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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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CONTENTS

Cover photo: Prawn catch at fishing harbour, Cochin

SYNOPSIS OF MARINE PRAWN FISHERY OF INDIA—1979*

Total Production

The total marine prawn production during the year 1979 was estimated at 1,77,582 tonnes, showing a decrease of only 2,274 t. (1.3%) from the total production of 1,79,856 t. in 1978 (Table 1). A study of the production trend over the past few years shows the maximum of 2,20,751 t. in 1975 and thereafter a gradual reduction with a slight increase in 1978.

The production being contributed mostly by penaeid prawns, more or less the same trend in total production is seen in the production of these prawns over the years. During 1979 the penaeid prawn catch recorded a reduction from 1978 from 1,29,204 t. to 1,13,665 t. while that of non-penaeid prawns showed an increase from 50,652 t. to 63,917 t. respectively (Table 2). The decrease in penaeid prawn catch was mostly brought about by the fall in the yield of these prawns in Kerala State.

The total monthly landings of prawns (Table 3) remained high from January to May with a sudden decline to the minimum of 5,571 t. in June. Although the catch went up in July it was very much less when compared to July 1978. During the monsoon months the catches were poor in the states of northwest coast while Tamil Nadu and Andhra Pradesh showed better catches. Both Gujarat and Maharashtra landed better catches during the first and last quarters of the year, the latter contributed mostly by penaeid prawns. One conspicuous feature in the prawn fishery of the year is the marked decline in the penaeid prawn catches of Kerala coast, especially that of Neendakara during the monsoon season from which landing centre the maximum quantity of prawns was landed by mechanised boats in last year.

The statewise production of prawns this year shows the maximum of 57.4% in Maharashtra, with Kerala coming second with only 16.7% of the total production (Table 1). The statewise and monthwise penaeid and non-penaeid prawn landings (Tables 4 & 5) indicate that penaeid prawns contributed to almost the entire fishery

*Prepared by Crustacean Fishery Resources Team.

Table 1: *Statewise prawn landings and percentage contributions during* 1979 *and* 1978.

	Prawn landings in tonnes		Percentage	
Maritime states	1979	1978	1979	1978
Gujarat	11,953	11,034	6.7	6.1
Maharashtra	1,01,846	85,346	57.4	47.5
Goa	1,594	1,673	0.9	0.9
Karnataka	4,660	8,440	2.6	4.7
Kerala	29,597	45,428	16.7	25.3
Tamil Nadu	11,119	13,912	6.3	7.7
Pondicherry	604	316	0.3	0.2
Andhra Pradesh	11,814	9,563	6.7	5.3
Orissa	3,017	2,611	1.7	1.5
West Bengal	571	1,268	0.3	0.7
Andamans	64	265	—	0.1
Larger private trawlers*	743	—	0.4	—
ALL INDIA TOTAL	1,77,582	1,79,856	100.0	100.0

*Landed in areas other than Andhra Pradesh.

Table 2: *Statewise penaeid and non-penaeid prawn landings and their percentage for* 1979 *and* 1978.

Maritime states	Landings in tonnes and percentage							
	1979				1978			
	Penaeid		Non-penaeid		Penaeid		Non-penaeid	
	Catch	%	Catch	%	Catch	%	Catch	%
Gujarat	8,606	7.6	3,347	5.2	7,938	6.1	3,096	6.1
Maharashtra	45,638	40.2	56,208	87.9	41,091	31.8	44,255	87.4
Goa	1,594	1.4	—	—	1,647	1.3	26	—
Karnataka	4,654	4.1	6	—	8,422	6.5	18	—
Kerala	29,522	26.0	75	0.1	45,034	34.9	394	0.8
Tamil Nadu	10,222	9.0	897	1.4	13,327	10.3	585	1.2
Pondicherry	532	0.5	72	0.1	245	0.2	71	—
Andhra Pradesh	8,697	7.6	3,117	4.9	8,031	6.2	1,532	3.0
Orissa	2,983	2.6	34	—	2,599	2.0	12	—
West Bengal	410	0.4	161	0.3	605	0.5	663	1.3
Andamans	64	—	—	—	265	0.2	—	—
Larger private trawlers*	743	0.6	—	—	—	—	—	—
ALL INDIA TOTAL	1,13,665	100.0	63,917	100.0	1,29,204	100.0	50,652	100.0

* Landed in areas other than Andhra Pradesh.

of Goa, Karnataka, Kerala, Orissa and Andamans. The major part of the fishery of Tamil Nadu and Pondicherry also was contributed by penaeid prawns. In Maharashtra 55.2% of the total catch was non-penaeid prawns of which the maximum was landed in February, April and May. In Gujarat and Andhra Pradesh 28.0% and 26.4% of the catches respectively were contributed by non-penaeid prawns. The maximum catch of non-penaeid prawns in Gujarat was in October to December period while that in Andhra Pradesh in August and September. In the case of penaeid prawns both Maharashtra and Gujarat registered very low catches during the southwest monsoon months. In Andhra Pradesh penaeid prawns registered maximum landings in August to October period, while in Tamil Nadu the highest catches of these prawns were in April and June.

