

## Length -Weight Relation in Female Specimen of *Channa punctatus* from Different Habitat in Uttarakhand

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### Abstract

The present study reveals length-weight relationship in the specimens collected from different habitat natural and captive conditions. The value of *a* and *b* ranged from 0.083 to 2.161 and 0.078 to 1.713 for natural condition and -0.207 to 2.078 and -0.216 to 1.766 for captive condition. The correlation between length-length was found to be non-significant and weight -weight was significant in both the cases.

**Key words :** Length-weight relation, *Channa punctatus*, Captive condition, Ponderal index, Habitat.

The present investigation was aimed at analyzing length-weight relationship in female specimens of *C. punctatus* in nature and captive conditions of tarai region of Uttarakhand. Different populations of the same species of a fish are known to differ through genetic differences or owing to differences in the ecological conditions, when the structure, shape and form in question are fixed throughout life. The fish *Channa punctatus* belongs to family Channidae, popularly known among air-breathing fishes and can survive in harsh condition successfully. Because of recuperative or wound healing property it is important fish amongst food fish available in India. For developing fishery, it is necessary to understand their population dynamics, how fast they grow and reproduce, the size and age at which they spawn, their mortality rates and its causes, on what they prey upon along with other biological processes. The size and shape (morphological variation) are fundamental to the analysis of variation in living organisms and often related to the varied environmental factors. Length-weight relationship are useful for fisheries research because it allows the conversion of growth-in-length equation to growth-in-weight for use in stock assessment model, allows the estimation of biomass from length observations allows an estimate of the condition of the fish and it is useful for comparison of life histories of certain species (1—3).

### Methods

Specimens of *Channa punctatus* were collected

from two different ecological conditions viz. natural conditions (reservoir) and captive condition (pond). The fish were brought to laboratory, removed the superficial water by wiping with blotting paper, were measured from snout to the tip of the caudal fin rays in cm on a fish measuring board and weighed to the nearest of gram. Data on weight were taken on monthly basis. Length weight relationship was calculated through using cube law formula given by Le Cren (4).

Ponderal index was determined using the equation (5)

$$K = \frac{100 \times W}{L^3}$$

K = Ponderal index, W = Weight gain (g), L = Length of fish (cm).

### Results and Discussion

Relationship between length and weight of specimens from nature and captive conditions are estimated through the log cuboidal regression model and presented in Tables 1 and 2. The values of regression parameters *a*, *b*, and *R*<sup>2</sup> in natural conditions ranged from 0.083 to 2.161, 0.078 to 1.713 and 0.037 to 0.509 while in captive condition -0.207 to 2.078, -0.216 to 1.766 and 0.006 to 0.834 were observed. The range of coefficient of variance for length under natural condition varied from 3.031 to 5.741 (Table 1) and for weight from 1.809 to 12.393 (Table 1). Under captive condition value of coefficient of variance for length

**Table 1.** Log length-weight relationship in female specimen in natural condition.

Months	Logarithmic equation	a	b	R <sup>2</sup>	Ponderal index (K)	Coefficient of variance	
						length	weight
Jan	Log w = 1.948 + 0.092 Log L	1.948	0.092	0.037	1.398	3.801	1.809
Feb	Log w = 1.901 + 0.178 Log L	1.901	0.178	0.037	1.221	3.215	3.012
Mar	Log w = 0.207 + 1.713 Log L	-0.207	1.713	0.509	1.252	4.899	11.2614
Apr	Log w = 0.083 + 1.498 Log L	-0.083	1.498	0.497	0.995	5.741	12.3943
May	Log w = 1.121 + 0.794 Log L	1.121	0.794	0.253	1.163	3.379	5.4524
Jun	Log w = 1.430 + 0.549 Log L	1.430	0.549	0.190	1.042	3.275	4.1755
Jul	Log w = 1.244 + 0.566 Log L	1.244	0.566	0.095	1.016	4.006	7.5034
Aug	Log w = 1.837 + 0.086 Log L	1.837	0.086	0.032	1.088	3.832	1.8338
Sep	Log w = 1.304 + 0.606 Log L	1.304	0.606	0.058	1.043	3.108	8.1423
Oct	Log w = 2.161 + 0.078 Log L	2.161	0.078	0.015	1.195	3.031	2.4973
Nov	Log w = 1.486 + 0.410 Log L	1.486	0.41	0.135	1.108	3.623	3.9991
Dec	Log w = 1.414 + 0.442 Log L	1.414	0.442	0.152	1.175	3.868	4.3530

