Indian J. Fish., 36 (2) : 169 - 174 (1989)

OBSERVATIONS ON THE LENGTH-WEIGHT RELATIONSHIP AND FOOD AND FEEDING HABITS OF SPADE NOSE SHARK, *SCOLIODON LATICAUDUS* MULLER AND HENLE

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ABSTRACT

The length-weight relationship of *Scoliodon laticaudus* was calculated for males and females separately since regression coefficients in respect of sexes were significant. This shark prefers to feed on prawns during the premonsoon and monsoon periods and on fishes during the postmonsoon period. A change in the feeding habit of the shark is seen when it attains adolescence. Starvation of females above 350 mm during pregnancy is also observed.

The spade nose shark, *Scoliodon laticaudus*, one of the smallest tropical carcharhinid sharks occupy mostly the shallow regions of the coastal waters. The earlier works on this species were mostly confined to the taxonomy and distribution. Literature on the biology of this shark is limited. A study on the description, bionomics and development of *Scoliodon sorrakowah* now considered a synonym of *Scoliodon laticaudus* was carried out by Setna and Sarangdhar (1948). The age and growth of *Scoloiodon laticaudus* were studied in Bombay waters by Nair (1976). Devadoss (1979) had carried out a detailed study on the maturity, breeding and development of this shark at Calicut. But there was no work on the other aspects of biology like length-weight relationship and food and feeding habits of this shark. Hence an attempt is made in this paper to fill up the gap.

Data for this study were collected from the trawl catches of Vellayil fish landing centre at Calicut during July, 1977 to April, 1981. The total length of the sharks was measured from the tip of the snout to the end of the upper caudal fin. Both length and weight of sharks was taken in fresh condition. The weight of pregnant female sharks included developing young also. The length-weight relationship was determined separately for the males and females. A total of 1,153 numbers of sharks, 575 males and 578 females were observed for length-weight relationship which was tested by the analysis of covariance.

The index of preponderance method suggested by Natarajan and Jhingran (1961) was followed for the analysis of the stomach contents of this shark. Wherever possible the food was identified upto the species/genus level as the stomach contents were found to be in various stages of digestion.

The observed values of length and weight and their logarithmic values for males

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and females when plotted and the calculated length weight curves fitted to the data, the following equations are obtained.

Males $W = 0.000006795\ L^{2.8905}$

Females $W = 0.000004904\ L^{2.9574}$

The corresponding logarithmic equation may be represented as :

Males = Log W = -5.1678 + 2.8905 Log L

Females = Log W = -5.3094 + 2.9574 Log L

The significance of variations between the regression lines was tested (Table 1) by the analysis of covariance (Snedecor, 1961). It was found that there was significant difference at one per cent level for elevation and five per cent for slope. Hence length-weight relationship in respect of males and females were treated separately.

Food and feeding

Feeding intensity is determined on the basis of the condition of stomach as empty, half, full and gorged. The occurrence of empty stomachs in good proportion in all the months of the year notwithstanding the incidence of starvation was more during July to October. Correspondingly the full and gorged stomachs were significantly less during this

