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THE MARINE FISHERIES INFORMATION SERVICE: Technical and Extension Series envisages the rapid dissemination of information on marine and brackish water fishery resources and allied data available with the Fishery Data Centre and the Research Divisions of the Institute, results of proven researches for transfer of technology to the fish farmers and industry and of other relevant information needed for Research and Development efforts in the marine fisheries sector.

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Cover photo: *Penaeus indicus* (Naran chemmeen)

SYNOPSIS OF MARINE PRAWN FISHERY OF INDIA – 1978*

Data on the marine prawn fishery for the first three quarters of 1978 were presented in earlier issues of this publication. Hence the details of the fishery for the last quarter of the year is dealt with first and then a general picture of the fishery for the whole year presented in the following pages. The total catch figures for the previous quarters given earlier were provisional, whereas the final figures are used for the study of the fishery of the last quarter as well as the annual picture.

Prawn fishery for the fourth quarter of 1978

Total catch: The monthwise and statewise details of catch of prawns for the quarter are shown in figure 1 and tables 1 and 2. The total catch of prawns during the quarter was 49,208 tonnes which is 16,770 t. more than that of the same quarter of previous year. The increase is mostly brought about by the increased landings from Maharashtra (Table 3), contributed by rise in catch of both penaeid and non-penaeid prawns, especially the former (Table 4). Out of the total of the 49,208 t. of prawn catch of the quarter, 31,101 t. were penaeid prawns and the rest non-penaeids.

Table 1. *Prawn landings in different maritime states from October to December* 1978

Maritime States	Prawn catch in tonnes			
	October	November	December	Total for IV Qr.
Gujarat (excluding Kutch)	2,034	1,051	4,091	7.176
Kutch	—	—	—	329
Maharashtra	11,997	8,203	13,406	33,606
Goa	24	220	392	636
Karnataka	4	148	444	596
Kerala	107	287	604	998
Tamil Nadu	1,166	463	685	2,314
Pondicherry	6	2	17	25
Andhra Pradesh	1,121	526	154	1,801
Orissa	325	348	110	783
West Bengal	4	128	812	944
TOTAL	16,788	11,376	20,715	49,208
Monthwise percentage	34.1	23.1	42.1	

During the quarter 42.1% of the catch was in December, more than half of the whole quantity being landed in Maharashtra. In October and November the percentages were 34.1 and 23.1 respectively and in these months also the maximum quantities were landed in Maharashtra. In this state the maximum catch was in December and the minimum in November. In Kerala the catch in this quarter was very poor (998 t.) compared to 27,489 t. of the previous quarter. The poor quantity of 107 t. landed in October steadily increased to 604 t. in December. Both Tamil Nadu and Andhra Pradesh recorded the highest catch in October, showing a decline in the later months of the quarter. The catch in Karnataka which was only 4 t. in October increased to 444 t. in December.

Out of the total catch of the quarter, 33,606 t. (68.3%) was landed in Maharashtra state. Gujarat contributed to 15,3% (7,505 t.). Kerala state's contribution to the total catch of this quarter was very poor, being only 2.0%, unlike in previous quarters. Tamil Nadu and Andhra Pradesh contributed to 4.7 and 3.6% respectively.

Gear-wise analysis of data showed that about 70% of the catch was obtained by indigenous gears, predominantly by those operated in the north west coast. The catch contribution by shrimp trawlers (30%) declined by about 22,000 t. over that of the previous quarter, despite a general revival of trawl net fishing along the coasts of Gujarat, Goa, Karnataka and Orissa after the end of the southwest monsoon. This was mainly due to the reduced landings from Kerala, Tamil Nadu and Andhra Pradesh (Fig. 2). Among the total landings of prawns caught by shrimp trawlers, Maharashtra contributed 50.5% followed by Gujarat (14.0%), Tamil Nadu (11.1%), Andhra Pradesh (6.1%), Kerala (5.9%), Orissa (Paradweep, 4.9%), Karnataka (3.8%) and Goa (3.7%).

*Prepared by the members of Crustacean Fishery Resources team.

Species composition and other biological aspects at selected centres

Cochin (Fig. 3)

The marine prawn fishery declined considerably both at Cochin as well as at Neendakara during the last quarter of 1978 with a total catch of 684.4 t. of prawns (Cochin and Neendakara combined) as against the total catch of 23,169.0 t. of the previous quarter. The maximum catches were 203.1 t. in December at Cochin and 244.0 t. in November at Neendakara. The catch rates per unit of effort of 5.8 kg of November and 10.0 kg of December at Cochin showed an improvement over the rates of 4.8 kg of November and 3.3 kg of December at Neendakara. *M. dobsoni* (49.6%) and *P. stylifera* (44.2%) were the dominating species in the catch. In case of *M. dobsoni* sizes ranged between 56–85 mm in males and 56–105 mm in females. With regard to *P. stylifera* in males length varied between 61–95 mm and in females within 61–115 mm.

Calicut (Fig. 3)

The post-monsoon prawn fishery was a failure at Calicut during October and November with nil catch. However, slight improvement has been recorded in December with an estimated total catch of 31.5 t. and catch per unit of effort of 57.0 kg. *M. dobsoni*, *P. indicus* and *P. stylifera* were the dominant species in the catch in percentages of 29.9, 28.8 and 28.6 respectively. In the case of *M. dobsoni* sizes ranged between 71-110 mm with modes at 83 mm for males and 98 mm for females. *P. indicus* occurred in a size range of 115–185 mm and *P. stylifera* in 71–120 mm with modes at 173 mm in males and 148 mm in females of the former and 83 mm and 103 mm in the males and females of the latter species.

Mangalore (Fig. 4)

Trawl fishing was relatively less active than during the premonsoon period and the catches showed a progressive increase from 0.25 t. in October to 88.1 t. in December. The catch rate, however, was the highest in November. Penaeid prawns chiefly represented by *M. dobsoni* (62–96%) and *P. stylifera* (3–16%) supported the major fishery. In December, fairly good quantities of *M. affinis* (12%) and *M. monoceros* (9%) also occurred in the catches. *P. indicus* was caught in meagre quantities throughout this quarter. The major size groups exploited were 66–115 mm for *M. dobsoni* and 66–75 mm in November and 81–105 mm in December for *P. stylifera*. While the maximum number of mature females of *P. indicus* was recorded in October, the same for *M. dobsoni* and *P. stylifera* was observed in November and December respectively.

Table 2. *Statewise penaeid and non-penaeid prawn catch from October to December* 1978

Maritime States	Landings in tonnes							
	October		November		December		Total for IV Qr.	
	Penaeid	Non-penaeid	Penaeid	Non-penaeid	Penaeid	Non-penaeid	Penaeid	Non-penaeid
Gujarat (excluding Kutch)	1,697	337	830	221	2,476	1,615	5,003	2,173
Kutch	—	—	—	—	—	—	319	10
Maharashtra	5,751	6,246	4,455	3,748	8,598	4,808	18,804	14,802
Goa	24	—	220	—	366	26	610	26
Karnataka	4	—	148	—	444	—	596	—
Kerala	107	—	287	—	604	—	998	—
Tamil Nadu	1,165	1	300	163	672	13	2,137	177
Pondicherry	6	—	2	—	15	2	23	2
Andhra Pradesh	919	202	374	152	127	27	1,420	381
Orissa	325	—	348	—	110	—	783	—
West Bengal	4	—	26	102	378	434	408	536
TOTAL	10,002	6,786	6,990	4,386	13,790	6,925	31,101	18,107
Month-wise percentage	32.2	37.5	22.5	24.2	44.3	38.2		

Karwar (Fig. 4)

The trend of fishery was more or less the same as observed at Mangalore. After the monsoon season was over, the shrimp trawling commenced in October and the catches steadily improved reaching the maximum in December (72.3 t.). The catches were exclusively composed of penaeid prawns with *M. dobsoni* (60–80%) and *M. affinis* (18-40%) as the major constituent species. *P. merguiensis* formed a sizeable portion of the catch during December. The dominant size groups in the fishery were 66–80 mm for *M. dobsoni* and 91–110 mm for *M. affinis* in November, which progressed to 71–90 mm and 106–120 mm for the two species respectively in December.

Bombay (Fig. 5)

While the penaeid prawn fishery of this centre was moderate during this quarter, the non-penaeid prawn landings (1719 t.) were exceptionally good when compared with the previous quarter's landings recorded at Sassoon Docks and Versova. This was mainly due to the heavy catches of *Acetes indicus* in 'dol' nets (93-95%). The peak landings were observed during October at Sassoon Docks and December at Versova. *Hippolysmata ensirostris* and *Palaemon tenuipes* were the other species that contributed to the fishery, the former being more common than the latter. Over 23% of the females of *P. tenuipes* and 31% of *H. ensirostris* were found to be in berried condition in October.

Veraval (Fig. 5)

The trawl fishing for prawns, which was totally suspended during the previous quarter on account of monsoon weather, was fairly active at this centre and registered a total harvest of 839 t. with peak landings during November. This production was 27% less than that of the corresponding period of the previous year.

