

AN ASSESSMENT OF THE FISHERY RESOURCES FOR NON-PENAEID PRAWNS IN INDIA

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ABSTRACT

Prawns other than penaeids account for an average annual production of nearly 34 thousand tonnes, not including the production figures of brackish water palaemonid prawns from the various lakes and backwaters along the coastline. In the total marine prawn fishery of the different zones of the Indian coast the non-penaeids average to 47.9%. Nearly 90% of these catches come from the Maharashtra and Gujarat coast. The species which are most abundant are *Acetes indicus*, *Palaemon tenuipes*, *Palaemon styliferus* and *Hippolytina ensirostris*. The distribution of these and other species are given in detail and the magnitude of their fishery in different areas depicted. An estimate of the population of these prawns along the Maharashtra coast is made by the fishing success method in order to study the trend of present production and the rate of exploitation. Mention is made about the commercial potentialities of the recent finding of pandalid prawns in the deeper waters off Kerala.

INTRODUCTION

THE prawn fishery of the country has been receiving unprecedented attention during the past one decade due to the ever-increasing demand for prawns and prawn products in markets abroad, particularly in the United States of America. Statistics of world fisheries reveal that in total prawn landings India ranks second. The prawns of commerce in India are largely constituted by two groups, viz., penaeid prawns belonging to the family Penaeidae and the non-penaeid prawns belonging to other families like Palaemonidae, Hippolytidae and Sergestidae. The prawns of the latter group account for 47.9% of the total marine landings of the country, averaging about 37,000 tonnes each year. At a time when the fishery is ever on the increase and all possible measures being sought for maximum exploitation and utilisation of the products, an evaluation of the resources of the fishery is essential and that is attempted in the present report.

SPECIES COMPOSITION

In the marine fishery for non-penaeid prawns, a couple of species belonging to the families Palaemonidae, Hippolytidae and Sergestidae are important.

Palaemon (Namatopalaemon) tenuipes (Henderson)

The species occurs in coastal waters upto a depth of about 20 metres as well as in estuaries and brackish waters. It has a general distribution from Indian waters through Malaysia to New Zealand. In Indian region it is found to occur mostly in the northern areas of both the east and west coasts, where it contributes to good fishery. In the coastal waters of Bombay as well as in the Gangetic delta area the species is one of the most important commercial prawns. Different biological aspects of this species were studied by Rajyalakshmi (1966), Subrahmanyam (1966) and Kunju (1967). The species attains a maximum size of about 8 cm. in length.

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Palaemon (Exopalaemon) styliferus (H. Milne Edwards)

This has a distribution in shallow coastal waters and brackish water areas. General geographical distribution is apparently restricted to West Pakistan and Indian waters to Malay Archipelago. Along the coasts of India, as in *P. tenuipes* this species is also more common in the northern region of both the coasts. In the Gangetic delta area this is one of the most important commercial species growing to a maximum size of about 9 cm. in length. The fishery and biology of the species formed subjects of investigation by Kunju (1955 and 1967) and Rajyalakshmi (1966).

Hippolysmata ensirostris Kemp

It has a general distribution in waters of India, Ceylon, Burma and Sumatra. Along the Indian coasts, the species is present in most regions and represented in the fishery in small numbers. In Bombay (Kunju, 1967) and in the marine zone of the Godavary estuary there is fairly good fishery along with other non-penaeid prawns. Maximum length attained is about 8 cm.

Hippolysmata vittata Stimpson

Although not so important commercially as the previous species, it has a wider distribution extending from South Africa through Red Sea, Persian Gulf and Indian seas to East Indies and Japan. In the Indian coasts, the species is represented in small numbers along with the other species of the genus. It is a smaller species growing only to about 4 cm. in length.

Acetes indicus H. Milne Edwards

The sergestids are the real shrimps. *A. indicus* is a very important commercial shrimp in India. It has a general distribution from Indian seas through Mergui Archipelago and Gulf of Siam to Malaya and East Indies. In Indian seas it is most common in Bombay waters, where it contributes to a substantive portion of the prawn fishery (nearly 20%). On the west coast, it is common only in the northern region, while on the east coast, it is represented throughout the regions but not in such large quantities as in Bombay. Among the species of the genus, this is the largest, females reaching a maximum of 4 cm. in total length.

