POSTLARVAL ABUNDANCE AS A POSSIBLE INDEX OF FISHING SUCCESS IN THE PRAWN *METAPENAEUS DOBSONI* (MIERS)

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The penaeid prawn *Metapenaeus dobsoni* (locally known as *poovaalan* in the bigger sizes and *thelly* in the smaller sizes) spawns in the inshore waters of the Southwest coast of India (Menon 1951) almost throughout the year with the peak breeding season between June, July and November (Menon 1955 and George 1962). The eggs hatch and through different stages quickly transform to postlarvae which are noticed to enter in very large numbers into the various estuaries and backwaters along the coast and to use these waters extensively as nursery grounds during their juvenile growth period. The very lucrative paddy field prawn fishery and the backwater fishery for prawns of Cochin and other areas of the coast is singularly dependent on this habit of the prawn. After a growth of about 9 or 10 months these prawns return to the coastal waters where they are henceforth exploited by both the indigenous fishing as well as the mechanised fishing operations.

A study of the recruitment of these postlarvae along with those of the other species into the backwaters of Cochin was begun in 1956 and followed through 1960 with a view to determine whether or not a reliable measure of postlarval abundance might serve as any index with which the magnitude of the commercial fisheries could be predicted. Weekly counts of all the penaeid postlarvae entering the backwater have been obtained thus, though discussion in the present report is limited to *M. dobsoni*. The methods of collection and estimation of the numbers of postlarvae in the samples of plankton and the station of collection are the same as described by George (1958 & 1962). A total of 230 weekly samples of plankton were analysed during the 5 years. The total number of postlarvae in the samples and the average number per sample are shown in Table I.

TABLE I.

Showing the total number in monthly samples and number per sample of postlarvae in the backwater plankton at Ernakulam, 1956-60.

	Year	Months												
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Total no. of postlarvae in the samples	1956	236	60	472	1044	120	408	735	484	1280	96	3424	39	8398
	1957	1175	220	108	52	1044	76	1015	120	52	1800	972	312	6946
	1958	135	496	304	405	260	3716	2752	1821	207	176	280	484	11036
	1959	249	909	800	712	580	1340	560	1100	1420	676	164	474	8984
	1960	220	352	364	369	750	453	90	921	104	192	600	530	4945

TABLE I—*Contd.*

	Year	Months												
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Average
No. of post-larvae per tow . .	1956	59	15	118	348	24	102	245	121	320	32	856	13	188
	1957	235	55	27	13	251	19	203	40	13	450	243	104	138
	1958	27	124	76	135	65	929	688	607	69	44	70	121	246
	1959	83	303	400	178	145	335	140	275	355	169	41	158	215
	1960	110	88	91	123	250	153	45	307	26	48	120	265	136

Relationship of the abundance of postlarvae with the fishery.

Menon (1954 & 1955) and George (1959) have traced the growth of *M. dobsoni* and *M. monoceros* respectively in the backwaters of Cochin. According to them the backwater commercial fishery is supported by the 0 year class of prawns *i.e* prawns of less than one year growth. The newly spawned prawns begin to appear in the backwater commercial fishery within about 3 to 4 months growth. Thus postlarvae entering the backwater by June, July months, which is the peak spawning period, begin to be represented in the paddy field prawn fishery catches towards the beginning of the season for the same which is November. From this it follows that the number of postlarvae which are recruited into the backwaters in a particular year will be reflected in the backwater fishery, the major portion of which being contributed by the species *M. dobsoni*, in the same year and by following the entry of postlarvae into the backwaters it may be possible to get an idea of the magnitude of the dependent fishery.

Similarly, the catches of the inshore area of the locality, especially in the case of the species *M. dobsoni* (Menon 1957), are contributed mostly by the lst year classes. According to Menon (1955 and 1957) and George (1959) *M. dobsoni* and *M. monoceros* migrate back to the sea after growth in the backwater for about 9 or 10 months. This one year group is then represented in the inshore catches. So the quantity of the postlarvae in the backwaters in a particular year will be reflected in the fishery of the inshore area in the next year only. Analysis of the catches of the shrimp trawlers of the Indo Norwegian Project and Deep Sea Fishing Station operating from Cochin also shows that in the case of the species *M. dobsoni* when the catch is at the highest it is the lst year class which is predominant (George et al. under publication). So the total postlarvae of one particular year is likely to have a definite relationship with the magnitude of the fishery next year. Hence it is suggested that the abundance of the postlarvae entering the backwaters is a possible index of the future fishery of the inshore and offshore waters of the area.

Unfortunately there is no reliable data regarding the total landings of prawns from the backwater for any of the years for which data for postlarval abundance are available. However, data for the total catches of prawns (mostly contributed by small-sized *M. dobsoni*) of a paddy field of 8 acres and 24 cents, situated north of Cochin bar mouth, is available and this may be taken as an indicator to find out the relationship with the total backwater fishery. The number of postlarvae per plankton sample and the catch per acre of the field

are shown in Table II and fig. 1. A study of the figure and table will show that n 1957 the number of postlarvae entering the backwater is very low. This is reflected in the paddy field catches of the same year, the corresponding catch per acre figure being very low. Similarly there is a rise in number of postlarvae in 1958 and it is natural to expect a higher catch in that year as borne out by the catch figures. Again in 1960 the postlarval index is at the lowest and from this it could be predicted that the fishing will be poor in the year and that is found to be correct from the data presented in the table.