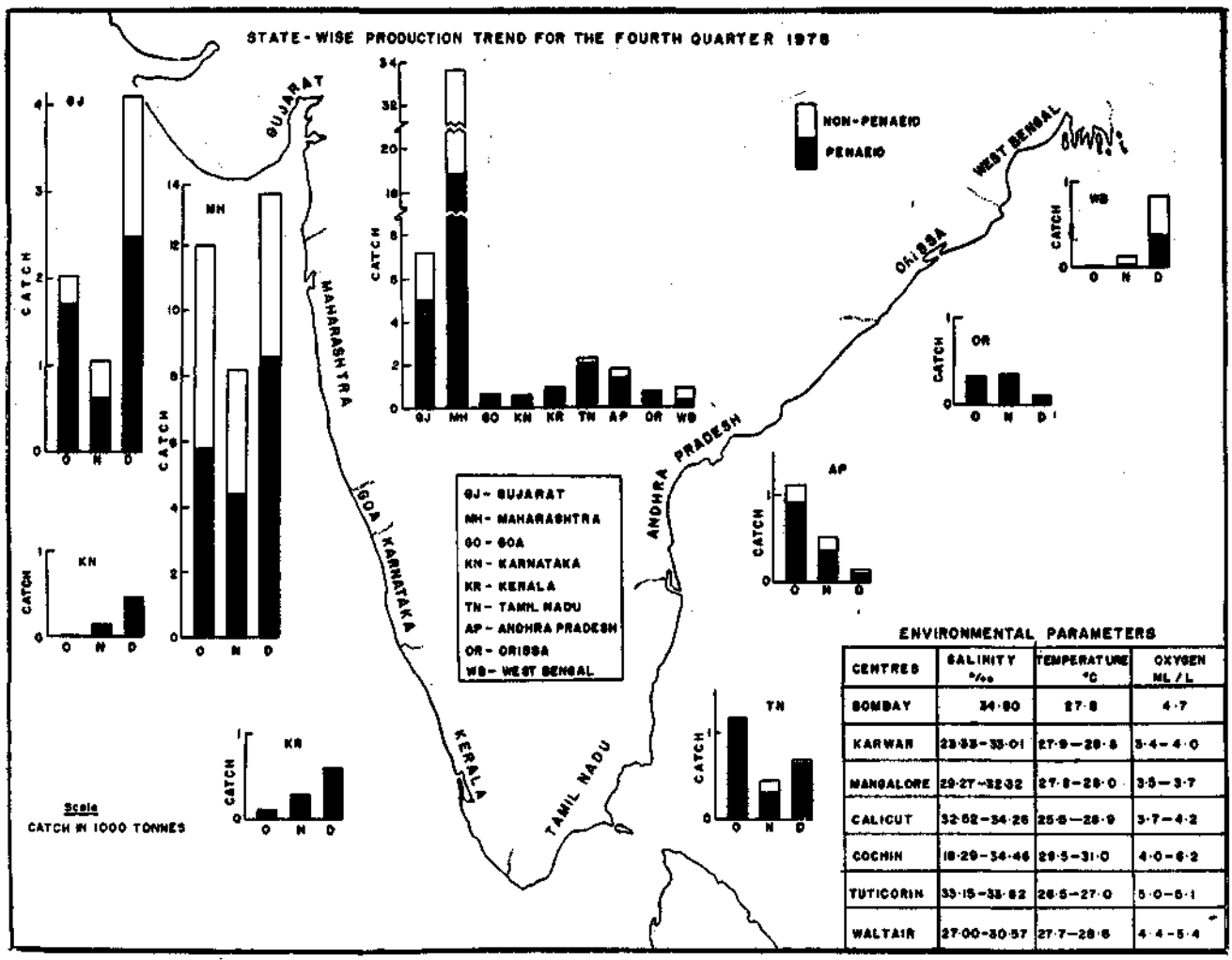


Fig. 1. Penaeid and non-penaeid prawn landings and environmental parameters of the sea in different maritime states during October–December 1978.

Nearly 85% of the catch was contributed by penaeid prawns and the rest by non-penaeids. *Parapenaeopsis stylifera* in the size range 70-154 mm dominated in the fishery. The major size groups of this species were 85–114 mm in October and November and 105–109 mm in December.

Tuticorin (Fig. 6)

Although prawn landing by trawlers was of lesser magnitude than that of the previous quarter, it was better during the year under report than that of the same period of the previous year. The major species represented were *P. indicus* and *P. semisulcatus*. There was a declining trend in the catch of *P. indicus* from October to November. The dominant size in *P. indicus* was higher (173–198 mm) in October. In *P. semisulcatus* the dominant size showed a decrease from October (143–168 mm) to December (133–178 mm). The percentages of mature females in the samples of *P. semisulcatus* were 30 in October, 8.9 in November and 33.3 in December. About 32.9% of the females of *P. indicus* were mature in October.

Mandapam (Fig. 6)

The prawn catches increased from 13.7 t. in October to 46.6 t. in December. During October-November the entire catch consisted of *P. semisulcatus*, although in December small quantities of *P. indicus* and *P. merguiensis* were also landed. The catch per unit effort also showed an increasing trend from 9.4 kg in October to 32.2 kg. in December. The dominant sizes in *P. semisulcatus* remained more or less same during the three months of the quarter (118–138; 113–138 and 113–128 mm respectively). In October 35.7% of the females were mature while the percentage of mature females were 28 in November and 2.4 in December.

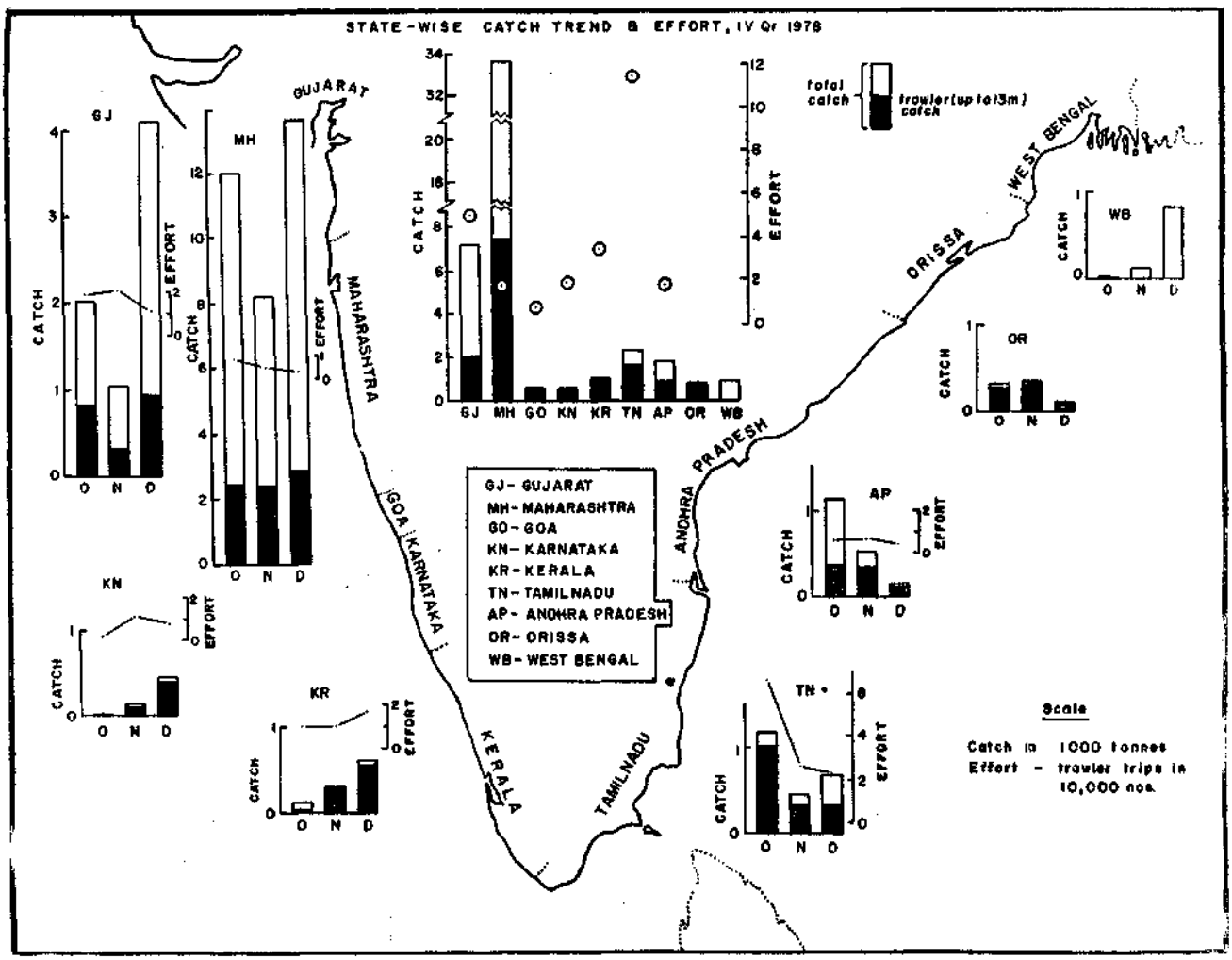


Fig. 2. Prawn landings by commercial shrimp trawlers in relation to the total prawn catch and the fishing effort during October–December 1978.

Madras (Fig. 6)

Prawn landings at Madras was poorer (49.6 t.) during this quarter than those of the previous quarter (87.8 t.) and the corresponding quarter of previous year (74.5 t.). The species which contributed to the fishery were *M. dobsoni, P. indicus, P. monodon, P. semisulcatus* and *M. monoceros* in the order of abundance. *P. indicus* dominated only in November.

Table 3. *Statewise prawn landings and percentage for the fourth quarter of* 1977 *and* 1978

Maritime states	Prawn landings in tonnes		Percentage	
	1977	1978	1977	1978
Gujarat	4,726	7,505	14.6	15.3
Maharashtra	15,401	33,606	47.5	68.3
Goa	662	636	2.0	1.3
Karnataka	862	596	2.6	1.2
Kerala	4,370	998	13.5	2.0
Tamil Nadu	3,762	2,314	11.6	4.7
Pondicherry	17	25	0.1	0.1
Andhra Pradesh	2,273	1,801	7.0	3.6
Orissa	112	783	0.3	1.6
West Bengal	253	944	0.8	1.9
TOTAL	32,438	49,208	100.0	100.0

Kakinada (Fig. 7)

During the quarter prawn fishery was fairly good as compared to the previous quarter with an estimated total catch of 312.2 t. November recorded the maximum catch of 173.3 t. The rates of catch per unit of effort ranged between 5.4 kg of December and 9.1 kg of November. *M. brevicornis* was the dominant species in October forming nearly 27.2% in the total catch with size groups ranging between 45–179 mm and with modes at 85–94 mm and 100–119 mm groups. *Parapenaeopsis* spp. were the next in order of abundance in the catch forming nearly 16,18 and 20 per cents for the months of October, November and December respectively. Non-penaeid prawns accounted for a total catch of 224.4 t. showing an improvement over the total catch of previous quarter.

