

The Fecundity of the False Trevally, *Lactarius lactarius* (Bloch and Schneider) along the Karwar Coast

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A clear knowledge of the reproductive potential or fecundity of a fish is quite an essential pre-requisite for the proper management and conservation of the resources. The fecundity studies are also undertaken to determine the index of diversity dependent factor affecting the population size (Simpson, 1951). Qasim & Qayyam (1963) have detailed the various pathways by which an understanding of fecundity could be used for fishery biological work. The ability of egg production varies within the individual limits such as length, somatic weight, gonadal weight, volume of fish etc.

The fecundity of any species of fish is determined from the computed number of ova forming a crop of the season. While Franz (1910) and Clark (1934) stated that the fecundity increased as the square of the length, Farren (1938) observed the increase at a rate higher than the fourth power of length. Hickling (1940) noted an increase in the fecundity of herring at a rate greater than the third power of its length. Smith (1947) found a linear relationship between the number of eggs and the length of fish in the eastern trout. But an exponential relationship between fecundity and the length along with a linear relation between fecundity and weight of *Hilsa ilisha* was established by Pillay (1958).

Very little work has been done on the fecundity of the false trevally, *Lactarius lactarius*. Rao (1971) estimated the average fecundity as ranging from 19155-104195 and James *et al.* (1974) gave the egg count in the range of 9000 to 79,000 in this species from Vishakapatnam and Mangalore waters respectively.

Materials and Methods

For the determination of fecundity of false trevally, ovaries of 20 specimens procured from the fish landing centres in and around Karwar, ranging from 153 mm to

232 mm were studied. Only ovaries containing mature eggs were used for this study.

The ovaries were hardened in 5% formaldehyde before estimating the number of ova in each. First, the entire ovary after removal of surface moisture, was weighed to the nearest milligram. To obviate any possibility of error due to the uneven distribution of the mature ova, a small portion (250 mg) was extracted from the posterior, middle and anterior regions of both the lobes of ovary. Ova in each piece were teased out, dispersed with little water and counted through binocular magnifier. The total number of eggs in the ovary was then computed.

Results and Discussion

Table 1 indicates numerically the number of ova released by a fish at a time during the spawning season show remarkable variations ranging from 17,972 to 63,121. Environmental conditions and food supply are known to affect the fecundity of fishes (Bagenal, 1957 and Scott, 1962). It is possible that the variation in fecundity of the false trevally may be due to environmental conditions of the Karwar waters.

The data were plotted (Figs. 1, 2, 3) and regression lines were fitted to the results by the method of least squares in order to study the relationship between the fecundity of the fish and the length and weight of the fish and weight of the ovary. The graphs suggest the following form of relationship:

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Table 1. *Fecundity and other particulars of 20 mature specimens of L. lactarius*

Total length of fish (mm)	Weight of fish (g)	Weight of ovary (g)	Fecundity
156	56.52	1.51	17,972
156	60.28	1.72	20,324
160	60.04	2.84	22,628
161	65.50	2.53	21,544
163	63.84	3.01	24,628
164	66.00	2.85	28,640
165	60.24	2.12	25,567
170	65.50	2.01	26,724
175	67.00	2.96	28,646
183	70.25	3.05	29,180
184	69.14	2.91	32,640
185	81.25	4.53	45,650
187	72.00	4.02	39,480
193	87.40	4.09	45,210
193	89.75	4.55	45,527
208	124.00	4.87	46,957
228	149.17	5.17	50,928
232	160.50	6.40	63,121

