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Breeding Biology of Feather-Back *Notopterus notopterus* from Keenjhar Lake, District Thatta, Sindh, Pakistan

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Abstract: Breeding biology was elucidated in terms of ova diameter, gonadosomatic index (GSI %) and fecundity of *Notopterus notopterus* from Keenjhar Lake, district Thatta, Sindh, Pakistan during May to September 2014. It was observed that the size of ova starts increasing from 1.0-2.82 mm during the study period and found highest (2.82) in July. The GSI % values were also found to increase from 0.1 to 1.83 and 3.72 to 7.92 for male and female, respectively. The estimation of fecundity in the present course of investigation was based on 12 graded fish. The fecundity of *N. notopterus* was ranged from 105-1500 eggs. The highest (1500 eggs) was recorded from the fish of 30.5 cm and 313.8 g and lowest (105 eggs) was recorded from the fish of 18.5 cm and 66.5 g in length and weight, respectively. It was concluded that the experimental fish *N. notopterus* was found to be low fecund fish as compare to carps due to bigger size of eggs and single lobed ovary. Fecundity was plotted against different body parameters like total length, body weight and gonad weight and found that it bears strong relationship with the total length.

Key words: Breeding biology, fecundity, *Notopterus notopterus*, Keenjhar Lake

INTRODUCTION

Notopterus notopterus belongs to family notopteridae found in Pakistan, India, Bangladesh, Myanmar, Thailand and Philippine (Mirza, 1982). It is commonly known as feather-back and plenty in ponds, streams, lakes and rivers of Pakistan. It breeds annually and migrates to spawning ground during rainy days and back to permanent habitat in dry season (Sathish and Kulkarni, 2012). It is relished both in fresh and dried state and important commercial fish for human consumption. Its soup is good for people suffering from measles (Parameswaran and Sinha, 1978). Breeding biology in fish plays important role to ascertain its interrelationship between various environmental factors like physical and biological characters of the given water body it should be determined for the species conservation. The results of the present study will serve as base-line data for the future researchers since this specie is a suitable candidate for artificial propagation in open water bodies.

MATERIALS AND METHODS

For enumeration aspects of breeding biology 12 samples of both the sexes (6 male 6 female) was procured every month from May to September 2014 from the catch of fishermen of Keenjhar Lake district Thatta, Sindh. The collected specimen was brought to the laboratory department of Freshwater Biology and Fisheries, University of Sindh, Jamshoro in plastic bags preserved in 10% formalin. Sex and the condition of the

gonad of each fish was noted; gonads dissected out, weighed on electronic balance and transferred to a vial filled with 10% buffer formalin for the subsequent studies.

Measurement of ova diameter: From each ovary, diameter of about 100 ova was measured under the binocular microscope fitted with ocular micrometer according to recommended methods as suggested by LeCren (1951).

Determination of gonadosomatic index (G.S.I): Gonadosomatic Index (%GSI) was determined for male and female separately throughout the study period by using formula:

$$\frac{\text{Gonad weight}}{\text{Total body weight}} \times 100$$

Estimation of fecundity: The estimation of fecundity in the present study was based upon 12 mature fishes ranged from 19.6-31.2 cm and 81.3-338.2 g in total length and weight, respectively. The fecundity was enumerated through gravimetric method describes by (Dewan and Doha, 1979; Blay, 1981) samples taken from interior, middle and posterior region of both the ovaries ere weighed separately and number of ova present within each samples was counted fecundity was estimated on the basis of total weight of ovaries. The fecundity of the fish was obtained by using formula:

$$F = N \times \frac{\text{Gonad weight}}{\text{Sample weight}}$$

where, F: Fecundity and N: The number of eggs in the sample.

