LONG LINE SELECTIVITY ON *Epinephelus malabaricus* (Bloch and Schneider, 1801) ALONG THOOTHUKUDI COAST, SOUTH EAST INDIA.

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ABSTRACT

A study on long line selectivity on the fishery of *Epinephelus malabaricus* (Family - Serranidae) was carried out along Thoothukudi coast. *Epinephelus malabaricus* formed year round commercial fishery with the peak from the month of October to March along Thoothukudi coast. The 'J' type hooks with the number ranging from 5 to 7 were found to be used for commercial exploitation of *E. malabaricus* along Thoothukudi coast. The study revealed that the hook number no 7 might be discouraged as it captured mainly juveniles of E .*malabaricus* and hook no 5 and 6 were found ideal for the commercial exploitation of *E. malabaricus*.

Keywords : Long line selectivity, Serranids, Length at first maturity, Fishing pressure, Catch and effort

INTRODUCTION

Of the several types of fishing gears, line is found to be one of the most dominant and economically viable fishing gears to capture commercially important fishes such as catfish, eel, seer fish, squids, groupers, carangids, perches and elasmobranches, as it can be operated even in uneven rocky fishing grounds. Line fishing is known to be responsible for about 12% of the world fish landings (Mathai, 2002). Long lines alone accounted for 5.71% of the total marine fish landings during 2003 - 2004 (Anon, 2004). Serranids constitute commercially important fishery along Thoothukudi coast and contributed to the tune of 18,213 t (9.31% of the total perches landing) to the country's fish catch during the year 2004 (Anon, 2004). Since the use of long line avoids the exploitation of young size groups, it is considered as conservation fishing method than trawling (Bjordal, 1989) and is encouraged because of its size selective characteristics (Sutterlin *et al*., 1982). Attempts have been made to study the relationship between hook and bait

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size with that of size of fish caught (Fry, 1949; Fraser, 1955; Allen, 1963; McCracken, 1963; Saetersdal, 1963 and Takeuchi and Koike, 1969).

In Indian waters, studies on hook and line with particular reference to selectivity of hook are very much limited. Balasubramanyan (1964) made an attempt to study different natural baits for sea fishing in India. Kartha *et al*. (1973) studied selective action of three types of baits and four hook sizes for elasmobranches in bottom-drift-long line operated off Veraval. Appukuttan *et al*. (1980) has reported modified version of long line fishing gear called Ayiramthundi used specifically fishing sacred chank in Kerala coast. Hameed (1982) studied swimming layers of shark vertical long lines with suitable hooks and baits at different depths in Cochin waters. Rajan (1982) studied shark long lines by mechanised boats in Thoothoor village of Kanyakumari coast. Mathew and Venugopal (1990) studied on the hook and line fishery for Kalava at Cochin, and he found that hook no. 7 and 8 found to be in use for capturing Kalava in Cochin waters. Durai (2003) studied the long line selectivity of lethrinid fishes along Thoothukudi coast. However, selectivity studies have been not yet been carried out on groupers although they form notable fishery. The present investigation deals with the hook and line selectivity on one of the important grouper namely *Epinephelus malabaricus.*

MATERIALS AND METHODS

The present study was carried out for one year from May 2005 to April 2006 at Thirespuram (Lat 8°47' N Long 78° 09 E), of Thoothukudi Coast, South East India. The catch data of *E. malabaricus* was collected from the traditional crafts popularly called 'Vallams'. Sampling was made thrice in a week. The length frequency data were collected from long line units operated with the hook Nos. 5, 6 and 7. The length frequency data collected from each type of unit were plotted separately taking the total length in X - axis and the number of fishes caught in Y- axis. The length at first maturity of *E. malabaricus* was estimated as per the method prescribed by Venkataramanujam and Ramanathan (1994).

Fishing pressure by different hook sizes were analyzed by estimating the percentage contribution of different size group of *E. malabaricus* and were expressed as pie diagram. Growth overfishing was ascertained based on the contribution of immature animals in the fish catch. The animals with the length below the length at first maturity were considered as groups suffering due to growth overfishing. Fishes with the length around the length at first maturity were considered as groups suffering due to recruitment over fishing. The fishes with the length exceeding the length at first maturity were considered as fishable length groups.

RESULT AND DISCUSSION

The general description of the long line unit operated along Thoothukudi coast is given in Table 1. Six different size of 'J' type hooks viz. hook no 5, 6, 7, 8, 9 and 10 were found to be used by the fishermen.