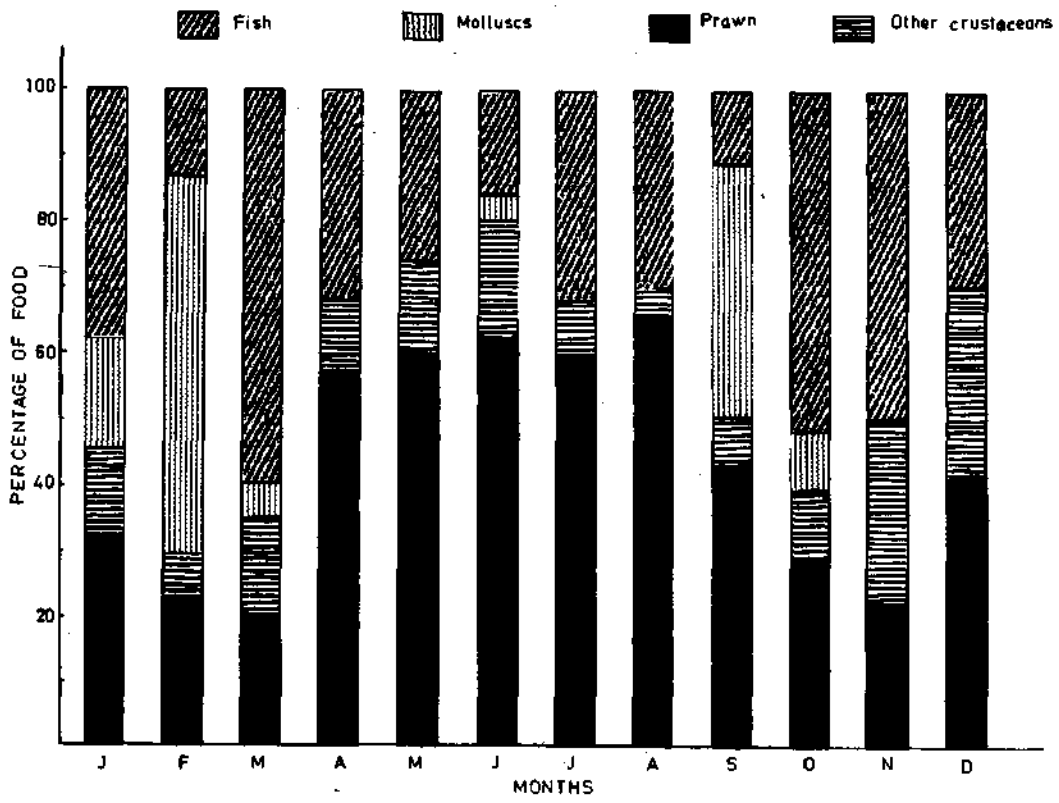

Fig. 1 : Percentage composition of food of *Scoliodon laticaudus* (data pooled)

TABLE 1. *Analysis of covariance for testing differences in regression in length-weight data in* Scoliodon laticaudus.

	Df	Σx^2	Σxy	Σy^2	b	Deviation from regression		
						df	ss	Ms
Within males	575	11.811475	34.141139	100.369775	2.890501	574	1.684604	0.002935
Withinfemales	578	15.776888	46.659762	140.738858	2.957455	577	2.743754	0.004755
			Deviation from individual regression			1151	4.428358	0.003847
Pooled	1153	27.588363	80.800901	241.108633	2.928761	1152	4.458651.	0.003870
			Differences between slopes			1	0.030293	
Combined	1154	27.744528	81.405258	243.453499	2.934101	1153	4.602218	
			between adjusted means			1	0.143567	

Comparison of slopes F = 6.37778 (df 1;151) significant at 5% level
Comparison of elevation F = 37.10 (df 1; 1152) significant at 1% level)

TABLE 2. *Feeding intensity of* S. laticaudus (*Pooled data*)

Month	No. fish examined	Condition of stomach (%)			
		Empty	Half	Full	Gorged
January	61	38.7	29.0	17.7	14.5
February	77	35.9	29.5	21.8	12.8
March	82	28.2	36.6	25.5	12.7
April	52	30.9	47.6	16.7	4.8
May	35	40.0	38.6	14.3	7.1
June	71	36.2	27.6	20.7	15.5
July	91	53.7	25.6	12.2	8.5
August	56	46.6	36.7	6.7	10.0
September	18	48.9	28.6	14.2	8.3
October	27	48.0	28.0	12.0	12.0
November	41	37.8	35.1	18.9	8.1
December	64	31.3	17.2	28.1	23.4
Average	-	38.6	30.2	18.6	12.6

TABLE 3. *Feeding pattern in relation to size of* S. laticaudus

Length group in mm	No.of fish examined	Food items			
		Prawn	Other crustaceans	Molluscs	Fish
151-200	119	68.4	13.2	-	18.4
201-250	69	54.9	10.3	10.3	24.5
251-300	76	59.1	22.7	-	18.2
301-350	140	56.0	12.0	8.0	24.0
351-400	118	45.4	26.0	-	28.6
401-450	56	40.9	13.7	9.0	34.6
451-500	32	21.4	21.4	14.4	42.8
501-550	30	25.0	33.3	-	41.7
551-600	23	-	22.2	11.1	66.7

TABLE 4. *Feeding in females of* S. laticaudus *to show the condition during pregnancy.*

Size (mm)	No.of fish examined	Condition of stomachs (%)			
		Empty	Half	Full	Gorged
Juveniles					
151-200	67	33.3	20.4	24.1	22.2
201-250	26	28.6	9.5	28.6	33.3
Adolescents					
251-300	39	28.6	39.3	17.8	14.3
301-350	76	36.5	41.6	19.3	2.6
Adults					
351-400	49	67.7	32.3	-	-
401-450	30	62.5	37.5	-	-
451-500	16	75.0	25.0	-	-
501-550	33	72.7	18.3	4.5	4.5
551-600	23	71.4	14.4	7.1	7.1
601-650	12	83.3	16.7	-	-

period (Table. 2). Percentage composition of the food of this shark as shown in Figure 1 revealed a preference to one organism or the other during different seasons of the year. For instance during premonsoon and monsoon months of April to August the incidence of prawn form 58 to 66% and a slight dominance of fishes in the postmonsoon months was noticed. The abundance or other wise of food organisms during a particular time of the year may also influence the feeding of fishes.