Waltair (Fig. 7)

The total catch of 181.3 t. of the quarter indicated a declining trend in the prawn fishery in this region as compared to the total catch of 292.2 t. of the previous quarter. The rate of catch per unit of effort was highest in November at 5.5 kg, 1.6 kg in October and 3.0 kg in December. *M. monoceros* dominated in the catch throughout the period with an increasing trend in the total catch towards the end of the quarter with percentages of 39.5 in October, 46.0 in November and 66.4 in December. The maximum catch of 113.1 t. was recorded in November when about 32.5% of the toal catch was *P. indicus.*

Table 4. *Statewise penaeid and non-penaeid prawn landings and their percentage for the fourth quarter of* 1977 *and* 1978

Maritime States	Landings in tonnes and percentage							
	1977				1978			
	Penaeid	%	Non-penaeid	%	Penaeid	%	Non-penaeid	%
Gujarat	3,866	18.9	860	7.2	5,322	17.1	2,183	12.1
Maharashtra	6,010	29.4	9,391	78.5	18,804	60.4	14,802	81.7
Goa	638	3.1	24	0.2	610	2.0	26	0.1
Karnataka	862	4.2	—	—	596	1.9	—	—
Kerala	4,370	21.3	—	—	998	3.2	—	—
Tamil Nadu	3,751	18.3	11	0.1	2,137	6.9	177	1.0
Pondicherry	17	0.1	—	—	23	0.1	2	—
Andhra Pradesh	692	3.4	1,581	13.2	1,420	4.6	381	2.1
Orissa	103	0.5	9	0.1	783	2.5	—	—
West Bengal	168	0.8	85	0.7	408	1.3	536	3.0
TOTAL	20,477	100.0	11,961	100.0	31,101	100.0	18,107	100.0

Puri (Fig. 7)

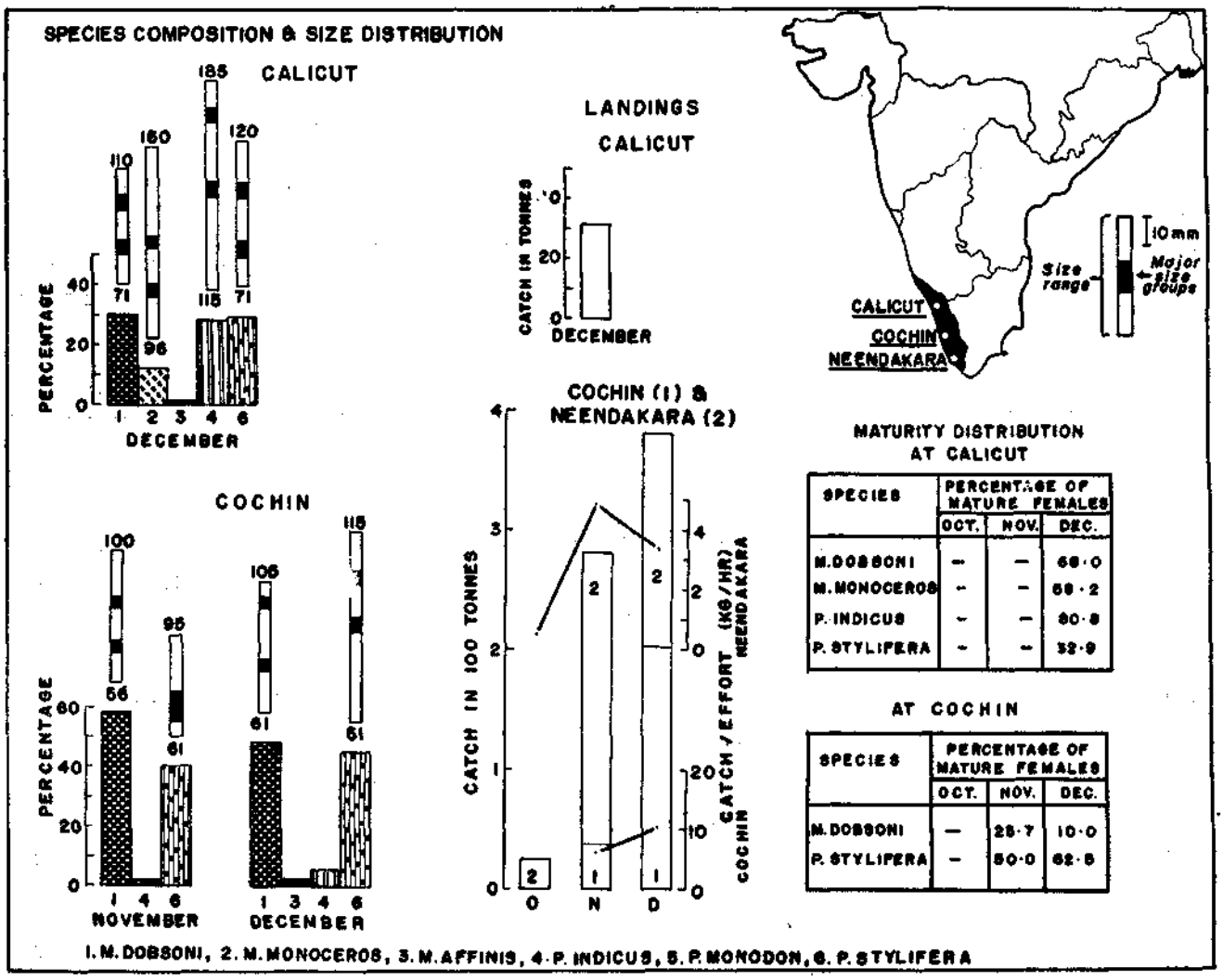
The landings of penaeid prawns by gill nets showed an increasing trend during the quarter with an estimated catch of 25.8 t. as against the estimated total catch of 10.5 t. of the previous quarter. *P. merguiensis* constituted the bulk of the catch maintaining a steady increase in total catch as indicated by percentages of 95.4, 70.5 and 94.4 during October, November and December months. The major sizes ranged between groups of 151–155 mm and 176–180 mm with modes at 158 mm in males and 163 mm in females. In the case of *P. monodon* the size groups between 196 mm and 210 mm dominated the catches.

Prawn fishery during 1978

Total production:

The total marine prawn production during 1978 was estimated at 1,79,856 t. as compared to 1,70,464 t. recorded during 1977, showing an increase of 9,392 t. (5.5%). The total prawn production for the year 1969 to 1978 is shown in figure 8. The production showed a steady increase from 1969 to 1973, reaching 2,03,469 t. There was a slight reduction in 1974 and reached the maximum of 2,20,751 t. in 1975. Thereafter there was reduction in the total catch in the subsequent years, although the year 1978 showed an increase over the production of 1977.

The major portion of the total production being contributed by penaeid prawns more or less the same trend in production over the years as that of the total production was seen in the case of these prawns, the increasing trend culminating in maximum production of 1,41,713 t. in 1975 and thereafter slight reduction. In the case of non-penaeid prawns the maximum landings of 85,488 t. were noticed in 1972 (Fig. 8) and thereafter fluctuating between 50,652 t. of 1978 to 79,038



SPECIES	PERCENTAGE OF MATURE FEMALES		
	OCT.	NOV.	DEC.
M. DOBSONI	–	–	68·0
M. MONOCEROS	–	–	68·2
P. INDICUS	–	–	80·8
P. STYLIFERA	–	–	32·9

SPECIES	PERCENTAGE OF MATURE FEMALES		
	OCT.	NOV.	DEC.
M. DOBSONI	—	28·7	10·0
P. STYLIFERA	–	80·0	62·5

Fig. 3. Catch trend, species composition and biological features of prawns at Cochin, Neendakara and Calicut during the IV Qr. 1978.

Table 5. *Monthly prawn landings in different maritime states during* 1978

Maritime States	Prawn catch in tonnes													
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total for 1978	Total for 1977
Gujarat (excluding Kutch)	817	285	293	458	492	37	40	56	493	2,034	1,051	4,091	10,147	10,121
Kutch	—	—	—	—	—	—	—	—	—	—	—	—	887	—
Maharashtra	4,824	7,929	4,764	6,931	15,624	684	3,207	2,755	5,022	11,997	8,203	13,406	85,346	93,653
Goa	121	90	292	208	166	13	2	36	109	24	220	392	1,673	1,460
Karnataka	2,223	797	497	1,812	235	99	42	1,884	254	4	148	444	8,440*	3,335
Kerala	895	814	3,484	1,624	4,468	5,653	17,213	7,146	3,130	107	287	604	45,428*	40,324
Tamil Nadu	1,465	1,235	1,028	882	481	1,110	1,287	1,530	2,580	1,166	463	685	13,912	8,356
Pondicherry	1	62	15	47	36	97	13	15	5	6	2	17	316	105
Andhra Pradesh	455	483	536	216	219	382	1,014	1,473	2,984	1,121	526	154	9,563	11,375
Orissa	375	293	248	349	34	31	91	68	339	325	348	110	2,611	819
West Bengal	34	167	28	8	24	44	—	—	18	4	128	812	1,268*	871
Andamans	5	4	3	3	4	3	3	2	3	2	3	3	265**	45
ALL INDIA TOTAL	11,215	12,159	11,188	12,538	21,783	8,153	22,912	14,965	14,937	16,790	11,379	20,718	1,79,856	1,70,464
Month-wise percentage	6.2	6.8	6.2	7.0	12.1	4.5	12.7	8.3	8.3	9.3	6.3	11.5		

* Include catches of exploratory fishing vessels of Govt. of India.

