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SOME ASPECTS OF THE BIOLOGY OF *TACHYSURUS TENUISPINIS* DAY FROM VERAVAL

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ABSTRACT

The regression coefficients in length-weight relationship of males and females of *Tachysurus tenuispinis* differ significantly. The relative condition factor was calculated for females in relation to various lengths and months. The sex ratio in the catch varied widely in the different months. The number of eggs ranged from 72 to 89 for the fish of length 394 to 570 mm. Empty stomachs occurred in a very high percentage (63.5%) of the total stomachs examined. This is a bottom carnivorous feeder. The main food items found in the guts in order of preference were crustaceans, polychaetes, molluscs, fishes and echinoderms.

Keywords: *Tachysurus tenuispinis*, length-weight relationship, relative condition factor, sex ratio, fecundity, food and feeding habit

INTRODUCTION

Tachysurus tenuispinis contributed 19.16% in trawl net and 10.53% in gill net catches in the total catfish catch at Veraval during 1983-87. Studies on various aspects of the biology of this species from Waltair have been made by Dan (1977, 1980), Dan and Mojumdar (1978), and Mojumdar and Dan (1981). The present study deals with some aspects of the biology of *T. tenuispinis* from Veraval.

MATERIAL AND METHODS

The material for this study was collected from the trawl and gill net catches at Veraval during October 1985 to February 1987. A total of 260 specimens comprising 141 males and 119 females were studied. Biological details such as length, weight, sex, stages of maturity in females and stomach contents were collected from fresh specimens. The observed sex ratio of males to females was tested against 1:1 ratio by Chi-square. After noting the length and weight of fish, the ovaries were preserved in 5% formalin for fecundity estimation. The food of the fish was analysed by volumetric and occurrence methods, and the index of preponderance was calculated by the method of Natarajan and Jhingran (1961).

RESULTS AND DISCUSSION

Length-weight relationship

The length-weight relationship was calculated for 139 males in the size range of 165-505 mm and 117 females in the size range of 188-580 mm. The logarithmic regression equation for both the sexes were as follows:

Males: Log W = - 4.4764 + 2.8052 Log L

Females: Log W = - 4.9991 + 3.0233 Log L

The analysis of covariance (Snedecor and Cochran, 1967) revealed significant difference at one per cent level for elevation and at five per cent level for slope between the regression coefficients of males and females of *T. tenuispinis* (Table 1).

However, Dan and Mojumdar (1978) did not find any difference between the length-weight relationships of males and females of *T. tenuispinis* at Waltair.

Relative condition factor

Following Le Cren (1951), the relative condition factor K_n was calculated only for females as Wo/Wc, where Wo was the observed weight and Wc the calculated weight. The individual K_n values were grouped according to size and months (Fig. 1). The relative condition factor peaked at 280, 380 and 539 mm sizes and during December, February and April.

Sex ratio

During the study period, sex ratio of male to female in *T. tenuispinis* was 1.18:1.00, showing no significant difference from the expected 1:1 ratio. Significant Chi- square values occurred in January and June with the preponderance of males and during May due to the predominance of females (Table 2).

Table 1: Comparison of regression lines of length-weight relationship of males and females of *Tachysurus tenuispinis*

Source of variation	DF	'b' value	Deviation from regression		
			DF	SS	MS
Within males	138	2.8052	137	1.53935	0.01124
Within females	116	3.0233	115	0.44268	0.00385
			252	1.98203	0.00786
Pooled (within)	254	2.9603	253	2.03140	0.00803
Difference between slopes			1	0.04937	0.04937
Total	255	2.9607	254	2.10896	0.00830
Between adjusted means			1	0.07756	0.07756

Comparison of slopes: F : 6.2812 (df = 1,252); Significant at 5% level
Comparison of elevation: F : 9.3446 (df = 1,253); Significant at 1% level

