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Short Communication

Length-weight relationship and condition factor of Tade gray mullet, *Chelon planiceps* (Valenciennes, 1836) from Hooghly-Matlah Estuary, West Bengal, India

Soumendra Pramanick • Sudhir Kumar Das • Dibakar Bhakta • Canciyal Johnson

Department of Fishery Resource Management, Faculty of Fishery Sciences, Panchasayar, Chakgaria, West Bengal University of Animal and Fishery Sciences, Kolkata 700 094, West Bengal, India

Correspondence
Dibakar Bhakta; Department of Fishery Resource Management, West Bengal University of Animal and Fishery Sciences, Kolkata, India
Email: dibakarbhakta@gmail.com

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Abstract

Tade gray mullet (*Chelon planiceps*) forms a lucrative fishery in the Hooghly-Matlah estuarine system. During eight months of investigation 232 specimens were examined to study length-weight relationship and relative condition factor (K_n). The length and weight of fish was varied from 41 to 283 mm and 0.81 to 208 g respectively. Two length-weight relationship equations were obtained from the analysis, $W=0.0000397L^{2.952}$ for <187 mm size group and $W=0.0000406L^{2.834}$ for >187 mm size group. The size at first maturity was recorded as 187 mm. The *b* value was not significantly different from 3 indicating isometric growth. The monthly mean K_n for the male and female were 1.041–1.125 and 1.009–1.236 respectively. The highest K_n value was recorded in July for both the sexes, which may be due to advance maturity stages. The present study will be useful in the context of biological management of mullet fishery as well as to find out aqua-farming potential of Tade gray mullet.

Keywords: Tade gray mullet; *Chelon planiceps*; length-weight relationship; condition factor; Hooghly-Matlah Estuary

1 | INTRODUCTION

The Tade gray mullet (*Chelon planiceps*), earlier known as *Liza tade*, forms an important commercial fishery in the estuarine and coastal waters. It is distributed in India, Bangladesh, Sri Lanka, Pakistan and Indonesia (Chondar 1999). In India, the species is distributed in both the coast but form fishery in Hooghly-Matlah estuary, Mahanadi estuary and Kayamkulam Lake. The species is found throughout the year in Hooghly-Matlah Estuary with peak landing in late winter to early summer months and were mainly caught by 'Pata Jal' (set barriers), 'Been Jal' (bag nets) and 'Ber Jal' (shore seines) (Chondar 1999). There is availability of natural seeds in this region; the farming possibilities of this species are extremely high in both monoculture and polyculture systems.

The production of mullets in India is exhibiting decreasing trend year after year due to different anthropogenic stress like habitat degradation, over exploitation etc. and many of them are becoming threatened (Das *et al.* 2006). Such species will be endangered if adequate conservation measures are not undertaken. *C. planiceps* is categorized as a threatened fish (Vulnerable) in West Bengal by Das *et*

al. (2006). Hence, there is a need of details biological investigation on this species to find out possible management measures in capture fisheries as well as to explore aquaculture potential. The present study will be useful in the context of biological management of mullet fishery as well as to find out aqua-farming possibilities of *C. planiceps.*

2 | METHODOLOGY

Tade gray mullet forms a lucrative fishery in the Hooghly-Matlah estuarine system and is being considered as an important fishery in terms of commercial importance. The sample species were collected from different landing sites of Hooghly-Matlah Estuary system namely Sagar Island, Bokkhali and 8-Jetighat. The species were mainly caught by stationary bag net, locally called as 'Been Jal' or 'Behundi Jal' which is non-selective multispecies small meshed net (Figure 1). In the investigation a total 232 specimen were sampled during 8 months of study (December 2005 to July 2006). The length of fish was measured with millimeter scale to the nearest millimeter and body weights were measured using mono-pan balance to the nearest gram. The length and weight ranged from 41 to 283 mm and 0.81 to 208 g respectively. The species was categorized into two group's *viz.*, group I (less than 187 mm) and group II (more than 187 mm) for convenience of interpretation.

