FURTHER OBSERVATIONS ON A NEWLY LOCATED PRAWN FISHERY OFF SAURASHTRA COAST *

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The abundance of prawns in a newly located ground off Saurashtra has been described. Catch composition showed that *Metapenaeus affinis* formed the bulk of the catches. Previously this species was thought to be of not much commercial importance in this region. The peak of the fishery lasted from September to November. Observations on the biology of this species showed that it occurs as an independent stock in this region. The significance of the gear employed in fishing is also emphasized.

INTRODUCTION

Exploratory fishing in the Saurashtra waters until 1960 was largely carried out by large sized trawlers using gears suited for the capture of demersal fish (Chidambaram, 1953; Srivatsa, 1953 *a;* Jayaraman *et al*, 1959). In 1960-61 with the establishment of Deep Sea Fishing Station of the Government of India and an Exploratory Fishing Centre of the Government of Gujarat in Veraval (Saurashtra), a systematic survey by the medium and small sized vessels, particularly equipped with gears suitable for the capture of shrimps, commenced in these waters. One of the major results of this venture was the discovery of grounds potentially rich in prawns off Veraval (Lat 20° 54'N, Long 70° 22'E) in 25-50m depth. A preliminary report on this was published (Anon., 1965). The location of a new prawn ground and the feasibility of its exploitation by small sized vessels provided great attraction to both fishermen and local exporters because of the growing overseas demand for prawns.

Earlier accounts on the biology and fishery of the Indian prawns by Panikkar and Menon (1955), Bhimachar (1965) and Menon (1965) reveal the scarcity of information on prawns from the Gujarat waters. However, some information on the traditional prawn fishery of the nearshore and backwaters of the Kutch region can be gained from the works of Srivatsa (1953 *b*), Lakumb (1960) and Ramamurthy (1963 and 1967). An attempt to assess the relative abundance of prawn in these waters has been made by Kagwade (1967).

* The data presented in this paper were collected while the author was on the staff of the Department of Fisheries, Gujarat State.

The present communication deals with some aspects of the relative abundance of prawns caught off Veraval and gives information on the biology of *M. affinis* which formed the major species in the landings.

Materials and methods

The survey fleet consisted of three Indian built stern trawlers of the Department of Fisheries, Gujarat State. Each of these vessels had an overall length of 14.85 m and was provided with 87 H. P. marine diesel engine. The findings presented in this paper are mainly based on the catches obtained by the vessel 'Silver Pomfret'. This vessel was persistently engaged in exploring the grounds off Veraval while the other two had programme of fishing off Okha and off Kolak where the prawn catches were not very substantial.

During the fishing season 1962-63 most of the operations were carried out by two-seam overhang shrimp-trawls having a head rope length of 13.5 m. In the next season 18-19.5 m non-overhang shrimp trawls were operated. The cod-end mesh size of all these nets was 3.2 cm. Rectangular otter boards as well as "Russian type" oval boards were used with the nets. Trawling speed was kept at 2.5 - 3 knots (900 - 1200 R. P. M.). Charting of the grounds was done using an approved map of the coastline of Gujarat. Sorting of the samples into species and measurement of length and weight of some specimens taken at random were carried out at weekly intervals following the methods of Menon (1955) and George (1961). After separating the sexes, the conditon of the gonads was noted as an index of maturity. No fishing was done during the period of the south-west monsoon (June - August).

Results

Table I shows the seasonal landings of prawns from the newly located grounds off Veraval. It can be seen from the table that prawns formed nearly 10% of the

TABLE I MONTHLY VARIATION IN THE PRAWN CATCHES FROM THE VERAVAL REGION (SAURASHTRA) DURING 1962-64.

Month	No. of trawling hrs.	Total fish catch in kg.	Total catch of prawns in kg	Catch/hr prawns in kg	Percentage of prawns
		1962 - 63			
October	24	5098	256	10.67	5.02
November	80	14463	721	9.00	4.99
December	101	17540	842	8.33	4.80
January	62	12308	92	1.48	0.75
February	38	9933	994	26.15	10.01
March	56	13840	73	1 30	0.53
April	80	22053	27	0.34	0.12
May	73	9183	12	0.16	0.13
		1963 - 64			
September	60	14665	2694	44.90	18.37
October	65	21571	5260	80.93	24.38
November	54	8553	2082	38.56	24.34
December	79	10387	645	8.17	6.21
January	108	13857	1605	14.86	11.58
February	93	9456	568	6.11	6.01
March	115	16932	1089	9.47	6.43

total fish catch or 26.15 kg per trawling hour in February, 1963. Steady catches of 4.80–5.02% were obtained in October–December, but in other months the catches were poor. During the next season (1963–64) the catches showed considerable improvement over those of the preceding year. They were fairly steady (18.37–24.38%) during September – November. The highest catch of 80.93 kg per hour was recorded in October. During this fishing season the minimum percentage of prawns was 6.01 caught in February and peak period of fishing lasted from September to November.

