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A FEW OBSERVATIONS ON THE BIOLOGY OF *TACHYSURUS THALASSINUS* RUPPELL FROM VERAVAL (GUJARAT)

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ABSTRACT

The length-weight relationship of *T.thalassinus* differed in the sexes and, therefore separate equations were obtained; for males log W = -5.1728 + 3.0495 log L; and for females log W = -5.7456 + 3.2798 log L. The spawning period of this species appears to be restricted to a short period from October to November. Fecundity has been found to range from 33 to 55 mature eggs in specimens of the size range 421-564mm. The sex ratio of males to females was 1.8:1. *T.thalassinus* is a bottom carnivore, crustaceans ranking first in food followed by fishes, molluscs and polychaetes.

INTRODUCTION

The family Tachysuridae comprise 99% of the marine catfish, represented by *Tachysurus tenuispinis, T. thalassinus, T.dussumieri* and *T.serratus*. The first three among them are more or less uniformly abundant in fishing grounds off West and East Coast of India (Mukundan, 1987). Among different species of catfish, *T. thalassinus* formed 25.64% in trawl net landing and 6.01% in gill net landing at Veraval during 1983-87. Dritrenko (1970) reported the spawning ground, the time of spawning and fecundity of *T. thalassinus* in the Arabian Sea. Mojumder (1969, 1978) studied the food of this catfish and its maturation and spawning from Waltair. The biology and fishery of this species have been dealt with by Menon (1979). A brief account on spawning and fecundity of this fish is given by Naama and Yousif (1987) from the Kohr-Zubair, Iraq.

Information on biology of *T. thalassinus* is not available from the North-West Coast of India, and hence the present study on its biology was taken up.

MATERIAL AND METHODS

Specimens of *T. thalassinus* were collected during April 1985 to February 1987 from trawl and gill net catch at Veraval. Trawl net fishing during the South-West monsoon month (June-August) is suspended and sample obtained during this period were from occassional operation of gill netters. A total 326 specimens, ranging in total length from 66mm to 710mm were analysed for this study. The fresh sample were examined for total length in mm, weight in g., sex, maturity stages of females and gut contents for food and feeding habits. The various maturity stages were recognised for this species as stated by Mojumder (1978). The ovaries were preserved in 5% formalin and examined later. Fecundity was estimated basing on all the matured ova present in fish of stage V of ovaries. Measurement of ova diameter from 6 ovaries in stage VI were made, following Mojumder (1978). One micrometer division of the occular micrometer corresponded to 0.019 mm. Volumes and number of frequency of occurrence of each food item of this species were determined. The index of preponderance was calculated by the method of Natarajan and Jhingran (1961).

To establish the length-weight relationship of *T. thalassinus*, a total of 277 fishes consisting of 178 males in the size range of 113-710 mm and 99 females in the size range of 147-708 mm were studied. The relationship was calculated separately for males and females by the least square method.

RESULTS AND DISCUSSION

The logarithmic regression equations obtained were as follows:

Males = Log W = -5.1728 + 3.0495 Log L.
Females = Log W = -5.7456 + 3.2798 log L.

The significance between the regression co-efficient for males and females was tested by the method of analysis of covariance (Snedecor and Cochran, 1967) and found significant at 1% level in slopes and elevation (Table 1).

Mojumder (1972) did not find any difference in length-weight relationship of males and females in *T.thalassinus* from Waltair.

Spawning

The ova diameter frequency in ovary stage VI of maturation shows that three groups of ova, viz. immature, maturing and mature are represented by mode 'a','b' and 'c' respectively (Fig.1). It can be seen from the figure that one batch of mature ova represented by a clear, definite mode 'c' separated from the maturing batch. Hence it is indicated that spawning in this species is restricted to a short period.

Dmitrenko (1970) reported that the entire spawning cycle of *Arius thalassinus* lasts approximately two months in the Arabian Sea.

Mature specimens (Stage V and VI) were available during the period from September to November (Table 2). Females with spent (stage VII) gonad were observed in October and November. The juveniles of length range 66-102 mm have been noticed during January and February in trawl catch. Hence it is concluded that the spawning period of *T.thalassinus* is restricted to a short period during October and November at Veraval.

Fecundity

The number of ova in the 15 mature ovaries studied ranged from 33 to 55 (Fig. 1) with an average of 47 for fish of the size range 421 to 564 mm in total length (Table 3) High fecundity in this species have been reported by Naama and Yousif (1987) from Iraq.