The overall species composition of prawn landings and their percentages for this year (Table 6) show that the sergestid shrimp *Acetes indicus* occupies the first place as in last year, with a slightly increased percentage of 23.3 as against 21.7 in 1978. The penaeid prawn *Metapenaeus dobsoni* which occupied the second place in percentage composition has been relegated to the fifth place this year with a percentage landing of only 9.4. The penaeid prawns *P. stylifera* and *M. affinis* and the non-penaeid prawn *Palaemon tenuipes* have taken the second, third and fourth places with 16.6, 11.4 and 11.2% respectively. Nearly 90% of the total catch is contributed by 10 species, namely *Acetes indicus, Parapenaeopsis stylifera, Metapenaeus affinis, Palaemon tenuipes, M. dobsoni, Solenocera crassicornis, Penaeus indicus, P. semisulcatus, M. monoceros and Parapenaeopsis hardwickii* in the order of abundance. While the major portion of *Acetes indicus, Metapenaeus affinis* and *Palaemon tenuipes* were landed along the coasts of Maharashtra and Andhra Pradesh, *P. stylifera* and *M. dobsoni* were mostly obtained from Kerala coast. The annual percentage distribution of important species in the prawn landings at different observation centres during 1979 is shown in Fig. 1.

Gearwise production

In the total prawn catch of 1,77,582 t. landed during this year 87,483 t. were exploited by shrimp trawlers (49.3%) and the rest by indigenous gears operated by machanised as well as non-mechanised crafts. Small and medium sized trawlers of size upto 13 m have been widely employed all along the west and east

Table 3: *Monthly prawn landings in different maritime states during* 1979.

Maritime states	Prawn catch in tonnes												Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	for 1979
Gujarat	3,384	260	990	607	173	35	64	45	553	2,502	1,526	1,814	11,953
Maharashtra	9,673	14,067	9,949	19,071	14,402	1,510	603	1,693	4,588	11,256	6,523	8,511	1,01,846
Goa	128	99	358	476	166	8	3	8	2	36	141	169	1,594
Karnataka	942	884	886	787	651	54	32	48	24	16	11	325	4,660
Kerala	1,275	980	4,587	1,673	2,741	1,437	10,347	3,465	561	221	552	1,758	29,597
Tamil Nadu	810	755	794	1,498	643	1,923	979	749	907	708	549	804	11,119
Pondicherry	7	51	8	87	37	88	21	130	102	2	5	66	604
Andhra Pradesh	518	994	209	317	628	405	1,167	1,907	2,696	2,128	323	435	*11,814
Orissa	138	—	2	46	4	106	144	64	1,596	803	114	—	3,017
West Bengal	148	72	6	—	—	—	—	32	19	—	60	234	571
Andamans	4	4	5	5	4	5	6	5	5	6	7	8	64
Larger private trawlers**	—	—	—	—	—	—	—	—	—	—	—	—	743
ALL INDIA TOTAL	17,027	18,166	17,794	24,567	19,449	5,571	13,366	8,146	11,053	17,678	9,811	14,124	1,77,582
Month-wise percentage	9.6	10.2	10.0	13.8	11.0	3.1	7.5	4.6	6.2	9.9	5.5	8.0	

* Includes 87 tonnes landed by larger private trawlers along this coast.
** Landed in areas other than Andhra Pradesh.

Table 4: *Penaeid prawn landings in different maritime states during* 1979.

Maritime states	Prawn catch in tonnes												Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	for 1979
Gujarat	3,319	198	560	401	97	30	55	37	484	1,462	752	1,211	8,606
Maharashtra	3,766	3,387	5,473	7,404	5,119	735	394	712	3,897	6,779	2,728	5,244	45,638
Goa	128	99	358	476	166	8	3	8	2	36	141	169	1,594
Karnataka	942	882	886	787	651	54	32	48	24	12	11	325	4,654
Kerala	1,275	971	4,580	1,665	2,741	1,437	10,305	3,465	561	221	552	1,749	29,522
Tamil Nadu	773	749	792	1,492	605	1,834	647	606	831	693	510	690	10,222
Pondicherry	7	51	8	60	37	59	21	130	102	2	5	50	532
Andhra Pradesh	360	993	178	238	381	332	776	1,378	1,274	2,084	304	312	8,697*
Orissa	106	—	—	46	4	106	144	64	1,596	803	114	—	2,983
West Bengal	68	50	6	—	—	—	—	26	—	—	60	200	410
Andamans	4	4	5	5	4	5	6	5	5	6	7	8	64
Larger private trawlers**	—	—	—	—	—	—	—	—	—	—	—	—	743
ALL INDIA TOTAL	10,748	7,384	12,846	12,574	9,805	4,600	12,383	6,479	8,776	12,098	5,184	9,958	1,13,665
Month-wise percentage	9.5	6.5	11.3	11.1	8.6	4.0	10.9	5.7	7.7	10.6	4.6	8.8	

* Includes 87 tonnes landed by larger private trawlers along this coast.
** Landed in areas other than Andhra Pradesh.

coasts. The prawn production by these vessels, however, was slightly less than what was recorded during the previous year, with a reduction to the tune of about 1.5%. The statewise percentage contribution of the annual trawler catch was: Maharashtra–37.1, Kerala–30.3, Tamil Nadu–9.4, Gujarat–6.5, Andhra Pradesh–6.1, Karnataka–4.9, Orissa–2.5, Goa–1.8 and Pondicherry–0.5. The larger trawlers of private firms engaged in prawn fishing contributed 0.9%. The trend of prawn landings by commercial shrimp trawlers in relation to the total prawn catch and the effort expended in different maritime states is shown in Fig. 2. It can be seen that the shrimp trawlers accounted for the bulk of the prawn catch in Goa (97.6%), Karnataka (92.0%), Kerala (88.7%), Tamil Nadu (74.3%), Orissa (71.6%) and Pondicherry (69.4%). The peak landings were recorded in April in Goa, March in Karnataka, July in Kerala, June in Tamil Nadu, August in Pon-

Table 5: *Non-penaeid prawn landings in different maritime states during* 1979.