Acetes erythraeus Nobili

It has a general distribution from Red Sea through Bay of Bengal and Gulf of Siam to Malay Archipelago. In Indian waters, it is more common along the east coast and south-west coast, occurring in fairly good quantities in Bengal, Orissa and Madras coasts. In size it is smaller than *A. indicus*, females reaching only a length of about 3 cm.

TRENDS IN THE FISHERY OF DIFFERENT REGIONS

During the years 1958 to 1967 in a total marine prawn landings varying from 62,768 to 97,838 tonnes averaging 80,845 tonnes, non-penaeid prawns contribute from 23,685 to 55,987 tonnes averaging 36,798 tonnes with a percentage of 47.9. The average total landings of non-penaeid prawns in the different zones of the coast for the years 1958 to 1967 depicted in Fig. 1 show that the northern region of the west coast, namely Maharashtra and Gujarat coasts are the most productive areas as far as these prawns are concerned. The Maharashtra coast by far exceeds in the landings of these prawns when compared to other zones, so much so that on an average 32,006 tonnes (88.5%) of the total non-penaeid prawn landings from the entire coastline of India comes from this area. The main fishing gear employed in this region is the fixed bag net, locally known as 'dol' and 'Bokshi'. It is generally seen that along this coast the maximum catches are obtained in Bombay

area, the fishery decreasing in magnitude southward and northward of Bombay (Kunju, 1967). Although the fishery is active throughout the year except in the monsoon months, the peak seasons are April-May and October-November periods. *Palaemon tenuipes*, *Acetes indicus* and *Hippolyasmata ensirostris* in the order of abundance are the most important species represented in the fishery.

TABLE I

Monthly catch (kg) and effort of non-penaeid prawns in the Maharashtra coast

| Period | Catch C (t) | Cumulative catch K (t) | Effort e (t) | Catch per effort c (t) | Cumulative effort U (t) |
|---------------------------------------|----------------|------------------------------|-----------------|------------------------------|-------------------------------|
| A—From April, 1965 to September, 1965 | | | | | |
| 1965 April | 6996000 | 0 | 1509129 | 4.63 | 0 |
| May | 10591000 | 6996000 | 2967910 | 3.56 | 1509129 |
| June | 651000 | 1757000 | 151044 | 4.31 | 4477039 |
| July | 121000 | 18238000 | 164361 | 0.74 | 4628083 |
| August | 111000 | 18359000 | 153398 | 0.72 | 4792444 |
| September | 469000 | 18470000 | 136578 | 3.43 | 4945842 |
| B—From October, 1965 to March, 1966 | | | | | |
| 1965 October | 2859000 | 0 | 1497747 | 1.909 | 0 |
| November | 1817000 | 2859000 | 1190595 | 1.526 | 1497747 |
| December | 10154000 | 4676000 | 1828347 | 5.553 | 2688342 |
| January, 1966 | 2668000 | 14820000 | 903678 | 2.952 | 4516689 |
| February | 3056000 | 17488000 | 1163441 | 2.626 | 5420367 |
| March | 2162000 | 20544000 | 808253 | 2.675 | 6583808 |

P. tenuipes is the most abundant species with the maximum landings in April-May, contributing to the extent of more than 80% of the total prawn fishery in these months. Kunju (*op. cit.*) gives the average percentage composition of the species as 32.56. The modal sizes in the fishery varied from 41-45 mm. to 51-55 mm. *A. indicus*, the species next in abundance, contributes to 19.07%. The period during which this species is most abundant is from December to March-April. *H. ensirostris* has an average annual representation of 6.19% in the catches and it is more abundant in the latter half of the year. Other species like *Palaemon styliferus* and *Acetes erythraeus* are also represented in the catches in smaller quantities.

Out of the 11.5% of the landings from the rest of the coastline of the country, 7.4% is caught from the Gujarat coast. The main species contributing to the fishery here are *P. styliferus*, *P. tenuipes* and *H. ensirostris*. In the two species of *Palaemon*, the modal sizes varied from 36-40 mm. to 51-55 mm. while slightly bigger sizes are obtained in the case of *H. ensirostris*.

Along the coast of Mysore, the landings of non-penaeid prawns are almost nil, the average percentage landings being only 0.005, contributed by occasional representation of species like *A. indicus*.

Marine catches of these prawns along the Kerala coast is also very little, the percentage being only 0.5. The species encountered along with the penaeid prawn catches, occasionally are *P. styliferus* and *H. ensirostris*. The inshore regions of Madras and Pondicherry contribute to an average of 0.9% of the total non-penaeid prawn landings. Occasional landings of *A. erythraeus* in fairly good quantities account for these catches. *Hippolysmata* spp. are also caught sometimes.