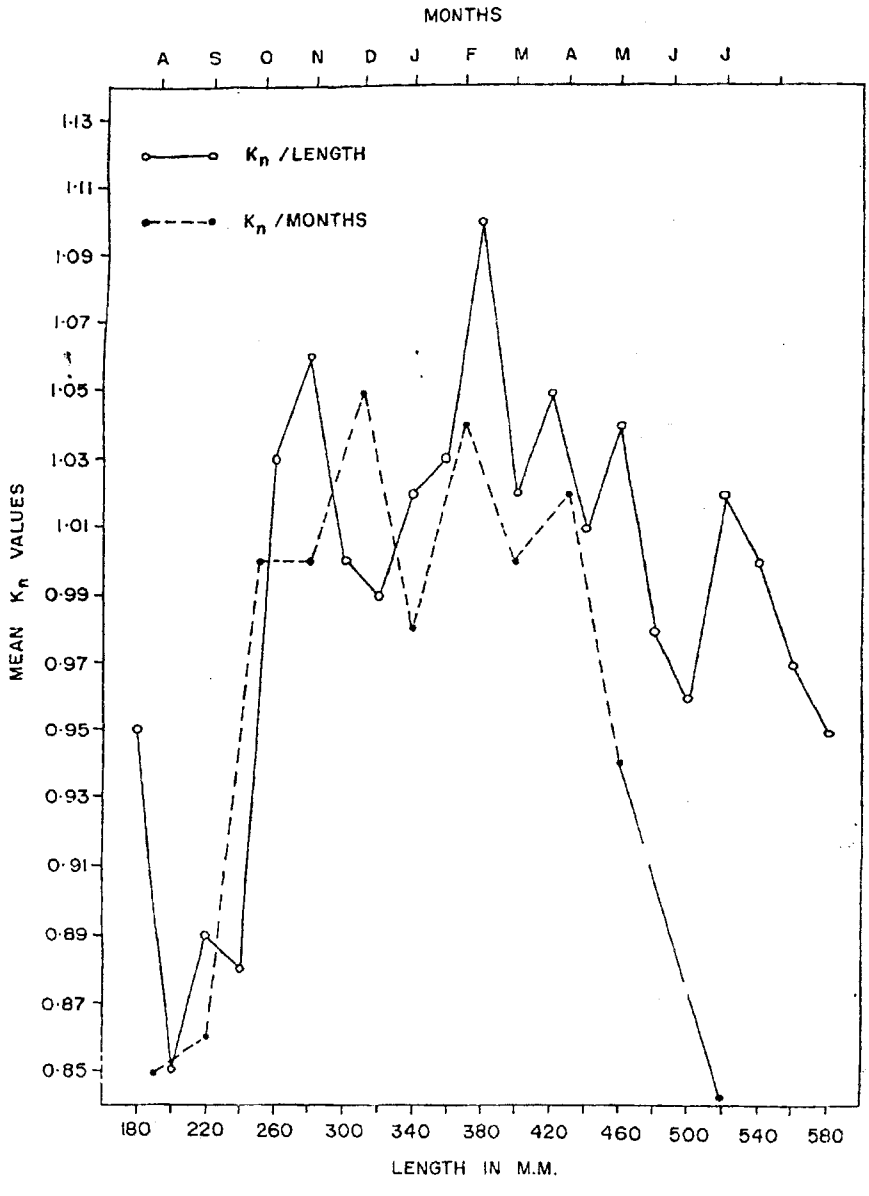

Fig. 1. Mean K_n values of Tachysurus tenuispinis *at different lengths and various months based on pooled data from October 1985 to February 1987*

Table 2: Sex ratio in different months in *Tachysurus tenuispinis* data pooled from October 1985 to February 1987

Month	No. of specimens	Males	Females	Chi-square
January	30	25	5	13.33**
February	25	9	16	1.96
March	8	5	3	10.50
April	25	11	14	0.36
May	15	1	14	11.27**
June	4	4	—	4.00*
July	3	2	1	0.33
August	5	4	1	1.80
September	10	4	6	9.40
October	58	28	30	0.07
November	37	22	15	1.32
December	40	26	14	3.66
Pooled	260	141	119	1.86

*Significant at 1% level

**Significant at 5% level

Fecundity

Fecundity varied from 72 to 89 ova in the Stage-V ovaries of seven specimens measuring 394-570 mm in total length and generally increased with the increase in fish length. Dan (1977) observed the fecundity in this species at Waltair to vary from 29 to 82 in the fish of 285-425 mm and the fecundity increased with increase in the size of the fish.

Feeding intensity

The intensity of feeding was determined by the degree of distention of the stomach expressed as full, 3/4 full, 1/2 full, 1/4 full, trace and empty. The data given in Table 3 show that 165 (63.8%) out of the 260 stomachs were empty. The percentage of fish with empty stomachs was high during all the months of observations. The occurrence of empty stomachs in high percentage has been recorded earlier (Kagwade, 1972) for many species of fishes.

Table 3: Percentage frequency of feeding intensity in *Tachysurus tenuispinis* data pooled from October 1985 to February 1987

Month	No. of fish	Full	¾ full	½ full	¼ full	Trace	Empty
January	30	—	3.3	3.3	3.4	30.0	60.0
February	25	—	4.0	12.0	24.0	12.0	48.0
March	8	12.5	—	12.5	25.0	12.5	37.5
April	25	—	—	—	4.0	20.0	76.0
May	15	—	—	—	13.3	13.3	73.4
June	4	—	—	—	—	—	100.0
July	3	—	—	—	—	—	100.0
August	5	—	—	—	—	40.0	60.0
September	10	—	—	10.0	10.0	20.0	60.0
October	58	—	—	3.5	20.7	13.8	62.0
November	37	—	—	—	—	29.7	70.3
December	40	7.5	—	7.5	7.5	20.0	57.5
Total	260	1.1	0.8	4.2	10.8	19.6	63.5

