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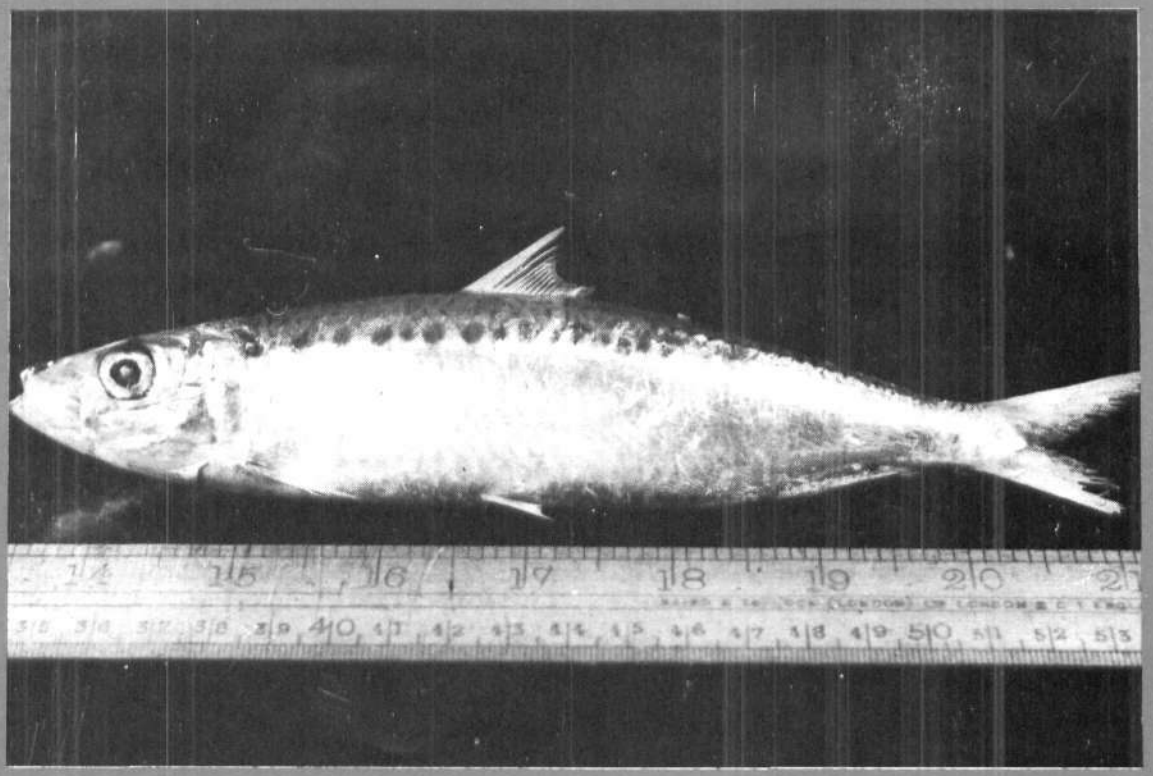

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EXPLOITATION OF JUVENILES OF THE SPINYCHEEK GROUPER, *EPINEPHELUS DIACANTHUS* BY MULTI-DAY TRAWLERS ALONG DAKSHINA KANNADA COAST

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INTRODUCTION

Till eighties, the trawl fishery along the Dakshina Kannada coast was confined to the inshore waters of 10-40 m depth. With the introduction of stay-over (multi-day) fishing, depths upto 75 m are being fished. This has led to the large scale exploitation of less fished juvenile resource of Spiny cheek groupers. (Zacharia *et al.*, 1991, *Mar. Fish. Infor. Serv., T & E Ser.*, No. 114: 29-31). These juveniles in the size range 9-24 cm are in sizeable quantities during October - May at Mangalore and Malpe landing centres of Dakshina Kannada coast. The present study is undertaken to highlight the magnitude of the exploitation of the juveniles of the Spinycheek grouper, *Epinephelus diacanthus* by trawlers along the Dakshina Kannada coast and its impact on the stock with a brief description on its biology. This species is known to grow to a large size and supports a fishery of some magnitude in other parts of the Indian coast. The results presented

here are based on the data collected on the landing of the species at Mangalore and Malpe during 1988/'89 - 1993-'94.

Fishery

Multi-day trawlers accounted for 97% of the *Epinephelus diacanthus* landed at both centres. These boats exploit this resource from 30-70 m depth by operating two types of nets, a shrimp net of 16-28 m headrope length and 25-28 mm mesh size and a larger fish trawl with 25-32 m headrope length and mesh size of 30-40 mm. The sea bottom off Mangalore-Malpe is generally sandy or muddy.

