ISSN: 2347-5129
IJFAS 2014; 1(6): 168-172

www.fisheriesjournal.com
Received: 16-05-2014
Accepted: 13-06-2014

V.P. Saini
Aquaculture Research & Seed Unit, Directorate of Research Maharana Pratap University of Agriculture & Technology Udaipur, Rajasthan (India)-313001

M.L.Ojha
College of Fisheries, Maharana Pratap University of Agriculture & Technology Udaipur, Rajasthan (India)-313001

M.C.Gupta
SKN College of Agriculture, Jobner, Jaipur (Rajasthan).

Correspondence:
V.P. Saini
Aquaculture Research & Seed Unit, Directorate of Research Maharana Pratap University of Agriculture & Technology Udaipur, Rajasthan (India)-313001

Selected morpho physiographic features of Tor Maheer (*Tor tor*) from Rana Pratap Sagar reservoir, Rajasthan (India)

V.P. Saini, M.L.Ojha, M.C.Gupta

Abstract
Length-weight relationship of Tor Mahseer, *Tor tor* (Ham.) was studied from the Rana Pratap Sagar reservoir of Rajasthan. Based on the selected morphometric features of specimens measuring 40-90 cm. in length and 1000 to 11000 gm in weight, K and Kn values have been computed. The weight of fish from this reservoir was found to increase as an exponential function of its length exhibiting relationship: Log W= -2.5118 + 3.3555 log x and Log W -1.9275 + 3.144 log x, for total and standard length respectively. When calculated for different size groups, the values of condition factor (K) and relative condition factor (Kn) were found to range between 1.14-1.28 and 0.98-1.09 respectively. These values were comparatively low for the small size group (41-50 cm) fishes and increased progressively with increase in length of fish except for higher size group of 81-90 cm which registered low values of K and Kn.

Keywords: Mahseer, *Tor tor*, Condition factor, Fish biology, Ponderal index.

1. Introduction
The term 'Mahseer' refers to a group of freshwater cyprinid fishes easily distinguishable by relatively larger size of scales on their body as compared to other cyprinid fishes. The members of Mahseer belong to two genera, *viz*., *Tor* and *Neolissochilus*. These two genera are distinguished by the presence of a continuous labial groove in *Tor,* but interrupted in *Neolissochilus*, and 10–14 gill rakers on the lower arm of first gill arch in the former and 6–9 in the latter. They inhabit the mountain streams and are distributed from Pakistan throughout Southern Asia to Southeast Asia up to the Malay Peninsula and the larger Indonesian islands across Sumatra, Borneo and Java. However, species composition within each genus varies in different localities, like Southeast Asian species are different from Southern Asian species. Furthermore, in India, many species of Mahseer are discontinuously distributed and mostly endemic to the South, Central and Northeast India.
With the growing human intervention in the natural aquatic ecosystems and especially of lakes and reservoirs sustenance of Mahseer has become an issue of vital concern in India. Under natural conditions this fish has been reported to spawn three times in a year and consumes a variety of food items owing to its omnivorous feeding habits. From Fishery biology angle, utility of estimating weight of fish of known lengths or vice-versa in assessing the condition of fish with the use of length-weight relationship is rather well established. LeCren [1] has categorically reviewed the methods used in determining length-weight relationship of fish with a clear exposition of superiority of general non-linear equation W = C Ln. According to Ricker [2] the cube law describing isometric growth, does not hold good for the fishes in view of their form and specific gravity, which are inconsistent due to changes affected in their body at different stages of life. In India fairly good amount of work on this aspect has attracted the attention of the scientists [3, 4, 5].
Tor Mahseer forms an important component of fish catch from Rana Pratap Sagar Reservoir but no information on its morpho physiographic features is available from this water body. Considering this, the present study on selected morpho physiographic features of tor Mahseer (*Tor tor*) from the Rana Pratap Sagar reservoir, Rajasthan (India) was conducted.

2. Materials and Methods

For the present study fish specimens were sampled from Rana Pratap Sagar reservoir for measuring length and weight. Rana Pratap Sagar (Fig.1) is located at 24° 35 N lat. and 73° 35 E on the river Chambal. This water body covers an area of 21,300 ha with a mean depth of 37 m. The length measurements were made using a conventional fish measuring board and for taking weight a field dial balance was employed. For measuring lengths and weights, specimens were randomly selected from commercial catches during 2013-14

The regression of weight on lengths was determined by fitting the regression of logarithmic values of average length on logarithmic value of average weight from the same size group. Log W = Log C + n Log L, relationship was used to derive regression of weight on length (Where W = weight of fish, L = length of fish; C = a constant being initial growth and n = growth coefficient). Relative condition factor (Kn) was estimated from the formula:

$$Kn = W/\hat{W}.$$

Where, W= the observed weight and $\hat{W}$= calculated weight of the fish (LeCren, 1951).