Sex ratio

The observed ratios were tested against an expected 1:1 ratio by the method of Chi-square. The ratio of males to females in the population

Table 1 : *Analysis of covariance for comparison of regression line of length-weight relationship of males and females of T.thalassinus*

Source of variation	Regression coefficient		Deviation from regression		
	DF		DF	SS	MS
Within males	177	3.0495	176	1.1306	0.0064
Within females	98	3.2797	97	0.3139	0.0032
			273	1.4445	0.0053
Pooled (within)	275	3.1256	274	1.4871	0.0054
Difference between slopes			1	0.0426	0.0426
Total	276	3.1258	275	1.5399	0.0056
Between adjusted means			1	0.0528	0.0520

Comparison of slopes : F = 8.0377 (df = 1,273) Significant at 1% level

Comparison of elevation : F = 9.7777 (df = 1,274) Significant at 1% level.

of *T. thalassinus* during the period of investigation was 1.8:1 showing significant departure from 1:1 due to preponderance of males. Monthwise sex ratio (Table 4) show significant difference during December-February with a preponderance of males.

Feeding intensity

The feeding intensity was assessed by the degree of distension of stomachs and the amount of the food contained in it. For interpreting the feeding intensity the stage of fullness of stomachs

Table 2 : *Monthly percentage occurrence of females of T.thalassinus in different stages of maturity for the period 1985-1987.*

Months	No. of females examined	Percentage of maturity stages			
		I & II	III & IV	V & VI	VII
8eptember	7	42.9	42.9	14.2	---
October	23	39.1	21.7	34.8	4.4
November	17	23.5	39.4	41.2	5.9
December	10	90.0	10.0	--	---
January	3	100.0	--	--	--
February	3	100.0	--	--	--
March	13	38.5	61.5	--	--
April	16	50.0	--	--	
May	5	--	100.0	--	--
June	--	---	--	--	---
July	2	50.0	50.0	--	---

Table 3 : *The fecundity in various size groups of T.thalassinus*

Length of fish (mm)	Weight of fish(g)	Weight of ovary (g)	No.of ova
421	769.5	72.5	40
424	842.5	79.5	53
425	850.0	85.0	33
429	824.0	128.0	46
440	910.0	63.5	53
442	881.5	131.0	51
460	1200.0	94.0	46
464	1080.0	78.5	47
468	1150.0	141.0	45
492	1250.0	131.0	46
495	1150.0	140.0	51
514	1430.0	203.0	52
523	1460.0	117.0	49
527	1470.0	150.0	45
564	1850.0	125.0	55
		Average	47