RESULTS

The ova diameter of experimental fish *Notopterus notopterus* from Keenjhar Lake district Thatta was ranged from 1.0-2.82 mm. The increase in ova size was noticed from May to August and tabulated in Table 1, indicated that the breeding season of experimental fish, *N. notopterus* starts from June to August with peak in July. The values of gonadosomatic index (GSI) ranged from 0.81-1.83 and 3.72-7.92 for male and female, respectively with highest in July (Table 2). Therefore it was concluded that the fish spawned once in a year with one peak in the month of July as indicated by the values of both ova diameter (2.82 mm in July) and GSI (1.83 and 7.90) in male and female, respectively. The results of the estimation of fecundity of *N. notopterus* were found to be varied from 105 to 1500 eggs. The highest fecundity (1500 eggs) was recorded from a fish of 30.5 cm and 313.8 g and lowest (105 eggs) was noted in 29.0 cm and 190 g in length and weight, respectively (Table 3). Fecundity was plotted against their respective body variables like total length, body weight and gonad weight, the fecundity was found to increase with the increase in total length having correlation of coefficient values ($r = 0.98$) shown in (Fig. 1-3, respectively). It inferred that the fecundity bears strong relationship with total length as compare to other body variables in *N. notopterus* from Keenjhar Lake.

DISCUSSION

In the present study the ova diameter as recorded from the ovaries of *Notopterus notopterus* from Keenjhar Lake, District Thatta, Sindh was ranged from 1.0-2.82 mm. The increase in ova diameter was noticed from June to August with peak in July. Similar findings have been reported by different authors in *N. notopterus* such as Parameswaran and Sinha (1978) reported egg size from 2.61-3.04 mm from India; Hossain *et al.* (2006) recorded ova size 2.5-3.5 mm from Bangladesh, these findings are in accordance with the present study. Various researchers (Ahyauddin, 1999; Marimuthu and Haniffa, 2007; Mastoi *et al.*, 2008) in different species, reported egg size in *Channa striatus* from India and Bangladesh ranging from 0.70 to 1.30 mm and 1.5-2.8 mm in *Labeo calbasu* from Sindh, Pakistan. The ranges of ova diameter reported by above authors are in agreement with the present study. Values of GIS observed highest from June to August ranged from 0.1-1.83 and 0.2-7.90 for male and female, respectively. Similar findings have been reported by different authors in *Notopterus notopterus* such as Parameswaran

Table 1: Data on gonad weight and ova diameter of experimental fish, *Notopterus notopterus* from Keenjhar Lake, District Thatta Sindh, Pakistan

Months	Gonad weight	Ova diameter
May	1.0	1.0
June	10.3	2.0
July	11.7	2.82
August	16.0	2.77
September	2.0	0.5

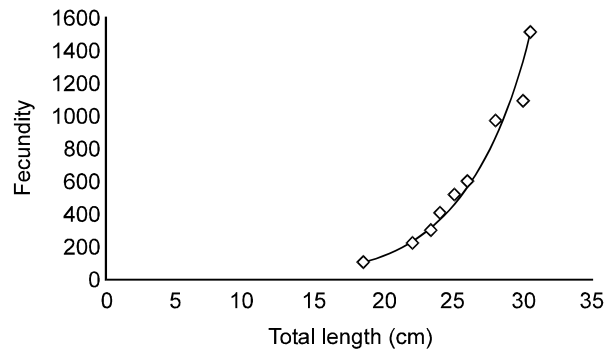


Fig. 1: Empirical relationship between total length versus fecundity in *Notopterus notopterus* from Keenjhar Lake, District Thatta, Sindh, Pakistan

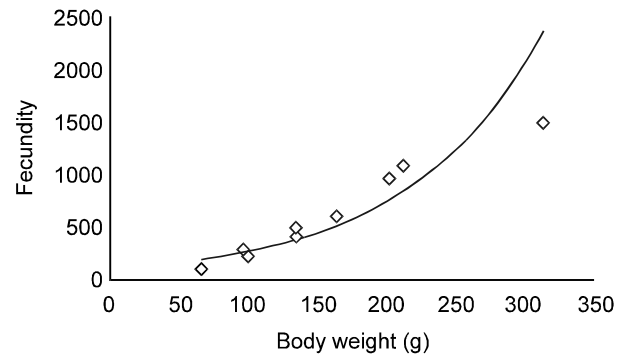


Fig. 2: Empirical relationship between body weight versus fecundity in *Notopterus notopterus* from Keenjhar Lake, District Thatta, Sindh, Pakistan