Maritime states	Prawn catch in tonnes												Total
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	for 1979
Gujarat	65	62	430	206	76	5	9	8	69	1,040	774	603	3,347
Maharashtra	5,907	10,680	4,476	11,667	9,283	775	209	981	791	4,477	3,795	3,267	56,208
Goa	—	—	—	—	—	—	—	—	—	—	—	—	—
Karnataka	—	2	—	—	—	—	—	—	—	4	—	—	6
Kerala	—	9	7	8	—	—	42	—	—	—	—	9	75
Tamil Nadu	37	6	2	6	38	89	332	143	76	15	39	114	897
Pondicherry	—	—	—	27	—	29	—	—	—	—	—	16	72
Andhra Pradesh	158	1	31	79	247	73	391	529	1,422	44	19	123	3,117
Orissa	32	—	2	—	—	—	—	—	—	—	—	—	34
West Bengal	80	22	—	—	—	—	—	6	19	—	—	34	161
Andamans	—	—	—	—	—	—	—	—	—	—	—	—	—
Larger private trawlers	—	—	—	—	—	—	—	—	—	—	—	—	—
ALL INDIA TOTAL	6,279	10,782	4,948	11,993	9,644	971	983	1,667	2,277	5,580	4,627	4,166	63,917
Month-wise percentage	9.8	16.9	7.7	18.8	15.1	1.5	1.5	2.6	3.6	8.7	7.2	6.5	

dicherry and September in Orissa. Prawn catch by indigenous gears accounted for 68.1% in Maharashtra and 52.8% in Gujarat where fixed bag nets *(Dol* and *Gholwa)* were the principal gears employed. In the east coast, substantial quantities of prawns were harvested by traditional gears in Andhra Pradesh (54.2%) and West Bengal.

Biological aspects at selected centres

Bombay (Fig. 3)

A general improvement in the prawn fishery was noticed at this centre in comparison to that of the previous year. The penaeid prawn catch at Sassoon Dock increased from 1605 t. to 2430 t. and the catch per unit effort from 126.7 kg to 136.5 kg this year with peak landings during August and November. Trawler landings were relatively more intensive at Kasara Bundar where penaeid prawns accounted for 6360 t. with an average catch rate of 358.8 kg. Peak landings were recorded during October and December. As in the previous year, *Metapenaeus affinis* (38%) and *Parapenaeopsis stylifera* (22%) constituted the bulk of the catch at Sassoon Dock, while at Kasara Bundar in addition to these species *Solenocera crassicornis* also contributed in substantial quantities. Other important species were *P. hardwickii, M. monoceros* and *P. sculptilis.* The major size groups contributing to the fishery were 116–150 mm for *M. affinis,* 76-115 mm for *P. stylifera* and 61-110 mm for *S. crassicornis.* Maximum percentage of mature females of the important species were noticed during April, June–July and October (Fig. 10).

Table 6: *Specieswise break-up of prawn landings and percentages during* 1979.

Species	All India landings in tonnes	Percentage
Solenocera crassicornis	9,635.51	5.4
Penaeus indicus	7,900.38	4.5
P. merguiensis	741.38	0.4
P. monodon	416.18	0.2
P. semisulcatus	4,568.30	2.6
Metapenaeus dobsoni	16,606.72	9.4
M. affinis	20,261.68	11.4
M. monoceros	4,374.85	2.5
M. brevicornis	526.17	0.3
Parapenaeopsis stylifera	29,394.20	16.6
P. hardwickii	4,320.79	2.4
P. sculptilis	1,100.82	0.6
Metapenaeopsis stridulans	1,100.82	0.6
Parapenaeus longipes	1,100.82	0.6
Other penaeids	11,616.38	6.5
Acetes indicus	41,305.47	23.3
Hippolysmata ensirostris	1,477.83	0.8
Palaemon tenuipes	19,909.33	11.2
P. styliferus	1,224.37	0.7
Total	1,77,582.00	100.0

The non-penaeid prawn landings also showed improvement with an estimated production of 5894 t. at Sassoon Dock and Versova as against 3260 t. of the previous year. Out of this, the landings at Versova