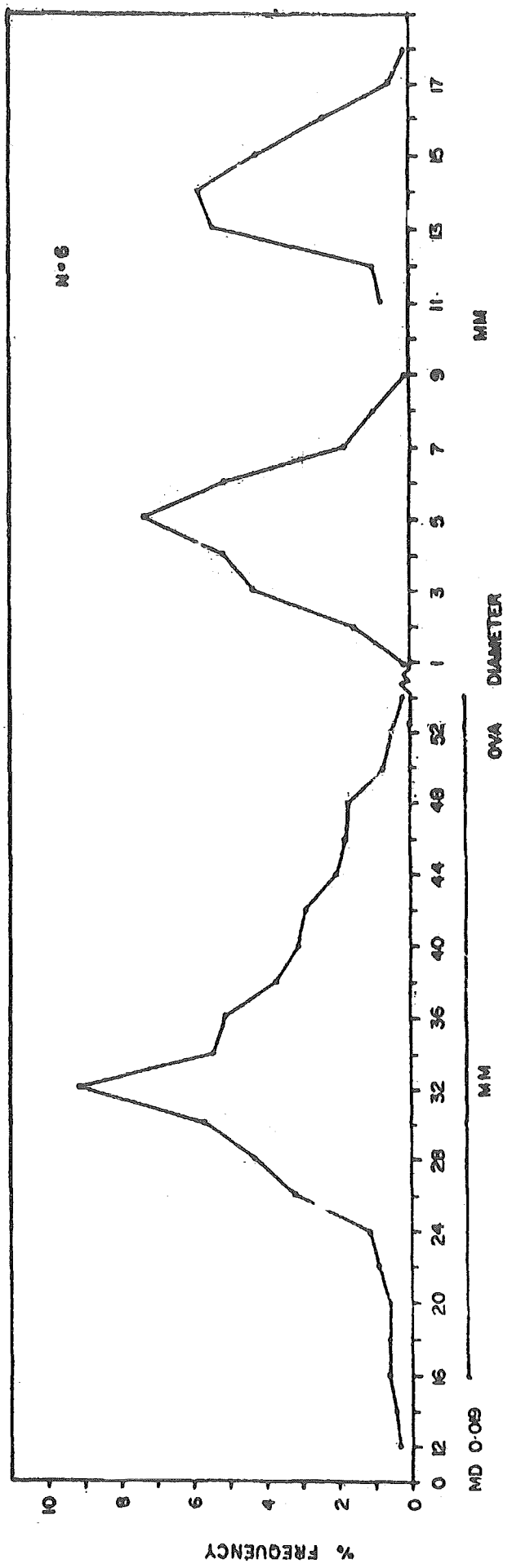

Fig. 1. Ova diameter frequency distribution of mature ovary (stage VI) of T. thalassinus.

were grouped as high (Gorged, full and 3/4 full), normal (1/2 full) and poor (1/4 full, trace and empty). The condition of the stomachs in percentage for various months are presented in Table 5. The poor fed stomachs (208 nos.) occurred in very high percentage (63.8%) of the 326 stomachs examined. It can be seen from the table that the incidence of poor fed stomachs was always higher in all the months except in April.

Fluctuation in feeding intensity in females and males were studied based on actual volume of stomach contents (Table 6). The average monthly feeding intensity in females including empty stomachs ranged from 2.17ml (January) to 34.69ml (April) and excluding empty stomachs ranged from 3.25ml (January) to 34.69 ml (April). The average monthly feeding intensity in case of males, when empty stomachs were included, ranged from 3.19 ml during November

Table 4 : *Chi-square test for T.thalassinus obtained in different months during 1985-87.*

Months	No. of fish	Males	Females	Chi-square
September	15	8	7	0.07 NS
October	41	18	23	0.61 NS
November	43	26	17	1.88 NS
December	59	49	10	25.78*
January	36	33	3	25.00*
February	23	20	3	12.56*
March	17	4	13	4.76**
April	35	19	16	0.26 NS
May	6	1	5	2.67 NS
June	1	1	-	1.00 NS
July	2	-	2	2.00 NS
Pooled	278	179	99	23.02*

NS = Not Significant
* = Significant at 1% level.
** = Significant at 5% level.

Table 5 : *Monthwise feeding activity (percentage-wise) in T. thalassinus during 1985-87.*

Months	No. of specimens examined	High	Normal	Poor
September	15	13.3	6.7	80.0
October	41	14.6	16.8	58.6
November	43	2.3	20.9	76.8
December	59	10.2	20.3	69.5
January	59	18.6	13.6	67.8
February	39	10.3	23.1	66.7
March	26	19.2	26.9	53.9
April	35	31.4	37.2	31.4
May	6	16.7	16.7	66.6
June	1	--	--	100.0
July	2	--	--	100.0
Pooled	326	14.4	21.8	63.8

to 10.92ml in April. But when empty stomachs were excluded the average ranged from 7.47 ml during January to 13.83 ml during April. The present observation on average volume of stomach content showed that the feeding intensity was more in females than in males in most of the months.

Food composition and their seasonal variations

The different food items comprising the diet of *T.thalassinus* in terms of index of preponderence for different months and for entire period of investigation were calculated and are presented in Table 7. Crustaceans (Index 83.75) formed the main bulk of the diet. They were represented by *Acetes* sp, crabs, penaeid prawn and *Squilla* sp. *Acetes* sp ranked highest among the food organisms and crabs ranked next to *Acetes* sp in total food of this species. Crustaceans formed the dominant food element in all the months of observation. Fishes (12.55) represented the next important item of food after the crustaceans. They were constituted by *Leiognathus* sp, sciaenids, *Lactarius lactarius, Apogon* sp, *Nemipterus* sp, *Myctophum* sp, *Upeneus* sp, *Epinephelus* sp, larvae of *T.thalassinus* and catfish eggs. Their availability was maximum during January and minimum during April. Mollusc an diet (1.65) taken in were *Sepia* sp, bivalves, *Loligo* sp and *Octopus* sp. It was found to be maximum during May and minimum during February. Polychaetes in the food was mainly comprised by *Neries* sp., which were noticed during April and October.

The present investigation reveals that *T.thalassinus* is a carnivorous bottom feeder, crustaceans, fishes, molluscs and polycheates forming the main constituent of food. Similar feeding habit in this species has been reported by Mojumder (1969) and Suseelan and Nair (1969) from Visakhapatnam and Bombay respectively.

