



SEX RATIO OF *LABEO BOGGUT* (SYKES) FROM KALU DAM AHMEDNAGAR DISTRICT, MAHARASHTRA, INDIA

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ABSTRACT

The sex ratio of a fresh water fish, *Labeo boggut* has been studied over a period from November 2014 to October 2015 from Kalu dam near Ahmednagar, Maharashtra. The overall sex ratio male to female was 1:1.04. Males outnumbered females, although the sex ratio showed no significant deviation in the population. Females outnumbered males, although the sex ratio showed no significant deviation in the population. Females outnumbered males during peak spawning (May to July) while after spawning (August) again males were dominant than the females. Sex ratio in length groups from 140 to 179 mm and 250 to 259 mm showed significant difference ($p < 0.05$).

KEY WORDS: *Labeo boggut*, Sex ratio, Kalu dam.

INTRODUCTION

Knowledge of sex population estimation in fishes is essential for the management practices of fishery science. It is important to ensuring a proportional fishing of two sexes. Sex population estimation is defined as the abundance of any sex at a particular time or the population is in natural condition or abnormal condition. It is generally found that in a healthy population, the sex ratio should be 1:1. There are several other factors like temperature, water velocity, vulnerability of females to their predators, migratory phase and other ecological hazards, which possibly change the sex composition in streams or rivers (Jameela Beevi and Ramachandran, 2005). For commercial utilization of any fish species, it is highly essential to have a prior knowledge of its spawning behavior, which includes the month, frequency, sex ratio and ecology of spawning (Verma, 2013). Many ichthyologists have worked on the fishes breeding biology, sex ratio and other aspects of different fishes biology (Sobhana and Nair, 1976; Pathani, 2000; Johal and Negi, 2000; Dobriyal *et al.*, 2004; Kumar *et al.*, 2006; Pawar and Mane, 2006; Bahuguna *et al.*, 2007; Shendge and Mane, 2009 and Bahuguna *et al.*, 2009, 2010a, b, c; Pandarkar *et al.*, 2010; Bahuguna and Kumar, 2011; Bahuguna *et al.*, 2011, Krishan *et al.*, 2012, Joshi *et al.*, 2014). No attempt has so far been made to find out the sex composition of commercially valued minor carp like *L. boggut*. The present study is dealing with population sex ratio status of *L. boggut*. This is for the first time this species is being studied from Kalu dam, Ahmednagar district, Maharashtra, India.

MATERIALS & METHOD

Kalu dam selected as freshwater body for the present study is a man-made perennial dam. It is built during the year 2000 to 2010 and has a catchment area 188.81 sq. kms. It is earthen and masonry and with length 1580 meters. Kalu

dam is major water source to the residential and adjoining areas for over 15 years. It is one of the oldest impoundments situated at Dhawalpuri across Kalu river, post-Dhawalpuri, Tahsil-Parner, District-Ahmednagar, State-Maharashtra. longitude: 74-28'-45" (E) and latitude: 19-12'-15" (N) of equator and at an elevation of 663.50 meters above full supply level (FSL). It is a shallow dam with maximum height of 37.09 meters. Gross storage of dam is 289.00 million cubic feet. The available yield is 685.00 million cubic feet. Many food fishes are abundant in this dam and constitute a major fishery resource.

Fishes were collected with the help of local fishermen using different types of nets, during November 2014 to October 2015 from Kalu dam. Immediately photographs were taken with the help of digital camera. After noting their original colour and general pigmentation, the specimens were brought to the laboratory and preserved in 10% formalin solution. The large fishes were given an incision in their abdomen and preserved. The meristic and morphometric characters were measured and fishes were identified up to the species level, with the help of standard texts (Dutta Munshi and Srivastava, 1988; Day, 1994; Jayaram, 1999). The scientific recognition and classification of fish species were made by using standard books and keys. Specimens with doubtful identifying characters were identified from Zoological Survey of India (ZSI) Pune.

The total length and weight of fish was recorded in fresh condition. However, the other parameters were measured within a monthly collection. During the study, a total of 365 specimens were examined covering a wide range of sizes to determine the sex ratio. The sex ratio was calculated for different months and for specific length groups. Thirteen length groups were made at an interval of 10 mm (from 130 mm to 259 mm in length) a total of 288 specimens comprising 144 males and 144 females were examined. Further the month wise data was divided into

Sex ratio of *Labeo boggut* (Sykes) from Kalu dam

different quarters of the year, viz. November to January, February to April, May to July and August to October. Chi-square test (Biradar, 1988) was employed to test the

significance of deviation from 1:1 sex ratio. The analysis of data was subjected to test of heterogeneity.

TABLE 1: Sex ratio of *L. boggut* from Kalu dam in different months

Sr. No.	Months	No. of specimen	Male	Female	Ratio M : F	Expected number in each sex	Chi-square value	Remarks
1	November	38	20	18	1 : 0.9	19	0.1053	Non Significant difference
2	December	35	20	15	1 : 0.75	17.5	0.7143	Non Significant difference
3	January	28	12	16	1 : 1.33	14	0.5714	Non Significant difference
4	February	28	13	15	1 : 1.15	14	0.1429	Non Significant difference
5	March	26	14	12	1 : 0.86	13	0.1538	Non Significant difference
6	April	27	13	14	1 : 1.07	13.5	0.0370	Non Significant difference
7	May	31	14	17	1 : 1.21	15.5	0.2903	Non Significant difference
8	June	29	14	15	1 : 1.07	14.5	0.0345	Non Significant difference
9	July	28	12	16	1 : 1.33	14	0.5714	Non Significant difference
10	August	32	17	15	1 : 0.88	16	0.1250	Non Significant difference
11	September	31	15	16	1 : 1.07	15.5	0.0323	Non Significant difference
12	October	32	17	15	1 : 0.88	16	0.1250	Non Significant difference
		365	181	184	1 : 1.04	182.5	2.9032	