Like some other prawn fishing centres of the west coast of India, the newly located fishery of the Gujarat coast was mainly contributed by the penaeid prawns. *M. affinis* and *P. stylifera* were the main species while *P. indicus* and *P. monodon* were landed in relatively small quantities throughout the season. Other species represented in the catches were *M. monoceros, P. sculptilis, Selenocera indicus* and *Acetes* sp.

Fig I shows the composition of four main species of prawns during the two fishing seasons. The rest were kept as miscellaneous. From the histogram it is clear that *M. affinis* formed the main bulk of the catches. The percentage composition

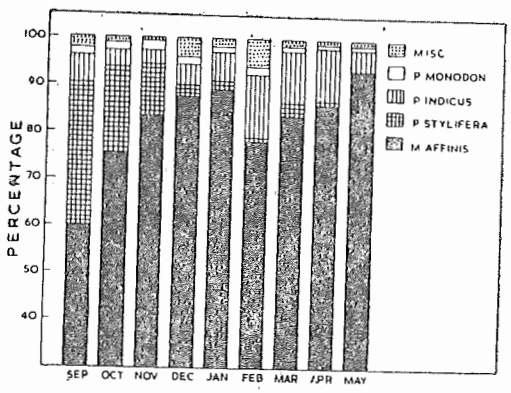

Fig 1. Species composition of prawns (percentage determined by weight) during the fishing seasons: 1962–63 and 63–64.

of this species increased steadily from September to January. There was a slight decline in February followed by a progressive increase subsequently from March to May, a trend which is more or less similar to that observed in Bombay (Mohamed, 1967). It is interesting to note that *P. stylifera* which constituted nearly 30% of the total prawn catch in September gradually diminished as the proportion of *M. affinis* increased and in May when *M. affinis* was maximum, no *P. stylifera* were seen in the catches. *P. indicus* contributed 11–12.5% during February–April which was the peak period of landing of this species. The percentage of *P. monodon* fluctuated between 0.5 and 1.9.

Table II shows the length ranges of four species of prawns in relation to their weight, from which it is clear that the size ranges of prawns caught in the trawl net are commercially exploitable.

TABLE II LENGTH RANGE OF FOUR SPECIES OF PRAWNS IN RELATION TO THEIR WEIGHT

Species	Length range in mm	Number per kg.
M. aflinis	50–180	48– 90
P. itylifera	75–110	145–175
P. Indicus	170–220	24–40
P. monodon	200–300	7–15

Observations on the biology of M. affinis

The availability of *M. affinis* in sufficient quantities throughout the fishing season enabled the author to make some observations on its biology. Length frequency curves of this species are given in Fig 2 which clearly shows that in the beginning of the fishing season i. e. in September – October the fishery is mainly contributed by a single group of small sized prawns of a length range 60–120 mm with the modal length at 96–100 mm. Curves for subsequent months show a progression of this mode and also the appearance of several additional modes.

During November - January a large proportion of the catch is comprised of medium sized specimens of modal size ranging between 106-110 mm and 126-130 mm. The small sized prawns which form a distinct group during the early part of the season gradually decrease in numbers and after February they are not readily available in the catches. From February to April, the well defined mode remains at 126-130 mm. A decline in the large sized prawns was noticeable in May when the modal length appeared at about 116-120 mm.

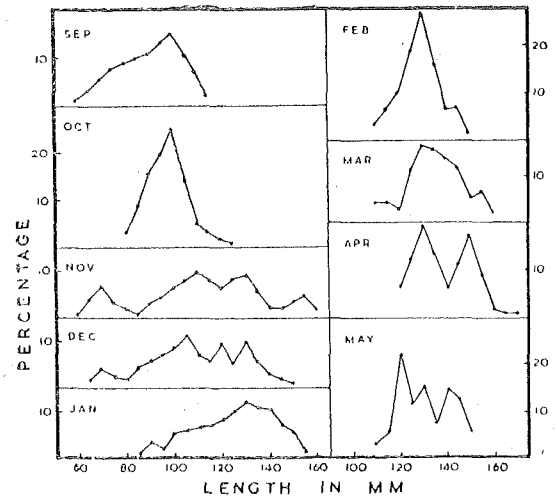

Fig 2. Length frequency of *M. affinis* at Veraval during 1962-64.

From these data, it is not possible to estimate the various age groups contributing to the fishery, but from the progression of major modes in the length frequency curves there is some indication that the species grows at an average rate of about 6 mm per month during the period October - March. The total size frequency curve plotted for the season 1962-63 (Fig 3) shows two prominent modes at 96-100 mm and 126-130 mm. When compared to *M. monoceros*, a closely related species in which the growth rate has been studied (George, 1959), it appeared that the modes indicated in Fig 3 correspond to first and second year classes.