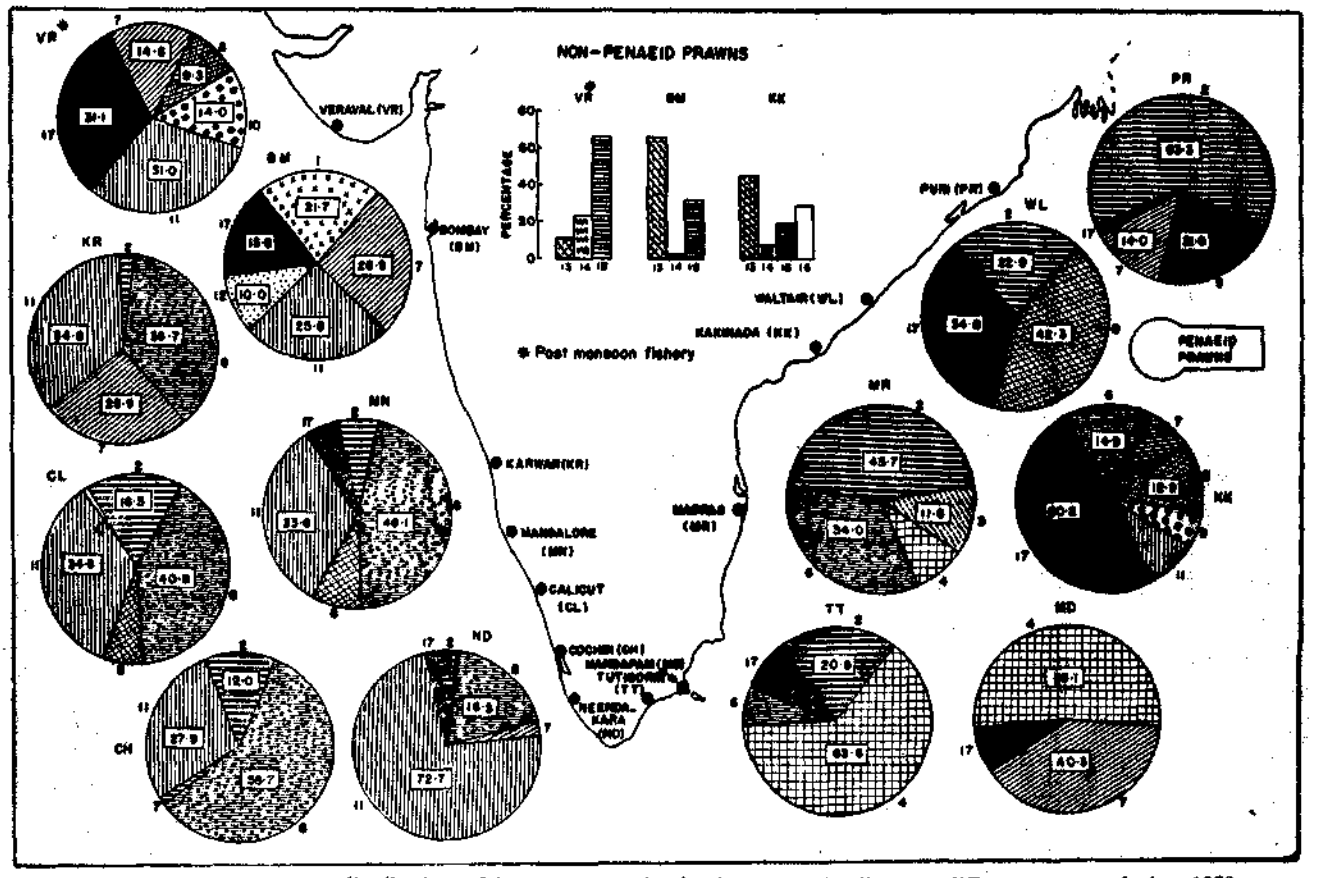

Fig. 1. Annual percentage distribution of important species in the prawn landings at different centres during 1979.
1. *S. crassicornis*, 2. *P. indicus*, 3. *P. monodon*, 4. *P. semisulcatus*, 5. *P. merguiensis*, 6. *M. dobsoni*, 7. *M. affinis*, 8. *M. monoceros*, 9. *M. brevicornis*, 10. *M. kutchensis*, 11. *P. stylifera*, 12. *P. hardwickii*, 13. *A. indicus*, 14. *H. ensirostris*, 15. *P. tenuipes*, 16. *P. styliferus*, 17. Others

were nearly three times that at Sassoon Dock. The catch per unit effort by the dol nets worked out to 299.4 kg and 135.4 kg at the two centres respectively. As usual, *Acetes indicus* (66%) constituted the bulk of the landings, followed by *Palaemon tenuipes* (32%) and *Hippolysmata ensirostris* (2%). *A. indicus* dominated in the fishery during January, April–May and September–December and *P. tenuipes* during the rest of the months. The peak breeding activities of *P. tenuipes* were noticed during March and August–October.

Veraval

The post-monsoon fishery of this centre, which commenced in September, indicated better production of prawns than in the previous year. During this period an estimated quantity of 946 t. of penaeid prawns by trawl nets and 307 t. of non-penaeid prawns by 'dol' nets were landed at Veraval and Nawabundar respectively. The trawl catch registered an increase to the tune of about 32% over that of the corresponding period of the previous year, with peak landings during October. The catch rate worked out to 7.35 kg/hr of trawling. *P. stylifera* (31.0%), with major sizes of 68–103 mm, was the principal species in the fishery, followed by *M. affinis* (14.6%), *M. kutchensis* (14.0%), *M. monoceros* (9.3%) and others. The non-penaeid prawn catch of the indigenous fishery was constituted by *P. tenuipes* (65.7%), *H. ensirostris* (23.0%) and *A. indicus* (11.3%). Examination of trawl catch data indicated the possibility of good resource of larger individuals of *M. monoceros* (above 170 mm) in deeper areas off this coast beyond 40 m depth.