The Ponderal index was calculated using following formula:

$$K - \frac{W\ (gm)}{L3\ (cm)}\ x\ 100$$

Fig 1: Location map of study area

3. Results and Discussion

3.1 Length- weight & girth relationship

The regression equations and correlation coefficient obtained for length-weight and girth of *Tor tor* are presented in Table 1. The best fit lines for total and standard length-weight and girth are shown in Fig. 2 & 3. From the results on the relationship it would be clear that the value of exponent "b" are above 3 i.e. 3.3555 and 3.1440 for total and standard lengths respectively. LeCren [1], Kumar [6] and Choudhary *et al*. [5] have reported values of exponent "b" above 2. Thus, the findings of the present study are in accordance to the studies cited above. Moreover, the higher correlation coefficient "r" values indicate that the length and weight-girth of *Tor tor* from this lake had a high degree of correlation.

The transformed length fitted over weight gave linear growth indicating the three dimensional growth structures of most fish species [7]. The values of the length exponent in the length-weight relationship being isometric imply that the fish species did not increase in weight faster than the cube of their total lengths. However, the weight of the rest species increased faster than the cube of their total lengths. Length-weight relationships give information on the condition and growth patterns of fish [8]. Fish are said to exhibit isometric growth when length increases in equal proportions with body weight for constant specific gravity. The regression co-efficient for isometric growth is '3' and values greater or lesser than '3' indicate allometric growth [9].

The values obtained for the weight – length relationship showed that *Tor tor* was isometric in their growth. Several authors have reported both isometric and allometric growth for different fish species from various water bodies. King [10] reported allometric growth patterns for *Tilapia* species from Umuoseriche Lake. King [11] reported isometric growth for *Pseudotolithus elongatus* from Qua Iboe

Estuary. Ekeng [12] also reported an isometric growth pattern for *E. fimbriata* from Cross River estuary in Cross River state. Marcus [13] obtained an isometric growth patterns for *E. fimbriata* from coastal and brackish water of Akwa Ibom state. Shenouda *et al.* [14] also observed an isometric growth patterns for *Chrysichthys auratus* from the southern most parts of River Nile and Egypt.

Table 1: Logarithmic relationship between weight, length and girth of *Tor tor*

S. No	Parameter	Y-equations	Correlation coefficient (r)
1	Weight(W) v/s Total Length (TL)	Log W = -2.5118 + 3.555 Log TL	0.9013
2	Weight(W) v/s Total Length (SL)	Log W = -1.9275 + 3.1440 Log SL	0.9602
3	Girth (G) v/s Total Length (TL)	Log G = -0.5182 + 1.164 Log TL	0.9586
4	Girth (G) v/s Total Length (SL)	Log G = -0.3389 + 1.1085 Log SL	0.6180
5	Standard length (SL) v/s Total Length (TL)	Log SL = -0.1581 + 1.0414 Log TL	0.9791

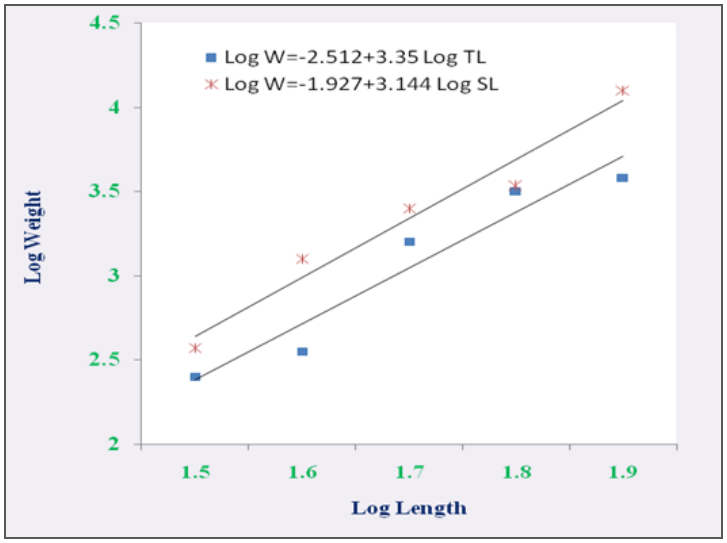

Fig 2: Logarithmic relationship between length and weight of *Tor tor*

3.2 Relative condition factor

Fig. 4 depicts variations in the mean Kn values with respect to the size of fish. It would be evident that the highest Kn values (1.09) as found in 51-60 cm size group, whereas the lowest value of 0.98 was obtained with lower size group of 41-50 cm. The notable variations in Kn values could be accorded to the state of feeding and breeding activities.

