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NOTE

Fecundity Indices of the Indian Ruff, *Psenopsis cyanea* (Alcock) inhabiting beyond 200m off the southwest coast of India

Radhika Rajasree, S. Venu and B.Madhusoodana Kurup

School of Industrial Fisheries,Cochin University of Science and Technology, Cochin-682 016, India

Abstract

Fecundity of *Psenopsis cyanea* (Alcock) belonging to the family *Centrolophidae* has been worked out. Absolute fecundity varied from 20,581 to 36,245 eggs in specimens ranging in total length from 131mm (27g) to 187mm (39g) while the number of ova per gram of ovary weight ranged from 618 to 908. The maturity indices varied from 5.2 to 6.9. Fecundity in relation to total fish length, fish weight, ovary length and ovary weight were regressed and the results showed positive correlation with total length and total ovary length. Average number of eggs per gram body weight was 742 and the same for one millimetre length of body worked out to 155. The reduction of fecundity in the length class 180-184 mm can be considered as a manifestation of aging and the reciprocal decrease in the reproductive capacities of the fish.

Psenopsis cyanea (Alcock, 1890), commonly known as the Indian Ruff, is one of the most dominant deep-sea fishes inhabiting abundantly in the area at Lat. 11^0 to 12^0 N off the southwest coast of India. Various authors have made observations on the occurrence, distribution and biology of *Psenopsis cyanea* inhabiting the continental slope in the southwest coast of Indian EEZ (Prasad and Nair, 1973; Sivakami *et al.*, 1991; Venu and Kurup, 2002). However, our knowledge on certain aspects of biology of these species is still scanty. One such aspect is the fecundity. Assessment of fecundity is having paramount importance in fisheries management as it provides knowledge about number of offspring production in a season and the reproductive capacity of the species (Raina and Bali, 1982). Relative fecundity would also serve as an index of endangerment (Kurup and Kuriakose, 1994). Since not much information on the fecundity of *P. cyanea* is available, a study has been undertaken and the results are presented.

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Material and methods

Materials for the present study were collected from the experimental trawling operations conducted onboard FORV *Sagar Sampada* (Dept.of Ocean Development), in the continental slope at Lat. 7° - 12° N in the Cruise Nos. 174, 183, 189, 196 and 197, off southwest coast of India during January 2000 to November 2001. Besides these, random samples collected from the commercial deep sea fishing boats operating off Cochin, Munambum and Sakthikulangara were also utilised. 45 adult ripe females of *P.cyanea* of total length ranging from 130mm (28g) to 189mm (39g) were analysed. The specimens were grouped into 6 size groups based on the total length. The total length and weight were recorded for the individuals to the nearest millimetre and gram respectively. So also the length and weight of the ovaries were recorded to the nearest mm and gram respectively. The ovaries were then preserved in modified Gilson's fluid for two weeks. The absolute fecundity was estimated following standard procedures (Bagenal and Braun,1978) and the values so arrived at were regressed against total length (mm), total weight (g), ovary length (mm) and ovary weight (g). Relative fecundity was derived by estimating the number of eggs per gram body weight, the number of ova present per gram ovary weight and the ovary weight as percentage of total fish weight (maturity index).

Results and discussion

Relationship of fecundity of *P. cyanea* with total length, total weight, ovary length, ovary weight and other variables are represented in Figure 1.The highest mean absolute fecundity was 33,223 eggs in a fish of total length 173mm (35g) and lowest in a specimen of 136mm (29g). Fecundity per unit body dimension was estimated directly from the mean of 45 observations (Table 1). The results of regression analysis of various parameters also have been indicated (Table 2). The fecundity showed significant correlation to almost all variables at 1% level. In the present study, the exponential value is equals to the cube of their length which is very much in agreement with the general accepted view that fecundity is related to the fish length by the so called cube factor (Bagenal, 1957). The exponential values (regression coefficient) between total weight, ovary length and ovary weight and fecundity were found to be higher than the cube, which showed a strong positive deviation from the cube (Table 2). Strong positive relationship between fecundity and body weight have been reported in a number of fishes (Bhatnagar, 1972; Khan and Jhingran , 1975; Raina and Bali, 1982; Siddhiqui *et al.*, 1976) and this would lend support to the present findings. It is significant to note that among various parameters studied, the fecundity is highly related to ovary weight because the weight of ovaries of fish are mainly influenced by the ova contained in them and this is in full agreement with the earlier reports (Qasim, and Qayyum,1963; Khan and Jhingran ,1975; Sivakami *et al.*,1996).