Karwar (Fig. 4)

With an estimated catch of 495.3 t. the prawn production at this centre registered an increase of nearly 80% over that of the previous year. Except for a small fraction of catch (0.1%) landed by the indigenous gear shore-seines (Yendi) the fishery was almost entirely made up by trawlers, with peak catches (163 t.) in April and catch rate (26.54 kg/hr) in October. The fishery was a total failure during the post monsoon period in contrast to the peak landings in December last year. *M. dobsoni* dominated in the fishery in January and February, *M. affinis* in March and *P. stylifera* during the rest of the period. *P. indicus* contributed to the

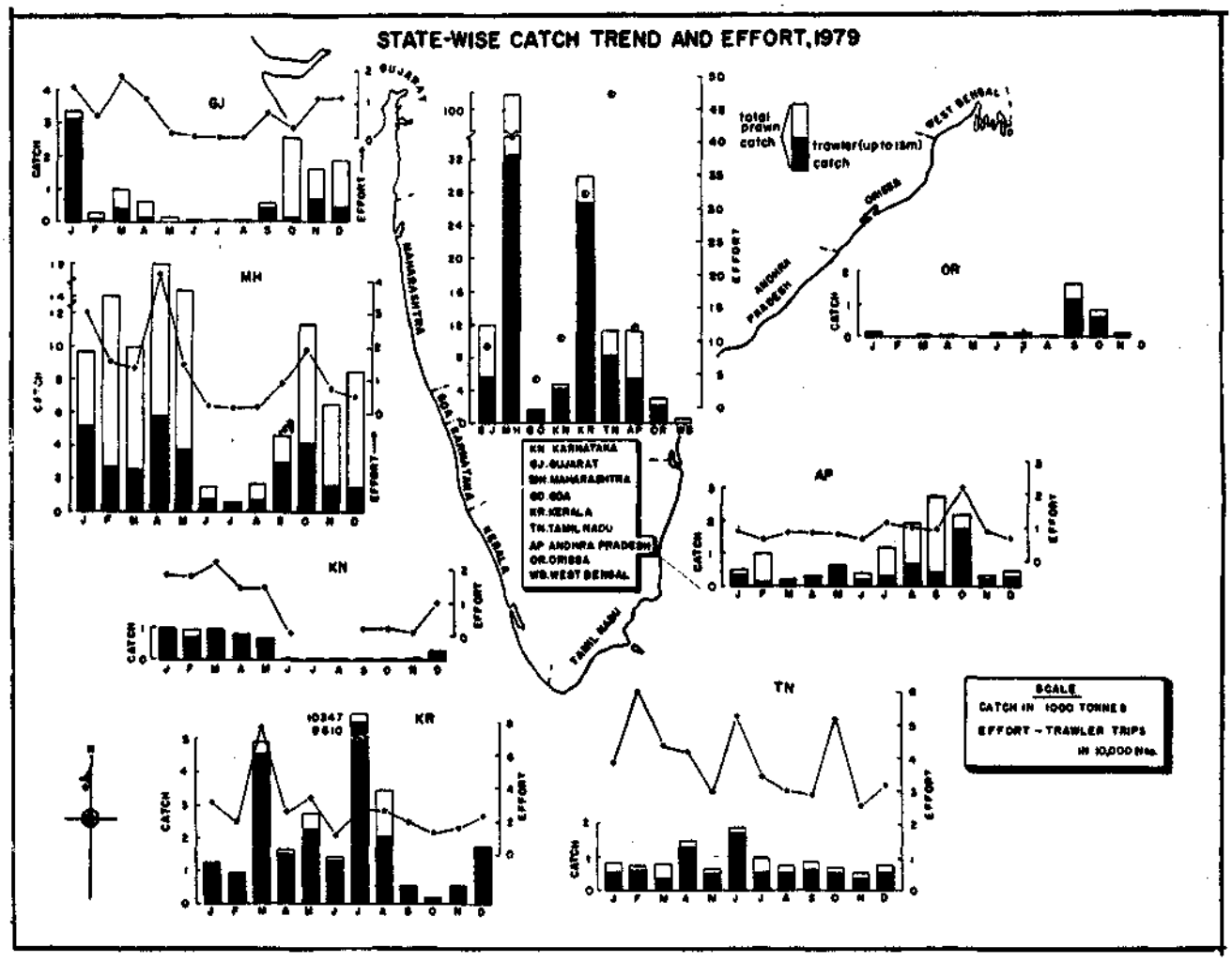

Fig. 2. Prawn landings by commercial shrimp trawlers in relation to the total prawn catch and the fishing effort during 1979.

fishery in small quantities. The modal sizes of prawns in the trawl catches varied between 71–115 mm for *M. dobsoni*, 71–100 mm for *P. stylifera*, 76–125 mm for *M. affinis* and 136–150 mm for *P. indicus*. Juveniles of *P. indicus*, mostly in the size range 91–120 mm, constituted the indigenous fishery which lasted for a short period from July to August.

Mangalore (Fig. 4)

The annual estimated total catch amounted to 1297.4 t. with a CPUE of 33.7 kg. The fishery indicated its peak during May yielding a total catch of 325.75 t. of prawns. The highest catch rate of 53.6 kg for the year has also been recorded during the month. The total catch and catch rate decreased considerably during the south-west monsoon with further decline in subsequent months, giving the poorest catch and CPUE of 4.4 tonnes and 7.5 kg respectively during October.

M. dobsoni was the dominant species, forming nearly 46.1% of the total prawn catch. The sizes ranged between 53 mm and 128 mm with principal modes at 81–85 mm and 76–80 mm. Females were dominating in the catch with matured ones in maximum percentage of 43.4 in September (Fig. 10). *P. stylifera* formed the next species in order of abundance constituting nearly 33.6% with sizes ranging between 58 mm and 128 mm and having modes at 71–75 mm and 76–80 mm groups. *P. indicus*, *M. monoceros* and *M. affinis* were also caught in lesser percentages of 7.0, 8.7 and 4.1 respectively. The maximum percentages of matured females of other species were noticed in January for *M. affinis* and *P. stylifera*. February for *M. monoceros* and April for *P. indicus* (Fig. 10).

