Research Paper

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Statistical Modeling of the Fecundity of Pseudecheneis Sulcatus from river Alaknanda, Garhwal Himalaya

Zoology

KEYWORDS : Fecundity, Pseudecheneis sulcatus, Alaknanda

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ABSTRACT

Pseudecheneis sulcatus is a carni-omnivore catfish attains a maximum Length of about 20 cm. On the basis of microscopic and macroscopic examination of gonads it was concluded that the fish spawns during July-Aug in the flooded moon soon. The ecological conditions of the stream play a vital role in the development and maturity of the fish. Food intake was observed generally poor during maturity.

INTRODUCTION

Pseudecheneis sulcatus, a carni-omnivore catfish is an important rare species inhabiting the Coldwater hill streams in Garhwal Himalayas. It was challenges to study its biology as it is normally not available in catches accept the monsoon season. Its breeding biology was successfully studied in the river Alaknanda in a stretch of about 65 km from Karnprayag to Srinagar Garhwal. It was observed as protracted spawner who spawns with a single frequency during monsoon flood. The present communication deals with its fecundity analysis which is an index of reproductive potential of the fish and is relationship with the body parameters. Some of the important contributors to the fecundity studies on catfishes are Ghosh and Kar (1952), Khanna and Pant (1966), Vasudevappa and James (1980), Singh et al. (1982, 1985) and Dobriyal and Singh (1987, 1989, 1993) Ramkrishna et al. (2011) and Dobriyal (2012, 2013)

METHODOLOGY

Thirty mature specimens were examined for this purpose, collected during the spawning and pre spawning season in the year 2011 and 2012. The morphometric measurements of the fish were recorded in fresh condition and the ovaries were preserved in 5% formalin for further analysis.

The absolute fecundity was estimated by the gravimetric count method and was correlated with the related body parameters by the regression analysis using straight line equation.

The sex ratio was also determined and significance was tested by the chi square method.

RESULTS

On the basis of the macroscopic and microscopic study of the gonads it was concluded that the fish is a protracted spawner with single frequency of spawning during July - August excepting a few rare specimens which were observed to be spawning in early September (Thapliyal and Dobriyal, 2002). Absolute fecundity of the fish ranged from minimum of 1945 ± 692 in the fish measuring 127.4 ± 3.05 mm with body weight 15.08 ± 3.43 g, ovary length 36.8 ± 7.53 mm and ovary weight 1.6 ± 0.93 g to a maximum of 6435 in a fish of 200 mm body length, 54.2 g body weight, 49 mm ovary length and 5.23 g ovary weight

Table-1.Fecundity and body parameters data of *Pseudecheneis sulcatus*

S.No.	Ovary weight	Fish Length	Fish weight	Ovary length	Fecundity
1	1.6	12.74	15.08	3.68	1945
2	1.587	13.53	21.82	3.69	2073
3	2.149	14.4	29.09	3.94	4058
4	3.32	15.38	36.46	4.21	4873
5	4.47	16.3	42.75	4.35	5648
6	4.8	17	46.2	4.1	6099
7	4.9	18	52.72	4.6	6266
8	5.32	20	54.2	4.9	6435

A straight line relationship was obtained in all the four relationships calculated (Fig. 1-4). Regression equation and correlation coefficient for the individual relationships were calculated as follows :

Fish length and Fecundity : F = - 9234.26 + 841.94 FL (r = 0.823)

Fish weight and Fecundity : F = 42.72 + 124.21 FW (r = 0.975)

Ovary length and Fecundity : F = - 8795.14 + 2905.43 OL (r = 0.455)

Ovary weight and Fecundity : F = 680.9 + 1138.78 OW (r = 0.965)

Where F = fecundity, FL = Fish length, FW = fish weight, OL = ovary length and OW = ovary weight, r = Coefficient of correlation between the parameters.

The sex ration in the fish was observed to be 1:1.05 (female: male, X^2 = 0.1, non significant) which is close to the natural one

DISCUSSION

Pseudecheneis sulcatus, a carni-omnivore catfish attains a maximum length of about 200 mm. The male fish matures at a size of about 123 mm and the female fish at a size of about 131 mm. On the basis of microscopic and macroscopic examination of gonads it was concluded that the fish spawns during July-August in the flooded monsoon. A single specimen was also observed spawning in early September. Absolute fecundity of the fish ranged from minimum of 1945 ± 692 in the fish measuring 127.4 ± 3.05 mm with body weight 15.08 ± 3.43 g, ovary length 36.8 ± 7.53 mm and ovary weight 1.6 ± 0.93 g to a maximum of 6435 in a fish of 200 mm body length, 54.2 g body weight, 49 mm ovary length and 5.23 g ovary weight. Few workers have also studied the fecundity of some other catfishes in the Himalayan hill streams. Dobriyal and Singh (1989) studied the fecundity of *G. pectinoprerus* and reported it to be in arrange of 1866 - 6903 in the fish measuring 121 - 160 mm from the river Nayar.

