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944 ON THE FISHERY OF THE WHITE PRAWN *PENAEUS INDICUS* FROM THE TRAWLING GROUNDS OFF TUTICORIN

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Introduction

The White prawn *Penaeus indicus* is one of the most widely distributed species of marine prawns supporting an active commercial fishery in various countries bordering the Indian Ocean. In India, this species supports the fishery significantly along the east coast from Tuticorin to Chilka lake and a fishery of lesser magnitude in the west coast from Kanyakumari to Karwar. Along Tuticorin coast this species is exploited mainly by two types of gear viz. trawl net and gill-net. The seasonal fishery of this species by the traditional gill net off Periathalai coast in the Gulf of Mannar has been reported earlier by the authors (Rajamani and Manickaraja, 1990. *Ind. J. Fish.*, 37). The present article gives an account of the *P.indicus* landed by mechanised trawlers at Tuticorin Fishing Harbour during the five year period from 1986-'87 to 1990-'91.

Data base

The resource is exploited mainly from the trawling grounds off Pinnakayal and Manapad in the south of Tuticorin in the Gulf of Mannar by mechanised trawlers of medium size (14 m in length) using shrimp trawl net with a mesh size of 20 mm at the cod end. The depth in the area of operation ranges from 20 to 60 metres. The trawlers normally leave the base (Tuticorin Fishing Harbour) in the early morning and after fishing return to the base during the night time. In the catches landed by mechanised trawlers at Tuticorin Fishing Harbour *P.indicus* forms second in the order of abundance under the genus *Penaeus*, the first and dominant one being the green tiger prawn *P.semisulcatus*. The catch and effort, composition of *P.indicus* in the total prawn catches, size-frequency distributions, sex ratio and stages of maturity during different months studied in detail are presented.

Catch and effort

The estimated effort and annual landings of *P.indicus* during the five year period are given in Table 1. The average annual landing of *P.indicus* at Tuticorin Fishing Harbour during the five year period was only 20.2 t constituting 8.0% of the total prawn catches. The landing showed a gradual increase from 11.6 t in 1986-'87 to a maximum of 34.0 t in 1990-'91. The annual catch per effort during the five year period of observation ranged from 0.6 kg in 1987-'88 to 1.9 kg in 1990-'91 with an average catch per effort of 1.0 kg. The annual catch per unit effort exceeded 1 kg only in two years viz. in 1986-'87 and 1990-'91.

Composition of *P.indicus* in the total catches

The annual composition of *P.indicus* in the total catches during the five year period varied from a minimum of 4.7% in 1987-'88 to a maximum of 15.0% in 1990-'91 with an average composition of 8.0% (Table 1). The composition exceeded 10% only in two years viz. 1986-'87 and 1990-'91. The average catch and composition of *P.indicus* during different months are given in Table 2. During the five year period of observation the maximum composition of 16.5% was recorded during June. The composition of *P.indicus* gradually increased from 4.5% in April to the maximum of 16.5% in June and then showed a marginal decline in July with a composition of 13.1%. Thereafter, the composition

TABLE 1. *Estimated catch (t), effort (units), catch rate (kg/unit) and composition (%) of* P. indicus *landed by mechanised trawlers at Tuticorin Fishing Harbourfrom 1986-'87 to 1990-'91*

Year	Effort (hrs)	Total prawn catch (t)	Catch (t)	Catch rate (kg/hr)	Composition (%)
1986-'87	10,640	107.2	11.6	1.1	10.8
1987-'88	29,382	348.6	16.4	0.6	4.7
1988-'89	18,366	288.6	15.7	0.9	5.4
1989-'90	24,317	284.5	23.5	1.0	8.3
1990-'91	17,998	226.3	34.0	1.9	15.0
Average	20,141	251.0	20.2	1.0	8.0

showed a sudden decline to 2.4% in August and then reached the minimum of 1.9% in September showing a marginal increase during the subsequent month. The contribution of *P.indicus* was moderate from November to January and then in March ranging between 7.4 and 9.0%. It may be mentioned here that there was negligible landing of *P.indicus* in September during 1989-'90; in October during 1987-'88; in January and March during 1986-'87 and in January and February during 1990-'91.