Food constituents and their seasonal variation

The index of preponderance (IP) of the various food items of *T. tenuispinis* during different months and for the entire period of observation is given in Table 4. It is seen that crustaceans (IP - 18.15) formed the major food item followed by polychaetes (IP - 13.78), molluscs (IP - 1.98), fishes (IP - 1.17) and echinoderms (IP - 0.03). The crustaceans were represented by *Acetes* spp., *Squilla* spp., prawns and crabs. Polychaetes were dominated by *Neries* spp. Molluscus were represented by *Loligo* spp. and bivalves and fishes diet comprised sciaenids, *Nemipterus* spp., *Leiognathus* spp. and catfish eggs. The echinoderm noticed in the gut was a single brittle star. It is evident that *T. tenuispinis* is a carnivorous bottom feeder. Mojumdar and Dan (1981) also made a similar observation.

Table 4 : Index of preponderance of food items in *Tachysurus tenuispinis* from October 1985 to February 1987

Main food item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Pooled
Crustaceans:													
Acetes spp.	13.50	4.97	18.86	4.58	—	—	—	—	—	58.40	—	26.30	17.44
Squilla spp.	—	—	—	9.09	—	—	—	—	—	—	31.53	—	0.36
Prawns	—	—	12.57	—	—	—	—	—	—	—	—	0.38	0.28
Crabs	—	—	—	—	—	—	—	—	—	—	3.37	0.24	0.07
Pooled	13.50	4.97	31.43	13.67	—	—	—	—	—	58.40	34.90	26.92	18.15
Polychaetes:													
Neries spp.	1.22	—	—	—	—	—	—	—	—	0.56	—	—	0.10
Other polychaetes	—	14.62	19.69	63.57	—	—	—	—	49.29	23.30	—	1.40	13.68
Pooled	1.22	14.62	19.69	63.57	—	—	—	—	49.29	23.86	—	1.40	13.78
Molluscs:													
Loligo spp.	—	—	4.40	—	49.51	—	—	60.00	35.21	—	—	—	1.49
Bivalves	—	2.69	17.46	—	—	—	—	—	—	0.55	—	—	0.49
Pooled	—	2.69	21.86	—	49.51	—	—	60.00	35.21	0.55	—	—	1.98
Fishes:													
Sciaenids	—	—	16.41	—	39.60	—	—	—	—	—	—	—	0.51
Nemipterus spp.	—	2.18	—	—	—	—	—	—	—	—	—	—	0.09
Leiognathus spp.	—	—	—	—	—	—	—	—	—	—	2.25	—	0.02
Cat fish eggs	—	—	—	4.58	—	—	—	—	—	—	—	—	0.01
Fish remains	9.74	—	3.14	9.09	—	—	—	—	—	—	—	—	0.54
Pooled	9.74	2.18	19.55	13.67	39.60	—	—	—	—	—	2.25	—	1.17
Echinoderms:													
Brittle star	—	—	4.40	—	—	—	—	—	—	—	—	—	0.03
Pooled	—	—	4.40	—	—	—	—	—	—	—	—	—	0.03
Digested matter	75.54	75.54	3.07	9.09	10.89	—	—	40.00	35.50	17.19	62.85	71.68	64.84

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REFERENCES

Dan, S. S., 1977. Maturity, spawning and fecundity in the catfish *T. tenuispinis* (Day). *Indian J. Fish.,* **24(1&2)**: 96-106.

Dan, S. S., 1980. Age and growth in the catfish, *Tachysurus tenuispinis* (Day). *Indian J. Fish.,* **27(1&2)**: 220-253.

Dan, S. S. and Mojumdar, P., 1978. Length-weight relationship in catfish, *Tachysurus tenuispinis* (Day). *Indian J. Fish.,* **25(1&2)**: 23-28.

Kagwade, P. V., 1972. Food and feeding habits of *Polynemus heptadactylus* Cuv. and Val. *Indian J. Fish.,* **16**; 188-197.

Le Cren, E. D., 1951. The length-weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatalis). J. Anim. Ecol.,* **20**: 201-219.

Mojumdar, P. and Dan, S. S., 1981. Studies on food and feeding habits of catfish, *Tachysurus tenuispinis* (Day). *Indian J. Fish.,* **26(1&2)**: 115-124.

Natarajan, A. V. and Jhingran, A. G., 1961. Index of preponderance method of grading the food in the stomach analysis of fish. *Indian J. Fish.,* **8(1)**: 54-59.

Snedecor, G. W. and Cochran, W. G., 1967. Statistical Methods (6th edition). Oxford and IBH Publishing Co., New Delhi, 593 pp.