In the present study, the peak season of *E. malabaricus* fishery was found to be from the month of October to March (Table 2) This is in accordance with the earlier report by Menon *et al.* (2004). The length

frequency distribution of *E. malabaricus* is presented in the Fig 1. Wide range of length groups ranging from 34 to 125 cm was recorded during the study period . Mathew (2003) reported that *E. malabaricus* formed fishery in long line gears of Thoothukudi coast with the length ranged 50 to 100 cm from November to April. Further Menon *et al*. (2004) recorded *E. malabaricus* with the length ranging from 30 to 114 cm in the long line catches of Thoothukudi coast. The length distribution of *E. malabaricus* observed in the present study is in accordance with the earlier reports.

Length frequency distribution of *E. malabaricus* showed two peaks, one at 57cm and another at 64cm for the hook no. 7. The other hooks no. 5 and 6 showed more or less similar pattern of length groups in their catch. It could be clearly observed that hook no. 7 captured large number of smaller length groups, while hook nos. 5 and 6 captured larger length groups.

The length at first maturity was estimated as 50 cm for females and 68 cm for males (Fig.3). Around 69% of catches recorded in the hook no.5.were fishable length groups (Fig.4) In the long lines with hook no.6, fishable length group contributed around 71% (Fig.5) Recruitment overfishing was observed in the catches from hook no. 7 and immature and maturing fish populations of *E. malabaricus* were found severely affected (Fig.6). Therefore, the use of hook no. 7 should be discouraged to avoid recruitment overfishing of this species.

The catch and effort details of *E. malabaricus* are given in Table 2. The highest catch of *E. malabaricus* was recorded as 26,928 kg in the month of March and the lowest catch of the same species was observed as 3,069 kg in June. The maximum and minimum effort for this species were recorded during the month of March and June as 120 and 45 boat days respectively. The highest CPUE of 10.2 kg/boat day was observed during the month of March and the lowest CPUE of 3.1kg/boat day in the month of June with the annual average CPUE of 82.9 kg/boat day.

The length frequency curves of *E. malabaricus* showed clear cut shift of peaks towards lower length group as the hook number increase. Ralston (1982) also have reported the shifts in the length composition of catch according to hook size as in the present study. Kartha *et al*. (1973) reported the hooking percentage for perches from hook nos. 5 and 6 in the bottom drift long lines operated off Veraval as 3%. Menon *et al*. (1993) have also reported the hooking percentages of long line catches as 3.35 in Arabian Sea, 1.99 in East coast and 1.51 in Andaman coast. The low hooking percentage (0.14) recorded in the present study may be attributed to the poor technical status of the long line units of Thoothukudi coast.

Catches of *E. malabaricus* were influenced by hook nos. 5 and 6 (Fig. 5 and 6) in the present study. Further two peaks could be observed both in the combined length frequency curve and length frequency curve of hook no. 6, one at 71 cm and another at 85 cm. The reason for two modes may not be only due to selectivity of the hook but also to the abundance of two different size groups of *E. malabaricus* in the population for the sustainable commercial long line fishing of E. *malabaricus* along Thoothukudi coast. Hook

no.7 may be discouraged as it was found to catch more number of juvenile fishes.

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Table 1. General Description of the long line units operated in Thoothukudi coast

Sl.No.	Particulars	Length/Number
1.	Length of main line	4500 m
2.	Length of basket line	1000 m
3.	Height of branch line	6 – 10 m
4.	Length between two branch lines	1.5 m
5.	Hook number	5, 6, 7, 8, 9 & 10
6.	Number of hooks per basket	300
7.	Number of basket/ boat	5
8.	Type of float	Plastic can
9.	Float size	7 Litre capacity
10.	Number of float	5 nos.
11.	Depth of operation	20 – 50 m
12.	Material used for main line	Polyethylene
13.	Diameter of main line	9 – 12 mm
14.	Material used for branch line	Nylon (Mono or multifilament)
15.	Diameter of branch line	8 – 11 mm