Desai [15] has considered feeding intensity and gonadal development as important factors in influencing variations in the relative condition factor.

3.3 Ponderal Index

As in the case of Kn, the K values were also low in the lower size group. The highest K (1.28) values were, however, obtained for the size group of 61-70 cm. Thereafter again K values indicate lower K in fish at size group 71-80 cm. Again the K attained higher values of 1.23 in higher size group of 81-90 cm. LeCren [1], Choudhary *et al.* [5] considered onset the of maturity to be important in determining the condition factor (K). According to Hart [16], the point of inflexion on a curve showing this dimunition of "K" with increasing length is a good indication of length at which the sexual maturity is attained. In the present study also a sharp inflexion is noticed in case of 61-70 cm size group.

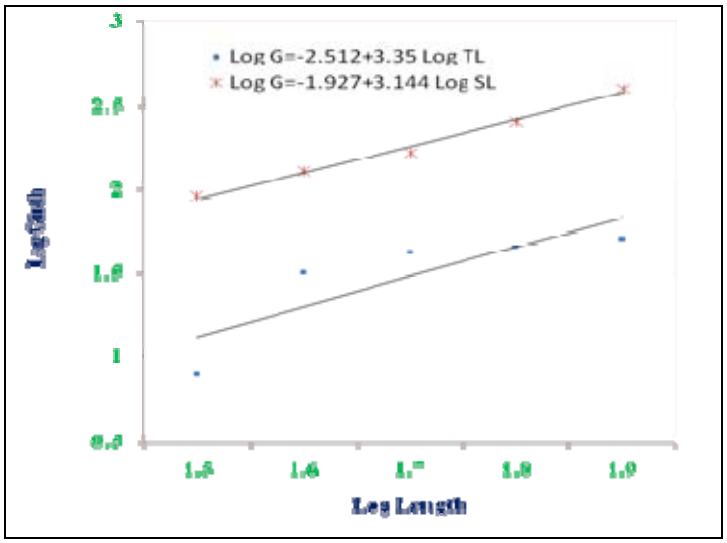

Fig 3: Logarithmic relationship between length and girth of *Tor tor*

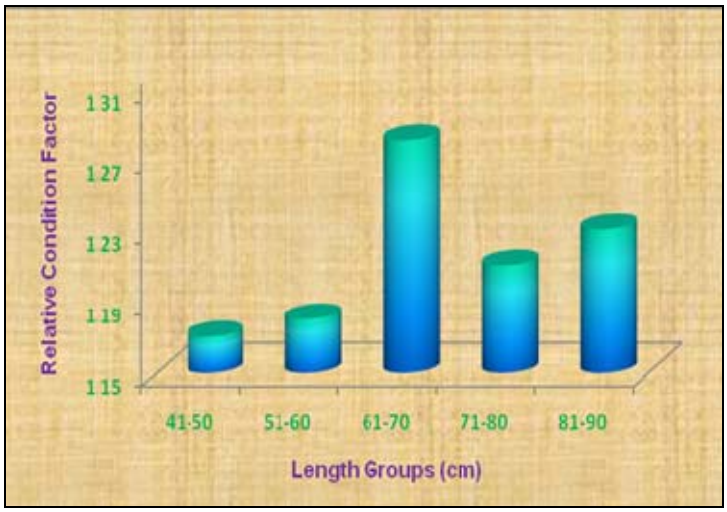

Fig 4: Relative condition factor (Kn) for different length groups

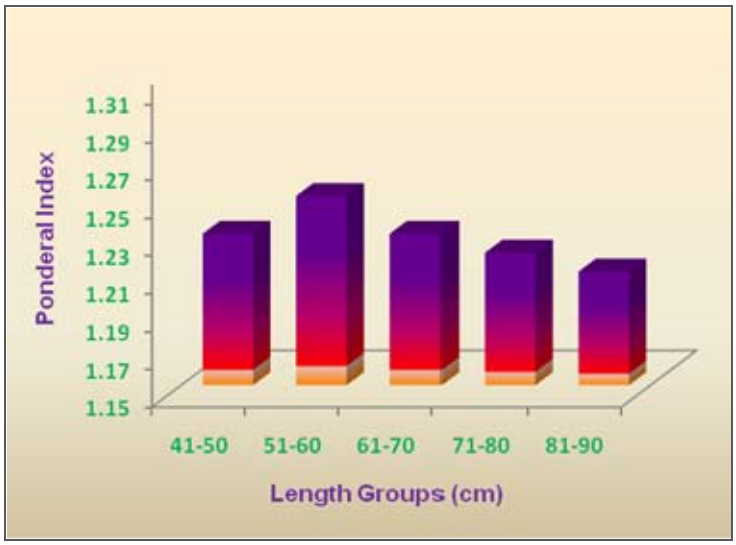

Fig 5: Ponderal index (K) vales at different length groups

4. Acknowledgement
The authors are indebted to Prof O. P. Gill (Vice Chancellor) Maharana Pratap University of Agriculture and Technology-Udaipur (Rajasthan) for administrative support. We are also thankful to Prof P. L. Maliwal (Director Research) for his kind support and encouragement. The financial assistance received from the Government of Rajasthan under the project 12-B "NPR on Fisheries" is thankfully acknowledged.

5. References

1. LeCren ED. The length-weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). J Anim Ecol 1951; 20:201-219.
2. Ricker WE. Methods of estimating vital statistics of fish populations. Indian Univ Publ Sci 1958; 15:105.
3. Desai VR. Studies of fishery and biology of *Tor tor* (Ham.) from river Narmada. Indian J Fisheries 1973; 39(2):228-248.
4. Desai VR. Studies of fishery and biological aspects of *Tor* mahseer, *Tor tor* (Ham.) from river Narmada. Ph.D. Thesis of Agra University, Agra (U.P.), 1982, 216.