** Include 227 tonnes landed by larger trawlers of private firms.

Table 6. *Non-penaeid prawn landings in different maritime states during* 1978 *and* 1977

Maritime States	Prawn catch in tonnes Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total for 1978	Total for 1977
Gujarat (excluding Kutch)	157	98	139	254	94	29	21	29	88	337	221	1,615	3,082	1,260
Kutch	—	—	—	—	—	—	—	—	—	—	—	—	14	—
Maharashtra	2,992	6,123	2,485	4,109	11,829	380	714	402	419	6,246	3,748	4,808	44,255	66,978
Goa	—	—	—	—	—	—	—	—	—	—	—	26	26	24
Karnataka	—	6	—	—	—	—	—	12	—	—	—	—	18	—
Kerala	23	9	91	49	19	17	134	52	—	—	—	—	394	174
Tamil Nadu	—	9	24	4	25	50	263	32	1	1	163	13	585	159
Pondicherry	—	—	—	5	—	64	—	—	—	—	—	2	71	2
Andhra Pradesh	9	29	18	58	2	118	264	417	236	202	152	27	1,532	5,109
Orissa	—	—	—	—	—	—	6	—	6	—	—	—	12	17
West Bengal	10	107	4	—	2	4	—	—	—	—	102	434	663	269
Andamans	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ALL INDIA TOTAL	3,191	6,381	2,761	4,479	11,971	662	1,402	944	750	6,786	4,386	6,925	50,652	73,992
Month-wise percentage	6.3	12.6	5.5	8.8	23.6	1.3	2.8	1.9	1.5	13.4	8.7	13.6		

Table 7. *Penaeid prawn landings in different maritime states during* 1978 *and* 1977

Maritime States	Prawn catch in tonnes													
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total for 1978	Total for 1977
Gujarat (excluding Kutch)	660	187	154	204	398	8	19	27	405	1,697	830	2,476	7,065	8,861
Kutch	—	—	—	—	—	—	—	—	—	—	—	—	873	—
Maharashtra	1,832	1,806	2,279	2,822	3,795	304	2,493	2,353	4,603	5,751	4,455	8,598	41,091	26,675
Goa	121	90	292	208	166	13	2	36	109	24	220	366	1,647	1,436
Karnataka	2,223	791	497	1,812	235	99	42	1,872	254	4	148	444	8,422*	3,335
Kerala	872	805	3,393	1,575	4,449	5,636	17,079	7,094	3,130	107	287	604	45,034*	40,150
Tamil Nadu	1,465	1,226	1,004	878	456	1,060	1,024	1,478	2,579	1,165	300	672	13,327	8,197
Pondicherry	1	62	15	42	36	33	13	15	5	6	2	15	245	103
Andhra Pradesh	446	454	518	158	217	264	750	1,056	2,748	919	374	127	8,031	6,266
Orissa	375	293	248	349	34	31	85	68	333	325	348	110	2,599	802
West Bengal	24	60	24	8	22	40	—	—	18	4	26	378	605*	602
Andamans	5	4	3	3	4	3	3	2	3	2	3	3	265**	45
ALL INDIA TOTAL	8,024	5,778	8,427	8,059	9,812	7,491	21,510	14,021	14,187	10,004	6,993	13,793	1,29,204	96,472
Month-wise percentage	6.2	4.5	6.5	6.2	7.6	5.8	16.6	10.9	11.0	7.7	5.4	10.7		

* Include catches of exploratory fishing vessels of Govt. of India.

** Include 227 tonnes landed by larger trawlers of private firms.

of 1975. During 1978 the penaeid prawn catch recorded an increase of nearly 33,000 t. from that of 1977. Except Gujarat almost all the states showed increased landings of penaeids this year. The non-penaeid prawn catch during the year on the other hand declined by about 23,000 t. mostly due to the reduced landings in Maharashtra and Andhra Pradesh.

The total monthly landings of prawns (Table 5) showed a steady increasing trend from January to May. In June there was a sudden decline to the minimum of 8153 t. (4.5%). However, the catch figures went up to the maximum of 22,912 t. in July (12.7%). In all the maritime states on the northwest and northeast coasts the prawn production was relatively poor throughout the southwest monsoon period (June–August) on account of lesser fishing activities. Later the fishery improved considerably. While in Gujarat more than 70% of the catch of the year was registered during the last quarter alone, the bulk of the landings in Maharashtra was contributed by two peaks–one in May and the other in October-December. January was the most productive month in Karnataka although substantial quantities of prawns were also caught in April and August. In Kerala, the fishery showed considerable improvement during the second and third quarters of this year as compared to the previous year, but it remained at a low level during the post-monsoon period when normally the shrimp catches are good. A unique feature noticed in this state was that when the fishing activities remained very weak in most of the areas of the west coast during the monsoon period the prawn production from here was the highest during July–August. This was mainly due to the intensive exploitation of prawns off Quilon area. The heavy catches landed at Neendakara (Quilon) resulted in ele-

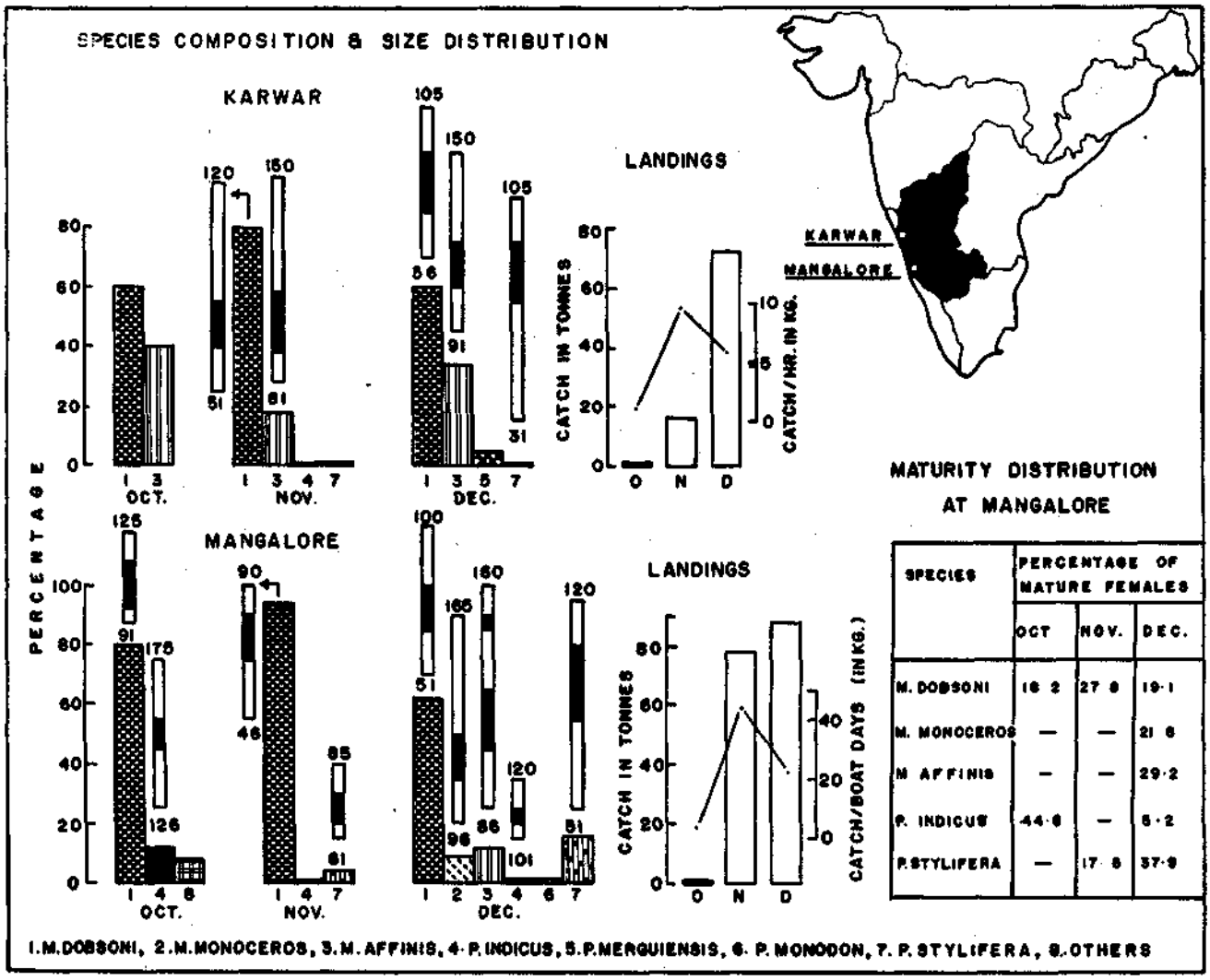


Fig. 4. Catch trend, species composition and biological features of prawns at Mangalore and Karwar during the IV Qr. 1978

vating July as the peak period of prawn production in the country. In the east coast the prawn landings, on the whole, was better this year although the fishery showed a decline in Andhra Pradesh when compared to the previous year. Except for the low production in April and May and during the northeast monsoon period of November-December relatively higher landings were maintained in most of the months in Tamil Nadu and Andhra Pradesh with peak in September.

The state-wise penaeid and non-penaeid prawn landings (Table 6, 7 and Fig. 9) show that in the overall catch penaeid prawns accounted for 72% and non-penaeids 28%. As could be seen from Fig. 9, the penaeid prawns supported almost the entire fishery of Goa, Karnataka, Kerala, Orissa and Andamans and also contributed to the extent of 95.8% in Tamil Nadu, 84% in Andhra Pradesh, 77.5% in Pondicherry and 71.9% in Gujarat. The maximum production of these prawns for the year was during July–September and December and this was mainly due to their peak landings in Kerala, Tamil Nadu and Andhra Pradesh during the former season and in Gujarat and Maharashtra during the latter. In Karnataka the highest catch was registered during January. The non-penaeid prawns dominated in the fishery in Maharashtra (51.9%) and West Bengal (52.3%) with peak catches during May and December in the two states respectively. These prawns also supported sizeable fisheries in Gujarat and Andhra Pradesh showing improvement over the previous year's landings only at Gujarat.