The maximum percentage catches of non-penaeid prawns along the east coast is from the coastal zone of Andhra Pradesh, the average percentage contribution being 2.6, constituted chiefly by *A. erythraeus*, *Palaemon* spp. and *Hippolysmata* spp. Most of the catches are in June-August period.

In Bengal almost all the landings of non-penaeid prawns mainly constituted by *P. styliferus*, *P. tenuipes* and *Macrobrachium* spp. are from the Hooghly estuarine areas. From the strictly marine zone the landings are almost nil, the average percentage contribution for the past 10 years being only 0.2, made up of mainly *Palaemon* spp.

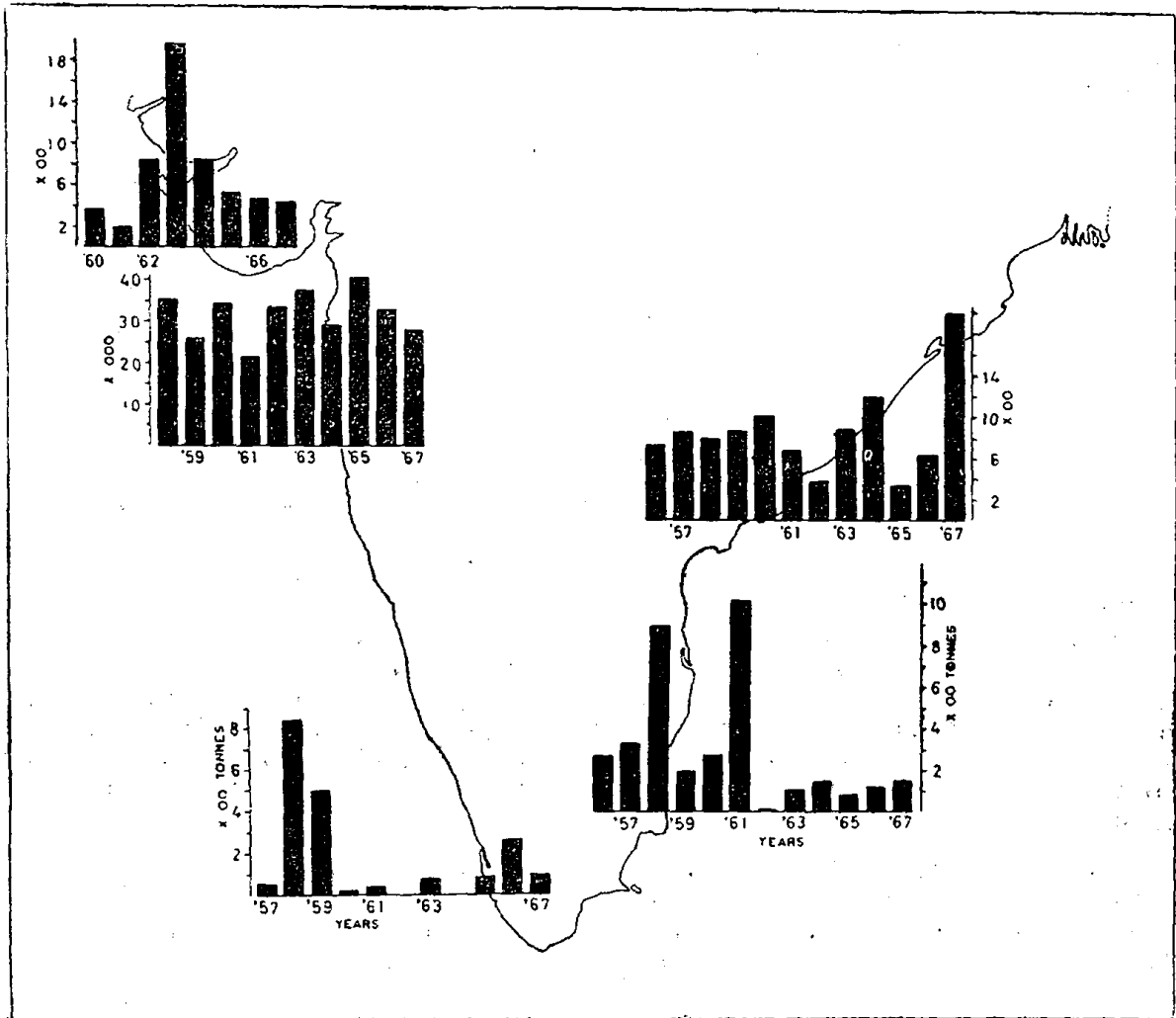


FIG. 1. Annual marine landings of non-penaeid prawns in different zones of the Indian coast.

