OBSERVATIONS ON THE FISHERY AND BIOLOGY OF *GRAMMOPLITES SCABER* (LINNAEUS)

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ABSTRACT

A preliminary study of the fishery and biology of *Grammoplites scaber* was made based on the landings of M.V. *Tarpon* during the years 1962-64. Higher catch rates (40.4 - 62.4 kg/hr) were obtained in depths 40-55 m and in shallower waters the catch rates were poor (6.2 - 20.4 kg/hr); also the larger size groups of fishes occurred in deeper waters. The sex ratio differed considerably according to depths. *G. scaber* feeds predominantly on crustaceans and the prawn *Parapenaeopsis stylifera* appears to be the favourite food of the fish above 142 mm.

INTRODUCTION

The rough flatheads belonging to the family Platycephalidae constituted about 9.4% of the miscellaneous groups of the trawler catches off Mangalore. *Grammoplites scaber*, which is the only representative of the family in the area between Coondapur and Kasargode is of some commercial importance, selling at a price of rupees 12-15 per basket of 40 kg. Since no information is available regarding the fishery and the biology of this fish, a preliminary study was undertaken, the results of which are presented in this paper.

MATERIAL AND METHODS

The material was collected from 20 metre shrimp otter-trawl with a cod end mesh of 25 mm operated by M.V. *Tarpon*, a Government of India fishing vessel, between depths of 10 and 55 metres in the region off Mangalore, Malpe, Coondapur and Kasargode during 1962 - 64 (Fig. 1). A total of 1020 specimens ranging from 82 mm to 301 mm in length was analysed during the period of investigation.

The collection of data was mainly done by the author on board as well as at the time of landing of catches. The skipper's log reports were also made use of for details on fishing grounds, nature of bottom and depth. The weight of *G. scaber* in the miscellaneous varieties was estimated.

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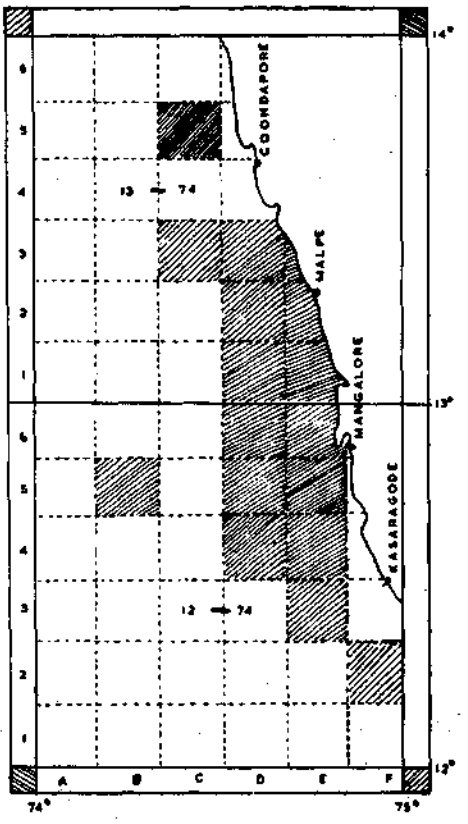

FIG. 1. Fishing grounds (shaded) trawled by M.V. *Tarpon* where *G. scaber* was obtained.

The volume of stomach contents was determined by the method of displacement, and the intensity of feeding was classified as empty, $\frac{1}{4}$ full, $\frac{1}{2}$ full, $\frac{3}{4}$ full and full.

OBSERVATIONS

Catch per unit effort

Since the catch per unit of effort gives the most important clue to find out the available stock in the sea for developing a suitable conservation and management policy for any fishery (Ricker, 1940 and Rounsefell and Everhart, 1953), the trawling data analysed for the catch rate of the various fishing grounds are presented in Table 1. A high catch rate of 32.5 kg per hour of trawling for *G. scaber* was noted in the area 13-74, 1E during the year 1963. Since no fishing was conducted in this area, during 1962 and 1964 no definite conclusion regarding the potentialities of this ground could be made. A systematic survey of the trawling grounds was made during 1964 and the catch rate of this species estimated in the various fishing