Crustaceans were dominant in the diet of this shark throughout the year except January to March. There was a slight decline of this group in the diet during September to Novemeber. Prawns like *Penaeus indicus, Metapenaeus dobsoni* and *Parapenaeopsis stylifera* were found predominantly more. In addition to prawns, other crustaceans found were small crabs, *Squilla* spp. and young *Thenus* sp. They were well represented in the diet in all the months.

Molluscs represented by squids and cuttle fishes were fairly taken in during January and September.

Fish diet taken in were mackerel, oil sardine, silverbellies, anchovies, soles, sciaenids and small ribbon fishes. Young ones of soles, silverbellies and anchovies were eaten by young sharks, while oil sardine, mackerel, ribbon fish and sciaenids were taken in by fairly larger sharks of above 400 mm during the months of September to February when these fishes were available abundantly.

An analysis of feeding data in relation to the size of sharks revealed a very interesting pattern. The young sharks preferred prawn diet rather than fish and molluscs (Table 3). As they grow up, the feeding preference is gradually shifted to fishes and fast moving molluscs like the squids and cuttle fishes.

With a view to find out the feeding condition of the female sharks during pregnancy, data were analysed and are presented in Table 4. It is clear that adolescent sharks (250 - 300 mm) had 28.6% of the stomachs empty and as they grew to maturity size the percentage of empty stomachs were limited to below 40%. Once they reached maturity size at 350 mm in total length and started carrying the developing embryos in their uteri, the percentage of starvation was more pronounced.

The length weight data studied in respect of *S. laticaudus* indicated the same pattern of relationship for males and females till the size fo 300-350 mm size class. After maturity this pattern tends to deviate suggesting that female sharks are heavier than males after attaining maturity at 350mm (Devadoss, 1979). Such cases of females tending to be heavier after attaining the maturity size was observed in a ray, *Dasyatis imbricatus* (Devadoss, 1983).

The type of food eaten indicates normally the place where the sharks forage and the nature of its habitat. It is popularly believed that sharks as a group do not exhibit any feeding pattern and they swallow all that come in their way. This statement may be true with sharks like tiger shark as is proved by Kauffman (1950), when all kinds of baits like horse and caribou meat, sharks and other fishes are accepted by this shark. But the majority of sharks do exhibit specific feeding habits specifically piscivores actively hunting their prey in the pelagic zones (Devadoss, 1977). Some sharks like *Carcharhinus sorrah* prefers to feed in the vicinity of rocks and reefs (Bass *et al.*, 1973). The whale shark and the basking shark are not predaceous feeders, but live on plankton. In the present study it

is seen that *S. laticaudus* exhibits a preference for a particular diet during different facets of its life history.

Fishing for sharks coincides with the appearance of the pelagic fishes like mackerel and sardines on the east coast during March and on the west coast during September. The presence of mackerel and oil sardine in the stomachs of adult *S. laticaudus* during September - March period proved that they prefer to feed on these fast moving pelagic fishes. Like wise during their early growing period after parturition when they could not move fast, they seek to bottom living fishes like small soles, silver bellies and curstaceans like prawn, *Thenus* and small crabs. When they grow up and have gained enough strength, they migrate to the pelagic zone and start actively preying on the pelagic fishes.

Springer (1960, 1967) observed that female Sand bar shark, *Carcharhinus plumbeus* from the Northwestern Atlantic region develop feeding inhibition during their advanced pregnancy and males during courtship. The observation in the present case of empty stomachs in greater percentage in adult females of *S. laticaudus* during pregnancy corroborates the finding of the above author.

The author wishes to thank Shri V.N. Bande, Head of Demersal Fisheries Division, Central Marine Fisheries Research Institute for the critical evaluation of the paper and to Shri R. Thiagarajan for the help in the statistical work.

References

Bass, A.J., J.D. D'Aubrey, and N. Kistnasamy, 1973. *Invest. Rep. Oceanogr. Res. Inst.*, 33 :1-168. Devadoss, P. 1977. *Ph.D. Thesis. Annamalai Univ., 210 pp.* Devadoss, P. 1979 *J. mar. biol. Ass. India*, 21: (1&2) : 103 - 110. Devadoss, P. 1983. *Matsya*, 9 & 10 : 129 - 134. Kauffman, D.E. 1950. *Res. Rep. U.S. Fish Wildl. Serv.*, 16 : 10p. Nair, K.P. 1976. *J. mar. biol . Ass. India*, 18 (3) : 531 - 539. Natarajan, A.V. and V.G. Jhingran 1961. Indian J. Fish., *8 (1) : 54 - 59.* Setna, S.B. and P.N. Sarangdhar 1948. *Rec. Indian Mus.*, 46 (1): 25-53. Snedecor, G.W. 1961. *Statistical Methods* - Applied to experiments in Agriculture and Biology., 534 pp. Springer, S. 1960. *Fish. Bull. U.S. Fish Wildl. Serv.*, 61 : 1-38. Springer, S. 1967 Sharks Skates and Rays. 149-74.