ESTIMATION OF POPULATION

Maharashtra coast being the most important non-penaeid prawn producing area, an estimation of the population of this region was attempted by the fishing success method. This method is applicable only when a population is fished heavily enough for the animals removed to reduce significantly the catch per effort and when recruitment during the season by immigration is not very significant. Accordingly, seasons in the fishery of this region which satisfied these conditions were selected for the estimation of the initial populations. The stock present is assumed to be proportional to the catch per effort and hence the relation between the accumulated catch upto any time (k_t) and the catch per effort at the same time (C_t) is a straight line and permits an estimate of the initial population $P_{(0)}$. Data of the prawn landings during April 1965 to September 1965 and October 1965 to March 1966 concerning monthly catch $C_{(t)}$, effort $e_{(t)}$, catch per unit effort $U_{(t)}$, cumulative catch $k_{(t)}$ and cumulative effort $U_{(t)}$ are tabulated in Table I. In short, the method consists of plotting catch per unit effort against accumulated catch and determining the intercept $kP_{(0)}$ on the Y-axis. The estimation of the total initial population $P_{(0)}$ is obtained by dividing the intercept value by k . Instead of getting a line to the plot of $C_{(t)}$ against $U_{(t)}$ a line was fitted to the logarithmised data as:

$$\text{Log } C_{(t)} = \text{Log } kP_{(0)} - b U_{(t)}$$

The least square estimate of b and $\log kP_{(0)}$ were obtained for the period of the first six months as:

$$b = -0.000000096 \text{ and } \log kP_{(0)} = 0.6776.$$

$$\therefore kP_{(0)} = \text{antilog of } 0.6776 = 4.76.$$

Hence the initial population

$$\begin{aligned} P_{(0)} &= 4.76/0.00000022 \\ &= 21600.000 \text{ tonnes.} \end{aligned}$$

The least square estimate of b and $\log kP_{(0)}$ for the period October 1965 to March 1966 was

$$b = 0.000000024 \text{ and } \log kP_{(0)} = 0.5037$$

$$\therefore kP_{(0)} = \text{antilog of } 0.5037 = 3.189.$$

Hence the initial population

$$\begin{aligned} P_{(0)} &= 3.189/0.000000055 \\ &= 58000 \text{ tonnes.} \end{aligned}$$

Considering the two consecutive periods together, the total population available in the area during the year, therefore, is 79600 tonnes. The total estimated catch from the zone during the particular period of 12 months is 41,650 tonnes. From this, the rate of exploitation works out to 52.3%. Concerning the other zones, the catches of non-penaeid prawns in those areas are so limited that detailed estimation of resources was not attempted.

DISCUSSION

Apart from the Maharashtra coast, the resources of non-penaeid prawns of the country are not fully exploited and there is ample scope for increasing the production further. But along with the increased exploitation and increased catches proper methods of utilisation of small-sized prawns

also should be evolved, the prawns belonging to this group being too small for freezing. It is found that even at the present level of exploitation along the Maharashtra State, some of the small-sized shrimps, especially *A. indicus* which are landed in large quantities on particular days, are not completely utilised for human consumption. Therefore, before thinking in terms of increasing the catches it would be beneficial to conduct investigations to evolve proper processing techniques in order to make suitable products of consumer preferences, so that, the quantities which are caught are utilised to the maximum extent possible. In other areas, the total catches being very little, these prawns are always utilised mingled with the smaller sizes of the penaeid prawns.

It may be mentioned here about the recent findings of the presence of fairly good concentrations of pandalid prawns like *Parapandalus spinipes*, *Plasionika martia*, *Plesionika ensis*, *Heterocarpus woodmasoni* and *Heterocarpus gibbosus* along with some other penaeid prawns in the deeper waters of 200–300 metres off Kerala coast (George and Rao, 1966; Menon, 1968). In the context of increasing demand for prawns, with the private enterprises taking to deeper water trawling operations, it is possible that these prawn stocks also be eventually exploited commercially and would add to the non-penaeid prawn resources of the country.

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