TABLE 1. *Estimated catch and catch per hour in kg of* Grammoplites scaber

Year		Fishing area 12-74, 5E	6E	5D	6D	5B	4D	3E	4E	2F	13-74, 3E	2E	3D	2D	1D	5C	3C	1E
1962	Estimated catch in kg	145.35	57.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	c/h in kg	10.4	10.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1963	Estimated catch in kg	1945.00	2905.00	167.4	364.5	—	—	—	—	—	—	—	—	—	331.2	—	—	409.5
	c/h in kg	10.9	12.9	23.8	23.5	—	—	—	—	—	—	—	—	—	27.5	—	—	32.5
1964	Esimated catch in kg	121.5	340.65	320.40	45.9	93.6	52.2	14.4	32.4	32.4	36.00	80.1	86.4	61.2	195.84	70.65	54.00	—
	c/h in kg	8.7	10.1	28.7	5.7	23.4	26.1	14.4	16.2	8.1	9.0	26.0	10.8	15.8	12.2	17.7	13.5	—

grounds could be seen in Table 1. It was generally seen that the grounds 5D, 5B and 4D of 12-74 and 2E of 13-74 registered a high catch rate for this species. From the available data, though meagre for an interpretation of the seasonal fluctuations, it could be stated that the catch rate was high during November and December (30.4-42.6 kg/hr) and low during April (10.5-12.8 kg/hr). It was observed that whenever the surface temperature exceeded 29°C, the trawl catch was very poor.

Depth-wise distribution

The variations in the catch per hour of trawling at different depth ranges during the years under study are presented in Table 2. It is evident from the table that the catch per hour of trawling of *G. scaber* was found to be more in the depth range 40-55 m. and low in the depth range 10-40 m. Better catch rate of *G. scaber* was recorded in grounds where the sea bottom was reported to be a mixture of mud sand and shells.

TABLE 2. *Catch per hour of trawling in different depth zones*

Year	Catch/hour in kg				
	10-20 m	20-30 m	30-40 m	40-50 m	50-55 m
1962	6.2	8.2	10.4	48.4	52.4
1963	8.4	14.4	18.2	52.4	48.2
1964	7.8	18.4	20.4	40.4	62.4

Distribution of size groups

The analysis of the percentage composition of the various size groups at different depth zones showed that the smaller size groups (82 - 161 mm) occurred in shallower waters (10-30 m) while the larger size groups (162-301 mm) occurred in deeper waters (30-60 m).

Sex ratio

Females dominated the catches from the depth ranges 10-20 m and 20-30 m and the sex ratio of males and females was 41 : 59 and 40 : 60 respectively. Males dominated the catches in the depth range 30 - 40 m and the ratio was 72 : 28. The sex ratio of males and females was 49 : 51 in the depth range 40-50 metres. Females dominated the catches in the deeper regions (50-60m) also and the ratio was 32 : 68.

Maturity

In order to determine the stages of maturity in the various size groups, 1018 fishes were examined and the results obtained are presented in Table 3. It was found that specific identification of the sexes could not be made in the size groups 82-121 mm and hence they were grouped as 'Indeterminate' individuals. All fishes were immature in the size groups 122-181 mm. In size group 182-201 mm a few

maturing individuals were observed whereas in the size group 202-221 mm, 78% of the fishes were maturing. In the next size group all the fishes examined were in the maturing state. The percentage of fully mature specimens dominated in the size range 242-281. Spent fishes were recorded in the size group 282-301 mm. However spawners were not recorded.

TABLE 3. *Frequency of occurrence of the various stages of maturity of* G. scabet *in the different size groups*

Size groups in mm	Number of fish examined	Stages of maturity (in percentage)			
		I	II	III	V
82—101	104				
102—121	96				
122—141	98	100.0			
142—161	100	100.0			
162—181	80	100.0			
182—201	106	68.0	32.00		
202—221	99	12.00	78.00		
222—241	101		100.00		
242—261	78		22.00	78.00	
262—281	93		24.00	76.00	
282—301	63			58.00	42.00

Stage I — Immature; Stage II — Maturing; Stage III — Mature (equiratent to III, IV & V of ICES Scale); Stage IV — Spawning (not observed); Stage V — Spent.