Size-frequency distribution

During the five year period of study the size of *P.indicus* landed by the trawlers ranged between 93 and 202 mm for male and between 95 and 216 mm for female (Table 3). The average month-wise minimum, maximum and mean size of *P.indicus* recorded during the five year period of study are given in Table 4. It can be seen from the Table that males measuring less than 100 mm were recorded in the catches landed during May, November and December whereas in the case of females it was observed only in November. Large-sized prawns measuring more than 200 mm were recorded in the catches landed during March in the case of male and during June, August, November and March in the case of female. The annual length-frequency distribution of both males and females during the five year period showed a multimodal distribution in most of the months with dominant modes occurring in the size range of 123-143 mm in male and 128-148 mm in female. During the peak season of the fishery i.e. in June-July bigger size groups (160-190 mm) formed the bulk of the catches. The smaller size groups were recruited to the fishery in November, December, and March.

TABLE 2. *Monthly landings of* Penaeus indicus *by mechanised trawlers at Tuticorin Fishing Harbour during the years 1986-'91 (in tonnes). Percentage composition is given in parenthesis*

Years	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
1986-'87	0.4 (6.8)	1.2 (6.1)	2.6 (33.8)	2.4 (44.5)	0.4 (3.4)	0.6 (5.4)	1.0 (5.5)	2.6 (31.3)	0.5 (4.3)	*	0.1	*	11.6 (10.8)
1987-'88	1.2 (12.7)	0.6 (5.9)	0.7 (5.0)	5.7 (10.7)	0.4 (0.9)	1.2 (2.7)	*	0.9 (2.4)	1.3 (3.8)	0.9 (4.3)	0.1 (0.4)	3.5 (12.4)	16.4 (4.7)
1988-'89	0.3 (3.2)	0.6 (2.3)	4.3 (4.4)	5.2 (14.3)	1.6 (4.5)	2.3 (5.6)	0.5 (4.8)	0.4 (6.3)	0.1 (5.3)	0.1 (0.5)	0.1 (1.3)	0.3 (3.9)	15.7 (5.4)
1989-'90	1.3 (3.0)	3.1 (5.8)	6.9 (10.0)	4.0 (14.3)	0.4 (2.0)	*	0.1 (0.2)	**	1.6 (13.3)	3.9 (44.7)	1.6 (17.5)	0.6 (7.0)	23.5 (8.3)
1990-'91	0.1 (1.1)	2.7 (26.0)	22.6 (64.1)	1.4 (7.3)	0.1 (1.1)	0.1 (0.1)	0.1	**	6.6 (12.6)	*	*	0.4 (3.7)	34.0 (15.0)
Average catch (t)	0.7 (4.5)	1.6 (6.9)	7.4 (16.5)	3.7 (13.1)	0.6 (2.4)	0.8 (1.9)	0.3 (2.4)	1.3 (7.4)	2.0 (9.0)	1.0 (9.0)	0.4 (3.9)	1.0 (8.3)	20.2 (8.0)

* Negligible landing of *P.indicus;* ** No fishing.

TABLE 3. *Annual size ranges and mean sizes in* P.indicus *landed at Tuticorin Fishing Harour from 1986-'87 to 1990-'91 (in mm)*

Year	Male			Female		
	Min.	Max.	Mean.	Min.	Max.	Mean.
1986-'87	95	195	135.5	95	216	150.0
1987-'88	111	178	141.3	116	196	155.6
1988-'89	118	202	144.4	121	216	153.2
1989-'90	106	163	141.1	120	176	148.2
1990-'91	93	176	138.2	101	207	145.7

TABALE 4. *Average month-wise size ranges and mean size in* P.indicus *landed at Tuticorin from 1986-'87 to 1990-'91 (in mm)*