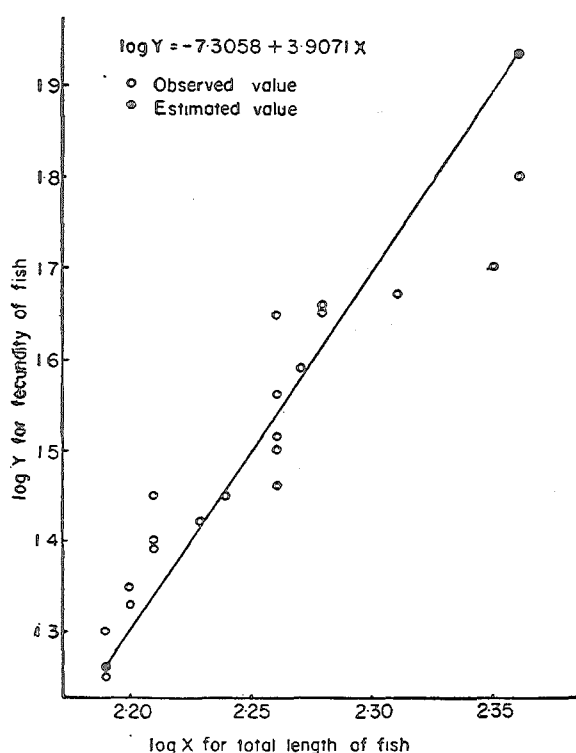


Fig. 1. Total length and fecundity relationship.

$Y^+ = a^+ + bX^+$
 $Y^+ = \log Y$ (fecundity),
 $a^+ = \log a$ (a constant), $b =$ a constant and
 $X^+ = \log X$ (length L or body weight W or gonad weight G as the case may be).

Relation between fecundity and length of fish

The scatter diagram of length-fecundity relationship is depicted in Fig. 1. and was found out to be.

$Y = -7.3058 + 3.9071 X$
 where $Y = \log F$ (fecundity in thousand)
 and $X = \log L$ (total length in mm).

From this equation the estimated values of fecundity were worked out. The fact that the length and fecundity are linear function of one another and that the latter increases at the rate of 3.9071 times the total length is clear from Fig. 1.

Further, the results of this investigation support Simpson's view that fecundity of a fish increases at the rate of about the third power of the total length.

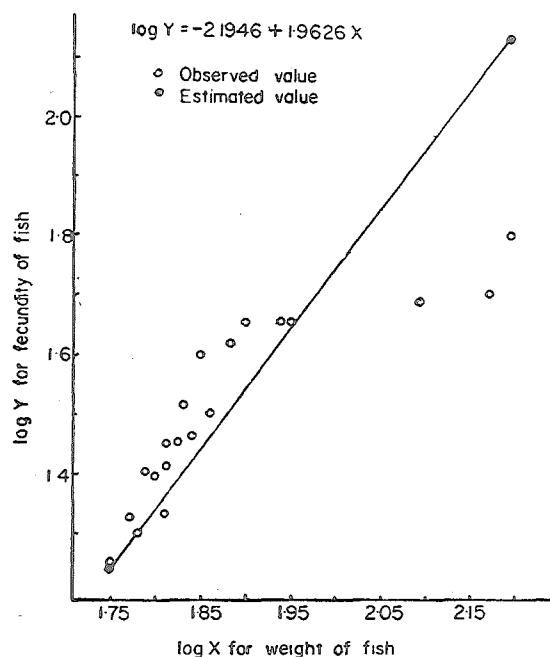


Fig. 2. Total weight and fecundity relationship

Relation between fecundity and weight of fish

Fig. 2 shows that the relationship between body weight and fecundity is linear. The rate of increase of fecundity is 1.9626

times the weight of the fish. The equation for weight and fecundity relationship runs as follows:

$$Y = -2.1946 + 1.9626 X$$

where $Y = \log F$ (fecundity in thousand)
and $X = \log W$ (body weight in grams).

The straight line relation between these two variables was reported also by Bagenal (1957), Sarojini (1957), Petersen (1961), Luther (1967) and Parulekar & Bal (1971).

Relation between fecundity and weight of ovary

The relationship between fecundity and weight of the ovary appears to be linear as shown in Fig. 3. The ability to produce eggs increases at the rate of 0.8488 times the weight of the ovary.