The catfish eggs in an advanced stage of maturity were encountered in the stomachs of male specimens of 436 mm and 499 mm length in November and juveniles of this species in December may be associated with those swallowed accidentally while providing parental care to them in its mouth cavity. The eggs and juveniles recovered from the stomachs were found intact and fresh. The occurrence of fertilised eggs in stomach of males of *T.tenuispinis* during parental care has been reported by Dan (1977) from Waltair. Mojumder (1978) observed exhibition of parental care in case of male *T. thalassinus* from Waltair.

Table 6 : *Sexwise average volume of stomach contents of T.thalassinus in different months during April 1985 to February 1987.*

Months	No. of specimens examined	Females		Males	
		Including empty stomachs (ml)	Excluding empty stomachs (ml)	Including empty stomachs (ml)	Excluding empty stomachs (ml)
September	15	5.00	5.83	4.75	12.67
October	41	19.65	23.79	5.72	6.87
November	43	10.90	15.44	3.19	7.55
December	59	13.18	13.18	5.37	11.45
January	36	2.17	3.25	3.39	7.47
February	23	12.00	12.00	8.82	11.75
March	17	13.00	13.00	5.50	7.33
April	35	34.00	34.69	10.92	13.83
May	6	15.80	19.75	--	--
June	1	--	--	--	--
July	2	--	--	--	--
Average for 1985-87	278	19.19	33.92	5.65	13.23

Table 7 : *Monthwise index of preponderance of different food items of T.thalassinus during 1985-87.*

	September	October	November	December	January	February	March	April	May	June	July	Pooled for 1985-87
Crustaceans :												
Acetes spp.	0.73	25.00	60.74	91.26	28.86	75.18	41.14	88.29	--	--	--	44.22
Crabs	36.79	7.77	8.53	--	7.76	12.98	44.68	--	61.71	--	--	36.48
Panaeid Prawns	--	12.40	2.71	--	12.01	--	0.66	2.45	--	--	--	2.38
Squilla spp.	51.16	--	--	--	0.87	0.05	--	1.34	--	--	--	0.67
Pooled	88.68	45.17	71.98	91.26	49.00	88.21	86.48	92.08	61.71	--	--	83.75
Fishes :												
Leioghathus spp.	--	18.93	--	2.62	0.96	--	--	2.85	--	--	--	2.99
Sciaenids	3.70	8.21	--	--	5.78	--	2.70	0.58	--	--	--	1.37
L. lacterius	--	3.82	13.06	0.17	2.12	--	--	0.76	--	--	--	1.07
Apoqon spp.	--	2.61	3.87	--	--	--	2.64	0.93	--	--	--	0.97
Nemipterus spp	--	0.16	--	0.29	--	--	--	0.47	--	--	--	0.20
Fish Soales	--	0.44	--	--	14.30	0.03	--	--	--	--	--	0.19
Myctophum spp.	--	--	--	1.43	--	--	--	--	--	--	--	0.10
Catfish eggs	1.37	0.09										
Upeneus spp.	--	--	--	--	--	1.34	--	--	--	--	--	0.04
Larvae of *T.thalassinus*	--	--	--	0.12	0.13	--	--	--	--	--	--	0.02
Epheniphelus spp.	--	0.71	--	--	--	--	--	--	--	--	--	0.02
Fish remain	5.05	6.90	3.15	1.30	25.10	7.52	--	--	--	--	--	5.50
Pooled	8.75	41.78	20.08	7.30	48.39	7.55	6.68	5.59	--	--	--	12.55
Molluscs :												
Sepia spp.	--	3.79	2.53	0.34	0.85	0.04	--	0.62	37.57	--	--	1.48
Bivalve	0.38	0.06	0.34	0.08	--	--	0.07	0.05	--	--	--	0.08
Loligo spp.	--	2.98	--	--	--	--	--	0.38	--	--	--	0.06
Octopus spp.	--	--	--	--	--	--	--	0.37	--	--	--	0.03
Pooled	0.38	6.83	2.87	0.42	0.85	0.04	0.07	1.42	37.57	--	--	1.65
Polychaetes :												
Neries spp.	--	1.37	--	--	--	--	--	0.04	--	--	--	0.05
Pooled	--	1.37	--	--	--	--	--	0.04	--	--	--	0.05
Digested matter	2.19	4.85	5.07	1.02	1.76	4.20	6.77	0.87	0.72	--	--	2.00

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