Calicut (Fig. 5)

The fishery was continuous only during the first half of the year and revived for a short period of

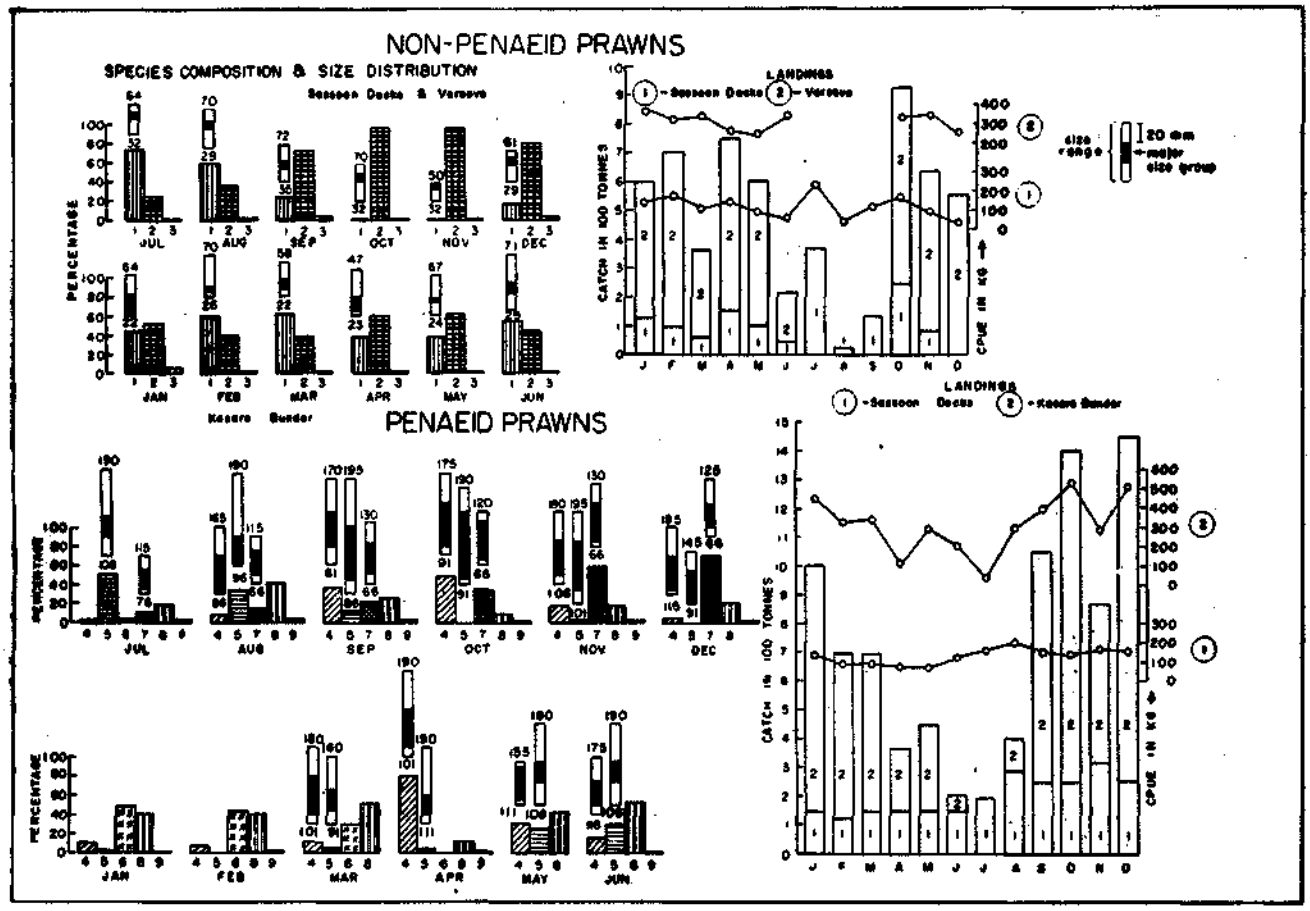

Fig. 3. Catch trend, species composition and size distribution of important species of prawns at Bombay during 1979. 1. *P. tenuipes*, 2. *A. indicus*, 3. *H. ensirostris*, 4. *M. affinis*, 5. *M. monoceros*, 6. *P. hardwickii*, 7. *P. stylifera*, 8. *S. crassicornis*, 9. Others.

December after a considerably long break of five months from July to November. At Calicut 338.02 t. of prawns were landed for the year with a catch rate of 39.19 kg per boat. When the maximum catch of 72.7 t. was recorded in March, the catch rate was 43.0 kg. The month of June sustained the maximum catch rate of 100.15 kg per boat when the total catch was at the lowest figure of 3.5 t.

Nearly 40.8 per cent of the total catch was constituted by *M. dobsoni* in size ranges of 46–105 mm in males and 41-115mm in females. The modal sizes of the species were at 63 mm, 68 mm and 98 mm for females and at 63 mm, 73 mm and 83 mm for males. *P. stylifera* with size ranges of 41–130 mm in females and 46–105 mm in males formed the next important species in the catch amounting to 117.6 t. (34.8%). *P. indicus* formed the third important species in the catch accounting for a total catch of 55.1 t. (16.3%). Mature specimens of these species were abundant in May for *M. dobsoni* (45.8%), February and December for *P. indicus* and January for *P. stylifera* (Fig. 10).