During 1988/'89 - 1993/'94, *Epinephelus diacanthus*, on an average, accounted for 1.21% of the multi-day trawl catch at Mangalore and 0.5% at Malpe (Table 1). The landing witnessed a sharp increase over the year at Mangalore whereas, a marginal increase was noticed at Malpe (Fig. 1). At Mangalore the catch increased from 81.4 t in 1988/'89 to 348.3 t in 1993/'94 and at Malpe from 35.6 t in 1988/'89 to 39.9 t in 1993/'94. The catch rate at Mangalore increased

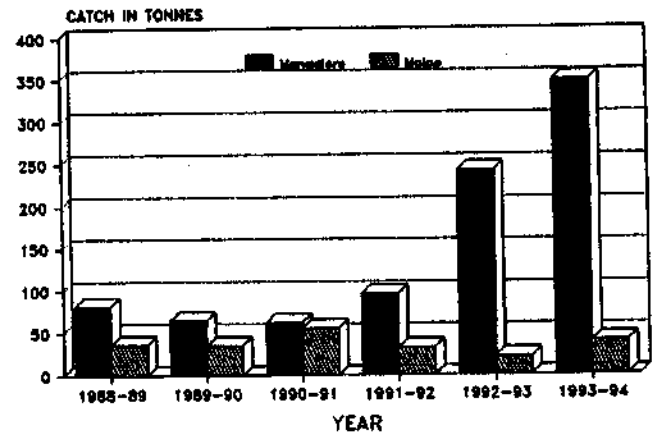

Fig. 1 Annual landings of *E.diacanthus* by multi-day trawl at Mangalore and Malpe.

sharply from 0.18 kg/hr in 1988/'89 to 0.54 kg/hr in 1993-'94 except in 1990/'91 when it showed a slight fall. At Malpe catch and the catch rate showed some fluctuations. The maximum catch of 54.7 t and the catch rate of 0.21 kg/hr were observed in 1990-'91 and the minimum catch of 35.6 t and the catch rate of 0.08 kg/hr were observed in 1988/'89.

TABLE 1. *Annual landings of* E. diacanthus *and 'all fish' catch by multi-day trawlers at Mangalore during 1988/'89 -1993/'94*

Year	Effort in trawling hours	Total trawl catch in tonnes	*Epinephelus* catch in tonnes	% in total trawl catch	Catch rate (kg/hr)
Mangalore					
1988-'89	446891	12121.9	81.4	0.70	0.18
1989-'90	233271	6609.6	64.2	0.97	0.28
1990-'91	302846	10223.1	61.7	0.60	0.20
1991-'92	438207	13571.3	96.3	0.71	0.22
1992-'93	528291	14055.3	241.7	1.72	0.46
1993-'94	644879	17076.4	348.3	2.04	0.54
Average	432398	12276.3	148.9	1.21	0.34
Malpe					
1988-'89	455621	12170.3	35.6	0.29	0.08
1989-'90	187206	8285.1	34.5	0.42	0.18
1990-'91	257895	9548.1	54.7	0.57	0.21
1991-'92	207587	5182.1	32.1	0.62	0.15
1992-'93	209635	5444.2	21.5	0.40	0.10
1993-'94	217371	5271.2	39.9	0.76	0.18
Average	255886	7650.2	36.4	0.48	0.14

The Spiny cheek grouper begins to appear in the trawl fishery by October and peak landing occurs during December (Fig. 2). The catch gradually declines by the end of May. Fishes are sold for Rs. 60-100 per 15 kg basket with the price varying with the size of the fish. Very small fishes are discarded as trash fishes and used for poultry feed.

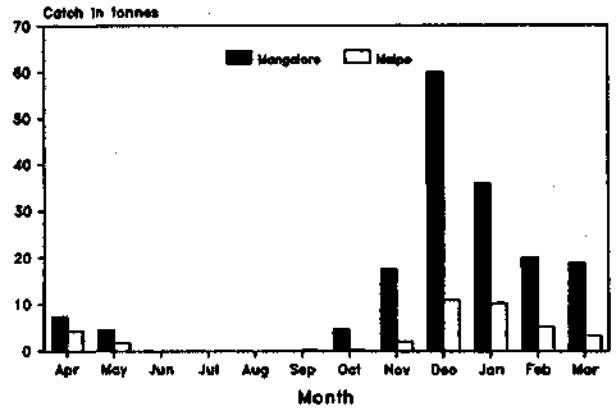

Fig. 2 Monthly landing of *E.diacanthus* by multi-day trawlers at Mangalore and Malpe.

Biology

Length composition

The length-frequency analysis carried out during 1993/'94 at Mangalore showed that the length of *E. diacanthus* ranged from 9.5 to 23.5 cm during November '93-March '94. The monthly length range, modal sizes and mean length are given in Table 2. The Modal size was at 10.5 cm in November, 13.5 cm in December, 16.5 cm in January, 19.0 cm in February and 20.0 cm in March indicating an average growth rate of 2.5 cm per month. The mean weight (g) during each month respectively were 31.9, 44.2, 63.0, 84.2 and 95.4.