ranged from 3.567 to 5.281 (Table 2) and for weight ranged from 0.721 to 15.749 (Table 2). Values of ponderal index (k) under natural condition ranged from 0.995 to 1.398 and in captive condition ranged from 0.834 to 1.446 (Tables 1 and 2). The correlation between length-length (LLR) was non-significant ( $P < 0.05$ ,  $r = 0.224$ ) and weight-weight (WWR) was significant ( $P < 0.05$ ,  $r = 0.339$ ) between nature and captive conditions.

Length-weight relationship in fish has mainly been directed towards two objectives. Firstly to provide a mathematical relation between the measurement, viz., length and weight, secondly to measure the variations from expected weight or length of individual fishes or group of fishes as indication of fitness, general well being or gonadal development (4).

In present study length-weight relation, values of  $a$ ,  $b$ , and  $R^2$ , and ponderal index (K) varies in both the conditions. Monthly variation under both the conditions (natural and captive) indicated towards the impact of environmental condition, difference in stock and other physico-chemical parameters. The seasons, habitat and gonadal maturity affects the length-weight relationship (6).

In present study length-weight relationship varied monthly and rate of increase in body length with respect to body weight was not found in cuboidal relation. This change might be due to various factors like species, their biological behavior, food and feeding habit, breeding behavior and habitat, gonadal maturity, stomach fullness and health which differentiate the *C. punctatus* from other fishes. Present re-

**Table 2.** Log length-weight relationship in female specimen in captive condition

Months	Logarithmic equation	a	b	R <sup>2</sup>	Ponderal index (K)	Coefficient of variance	
						length	weight
Jan	Log w = 1.471 + 0.39 Log L	1.417	0.39	0.161	0.834	3.7967	3.7201
Feb	Log w = 1.614 + 0.282 Log L	1.614	0.282	0.329	1.446	5.2810	2.6479
Mar	Log w = -0.207 + 1.567 Log L	-0.207	1.567	0.273	1.129	5.0010	15.7494
Apr	Log w = 0.696 + 0.755 Log L	0.696	0.755	0.204	0.705	4.9865	8.2282
May	Log w = 1.777 + 0.124 Log L	1.777	0.124	0.006	1.103	4.4886	6.7732
Jun	Log w = 1.441 + 0.358 Log L	1.441	0.358	0.045	1.080	3.7385	6.0083
Jul	Log w = -0.311 + 1.693 Log L	-0.311	1.693	0.213	0.937	4.0643	13.2791
Aug	Log w = 1.480 + 0.333 Log L	1.480	0.333	0.031	1.094	3.4515	6.3138
Sep	Log w = 0.386 + 1.766 Log L	-0.386	1.766	0.389	1.057	5.1776	13.0941
Oct	Log w = 1.118 + 0.526 Log L	1.118	0.526	0.032	0.897	3.8062	11.6539
Nov	Log w = 2.078 + -0.180 Log L	2.078	-0.180	0.819	1.057	3.5679	0.7213
Dec	Log w = 2.007 + -0.216 Log L	2.007	-0.216	0.834	0.939	3.8450	0.9192