Table 2. Estimated catch and effort for *Epinephelus malabaricus*

Sl. No.	Month boat	Average No. of days operated	Boat landed /	Average number percentage boat	Combined hooking landed / 5,6,&7 No.	Average weight landings in boat (kg)	Estimated total landings in number	Estimated total weight (kg)	CPUE kg/boat
1.	May	50	1100	1		3.4	1100	3740	3.4
2.	June	45	990	1		3.1	990	3069	3.1
3.	July	55	1210	1		4.5	1210	5445	4.5
4.	August	60	1320	1		5.2	1320	6864	5.2
5.	September	65	1430	2		6.8	2860	9724	6.8
6.	October	70	1540	3		7.5	4620	11550	7.5
7.	November	65	1430	3	0.14	8.1	4290	11583	8.1
8.	December	75	1650	4		9.5	6600	15675	9.5
9.	January	105	2310	3		8.3	6930	19173	8.3
10.	February	115	2530	4		8.5	10120	21505	8.5
11.	March	120	2640	2		10.2	5280	26928	10.2
12.	April	80	1760	1		7.2	1760	12672	7.2
	TOTAL	**905**	**19910**		**0.14**		**47080**	**147928**	**82.9**

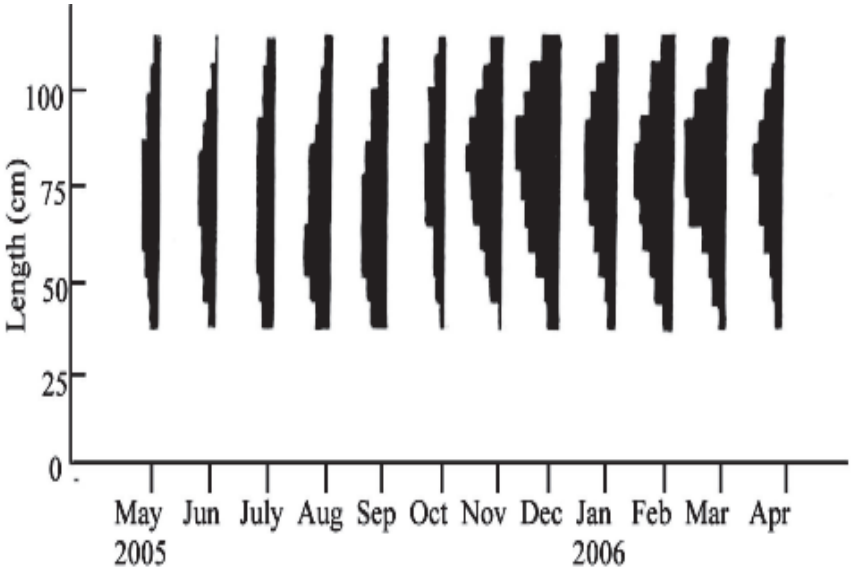

Fig. 1. Seasonal occurrence of *Epinephelus malabaricus* from May 2005 to April 2006

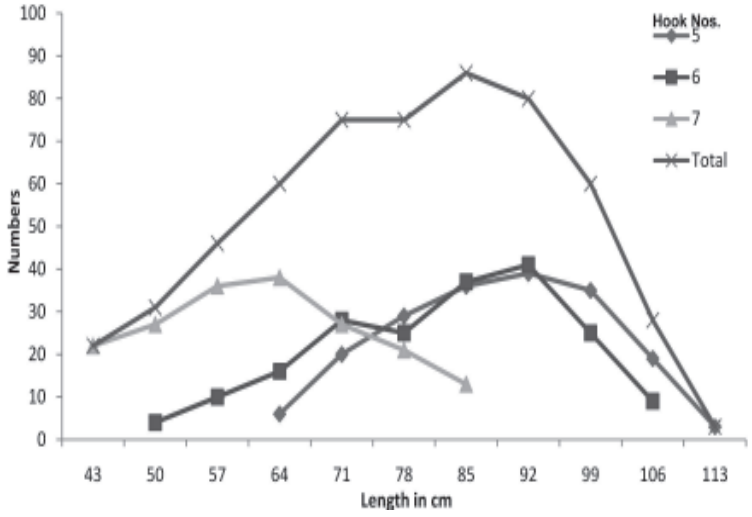

Fig.2.Hook wise Length frequency distribution of *Epinephelus malabaricus* in the fishery