It is evident that the ecological conditions of streams play in vital role in the development and maturity in fish. The fish *P. sulcatus* feed on the insect larvae, earthworm and animal flesh. Also the occasional food in the form of algal carpet, diatoms etc. were recovered from its gut due to its bottom feeding habit. Food intake was observed generally poor. According to Nikolski (1961), the food consumed by fish determines not only the fecundity but also the quality of eggs and percentage of their fertilization. In the present investigation there were equal lobes of ovaries in most of the cases excepting few specimens where the lobes of the ovaries were unequal. Unequal lobes in the ovaries have also been reported by Desai (1973) in *Tor tor* and Dobriyal and Singh (1987) in *Barilius bendelisis*.

Many authors reported the reproductive capacity in terms of

relative fecundity (Dobriyal, 1993) in *G. madrespatanum*. In *P. sulcatus*, it was also estimated which fluctuated from a minimum of 118.7/g body weight in the fish measuring 20 ± 0.0 cm and weighing 54.2 ± 0.0 gm to the maximum 139.49 in the fish measuring 14.4 ± 0.23 cm and weighing 29.09 ± 4.17 gm. Thus, it was observed that the fish in medium length group was more fertile than the fish of higher length group. Dobriyal and Singh (1989) reported the relative fecundity of G. pectinopterus as 139.18/g body weight. Fecundity studies have also been made in some other fishes. Joshi and Khanna (1980) reported the fecundity range of 47,168-3,80,714 in *Labeo gonius.* Dobriyal and Singh (1987) reported the fecundity in a range of 900 to 5048 for *B. bendelisis* and 1866 to 6903 for *G. pectinopterus* (Dobriyal and Singh, 1989).

A straight line relationship is obtained between fecundity and body parameters which was much closer in Fish weight - fecundity (r = 0.975) and ovary weight - fecundity by Bagenal (1957), Agarwal et.al. (1988) and Dobriyal and Singh (1993). The sex ratio analysis has been considered of immense importance in the fisheries investigations. In the fish under study, the sex ratio was observed to be very close to the nature (1.05 male: 1 female, X^2 = 2.70554, NS). Such close relationships have also been reported by James and Baragi (1980). It is taxonomically considered as normal population.

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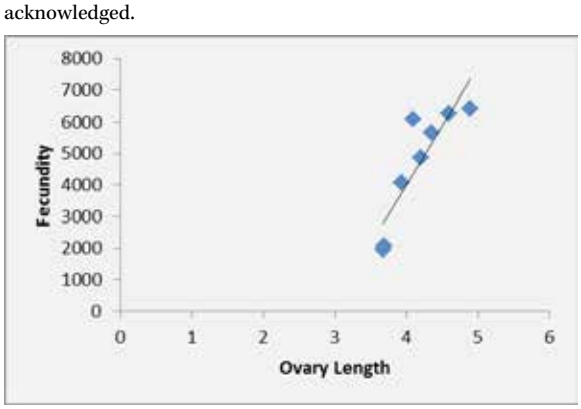

Fig 1

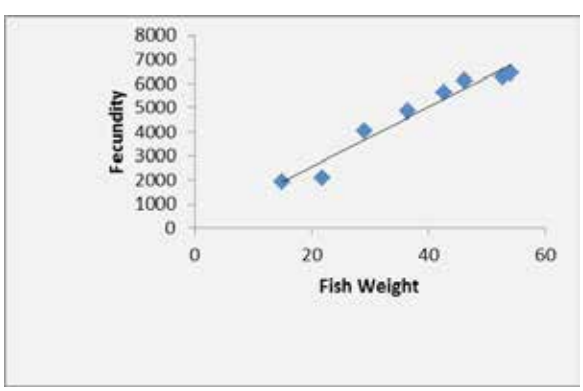

Fig 2

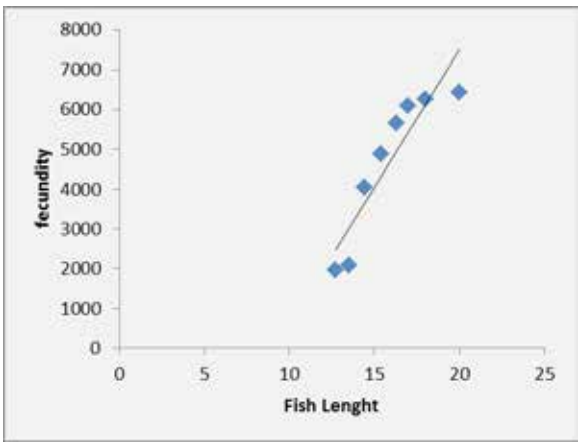

Fig 3

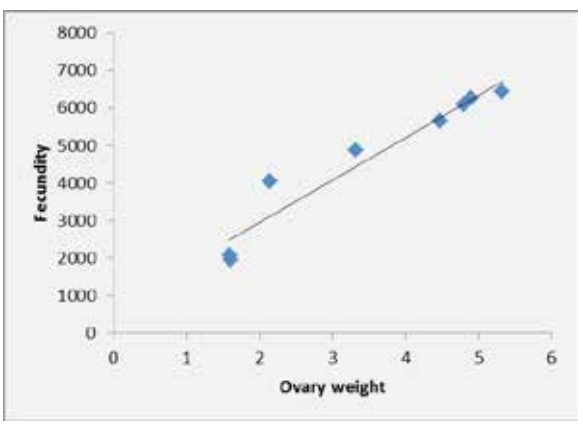

Fig 4

Fig 1-4 Relationship between the fecundity with the body parameters of *Pseudecheneis sulcatus*

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