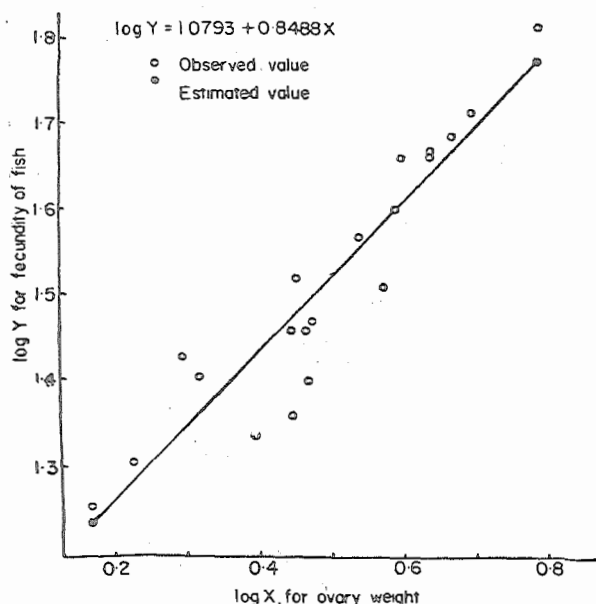


Fig. 3. Ovary weight and fecundity relationship.

The equation obtained is,
 $Y = 1.0793 + 0.8488 X$
where $Y = \log F$ (fecundity in thousand)
and $X = \log g$ (ovary weight in grams).

Qasim & Qayyum (1963) and Pai (1968) obtained a straight line relation between gonad weight and fecundity in some freshwater fishes and the marine percoid fish *Psammoperca waigensis* respectively.

Thus, the equations for the relationship between fecundity and three different parameters namely, total length, weight of fish and weight of ovary can be expressed as follows:

Total length and fecundity $Y = -7.3058 + 3.9071 X$

Weight of the fish and fecundity $Y = -2.1946 + 1.9626 X$

Ovary weight and fecundity $Y = 1.0793 + 0.8488 X$

From the equations developed, the estimated number of mature ova for each variable such as length, weight and gonadal weight of fish were estimated and plotted in Figs. 1-3. After noting down the difference between observed value and the estimated value, the average difference for each of the three variables was estimated. It was found out from the estimated fecundity (F) through different variables like length, body weight and gonadal weight and fecundity can be accurately calculated by any two variables taken together. The difference between the observed and estimated fecundity against total length of the fish and weight of the ovary was of the order of 5.51 and 2.98 respectively. The corresponding figure for fecundity against weight of the fish was 12.08. Hence it is evident that fish length and ovary weight are better indices for the estimation of fecundity than the weight of the fish.

References

- Bagenal, T. B. (1957) *J. Mar. Biol. Ass. U.K.*, 36, 377
- Clark, F. N. (1934) *Calif. Fish. and Game.* 42, 1
- Farren, G. P. (1938) *J. Cons. Int. Explor. Mer.* 13, 91
- Franz, G. P. (1910) *Die Reproduktion der scholle (Pleuronectes platessa)* Wiss Meeresuntersuch, Helgoland, N. F., a:59
- Hickling, C. F. (1940) *J. Mar. biol. Ass. U.K.*, 24, 619
- James, P.S.B.R., Shanbhogue, S. L. & Gupta, T.R.C. (1974) *Indian J. Mar. Sci.* 3, 72
- Luther, G. (1967) *The Grey Mullet. Souvenir, 20th Anniversary, Central Marine Fisheries Research Institute, Mandapam Camp*: 70

- Pai, M. V. (1968) *The Biology and Fishery of Marine Percoid fish, Psammoperca waigensis* (Cuvier) from the Palk Bay and Gulf of Mannar' Ph.D. Thesis, Univ. Bombay
- Parulekar, A. H. & Bal, D. V. (1971) *J. Bombay nat. Hist. Soc.* 68, 20
- Petersen, C. L. (1961) *Fecundity of the Anchoveta, (Cetenoraulia mysticetus) in the Gulf of Panama. Inter-American Tropical Tuna Commission-Bulletin*, VI, No. 1
- Pillay, T. V. R. (1958) *Indian J. Fish.* 4, 344
- Qasim, S. Z. & Qayyum, A. (1963) *Proc. nat. Inst. Sci. India.* 29, 373
- Rao Appa, T. (1971) *Indian J. Fish.* 13, 334
- Sarojini, K. K. (1957) *Indian J. Fish.*, 4, 160
- Scott, D. P. (1962) *J. Fish. Res. Bd. Can.* 19, 715
- Simpson, A. C. (1951) *The Fecundity of the Plaice. Fish. Invest. London Ser. II*, 17, 1
- Smith, O. R. (1947) *Trans. Am. Fish. Soc.* 74, 281