The overall species composition of prawn landings and their percentages for this year are shown in Table 8. In the total prawn landings, *Acetes indicus, Parapenaeopsis stylifera, Metapenaeus dobsoni, M. affinis, Penaeus indicus* and *M. monoceros* in the order of abundance constituted more than 81%. While the

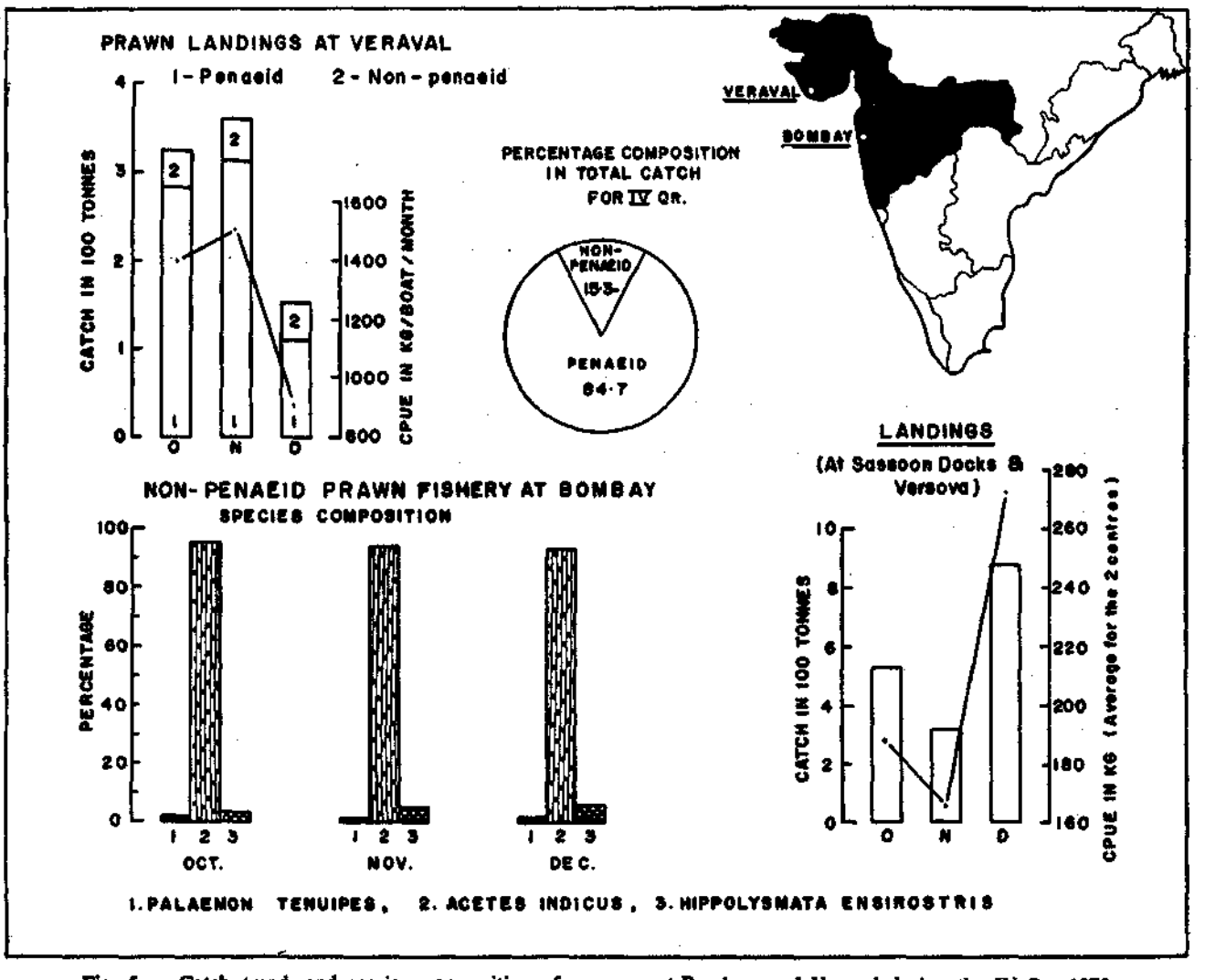


Fig. 5. Catch trend and species composition of prawns at Bombay and Veraval during the IV Qr. 1978

major portions of *A. indicus*, *M. affinis* and *M. monoceros* were landed in the coasts of Maharashtra, the maximum catch of *M. dobsoni* (15,762 t.), *P. stylifera* (14,861 t.) and *P. indicus* (10,808 t.), were obtained from the Kerala coast. *P. semisulcatus* was mostly landed in Tamil Nadu coast. *M. dobsoni* and *P. stylifera* were the major species landed in Karnataka. *M. monoceros*, *M. brevicornis* and *P. indicus* were the dominant species in Andhra Pradesh.

In the total prawn catch of the year the landings from shrimp trawlers constituted about (51.2%), with Kerala State as the leading contributor (40.%) followed by Maharashtra (24.7%) ,Tamil Nadu (9.8%) and Karnataka (6.4%). The indigenous gears operated by mechanised as well as non-mechanised crafts accounted for 48.8% of the landings. Fixed bag nets which were the major gears landing the non-penaeid prawns of the northwest coast, contributed about 37.1%. Other major gears in operation for prawn fishing were the boat seines and shore seines (6.9%) and gill nets (3.9%). The peak seasons for the different gears were July –August for trawl nets, May and October-December for fixed bag nets, August–September for seine nets and January–February and July–August for gill nets.

Biological aspects at selected centres (Fig. 10)

Cochin

The annual total prawn landings in Cochin and Neendakara (combined) amounted to 35,462.8 t. with a catch per unit effort of 13.5 kg. Of the total catch Neendakara alone recorded 33,142.0 t. with a catch rate of 13.5 kg per unit of effort. When July recorded the maximum total catch of 16,119.0 t. and catch rate

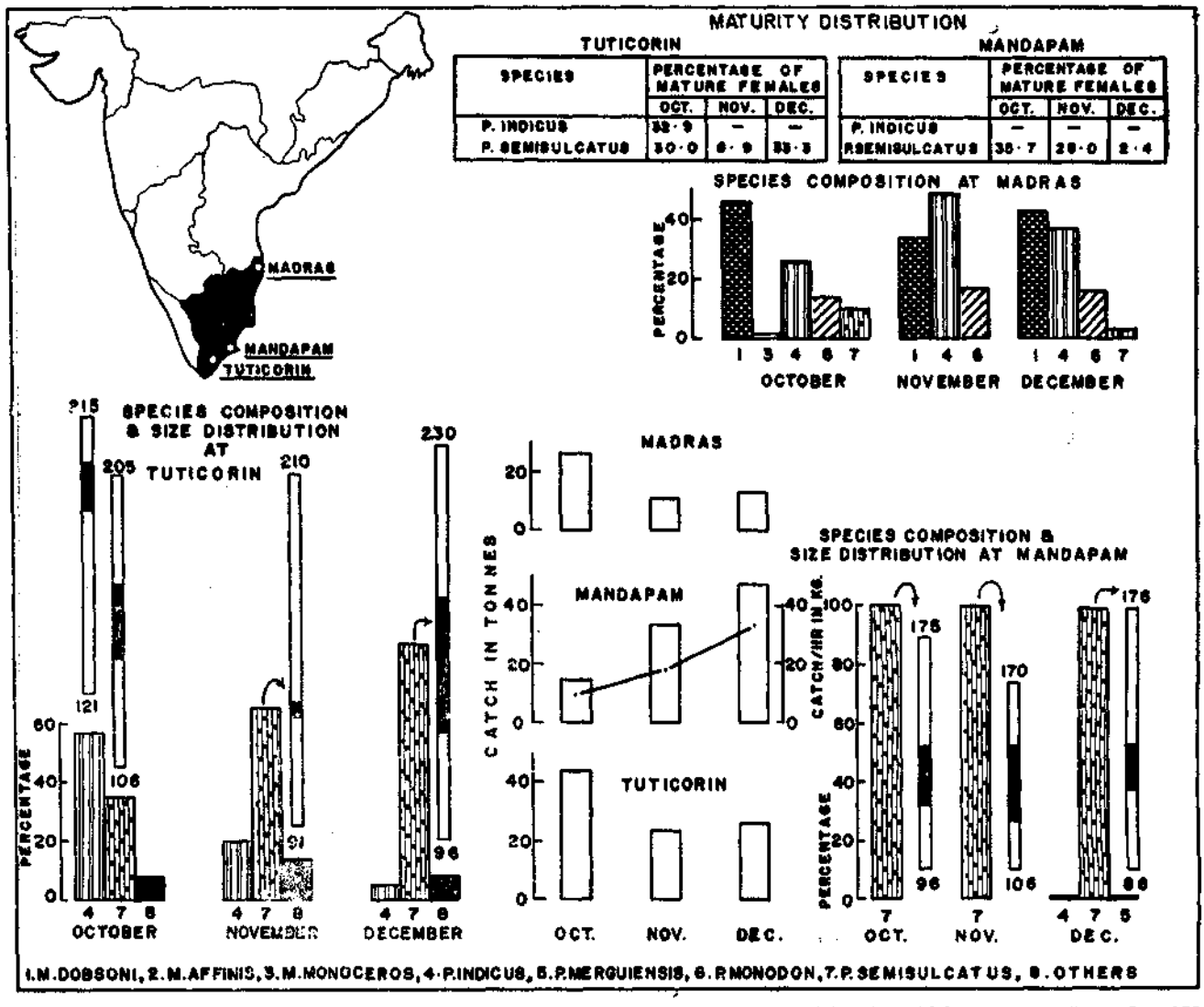


Fig. 6. Catch trend, species composition and biological features of prawns at Tuticorin, Mandapam and Madras during the IV Qr. 1978.

