44 times for the

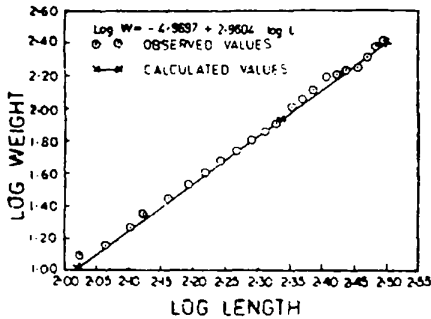


Fig. 1. Logarithmic relationship between length-weight of male in *Mugil cephalus*.

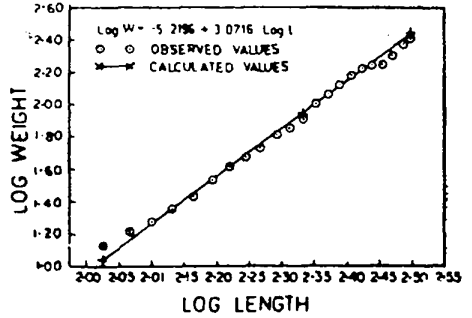


Fig. 2. Logarithmic relationship between length-weight of female in *Mugil cephalus*.

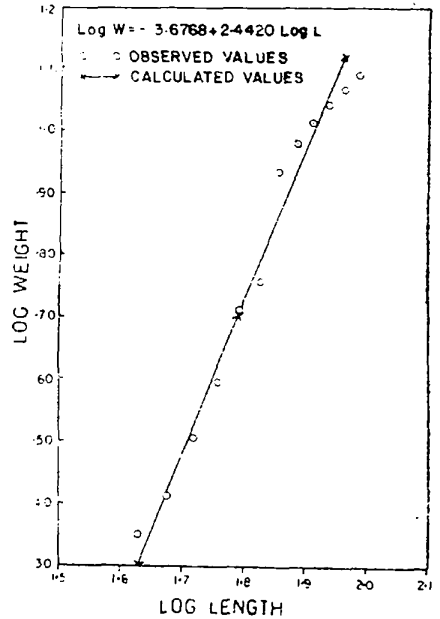


Fig. 3. Logarithmic relationship between length-weight of O-groups in *Mugil cephalus*.

O-groups fishes. Thus, indicating that in females the increase in weight is more than the males or the O-groups fishes. It is also clear from the regression lines in that the weight of fish increases proportional to approximately the cube of the length. It is also evident from the respective figures that there is close agreement between the observed and estimated values.

Relative condition factor

In 100 mm to 130 mm size, classes of both male and female, the K value (Fig. 4) was higher probably due to the first of growth rate. The condition factor for both the sexes decreased after this and remained steady till the size 240 mm. At 260 mm size the K value increased

and then decreased reaching the lowest at 290 mm size class. After this, there was a slight increase. Thus, the point of inflexion for both the sexes was found at 290 mm (Fig. 4).

In the monthly K values (Fig. 5) more or less similar fluctuations were seen in both the sexes, thus indicating that the metabolic strain in spawning in male and female is almost equal. During January to March the K values for both the sexes remained high. These high values may be attributed to the high feeding intensity during the post spawning period mentioned by Qasim (1957). In the months of April, May, July and September to December, the K values for both the sexes remained low, showing an increase in

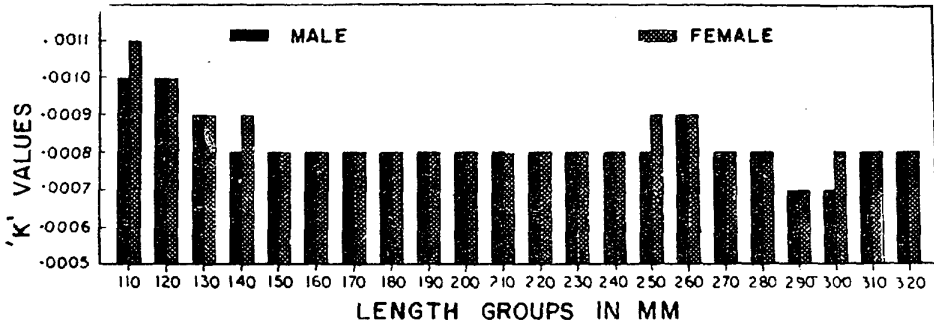


Fig. 4. Average K at different lengths of *Mugil cephalus*.

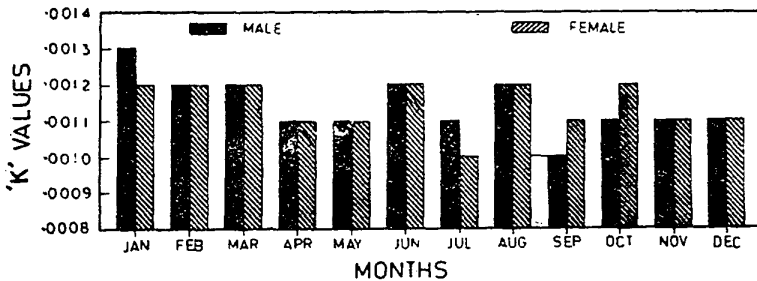


Fig. 5. Monthly fluctuations in K values of *Mugil cephalus*.

June and August months. The low values during September to December may probably be due to increased activities during the spawning season. The spawning season of *M. cephalus* reported by Jhingran (1958) and Anderson (1958) also agreed with the present finding.

DISCUSSION

Luther (1963) studied the relationship between total length and weight in *Liza macrolepis* (Smith) and *M. cephalus* (Linnaeus) from the Palk Bay. In *M. cephalus* the relationship was calculated based on the pooled data of the two sexes and all sizes. In the present investigation the increase in weight in relation to the length was more in female than in males or O-groups. Sarojini (1957) observed similar differences between males and females in *Mugil parsia*. Eggleston (1970) also found the difference in length - weight relationship of males and females of *Nemipterus virgulus* from the China Sea, particularly when studied in relation to spawning season.

Pillay (1954), Sarojini (1957), Narasimham (1970), Bhatt (1970) and Parulkar and Bal (1971) mentioned that the point of inflexion on the curve

showing a diminution of K with increasing length is a good indication of the length at which sexual maturity starts. The point of inflexion for both the sexes in the present study was at 290 mm length group (Fig. 4). This would, therefore, indicate that in males and females the size at sexual maturity is 290 mm total length. The study of gonads also indicate that the minimum size at maturity in both the sexes is 280 mm to 290 mm. The slight increase in K values of fish larger than 290 mm, perhaps is due to the recovery in weight of both the sexes.

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