TABLE 4. *Average volume of stomach contents of* G. scabet *in different size groups in relation to depth*

Depth range in metres	No. of fishes examined	Average volume of stomach contents in ml										
		Length Range in mm										
		82-101	102-121	122-141	142-161	162-181	182-201	202-221	222-241	242-261	262-281	282-301
10—20	210	1.4	1.6	2.0	2.2	1.2	2.6	1.2	1.0	0.8	—	—
20—30	200	1.8	2.4	2.6	2.4	1.4	1.8	1.4	0.8	0.4	—	—
30—40	190	—	—	—	—	2.8	3.2	3.0	3.0	4.2	4.0	0.4
40—50	190	—	—	—	—	3.2	4.2	8.4	3.6	6.8	5.2	0.6
50—60	190	—	—	—	—	2.4	1.2	1.2	9.8	11.4	12.4	1.1

TABLE 5. *Percentage composition of food of* G. scaber *in relation to different size groups*

Lengh range in mm	Percentage composition of the diet														
	1963					1964					1965				
	S.C	L.C	P.S	T	M	S.C	L.C.	P.S	T	M	S.C.	L.C	P.S	T	M
82—101	54.6	—	12.4	—	33.0	64.6	—	18.4	—	17.0	56.8	—	19.2	—	24.0
102—121	56.8	—	14.2	—	29.0	52.8	—	17.2	—	30.0	53.2	—	24.2	—	22.6
122—141	63.2	—	20.4	—	16.4	64.2	—	24.8	—	11.0	66.8	—	28.2	—	16.0
142—161	20.4	17.0	32.6	—	30.0	28.2	19.0	32.8	—	20.0	28.8	22.0	38.2	—	21.0
162—181	18.4	20.0	42.6	—	19.0	24.6	—	48.4	—	27.0	20.0	10.0	47.0	—	23.0
182—201	10.2	—	58.4	—	31.4	8.4	—	59.4	—	32.2	—	—	67.4	—	32.6
202—221	—	6.4	64.6	—	29.0	—	4.6	72.4	—	23.0	—	6.2	88.4	—	5.4
222—241	—	14.6	72.6	—	12.8	—	7.8	80.4	—	11.8	—	3.4	90.2	—	6.4
242—261	—	10.2	74.6	—	15.2	—	4.2	90.2	—	5.6	—	4.6	92.2	—	3.4
262—281	—	—	80.0	20.0	—	—	—	90.4	9.6	—	—	—	90.0	10.0	—
282—301	—	—	84.6	13.4	—	—	—	86.4	13.6	—	—	—	84.0	16.0	—

S.C. = Smaller crustaceans; L.C. = Larger crustaceans; P. S. = *Parapenaeopsis stylifera*; T = Teleosteans; M = Miscellaneous.

Feeding intensity and food items

From an examination of the fullness of stomach it was found that the rate of feeding was very high in the mature fishes, less in the immature and very poor in the spent ones. The volume of diet of the various length groups (Table 4) showed that the volume of food consumed by the mature fish was far greater tha n that of the immature ones.

The quantitative analysis of the food components of *G. scaber* for the three year period 1963-65 is presented in Table 5. In the size range 82-141 mm the feeding habits were found to be similar. Smaller crustaceans formed the bulk of the diet, of which prawn larvae, *Acetes* spp., young ones of crabs *Neptunus pelagicus* and *Charybdis* spp. were the most common (58.8%). Apart from this, there were also unidentifiable crustacean remains and broken bits of shells constituting miscellaneous items of diet (31.0%). *Parapenaeopsis stylifera* formed the rest of the diet.

Considerable change in the type of feeding was observed from fish of size group 142-161 mm and above and the major items were the same up to size group 182-201 mm *Parapenaeopsis stylifera* formed 51%. Smaller crustaceans were represented by *Squilla* larvae and *Cumacea* spp. Copepods (species of *Oithona, Paracalanus, Temora, Macrosetella, Euterpina, Pseudodiaptomus, Corycaeus, Acartia* and *Labidocera*) and *Mysis* constituted 11.0%. *Metapenaeus dobsoni* and *Squilla* together formed 9.8%. Decayed plant matter and mud mixed with foraminiferan shells formed the remaining portion of the diet.

P. stylifera dominated the food constituting 78.1% in size group 202-261 mm. The smaller crustaceans were totally absent. *Metapenaeus affinis* and *Penaeus* spp. together constituted 8.9 %. Pelychaete remains and mud mixed with shell bits formed the rest of the diet.

The inclusion of the teleostean item in the diet was observed for the first time in the size group 262-301 mm. though *P. stylifera* continued to be the dominating item of the food forming 85.5%.

REMARKS

During this study no specific relationship between the depth and feeding intensity or food components was noticed. However, the different size groups showed definite feeding habits. It was generally observed that *G. scaber* has a preference for the prawn *Parapenaeopsis stylifera.* This is exhibited even in the early stages of this fish, the young ones feeding more on the smaller *P. stylifera.* Such a selective feeding has been observed in *Polydactylus indicus* (Kuthalingam, 1955).

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