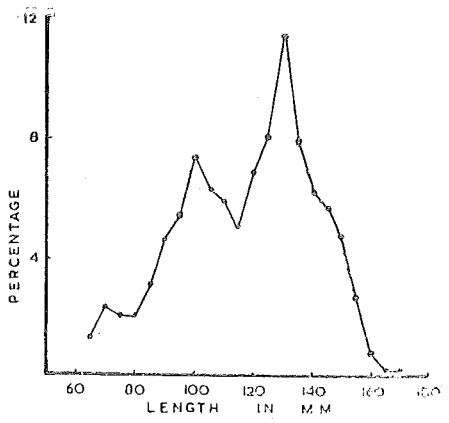

Fig 3. Total size frequency distribution of *M. affinis* during 1962-64.

If it is true, then the second year class seems to be recruited into the fishery from November onwards as has been observed in Cochin and Alleppey waters (George, 1961).

Maturity and Breeding

During the investigation it has been found that males of *M. affinis* attain maturity at a length of 115 mm and the females at 120 mm as has been determined by Menon (1967). Fig 4 gives the length frequency distribution of the two sexes. It can be seen from the figure that the growth rates of the two sexes seem to be

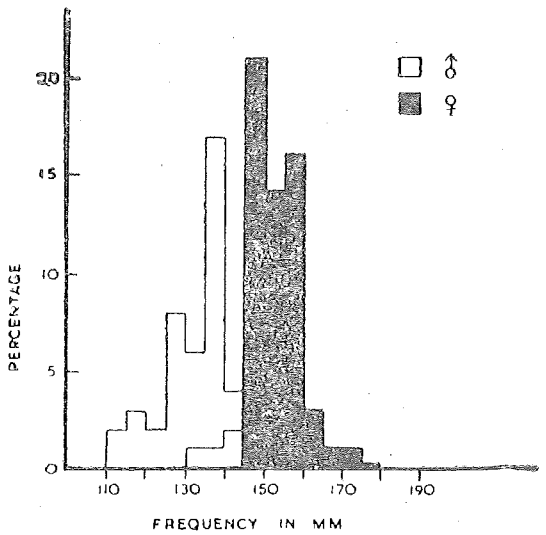

Fig 4. Length frequency distribution of the two sexes of *M. affinis* from 47-50 metres depth off Verval in April 1963.

different. It is interesting to note that males larger than 145 mm were not seen in the catches whereas the larger females of 180 mm were common. Sex ratio showed a preponderance of females over males both in the juvenile and adult groups. The difference was very conspicuous in the maturing and mature groups, especially during February–April when the females outnumbered the males by about 14%. This does not tally with the observations of George and Rao (1967) who found more or less evenly distributed sex-ratio in *M. affinis* in the trawl catches of Cochin where the species is intensely exploited for the past several years. The preponderence of one sex in the population might be due to the sexual difference in the growth rate as has been pointed out by Qasim (1966). However, in May the disparity in the sex ratio was not very significant. This may be because of the segregated migration of gravid females to some suitable sites for spawning as has been pointed out by Menon (1957). Since large number of ripe females and running males were seen in the catches in February–April, it seems that these are the main breeding months. This partly agrees with the breeding period determined by Shaikhmahmud and Tembe (1960). However the present data do not support the view that the species breeds continuously (Mohamed, 1967). In April 1963, a sample obtained from a depth 47–50 m off Veraval showed 95% of the specimens in fully mature condition. The size range of the females in this sample was 130–180 mm and that of the males 110–145 mm (Fig. 4). The concentration of such large sized and fully mature prawns indicates the possibility of their spawning somewhere around this locality.

Discussion

Earlier fishing surveys had shown that the trawling grounds off Saurashtra are one of the richest in the country for the exploitation of many commercial species such as sciaenids, polynemids, eels, catfishes, perches, pomfrets and sharks and rays. But the quantity of prawns generally obtained from these grounds during earlier surveys were not very substantial. Srivatsa (1953 *c*) recorded 0.039% of crustaceans in the catches of Japanese vessel "Taiyo Maru No 17" from Saurashtra waters. Results of the commercial bull trawling in various grounds off Bombay and Saurashtra reveal the lowest annual average catch (0.16%) of prawns from Veraval region (Kagwade, 1967). Prawns were not available in the traditional drift nets "Valli" and "Dhakkal" used by the local fishermen. From the foregoing account it becomes clear that the existence of rich prawn grounds off Saurashtra coast remained unknown, because of the lack of suitable gear. Considerable increase in the catch (6.01 – 24.38%) during the second year of the present survey using the modified shrimp gear suggests the need for further exploration of these grounds in order to assess the potential prawn resources fully.

It is important to point out that trawling along the mouths of some small rivers joining the sea, especially in the Veraval region, yielded relatively better catches of prawns than in other areas. The environmental peculiarities of these localities are yet to be investigated. The shallow mouths of these rivers, locally known as "Kharis" are estuarine in nature and have soft muddy substratum. These areas provide an ideal ground for the sustenance fishery of juvenile prawns especially during the monsoon months. The occurrence of a spawning stock of *M. affinis* in the deeper inshore areas and the presence of juveniles in the creeks and estuaries indicate the possibility for the existence of an independent stock of these prawns in this region. The catch

composition reveals that the present fishery is not related to the traditional prawn fishery of Gujarat, which is mainly contributed by *M. Kutchensis*.

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