Table 8. *Species-wise break-up of prawn landings and percentages during* 1978

Species	All India landings in tonnes	Percentage
Solenocera crassicornis	3,019	1.7
Penaeus indicus	18,085	10.1
P. monodon	1,014	0.6
P. semisulcatus	6,029	3.3
P. merguiensis	1,179	0.7
Metapenaeus dobsoni	21,969	12.2
M. affinis	20,704	11.5
M. monoceros	16,447	9.1
M. brevicornis	1,124	0.6
Parapenaeopsis stylifera	30,306	16.9
P. hardwickii	240	0.1
Acetes indicus	39,002	21.7
Hippolysmata ensirostris	2,533	1.4
Palaemon tenuipes	6,078	3.4
Others	12,127	6.7
TOTAL	1,79,856	100.0

of 80.2 kg at Neendakara, 636.2 t. and 34.3 kg were the peak landings and catch per unit of effort respectively at Cochin during June. The prawn fishery was contributed mainly by 5 species of which *Metapenaeus dobsoni* was the dominant species forming nearly 38.8%, with sizes ranging from 51–110 mm and modes at 86–90 mm. *Parapenaeopsis stylifera* was next in order of abundance (37.5%) with size ranges of 56–125 mm. Matured females were occurring at a higher percentage of 70.0 in *P. stylifera* and 46.0 in *M. dobsoni*.

Calicut (Fig. 10)

The total prawn landings were estimated at 231.1 t. with 35.0 kg catch per unit effort. April was the most productive month accounting for 79.0 t., followed by January with 70.0 t. Catch per unit of effort (per boat) was highest in December, viz. 57.0 kg, followed by 39.3 kg for both January and April. *M. dobsoni*,

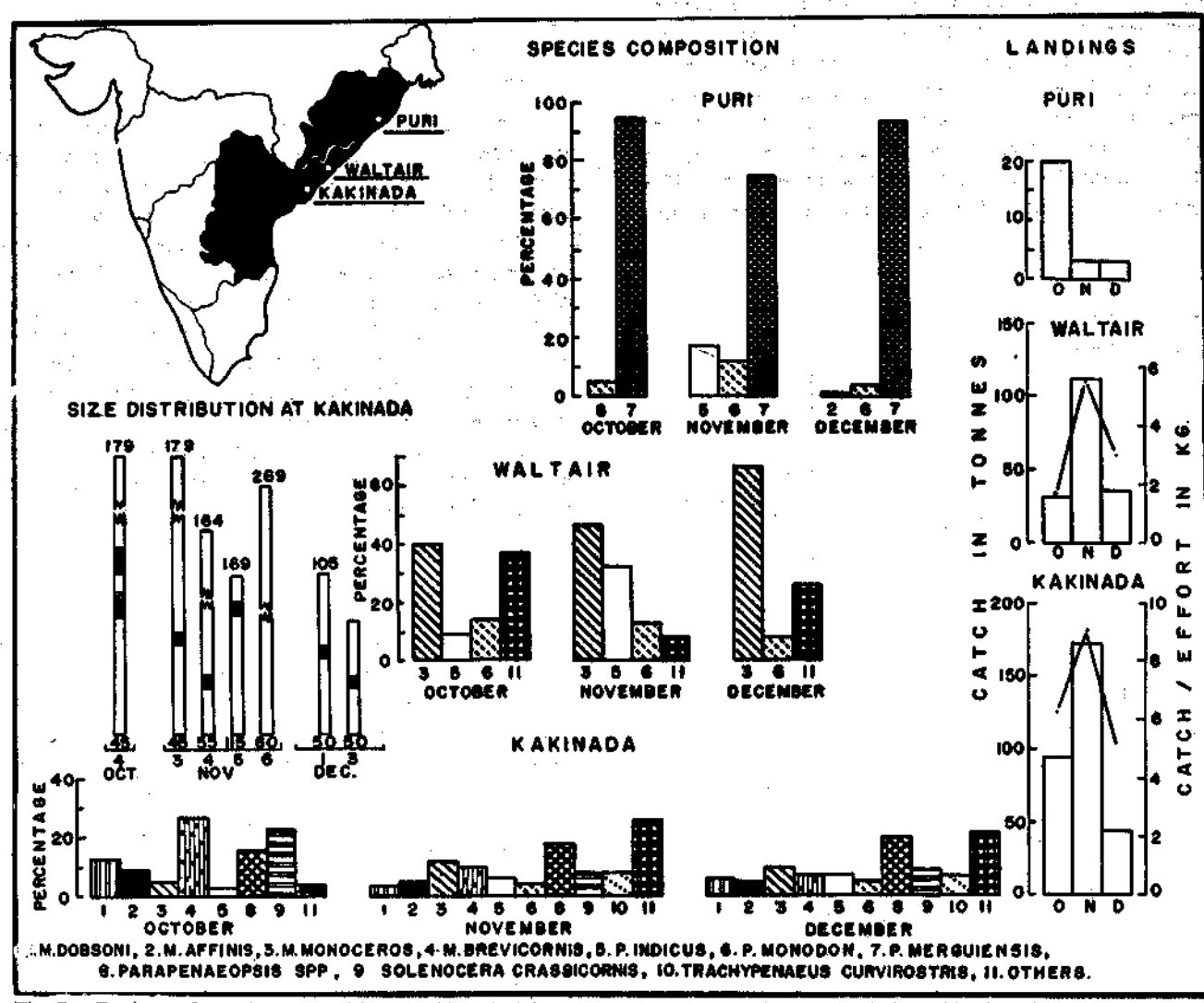


Fig. 7. Catch trend, species composition and biological features of prawns at Kakinada, Waltair and Puri during the IV Qr. 1978.

P. stylifera and *P. indicus* formed the major fishery constituting more or less same percentages of 29.9, 28.8 and 28.6 respectively in these months. In the case of males of M. *dobsoni* the sizes ranged from 51 to 95 mm, with modes at 68 to 83 mm. Females of the same species were occurring in length frequencies of 51–126 mm, with modes at 63 to 98 mm. In *P. stylifera* sizes varied between 51–115 mm in males and 46–125 mm in females having modes at 73 mm to 103 mm. *P. indicus* had size ranges at 71–185 mm in males and 61–200 mm in females. Principal modes were observed at 128 to 163 mm in males and at 133 to 183 mm in females of the species.

Mangalore

The best season for prawn fishery was from January to April, the general trend being of a decreasing nature from January to April which continued till September. The catch was least (0.25 t.) in October, followed by increase in the two subsequent months. The species caught were *P. stylifera. M. dobsoni, M. monoceros, M. affinis, P. indicus,* and *P. monodon* in the order of abundance. The catch per unit effort was in the decreasing order from January (71 kg) to October (4.3 kg). The effort expended was also more during the first four months and in October it was the least. The larger sizes of most of the species were more during the months of January to April, November and December. Indigenous gears were operated for prawn fishing during July, August and September only. Maximum catches were recorded in August, the important species being *M. dobsoni* and *P. indicus* in the order of abundance.

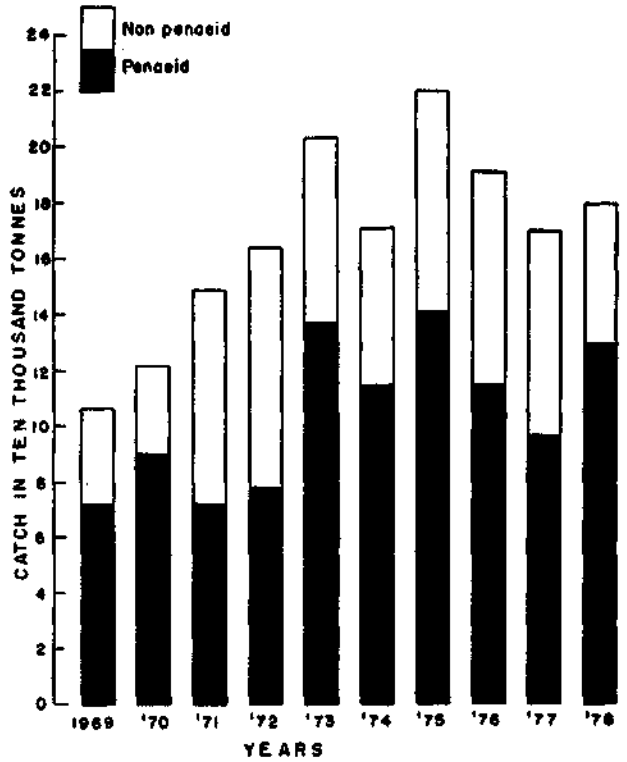


Fig. 8. Trend of prawn production during 1969–1978.

Karwar

The peak prawn landing by trawlers occurred in December although during January and March to May also the catches were good. The most abundant species was *M. dobsoni* followed by *M. affinis* and *P. stylifera.* The catch per unit effort was maximum during April and May. The shore seines were operated only during the monsoon months. The order of abundance of species in the catch was *P. stylifera, P. indicus, P. merguiensis* and *M. dobsoni.* The larger sizes of *P. stylifera* were caught during April and May while in *M. dobsoni* the larger prawns occurred in February, March and April.

Bombay

With a total production of 1605 t. and an average catch rate of 126.7 kg, the penaeid prawns showed improved landings over the previous year's catch at Sassoon Dock. *M. affinis,* with major size groups 131–140 mm, formed 36.6% of this fishery and its peak occurrence was observed during March and September. Other important species were *M. monoceros, P. stylifera* (76–100 mm) and *Solenocera crassicornis.* The non-penaeid prawn catch at this centre and Versova amounted to 3,260 t. at an average catch rate of 148.1 kg for the period March–December chiefly in 'dol' nets. *Acetes indicus* was the dominant species (77%) with peak abundance during July–December. *Palaemon tenuipes* contributed 18% and *Hippolysmata ensirostris* 5%.

Veraval

With an estimated catch of 1,045t. of prawns landed by shrimp trawlers, the fishery at Veraval showed a steady declining trend over the previous two years landings. The peak catches were recorded during October–December. Over 82% of the catch was constituted by penaeid prawns and the rest by non-penaeid shrimps. *Parapenaeopsis stylifera* in the size range 65–154 mm dominated in the fishery with major size groups between 85 and 124 mm.