M: Male, F: Female

TABLE 2: Sex ratio of *L. boggut* from Kalu dam in different quarters

Sr. No.	Months	No. of specimen	Male	Female	Ratio M : F	Expected No. in each sex	Chi-square value	Remarks
1	November - January	101	52	49	1 : 1	50.5	0.0891	Non Significant difference
2	February - April	81	40	41	1 : 1	40.5	0.0123	Non Significant difference
3	May - July	88	40	48	1 : 1	44	0.7273	Non Significant difference
4	August - October	95	49	46	1 : 1	47.5	0.0947	Non Significant difference
		365	181	184	1 : 1	182.5	0.9235	

M: Male, F: Female

TABLE 3: Sex ratio of *L. boggut* in relation to various length groups

Sr. No.	Months	No. of specimen	Male	Female	Ratio M : F	Expected number in each sex	Chi-square value	Remarks
1	130-139	24	13	11	1 : 0.85	12	0.1667	Non Significant difference
2	140-149	9	6	3	1 : 0.50	4.5	1.0000	Non Significant difference
3	150-159	10	6	4	1 : 0.67	5	0.4000	Non Significant difference
4	160-169	12	8	4	1 : 0.50	6	1.3333	Non Significant difference
5	170-179	22	14	8	1 : 0.57	11	1.6364	Non Significant difference
6	180-189	36	24	12	1 : 0.50	18	4.0000	Significant difference
7	190-199	32	14	18	1 : 1.29	16	0.5000	Non Significant difference
8	200-209	24	6	18	1 : 3.00	12	6.0000	Significant difference
9	210-219	31	15	16	1 : 1.07	15.5	0.0323	Non Significant difference
10	220-229	23	17	6	1 : 0.35	11.5	5.2609	Significant difference
11	230-239	35	14	21	1 : 1.50	17.5	1.4000	Non Significant difference
12	240-249	22	6	16	1 : 2.67	11	4.5455	Significant difference
13	250-259	8	1	7	1 : 7.00	4	4.5000	Significant difference
		288	144	144	1 : 1.57	144	30.7749	

M: Male, F: Female

RESULTS & DISCUSSION

In the present study sex ratio of fresh water fish *L. boggut* from Kalu dam near Ahmednagar was calculated for various months and different length groups. The data of sex ratio for each month (Table 1) showed more or less

equal distribution of males and females. Males were found to be less in January, February, April, May, June, July and September. Some fluctuations were observed during the spawning period, i.e. between May to July, when the females were more abundant than the males. On the

contrary, during November, December, August and October the males were more abundant than the females. This might be due to the fact that the spent females left the spawning grounds before the males (Pandarkar *et al.*, 2010), hence a reduction in their relative numbers was observed during November, December, August and October as compared to the spawning period between May to July. The data on sex in relation to length (Table 2) showed no significant difference in the abundance of any sexes from 130 to 179 mm, 190 to 199 mm, 210 to 219 mm and 230 to 239 mm. However, from 200 to 209 mm, 240 to 249 mm and 250 to 259 mm size the females were significantly dominant ($p < 0.05$) over the males whereas from 180 to 189 mm and 220 to 229 mm size the males were significantly dominant ($p < 0.05$) over the females.

The sex composition in different length groups showed a possible switch in the sex ratio. The males seemed to predominate at smaller size where as the female seemed to predominate among the bigger (Sriramchandramurty, 1979; Menzens, 1980; Brewer *et al.*, 1994). The results of the present study on *L. boggut* showed similarity with the reports quoted above. This indicated that the males die off much faster than females.

From table 3 the analysis of percentage occurrence of sexes in different quarters of the years showed that in *L. boggut*, males were dominant in the quarter November to January, while in February to April and May to July females were more dominant than the males, while in rest of the quarter *i.e.* from August to October males were dominant than the females. Chi-square analysis showed that, there was no significant difference between the proportion of the sexes in *L. boggut* in a each quarter. Information on the sex ratio of *L. boggut* from Kalu dam presents overall picture of sex ratio (Table 1 and 2). There was no significant difference between the numbers of any two sexes from November to October. However, during November, December, March, August and October males outnumbered females, while during January, February, April, May, June, July and September females were dominant than the males. The sex ratio pattern in *L. boggut* may be utilized in ascertaining the population characteristics, possible catch size at a given time and locality and ensuring a proportional fishing of the two sexes to exploit fisheries resources on sustainable basis. Chacko and Ganapati (1949) suggested that the studies on the sex composition status estimation have their own significance and are helpful in detecting differential fishing, if any, in different periods of the year in the various size-groups and thus we can get information about the abundance of the sex at a particular time or throughout the year.

The overall sex ratio in nature is close to 1:1 in the species but it may be far from this in particular size groups (Nikolskii, 1980). Holcik *et al.* (1988) stated theoretically, the expected composition of males to females is 1:1. Thus optimum sex ratio may change drastically as a result of being affected by numerous factors. During present study it was found that, overall sex ratio of male to females was 1.0: 0.98. Chi square test indicated that there was no significant difference ($p > 0.05$) from the expected 1:1 ratio, hence the hypothetical value was of 1:1, while studies of Johal *et al.* (2000) and Johal and Negi (2003) on sex ratio

in *Tor chilinoides* and *Tor putitora* suggested abnormal sex ratio.

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