and Sinha (1978) reported GSI values from 0.8-1.8 and 3.70-8.0 from India; Hossain *et al.* (2006) suggested 0.5-1.90 and 3.5-8.1 from Bangladesh, this accords with the present findings. Fecundity estimation in the present study in *N. notopterus* was ranged from 150-1500 eggs. The highest fecundity (1500 eggs) was recorded from a fish of 30.5 cm and 313.8 g and lowest (105 eggs) was noted in a fish of 29.0 cm and 190 g in length and weight, respectively in the present study. Parameswaran and Sinha (1978) reported fecundity of *N. notopterus* varied from 1750 to 1188 eggs, Hossain *et al.* (2006) estimated fecundity in *N. notopterus* ranged from 1580-9800 eggs from Bangladesh. The above ranges of the fecundity in *N. notopterus* are similar with the present findings. The eggs present in

Table 2: Data on gonadosomatic index (GSI %) of experimental fish, *Notopterus notopterus* from Keenjhar Lake, District Thatta Sindh, Pakistan

Months	No. of males	% GSI in male	No. of females	% GSI in female	Ova diameter (mm)
May	05	0.81	05	3.72	1.91
June	06	1.0	06	6.69	2.70
July	05	1.83	06	7.92	2.82
August	05	1.80	05	7.60	2.77
September	06	0.49	07	1.50	1.0

Table 3: Data on length weight, gonad weight and fecundity of experimental fish, *Notopterus notopterus* from Keenjhar Lake, District Thatta Sindh, Pakistan

S. No.	Length of fish	Weight of fish	Gonad weight	Fecundity
01	18.5	66.5	1.0	105
02	22.0	100	2.3	215
03	23.4	95.8	3.3	290
04	24.0	135	5.2	406
05	25.0	134.5	6.5	510
06	26.0	164.0	9.0	600
07	28.0	202.0	10.3	960
08	30.0	212.4	11.7	1090
09	30.5	313.8	16.0	1500

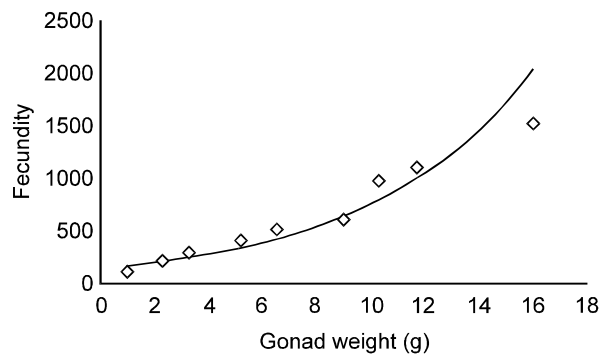


Fig. 3: Empirical relationship between gonad weight versus fecundity in *Notopterus notopterus* from Keenjhar Lake, District Thatta, Sindh, Pakistan

one gram of body weight and ovary weight in the present study was found to be 5.8 and 809, respectively. Similar observations (5.6 to 904 and 3.8 to-902) have been reported by Parameswaran and Sinha (1978) and Hossain *et al.* (2006) from India and Bangladesh, respectively. The above ranges of fecundity are in accordance with the findings of the present study. Various authors have estimated fecundity in different fish species like Reddy (1979) calculated fecundity of *Channa striatus* from India ranged from 3100 to 12100 eggs, Narejo *et al.* (2006) and Mastoi *et al.* (2008) in *Gudusia chapra* and *Labeo calbasu*, respectively. The fecundity values were plotted verses different body parts like body weight, gonad weight and body length. Fecundity of *N. notopterus* was found to be positively correlated ($r = 0.99$) with body length in the present study. Numerous workers were of the idea that the number of egg increases as the increase in body length. Alike reports have been published by many researchers like Mian and Dewan (1984) in *Sarotherdon niloticus*,

Narejo *et al.* (2002) in spiny eel, *Mastacembelus armatus* Narejo *et al.* (2003) in mud eel, *Monopterusuchia*. The results of the present study are in agreement with the above researchers.

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