Tuticorin

Prawn landing was maximum here in April. September to December season also registered higher

catches. The maximum quantities of the important species viz., *P. semisulcatus* and *P. indicus* were landed in December and April respectively. The maximum effort was spent in May and November, the highest catch per effort being in April (2.25 kg/hr). The larger sizes were caught during March to May and September to December.

Mandapam

The peak season for prawn fishing was May–June and November–December. The mainstay of the fishery was *P. semisulcatus*, although small quantities of *P. merguiensis* and *M. affinis* were landed during January to March and August–September. The catch per unit effort was also maximum during the peak seasons. The larger sizes of prawns were caught during the months of March–April and August–September.

Madras

The peak prawn landings were during the months of January and May to October. The constituent species of the fishery were *M. dobsoni*, *P. indicus*, *P. monodon*, *P. semisulcatus* and *M. monoceros* in the order of abundance. The effort expended as well as catch per unit effort were more during this peak season.

Kakinada

The total catch of prawns at Kakinada amounted to 2,026.0 t. and the catch of prawns per unit of effort was recorded as 5.4 kg. About 27.2% of the catch was contributed by *Metapenaeus brevicornis* in which the sizes ranged between 55–164 mm with modal sizes in 84–120 mm group. *Solenocera crassicornis* having length ranges and modal sizes as 35–119 mm and 64–75

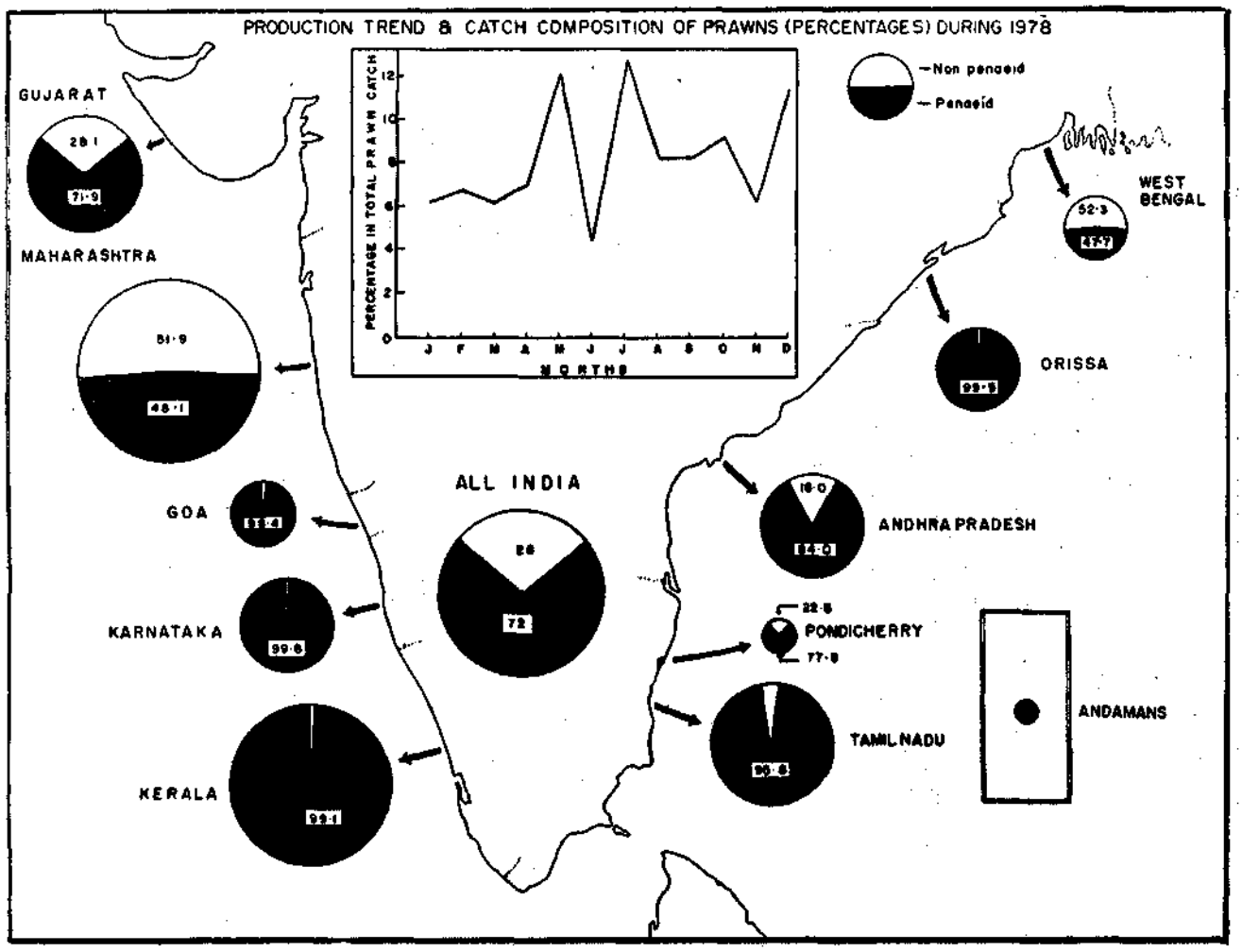


Fig. 9. Monthly production trend and catch composition of prawns during 1978.

mm respectively, were second in abundance in the catch. The peak landing of 488.0 t. have been recorded during August with catch per unit effort of 17.5 kg. *M. dobsoni. M. affinis* and *P. monodon* were the next important species contributing to the fishery in this area.

Waltair

The total catch of prawns amounted to 659.7 t. with catch per unit of effort of 3.5 kg. September showed the maximum of 132.9 t. *M. monoceros* constituted the major species in the catch forming nearly 34.3% of the total prawn landings. The next species in order of abundance were *P. indicus* (21.1%) and *P. monodon* (7.5%). The prawns were in a size range of 185–285 mm in the case of *P. monodon.*

Puri

The total catch was estimated at an amount of 108.2 t. with catch per effort as 0.3 kg. January recorded the peak landings of 56.1 t. and the catch rate was 1.9 kg during that month. *P. indicus* was the dominating species forming nearly 52.1% of the total prawn catch. The sizes were ranging between 141–185 mm in the species with modes at 146–160 mm. *P. merguiensis* was the next species in order of abundance (34.3%) with length frequencies of 121–205 mm and modal sizes of 151–165 mm. *M. affinis* and *P. monodon* were the next important species in the catch with size ranges of 101–155 mm and 151–215 mm respectively.

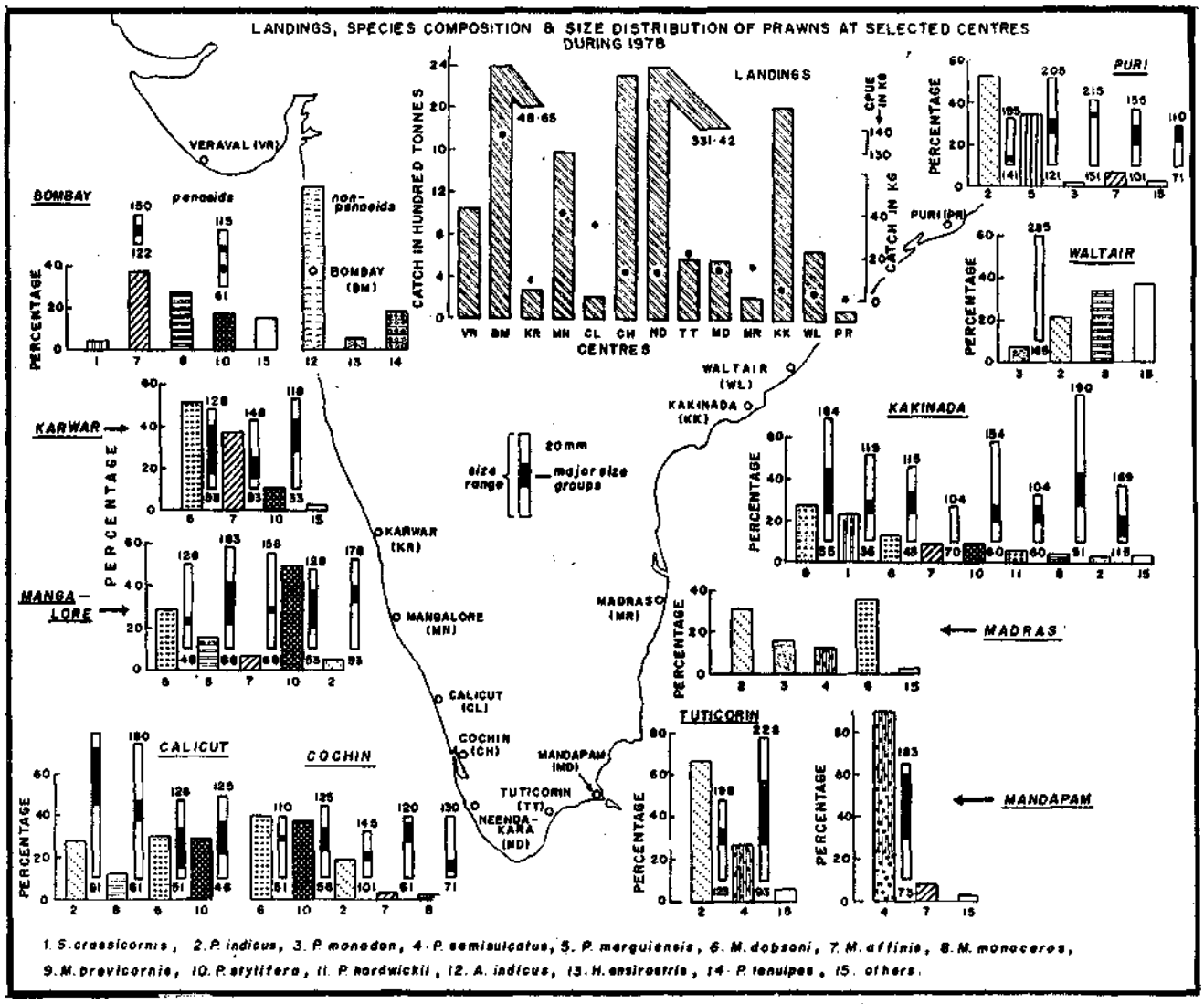


Fig. 10. Annual landings, species composition and size distribution of prawns at selected centres during 1978.