TABLE 2. *Monthly length-frequency distribution (in %) and mean size of* Epinephleus diacanthus *during November '93 - March '94*

Mid.-length (cm)	Nov.	Dec.	Jan.	Feb.	Mar.
9.5	2.3				
10.5	30.2	1.6			
11.5	25.6	10.5	1.5		
12.5	20.9	21.1	3.4		1.4
13.5	9.4	28.3	4.8	4.1	3.3
14.5	9.3	26.3	6.7	4.5	2.9
15.5	2.3	9.5	20.5	3.6	5.3
16.5		2.7	28.1	11.1	8.6
17.5			22.4	15.2	10.1
18.5			10.0	23.1	12.1
19.5			2.1	23.3	21.1
20.5			0.5	11.1	22.2
21.5				3.6	10.1
22.5				0.4	2.4
23.5					0.5
Mean length	11.9	13.6	16.3	18.2	18.8

Length-weight relationship

The length-weight relationship was worked out using length (cm) and weight (g) measurements of 108 specimens ranging from 9 cm to 23.5 cm.

The observed maximum length of this species as per FAO sheets is 52 cm (Fischer and Bianchi, 1984, *FAO Identification Sheets for Fishery Purposes, Western Indian Ocean*, Vol. III). As per the length-weight relationship equation the maximum weight attainable by a specimen of 52 cm is 1807 g.

Food and feeding

A total of 65 fish was used for food and feeding analysis. Of this, only 13 fishes showed the presence of some food item in their stomachs in varying degrees of fullness. The diet item consisted of curstaceans and fishes. Among fish groups *Ambassis* sp. and *Leiognathus* spp. formed the main item and among crustaceans, crabs and small prawns dominated. From the study it is inferred that the juveniles of *E. diacanthus* is a carnivore showing no preference for any particular food item.

Remarks

Epinephelus diacanthus landing witnessed a sharp increase over the years at Mangalore. The present 'all-fish' catch in trawl at Mangalore compared to the beginning of the study period has increased by 41% only whereas the catch of spinycheek grouper has increased by 328%. The catch rate also shows a similar increasing trend. At Malpe the trawl fishery has registered a negative growth whereas the catch of *Epinephelus diacanthus* increased by 12%. The catch rates show wide fluctuations over the years. *Epinephelus diacanthus* is known to occur in muddy or sandy bottom. This species is an important component of the grouper fishery off the Kerala coast in depths 63 to 100 m (Talwar and Kacker, 1984, *Commercial Seafishes of India*. 997 pp). Along the Dakshina Kannada coast this species began to form a sizeable portion of the demersal resources after the extension of trawling operations to the distant waters.

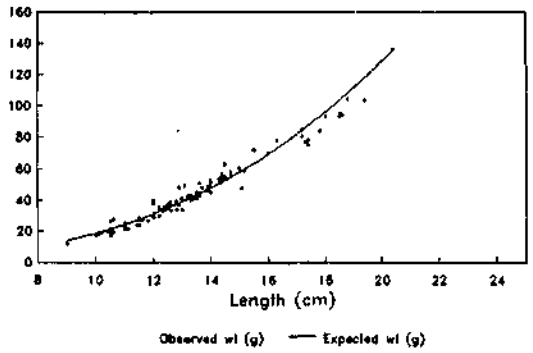

Fig. 3 Length-weight relationship of *E. diacanthus* at Mangalore.

Though this species is known to grow as large as 52 cm (Fischer and Bianchi, 1984, *op. cit.*) the maximum size of the fish landed off Mangalore-Malpe was 23.5 cm indicating that these are all juveniles. The fishery of *E. diacanthus* consisting exclusively of juveniles from 30 to 60 m depth in the area indicates that these young ones abound the midshelf waters for feeding purpose and stay in the fishing ground for eight months after which they might migrate to the deeper waters for further growth and breeding. This explains the complete absence of any adults in the landings.

According to Chakraborty (1994, *Bull. Cent. Mar. Fish. Res. Inst.*, 47: 130-133) fish upto 47.8 cm size was recorded from Bombay waters and the age of a fish of this size is 4.98 years. Further he has stated that *E. diacanthus* attains 22.9 cm when it completes one year of age. The present observation on the juvenile length data indicated a growth rate of 2.5 cm per month. Considering this, the fish would be of 3 months old when recruitment to the fishery takes place in this area in November every year. The fish of 23 cm would be of nine months old. Hence it is inferred that the fishery of this species in the area is constituted by 0-year class. From the present length-weight relationship the maximum weight attainable by a fish of length 52 cm is calculated as 1807 g. The mean weight of the fish landed was 64 g and the mean length 15.8 cm.

Fig. 4. Catch of *E.diacamthus* ready for auctioning.

The indiscriminate exploitation of juvenile fishes is not a healthy sign in terms of economical as well as conservational point of view because if the fish is allowed to grow to its normal size it would bring much higher return and at the same time the fish will also get a chance to breed. The fishes which are presently sold for Rs. 3-5 per kg if allowed to grow to the adult size would have good export potential and can fetch upto Rs. 25-30 per kg. The heavy removal of young ones of the population from fishing grounds before they can grow to a reasonable size can lead to overfishing. Trawlers, no doubt are responsible for the increased yield from our waters but in instances like this, where indiscriminate fishing of young ones takes place, it may lead to overfishing and tilt the balance of the natural population of the stocks. Hence exploitation of young ones of *Epinephelus diacanthus* by trawlers along Dakshina Kannada coast may be restricted otherwise it will lead to depletion of the stock of the fish from this coast.

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