Cochin (Fig. 5)

The estimated annual landings amounted to 3369.83 t. with the CPUE of 12.6 kg per hour. While the highest total catch of 896.4 t. was in May the maximum catch rate of 30.0 kg per hour was recorded in July. After a decline during south-west monsoon, the fishery revived once again during December giving a total catch of 608.0 t.

Throughout the year *M. dobsoni* was the dominant species forming higher percentages like 78.7, 69.4 and 61.4 during December, November and January respectively. The sizes were ranging between 63–103 mm in males and 63–123 mm in females. The principal modes shifted from 81–85 mm group of the 1st quarter to 101–105 mm towards the end of the year in males

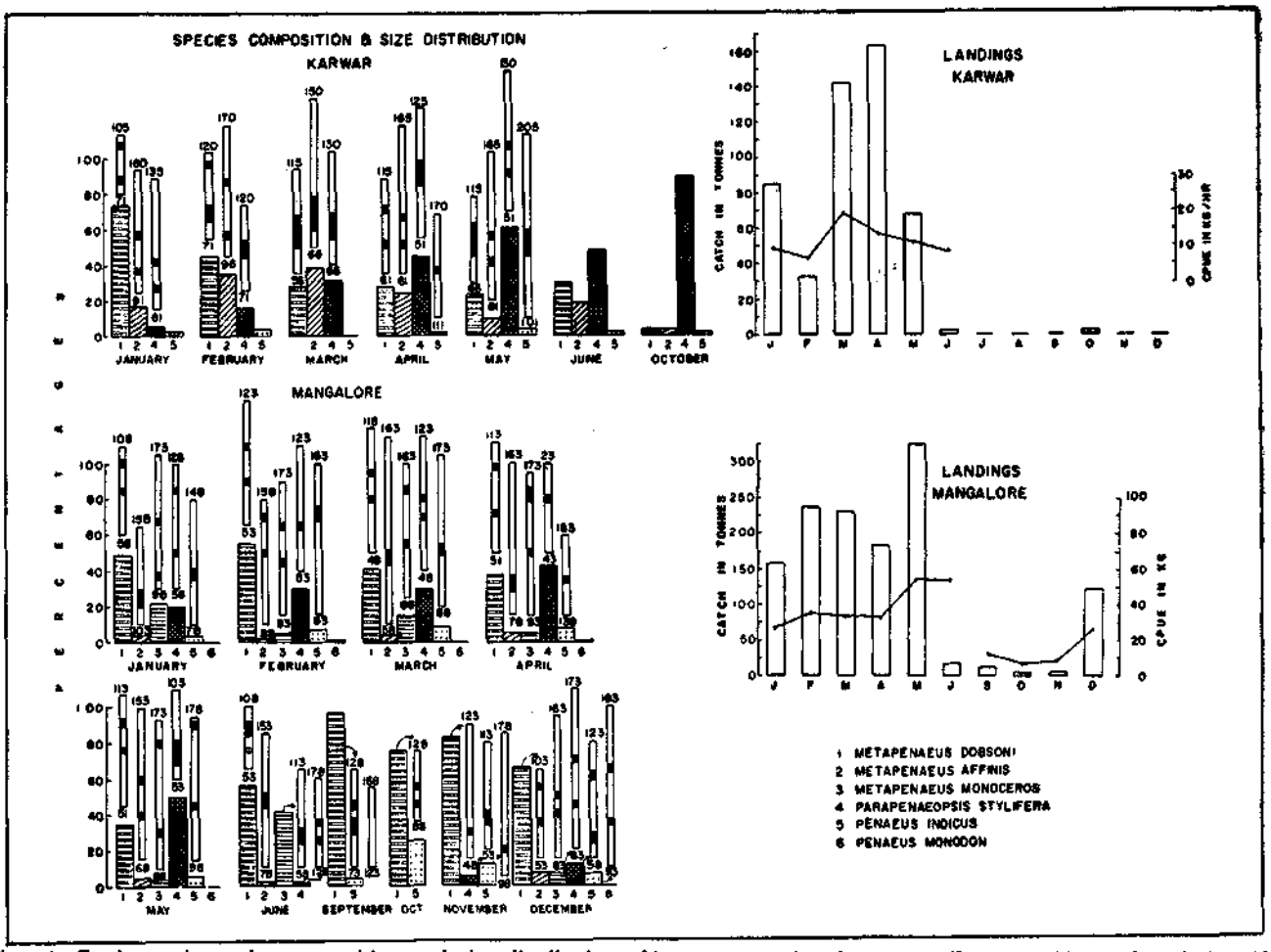

Fig. 4. Catch trend, species composition and size distribution of important species of prawns at Karwar and Mangalore during 1979.

while in females the modes shifted from 81–85 mm to 121–125 mm during the same period. Females were dominating in the catch with greater percentages of matured ones like 75.0 and 60.4 during March and February (Fig. 10). *P. stylifera* ranked second in abundance (28.0%) with prominent sizes ranging from 58–98 mm with modes at 71–75 mm and and 76–80 mm in males and between 63–123 mm with modes at 81-85 mm and 86–90 mm in females. *P. indicus* in size range of 113–178 mm was the species next in abundance during the year. *M. affinis* ranging in size of 58–123 mm were present in small quantities. The peak season for mature specimens of *P. stylifera* seems to be April (75.6%).