Le Cren (1951) proposed a non-linear equation in the form of $W = aL^b$, which explains the relationship between length (L) and weight (W) of fish. Student's 't' test was employed to test significant variation of *b* value. The relative condition factor (K_n) was calculated by using the formula $K_n = W_0 / \hat{W}$, where W_0 is observed weight and $\hat{W}$ is calculated weight. K_n value was observed for male and female separately in different months. The data used for length-weight relationship were used for the calculation of monthly mean values of K_n for each species. The equation used to calculate Gonado-Somatic Index (GSI) = weight of gonad / weight of fish × 100.

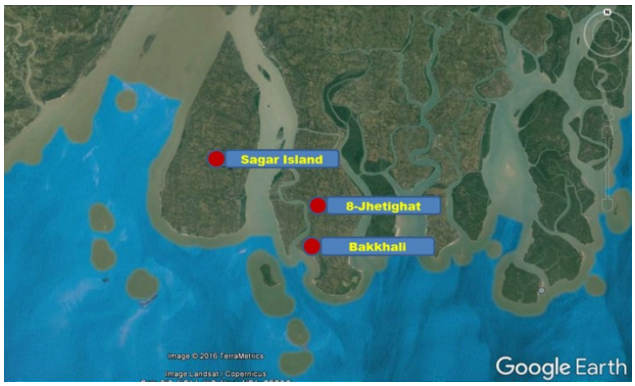

FIGURE 1 Sampling station under Hooghly-Matlah estuary

3 | RESULTS AND DISCUSSION

3.1 | Length-weight relationship

About 30 specimens of *C. planiceps* were examined monthly in laboratory condition for a period of eight month (December, 2005 to July, 2006). Length and weight of the specimen varied from 41 to 283 mm and 0.81 to 208 g respectively. The length-weight relationship was recorded as $W = 0.0000397L^{2.952}$ for less than 187 mm size group and $W = 0.0000406L^{2.834}$ for more than 187 size group (Table 1). The size at first maturity was recorded as 187 mm. The *b* value was not significantly different from 3 indicating isometric growth**.** The exponent value of *b* was relatively low in higher size fish.

TABLE 1 Group wise length-weight relationship of *Chelon planiceps*

Size group	*No. of specimen*	*Length-weight relationship*	
Group I	79	$W=0.0000397L^{2.952}$	Log W = –10.134+2.952 Log L
Group II	102	$W=0.0000406L^{2.834}$	Log W = –10.112+2.834 Log L

Renjini and Bijoy Nandan (2011) reported *b* value of gold spot mullet *Liza parsia* was 3.1545 for male and 3.0094 for female and 3.1938 for combined group from the Champakkara region of Cochin estuary and growth of the species was found satisfactory. Rao *et al.* (2005) studied length-weight relationship of *Liza parsia* in relation to industrial pollution and found *b* value as 2.4986 for polluted waters and 2.5210 in non-polluted waters of Visakhapatnam. Moorthy *et al.* (2003) obtained length-weight relationship of *V. seheli* from Mangalore which was $W = 0.0372\ L^{2.6294}$ for male and $W = 0.0502\ L^{2.5283}$ for female with negative allometric form of growth. Sandy and Shameem (2003) reported a high '*b*' value for mullets collected from unpolluted water as those from polluted water. The regression equations were drawn as Log W = –17.551+3.681 Log L for unpolluted waters and Log W = –5.817+2.066 Log L for polluted waters. Udupa *et al.* (2003) studied comparison of length-weight relationship of *L. tade* from five estuaries of southern Karnataka and found *b* value being ranged from 2.42 to 3.11. Out of five estuaries studied, they found isometric growth only for female from Kallyanpura estuary, other four estuaries exhibited non-isometric growth for both sexes. Mitra and Mandal (1997) estimated the length-weight relationship of *Liza parsia* based on 265 specimens, which was $W = 0.00816\ L^{3.134}$ with *b* value of 3.134. El-Serafy (1993) estimated the length-weight relationship and condition factor of *Liza ramada* from Lake Manzalah (freshwater) and Mediterranean Sea Coast off Damietta (marine water) and recorded *b* value as 3.219 and 3.027 respectively.

Abdel-Baky and Bahnasawy (1993) studied age and growth of *L. ramada* in Lake Manzalah of 10.0 to 31.0 cm size of specimens and found maximum growth rate was recorded in the first year and it resembles to the present work.