Environmental Data

Highest temperatures were recorded during the summer months of March, April and May in Maharashtra, Kerala and in the southern parts of Tamil Nadu. Along the other parts of the east coast especially in Tamil Nadu and Andhra Pradesh, the highest temperatures were recorded during September, October and November. The trend of salinity was also dependant on the monsoon rains along the west coast. The gradual rise in salinity was noticed from January to May after which there was a sudden fall due to the south-west monsoon. Again, the salinity increased after the rains and reached maximum in December. In Tamil Nadu and Andhra Pradesh this phenomenon was not observed, probably, due to the lesser influence of the monsoon in this area. The dissolved oxygen did not show any correlation with the values of salinity and temperature of a particular area.

NEWS — INDIA AND OVERSEAS

FAO Fishery Project in Bay of Bengal

A project for the development of small scale fisheries in the Bay of Bengal funded by the Swedish International Development Authority is to be executed by the Food and Agricultural Organisation from Madras.

Forming part of the FAO's general Indian Ocean fisheries survey and development programme, the project includes experiments which will help artisan fishermen.

The research activity will cover the Bay area touching Tamil Nadu, Andhra Pradesh, Orissa and West Bengal, Bangladesh, Malaysia and Thailand. International fisheries experts will join the project to develop new techniques of fishing, marketing and processing.

Necessary assistance will be taken from the participating states and other institutions. When new techniques are developed they will be transferred to the states for enabling small fishermen to augment their resources. There will also be extension and training wings attached to this centre at a later stage.

One of the other major tasks before the FAO experts is to involve more women in the fishing industry. Research will be undertaken to improving the catamaran used by the fishermen.

(UNI, Vol. IV, No. 24, June 14, 1979)

Japan's production and consumption of squids increasing

Squids range widely from coastal waters to the deep sea throughout the world in some 450–500 varieties and are a great potential food resource. The Japanese call squid collectively 'ika'. Since ancient times the Japanese have been catching for food mainly the 'Kon-ika' (Sepudae), 'Yari-ika' (Loliginidae) and 'Surume-ika' (Ommastrephidae) species. The most important species caught is *Todarodes pacificus* with an average annual catch varying between 300,000 and 500,000 tonnes. Until about 10 years ago they dried or half-dried most of the catch. Today, however, 60 or 70% of the total catch is being supplied to consumers in fresh or frozen form. In cities the annual average per capita consumption of 'ika' is 1.8 kg, preparing them in wide varieties of cooking methods. Advanced Japanese frozen food techniques and highly developed distribution system have greatly helped the growth of the fishery production and consumption.

World Fishing 27 (7): July 1978

Increase in fish consumption in Hong Kong

According to a Food and Agriculture Organisation study Hong Kong is the world's fourth largest fish consumer on a per capita basis. Iceland, Japan and Portugal in that order claims the top ranks. The FAO statistics show that for every person in Hong Kong there are 49 kg of fish available in the markets. For the world's top fish consumers this quantity is between

50 to 60 kg. The study further indicates that 25 to 30 per cent of the total protein intake in the diet of Hong Kong people comes from fish.

Commenting on this, Hong Kong's Director of Agriculture and Fisheries said that the fish catch of the country had been increasing at the steady rate of 4 per cent in the past ten years and that the present fishing fleet of 5000 vessels could cope with the demand.

World Fishing 27(8): August 1978

Breakthrough in artificial propagation of milkfish

The International Fishery Research Institute in the Philippines has announced that it has succeeded in the artificial breeding of milk fish with the assistance of a fishery specialist from the Republic of China, Dr. I. C. Liao, Director of the Taiwan Fishery Research Institute's Tungkang Marine Laboratory. Dr. Liao was assisting the milkfish artificial propagation programme of the Southeast Asian Fisheries Development Centre (SEAFDEC) in May 1978.

The breakthrough was made possible by catching mated milkfish and injecting synthetic hormone into the females to induce spawning. About 128,000 eggs were obtained, 38 per cent of them fertilized. Eggs started hatching in two days time. About 35,000 larvae started feeding two days later.

Taiwan has been experimenting on the artificial propagation of milkfish for some years. Mature milkfish are hard to catch, and it has not been previously possible to rear females to maturity in ponds.

World Fishing 27 (9): September 1978

Submersible for sea farm tests

Scientists of the Far Eastern University have successfully completed the first tests of the "Shelf" bathyscaphe developed in the USSR. The submersible will help experimental farms in the search for colonies of sea kale, sea scallop, mussel and trepang.

With a crew of two the bathyscaphe is said to be steady and reliable in deep sea operation. Its overall weight is 3.3 tonnes making it possible to transport it aboard ships and helicopters to any part of the ocean. Its engines do not disturb the surrounding medium and it can remain submerged for up to 36 hours.

Fish Farming International 4(4): December 1977

No danger of radio activity

The USSR Health Ministry believes that there is no danger of radiation in water used to cool two-circuit atomic power stations. Long-term research focussed on the Leningrad nuclear power station, which discharges waste water into the sea, and the Kola nuclear power station on Lake Imandra has proved that fish can be bred in these waters in complete safety. No trace of radio activity was found in the fish analysed from these areas of discharge of waste cooling waters. Therefore, wider use of the warm water discharged from nuclear power stations for fish farming and for heating green houses have been advocated.

Biological effects of warm water pollution from power stations on local marine life formed the subject of study in Scotland. Seventeen years of study (the longest running study of its kind in the world) and sampling of life in the sea bed in the vicinity of the nuclear power stations Hunterston A and B on the Firth of Clyde have shown that cooling water from the power stations is doing no harm to tiny creatures which live in the sand, eat up detritus and bacteria and at the same time provide a source of food for other sea creatures.

FNI 10(10 & 11): October, November 1977

Giant fish larva

A transparent deep-bodied, 30 cm long mystery fish larva caught in the trawl of the US research vessel David Starr Jordan has been identified as the larval form of a rare kind of eel. The NMFS laboratory at La Jolla, California has identified it as the eel, *Thalassenchelys coheni*. In terms of body mass this is the largest fish larva known to science. The adult form of the eel has never been found.

FNI 16(11): November, 1977

Lake Nassar fish stocks survey

NORAD, the Norwegian organisation for aid to developing countries is to undertake a three year programme in Egypt to investigate the commercial fishing potential in Lake Nassar.

The 500 km^2 lake was created when the Aswan Dam was built in the Nile. Part of it is located in Sudan where it is called Lake Nubia. FAO stocked Lake Nassar with fish some years ago and 6000 fishermen with 1500 small boats are at present working there.

Two Norwegian boats, one alluminium and one wood will be used to measure fish stocks in order to estimate the quantity which can be caught. Subsequently suitability of gears will also be tested. The scheme is only exploratory, and a much larger project will be necessary for effective exploitation of the Lake's potential.

BOOKS

A Biologist's Mathematics. By David R. Causton, Edward Arnold, England, pp. 326, 1977.

This book presents mathematical ideas and methods in a biological setting. It assumes an elementary knowledge of mathematics and progresses gradually to more sophisticated topics by using elementary ideas. The book begins with an introduction to the properties of numbers, indices and logarithms as the necessary tools for understanding mathematical methods. Biological examples are widely used and demonstrate the usefulness of the methods to the biologist. It will be of interest to research workers in areas of biology which require a mathematical approach.

Biology of Seaweeds. By A. R. O. Chapman, Edward Arnold, England, pp. 134, 1979

This book focuses mainly on seaweed algae and emphasises ecological considerations to point out the unifying trends and concepts that are essential for a student's thorough understanding of the subject. It consists of four sections of which first one introduces organization in cells, including both cell structure and cell function. The second section studies organisation in whole organisms with chapters on thallus structure, functioning of whole plants, and reproduction. The third section covers oraganization in population and population biology, the final section covers organization in communities, specifically community structure and community interaction.

Fisheries ecology of floodplain rivers. By Robin L. Welcomme. Longman, London, pp. 317, 1979.

This book assembles information on the general ecology of those rivers that undergo seasonal flooding, and applies it to the special case of fisheries. It is divided into six parts starting with a general introduction outlining previous work done in the field followed by a section on environment. Third section discusses the adaptation of fish for life in a fluctuating environment showing the effects on feeding, growth, reproduction, mortality and the general dynamics of the community. Fourth section deals with the fishery and fifth one explores the ralationship of fish community to other activities in the river basin. The concluding part discusses the stages through which fish communities and fisheries pass as the environment is altered by basin development. This book is invaluable to freshwater and fishery scientists.

Handbook of Statistical genetics. By Prem Narain, V. K. Bhatia and P. K. Malhotra.

The Handbook contains chapters on estimation of linkage, components of phenotypic variance, repeatability, heritability, genetic correlation, analysis of diallel and partial diallel cross, progeny row selection, response to selection, simultaneous selection for several characters, correlated response to selection, combined selection and coefficients of inbreeding and relationship. An attempt has been made to illustrate the methodology with the help of fully worked out examples. Unsolved exercises have also been given at the end of each chapter. The handbook would be useful to researchers and the students interested in statistical tools for analysing plant and animal breeding data. It would also benefit the statisticians and geneticists who teach the subject to post-graduate students.

Copies available from: Chief Administrative Officer, Indian Agricultural Statistics Research Institute (ICAR) Library Avenue, New Delhi-110012. Price Rs. 31.00 (Postage Rs. 6.00).

Compiled and prepared by M. J. George, C. Suseelan, M. M. Thomas, N. S. Kurup, C. Nalini, S. K. Dharmaraja and G. Subbaraju. Published by Dr. M. J. George, Senior Scientist on behalf of the Director, Central Marine Fisheries Research Institute, Cochin-682 018.