5. Choudhary CS, Sharma LL, Sharma SK, Saini VP. Some aspects of morpho physiology of *Labeo calbasu* (Ham.) from Rana Pratap Sagar reservoir, Rajasthan. Indian J Fisheries 1991; 38(40):207-211.
6. Kumar R. Some aspects of biology of *Puntius sarana* (Ham.) and fisheries of the Lake Jaisamand. M.Sc. (Ag.) dissertation. Rajasthan Agri. University, Bikaner, Rajasthan, 1988, 78.
7. Lagler KF, Bardach JE, Litter RR, Passimo DRM. Ichthyology. John Wiley and Sons Inc, 1977, 506.
8. Bagenal TB, Tesch AT. Conditions and Growth Patterns in Fresh Water Habitats. Blackwell Scientific Publications, Oxford, 1978, 75-89.
9. Gayando FC, Pauly D. FAO ICLARM stock assessment tools (FISAT): References Manual, FAO Computerized Information Series (Fisheries), 1997; (8):262.
10. King RP. The biology of tilapia mariae Bovlenger 1899 (Perciformes: Cichlidae) in a Nigeria Rainforest stream. Ph.D. Thesis, Department of Zoology, University of Port Harcourt, Nigeria, 1991.
11. King RP. Population dynamics of the mud skipper *Periophthalmus barbarus* (Gobidae) in the estuarine swamps of Cross River Nigeria J. Aquatic Sci 1996; 11:31-34.
12. Ekeng EO. Length-weight and diet composition of *Ethinalose fimbriata* (Bowchch). Pliscea: clupeidae in Cross River estuary, Nigeria. B.Sc. Project University of Calabar. Cross River State, Nigeria, 1990, 36.
13. Marcus C. Biology of bonga fish, *Ethmalosa fimbriata* (Bowdich): In: The Nigeria Coastal and brackish waters project (NF) 1, 2. Annual Report, Nigeria Institute for Oceanography and Marine Research Lagos 1984, 232.
14. Shenouda TS, Faten FA. Mahmoud MR and Rayzg MM. A detail study on age and growth for *Chrysichthys auratus* and *Chrysichthys rueppelli* from the southern most part of the River Nile (Egypt). J Egypt Ger Soc 1994; 200(1412):73-101.
15. Desai VR. Investigations on *Tor* mahseer *Tor tor* (Ham.) from river Narmada (around Hoshangabad) with utility for reservoir fisheries development of Narmada Basin. Pb Fish Bull 1991; 14(1):21-25.
16. Hart SA. The biology of *Mugil cephalus* Linnaenus, 1758, perciformes (Muglidae in Bonny River Estuary. M.Sc. Thesis. Department of Zoology University of Port Harcourt, Nigeria 1997, 102.