Months	Male			Female		
	Min.	Max.	Mean	Min.	Max.	Mean
April	110	171	133.0	116	168	141.6
May	95	170	136.0	112	194	144.5
June	118	176	144.4	111	207	155.2
July	123	196	144.5	116	196	162.6
August	119	169	145.0	131	204	160.3
September	123	173	146.3	126	199	152.1
October	142	166	152.1	126	196	167.6
November	98	195	137.7	95	216	158.2
December	93	155	129.7	111	182	134.9
January	119	148	131.5	121	170	137.2
February	122	163	140.8	124	176	148.6
March	106	202	145.0	102	216	159.5

Sex ratio and maturity stages

The average annual sex ratios recorded for the five year period are given in Table 5. It can be seen from the Table that females were predominant in the catches during the first four years with their composition ranging from 53.9% in 1988-'89 to 76.6% in 1989-'90. On an average females constituted 53.3% of the total catches. Mature females were encountered in the catches only after a size of 128 mm. However, females of 156-175 mm size groups formed nearly half of the spawning population. The average annual and monthly composition of females of *P.indicus* with different stages of maturity are given in Tables 5 and 6. It can be seen from Table 5 that mature and spent females formed a sizable proportion during all the five years forming on an average 29.9 and 30.7% respectively. The average month-wise composition of different stages of maturity in the females also indicates high percentage of mature and spent females during most of the months. The composition of immature female was less than 10.0% from June to October (Table 6). June-August period formed the main spawning season as evidenced by the higher proportion of mature and spent females. Thus it can be inferred that *P.indicus* spawns throughout the year with peak activity during June-August.

TABLE 5. *Annual sex ratio and maturity stages in the females of* P.indicus *in percentage. (IM - immature; EM - early maturing; LM - late mature; M - mature; SP - spent-recovering)*

Year	Sex ratio		Maturity stages				
	Male	Female	IM	EM	LM	M	SP
1986-'87	45.3	54.7	19.4	13.5	9.2	22.8	35.1
1987-'88	41.5	58.5	10.7	18.5	8.7	30.9	31.2
1988-'89	46.1	53.9	5.8	26.6	1.4	33.8	32.4
1989-'90	23.4	76.6	3.2	25.4	3.2	42.9	25.4
1990-'91	53.0	47.0	16.1	22.9	6.8	28.8	25.4
Average	46.7	53.3	13.2	19.0	7.3	29.9	30.7

TABLE 6. *Average month-wise percentage composition of different stages of maturity in the females of* P.indicus

Months	Total No. of females sampled	IM	EM	LM	M	SP
April	68	20.6	17.6	4.4	45.6	11.8
May	154	11.0	24.7	1.3	12.3	50.6
June	187	8.6	11.2	12.3	37.4	30.5
July	194	5.2	22.2	7.2	24.7	40.7
August	28	3.6	17.9	3.6	25.0	50.0
September	77	5.2	26.0	11.7	26.0	31.2
October	25	4.0	16.0	4.0	40.0	36.0
November	72	29.2	12.5	4.2	41.7	12.5
December	83	43.4	13.3	7.2	22.9	13.3
January	33	12.1	15.2	15.2	33.3	24.2
February	36	-	41.7	-	47.2	11.1
March	128	14.8	18.0	9.4	32.8	25.0

Remarks

The present investigation shows that the fishery of *P.indicus* at Tuticorin is only moderate with an average annual composition of 8.0%. The average monthly composition of this resource in the trawl catches exceeded 10% only during two months viz. June and July. The occurrence of large-sized females were encountered in the catches mainly from June to August. During these months most of the vessels carried out fishing operations in the grounds off Manapad and at times the vessels even went south of Manapad upto Periathalai. But as the season came to an end by August the trawling operations were carried out in the grounds off Tuticorin and Pinnakkayal.

It has been proved earlier by the tagging experiments conducted by the Central Marine Fisheries Research Institute that *P.indicus* migrates from the west coast to the east coast during the southwest monsoon. Prawns tagged and released off Cochin have been recovered from the Gulf of Mannar off Ovari and Periathalai (Anon, 1982, *Mar. Fish. Infor. Serv., T & E. Ser.*, No.45). Thus, the present investigation reveals that the trawl fishery of *P.indicus* along the Tuticorin coast is sustained mainly by the stock migrating from the southwest coast during the southwest monsoon and the native population of the resource contributing to a minor fishery during the rest of the months.