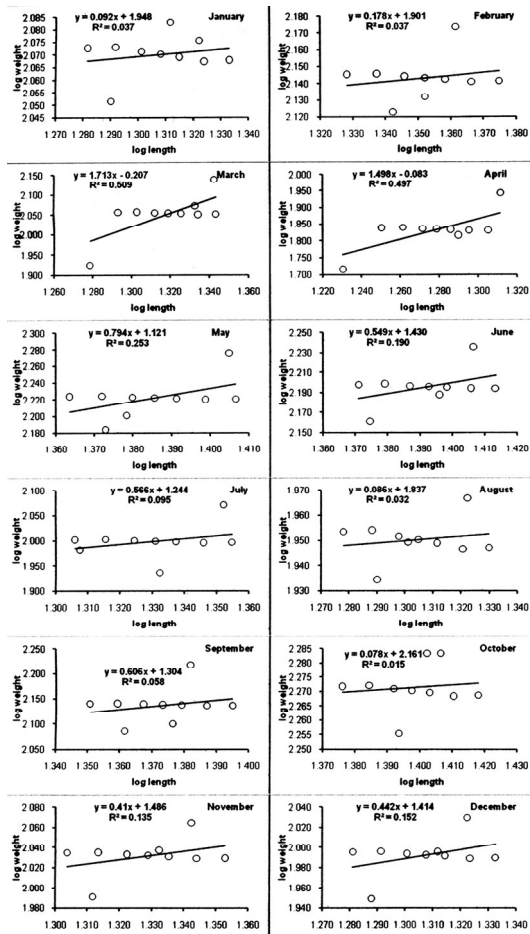


Figure 1. Length-weight relationship in female under natural conditions.

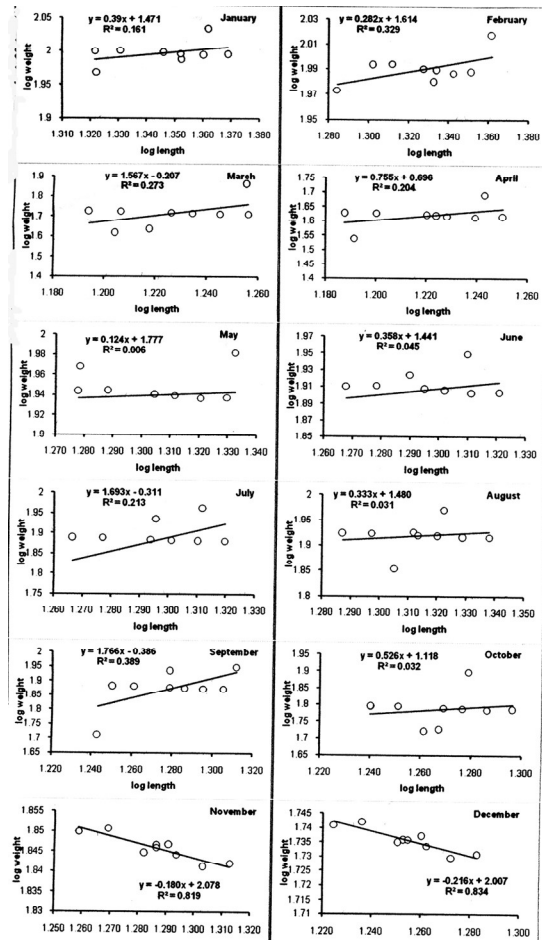


Figure 2. Length-weight relationship in female under captive conditions.

sults are similar to the earlier findings (6—8).

Biotic and abiotic factors viz. water temperature, food availability, habitat characteristics, species specificity, maturity and season and environmental condition of a particular habitat govern the overall development (9—13).

Ponderal index (K) is an index of physiological well being of fish (13). Ponderal index (K) is one of the standard practices in fishery ecology that the individual fish species conditions determined based on the analysis of length-weight data reflected that the heavier fish at a given length is in better condition (14) indicating the conducive environment. In the present study ponderal index (K) in specimens from

natural conditions have wide range than the captive conditions and monthly variation was observed in both the conditions. This might be due to stock difference and environmental conditions. This study too, is corroborated by the findings of several workers (15—17). Olurin and Aderibigbe (12) and Khallaf et al. (11) have documented the length-weight relationship and worked out that allometric or isometric growth differ not only between species but sometimes also between stocks of same species. The development of fish involves several stages, each of which has its own length-weight relationship. Values of *a, b* (regression coefficient) and correlation coefficient, condition factors for specimens (female) were not in iso-

meric relation ( $w=aL^b$ ). Allometric relation between length and weight is observed in the present study.

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