Mean fish length, mean fish weight, mean ovarian weight, number of ova per gram fish weight, coefficient of maturity and the absolute fecundity of various length groups of *P.cyanea* are presented in

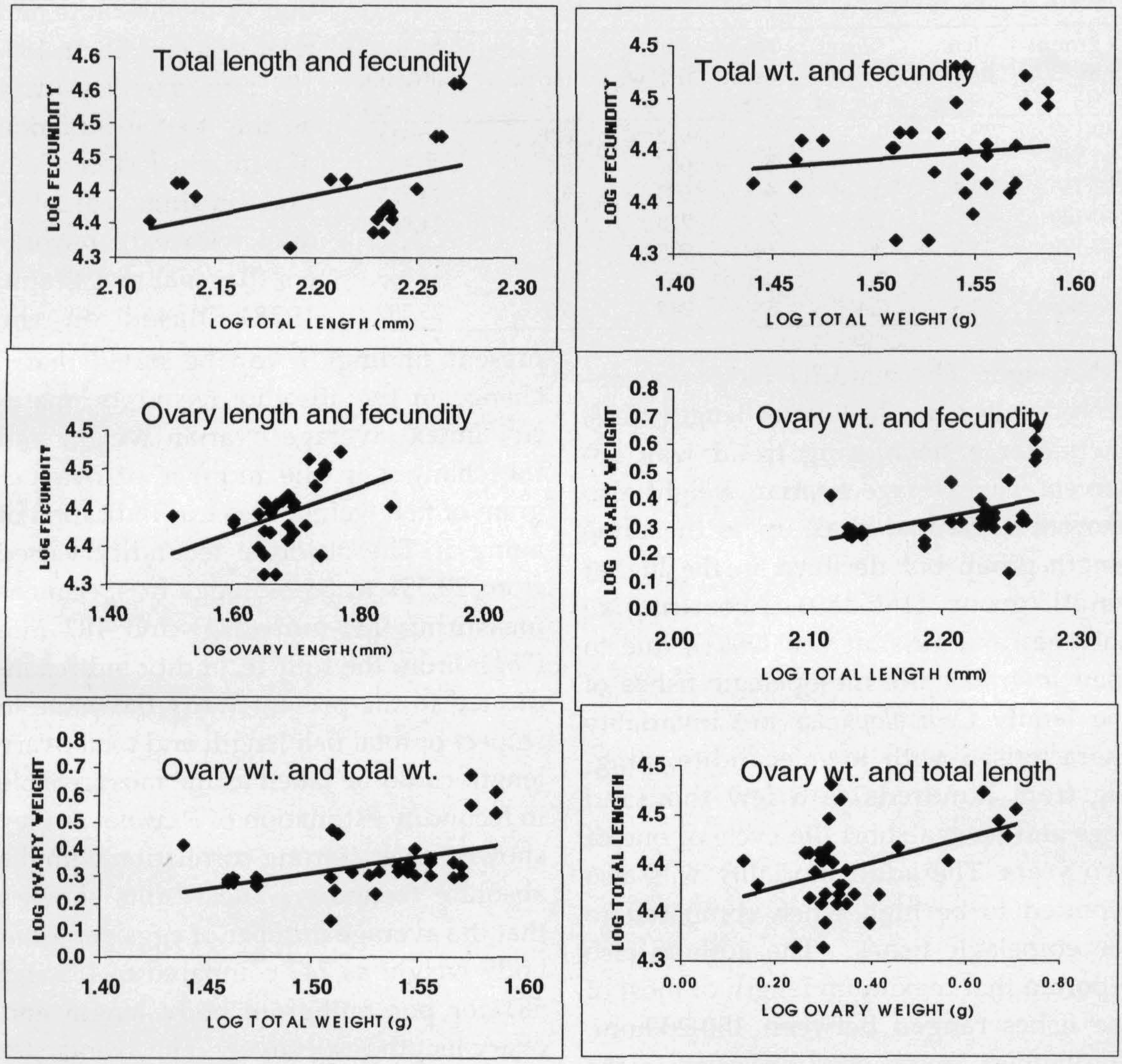

Fig.1. *Fecundity* P. cyanea

Table 1. The average absolute fecundity of a specimen having 159mm of total length and 2.47mean ovarian weight was estimated as 25,589 eggs. The average number of ova per gram of fish weight was 744 while the maturity index was worked out to be 7. Average absolute fecundity enumerated for six length groups was 20,311; 20,581; 24,375; 24,837; 33,223 and 24,927 respectively. The mean absolute fecundity showed a gradual increase in the first five stages; however, a decreasing trend in the last stage is noteworthy. Number of ova produced per gram fish weight also showed a gradual increase up to 170-179mm size group, with a maximum value of 908, while in 180-189mm length class, it decreased to 858 per gram

Table 1. *Average value of fecundity indices in* P.cyanea

Lt.group mm	Mean fish wt. (g)	Mean ovary wt.(g)	No. of fish	Ova/g fish wt.	Maturity index	Mean absolute fecundity
130-139	29.0	1.7	9	618	6.9	20,311
140-149	31.5	1.9	3	667	6.4	20,581
150-159	33.3	2.0	4	693	5.2	24,375
160-169	34.1	2.1	7	718	6.8	24,837
170-179	35.3	3.4	14	908	9.2	33,223
180-189	36.5	3.2	8	858	6.2	24,927
Average	33.3	2.4	8	744	6.8	25,589

fish weight. The maturity index was observed as 9.2 in 170-179mm length class, thereafter a decreasing trend was observed. The average ovarian weight also showed a gradual peak up to the same length group but declined in the higher length group (180-189). According to Salvenes and Kristofersen (2001), due to their low size, the mesopelagic fishes of the family *Centrolophidae* are invariably characterised with low fecundity, ranging from hundreds to a few thousand eggs and have a short life cycle of one or two