Negative allometric growth was reported by Kurup and Samuel (1992) in length-weight relationship of *L. parsia* for both the sexes with Log W = –1.0628+2.4465 Log L (female) and Log W = –1.2117+2.4465 Log L (male) from Cochin estuary. Gowda *et al.* (1987) reported length-weight relationship of *Valamugil seheli* from Mangalore water bodies and found pooled value as 2.586 with length at first maturity in the length of 24–26 cm. They also reported that, there was no significance difference in length-weight relationship of *V. seheli* for both the sexes from Mangalore water. Rangaswamy (1976) did not found any variations of length-weight relationship of *M. cephalus* from Ennore and Adyar estuary with *b* value 2.779. Das (1977) reported homogeneity of length-weight relationship of *M. cephalus* with same *b* values for male and female in 3 estuaries.

The present work complies with the works by Mitra and Mandal (1997), El-Serafy (1993), Abdel-Baky and Bahnasawy (1993), Gowda *et al.* (1983), Rangaswamy (1976), Das (1977) and slightly differ from the works done by Kurup and Samuel (1992), Udupa *et al.* (2003), Moorthy *et al.* (2003), Rao *et al.* (2005), Gowda *et al.* (1987) as well as Sandy and Shameem (2003).

3.2 | Relative condition factor

The monthly mean K_n values for the male and female were ranged from 1.041–1.125 and 1.009–1.236 respectively. The highest K_n value was found in July for both the sexes, which may be due to advance maturity stages. Month wise variation of K_n value for both male and female presented in the Figure 1. The condition factor indicates an important part about feeding, spawning and other aspects related to the wellbeing of the fish.

Rao *et al.* (2005) has reported condition factor of *L. parsia* from Visakhapatnam unpolluted and polluted waters. It was varied between minimum 0.64 in February and maximum 1.44 in September (polluted waters) and minimum 0.80 in January and maximum 1.69 in September respectively (unpolluted waters). Sandhy and Shameem (2003) found higher K_n value of *Liza macrolepis* collected from unpolluted water than polluted water of Visakhapatnam. Kalita *et al.* (1998) found that K_n value increased with approach of spawning and receded at the end of spawning season in *Notopterus notopterus*. Gowda *et al.* (1987) found high condition factor for *Vamamugil seheli* during September (1.1294 for female and 1.1441 for male) from Mangalore waters which was attributed to matured condition of the gonads. A significance variation ($P< 0.05$) was observed in relative condition factor of fish during different months.

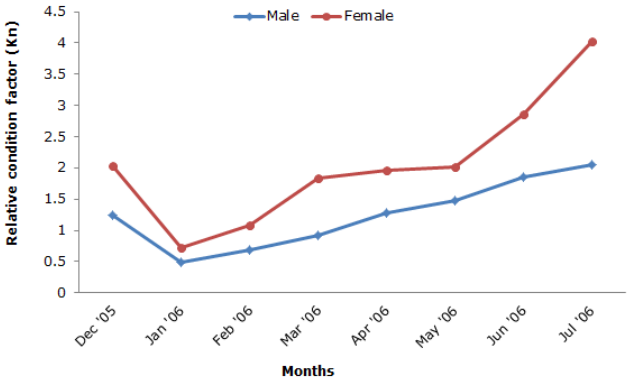

FIGURE 1 Monthly variations of relative condition factor (K_n)

Condition factor in fishes may be influenced by several factors like age and sex of the individual (Everhart *et al*. 1975), availability and types of food abundance and physico-chemical characters of the environment (Ranganathan and Natarajan 1970), onset of maturity (Hoda, 1987), spawning (De Silva and Silva, 1979), environmental condition, breeding, feeding (Dhanze and Dhanze 1997), sex and maturity (Gowda *et al*. 1987), pollution (Sandhya and Shameem 2003; Rao *et al*. 2005) etc.

CONCLUSION

In the present study growth of the species was found to be satisfactory due to the nature of isometric growth which indicates the environment is suitable for fish growth and reproduction. Knowledge of stock assessment of certain species is a prerequisite for sustainable management of the fishery in any region. This study will provide the baseline information of *C. planiceps* which can play an important role in the management of this species.

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CONTRIBUTION OF THE AUTHORS

SP, DB & CJ primary data collection; **SKD** research supervision; **DB & CJ** data analysis; **DB** manuscript preparation.