TABLE II

Showing the number of postlarvae of M. dobsoni *per sample and the corresponding catch indices for* 1956-60

Year	No. of postlarvae of *M. dobsoni* per sample	Catch per acre of prawns in 8 acre 24 cent field in kg.	Catch per hour of prawns in the inshore fishery at Narakkal in kg.	Catch per hour of prawns in the shrimp trawler catches at Cochin in kg.
1956 . . .	188	559	245·8	..
1957 . . .	138	491	110·2	59·5
1958 . . .	246	583	85·4	45·2
1959 . . .	215	578	218·5	51·8
1960 . . .	136	488	152·3	43·0
1961 . . .	..	578	98·3	43·7

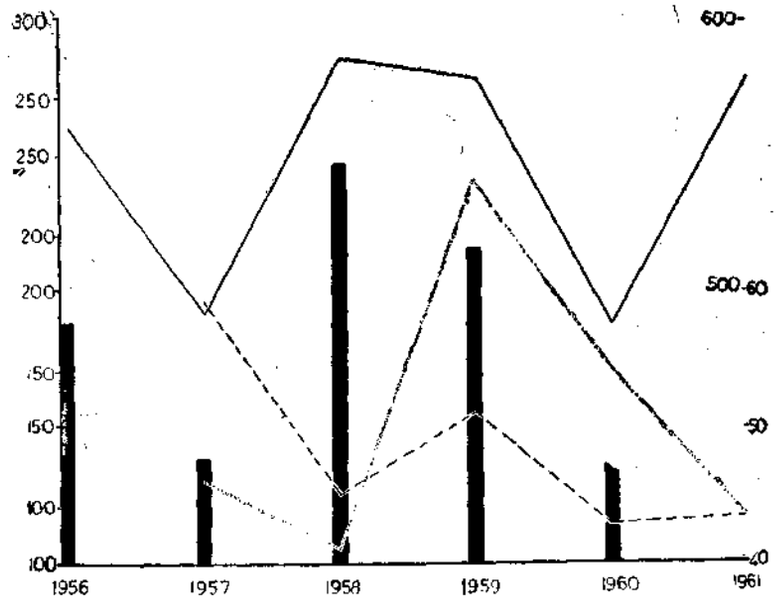

FIG. 1. The number of postlarval of *M. dobsoni* and prawn catch indices for 1956-60.
——— catch per acre of prawn field.
– – – – catch per hour in the inshore fishery.
..... catch per hour in the trawler catches.

In the inshore catches also this trend is reflected. The indices of postlarval abundance and inshore catches at Narakkal shown in Table II and Fig. 1 indicates that consequent to the lower number of postlarvae in 1957 the catch per hour in the inshore catches is at the lowest in 1958. In 1958 the postlarval number is very high and the catch per hour at Narakkal shows a corresponding increase in 1959. So it was tempting to predict that consequent to the low number of postlarvae in 1960 the fishery of the inshore area will be poor in 1961 and the landings show this to be correct. The data for the catches of the shrimp trawling vessels also show this clearly. The lower number of postlarvae per sample in 1957 is reflected in the catch per hour of prawns in the trawler catches in 1958. The increase in the postlarval abundance in the next year is similarly reflected in the increased catch per hour figure for 1959.

Thus a relationship is noticed between the entry of postlarvae into the backwaters during a particular year and the following fishery of the area. Baxter (1962) making a similar study on the brown shrimp *Penaeus aztecus* of the Texas coast of the Gulf of Mexico reports that "it is apparent that the postlarval index forecasts quite well the relative magnitude of subsequent juvenile abundance in estuarine areas, as well as the ultimate quantity of commercial-size shrimp available offshore." Of course correlating the strength of postlarvae entering the backwaters and the subsequent fishery has to be treated with caution as several other factors like natural mortality of the postlarvae and juveniles, predatory mortality, fishing mortality etc. have also to be taken into consideration. However, the relationship between the postlarval abundance and the fishery presented in this report is too striking that it is tempting to suggest that this factor could probably be made use of as an index in predicting the fishery, although further work is highly necessary to establish its reliability.

SUMMARY

In order to determine the possibility of using the index of postlarval abundance of the penaeid prawn *Metapenaeus dobsoni* in the backwater plankton, in predicting the future commercial prawn fishery of the area, 5 years' postlarvae sampling in Ernakulam channel are correlated with measures of abundance of juveniles in the backwater fishery and adults in the marine fishery of the coast. It is apparent that the success or failure of the fishery in a year could be foreseen in the magnitude of postlarval recruitment into the backwaters, although further work is needed to establish its reliability.

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