years. The adult mortality was also reported to be high when compared to the epipelagic fishes. The authors also reported that maximum length of most of the fishes ranged between 150-200mm. The highest length class observed in the present study is 180-189mm. The reduction in the absolute and relative fecundity in 180-189 mm size class may be due to the initiation of aging in *P.cyanea* and this findings corroborates with earlier workers (Bagenal and Braun, 1978). Based on the present findings it can be stated that a change in the absolute fecundity, maturity index, average ovarian weight and the changes in the number of ova per gram of fish weight are clear indication of aging . The absolute fecundity varied from 20,581 to 36,245 eggs in specimens measuring 131-mm (27g) and 187 mm (38g). From the four fecundity indices indicated in the present study the value in respect of total fish length and total ovary length could be taken as the most reliable in fecundity estimation of *P.cyanea* as they showed a very strong correlation with the absolute fecundity. The results showed that the average number of eggs per gram body weight as 743 compared to 155 and 581 for per milligram body length and ovary length respectively. The average fecundity per gram ovary weight was estimated as 9,972 (Table 2). The fecundity of deep sea fishes inhabiting the south west coast of India are not fully known and therefore the results of the present study cannot be compared with observations on this aspect in coastal fishes:

Table. 2. *Results of regression analysis with fecundity in* P.cyanea

Variable	a	b	Corr. Coeff. ®	Fecundity per unit body dimension
Tl	0.61	3.03	0.41*	155
T.wt	0.14	4.18	0.13*	743
O.wt.	0.13	4.35	0.42*	9973
O.l	0.29	3.90	0.42	581

Tl = total length, T.wt = Total wt., O.wt. = Ovary wt., O.l = Ovary length. * Significant at 1% level

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