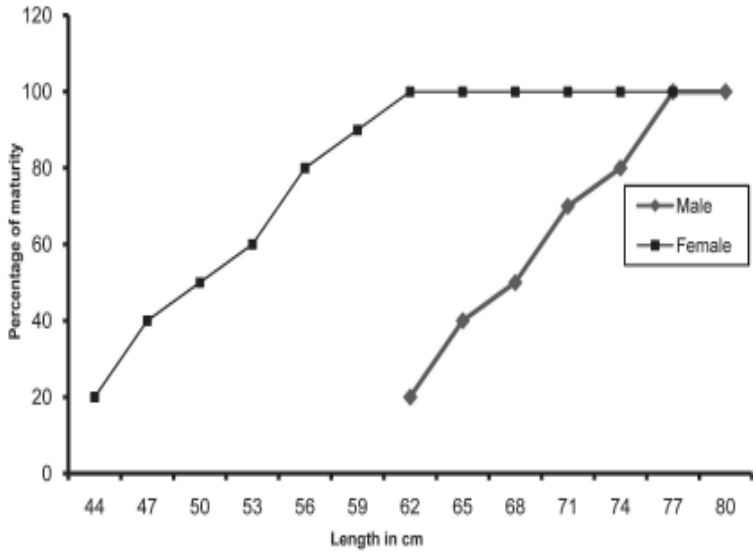

Fig. 3. Determination of length at first maturity in males and females of *Epinephelus malabaricus*

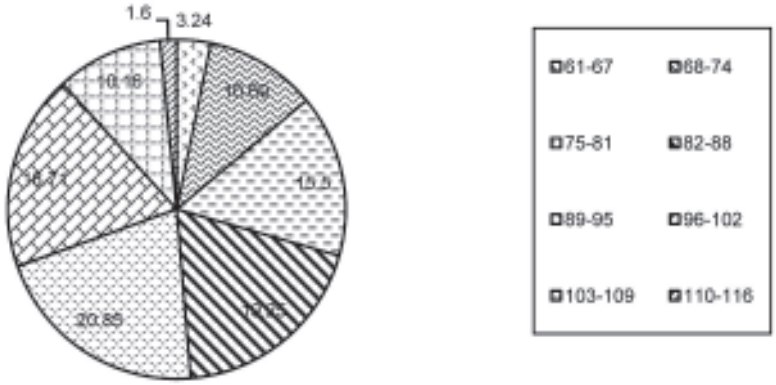

Fig.4. Fishing pressure on *Epinephelus malabaricus* by hook No. 5

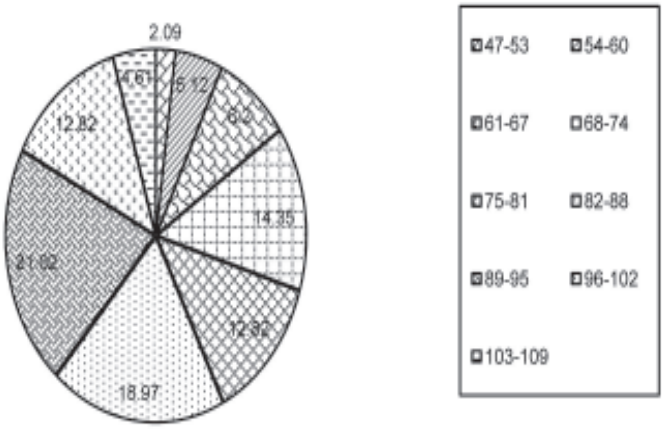

Fig. 5. Fishing pressure on *Epinephelus malabaricus* by hook No. 6

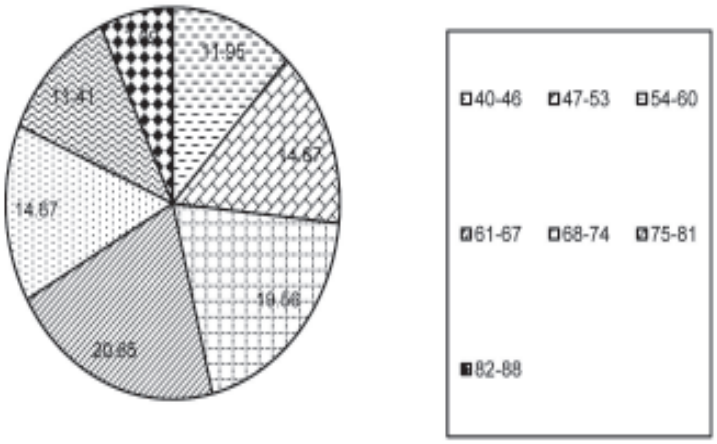

Fig.6. Fishing pressure on *Epinephelus malabaricus* by hook No. 7