Neendakara (Fig. 6)

At Neendakara the total estimated catch by trawlers amounted to 14,582.0 t. of prawns as compared to 33,143 t. in 1978. The catch per unit effort was recorded at 20.1 kg per boat hour. The month of July, the peak period of south-west monsoon, recorded the maximum of total catch and CPUE (per boat hour) as 9313.0 t. and 71.8 kg respectively. Of the 9313.0 t., *P. stylifera* alone constituted 7599.4 t. forming nearly 81.6% of the total prawn catch. The next dominating species in the catch was *M. dobsoni* which contributed 1527.3 t. (16.4%). This peak was followed by a sudden decline in the fishery during the succeeding month of August with a total catch of 2064.0 t. and CPUE of 15.7 kg. January sustained the poorest yield and catch rate as 73.0 t. and 3.7 kg respectively. A detailed aceount of the depletion of the prawn resources of this centre was given in Marine Fisheries Information Service T & E Series No. 18, April 1980.

P. stylifera, forming nearly 72.7 per cent of the total landings of the year dominated in the catch. The sizes of the species ranged from 51–120 mm with modal sizes mainly at 71–75 mm and 81–85 mm forming 26% and 22% for males and females respectively. Females dominated in the catch in a ratio of 63:37. With size

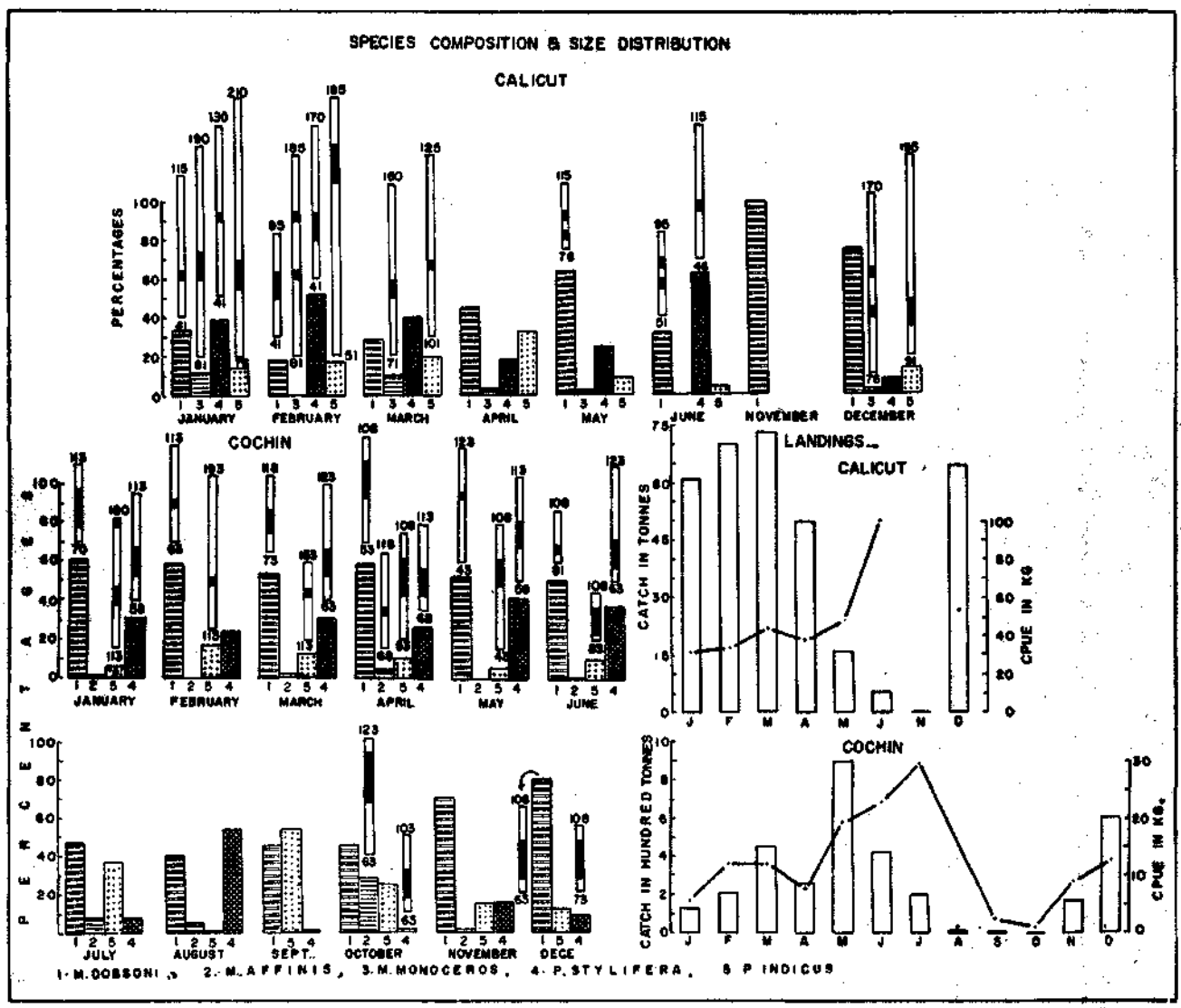

Fig. 5. Catch trend, species composition and size distribution of important species of prawns at Calicut and Cochin during 1979.

ranges between 56–95 mm in males and 56–120 mm in females, *M. dobsoni* formed the second dominant species (18.9%). The principal modes of the species were at 71–75 mm and 81–85 mm for males and at 81–85 mm for females which dominated in a ratio of 64:36. *P. indicus, M. affinis* and *M. monoceros* occurred in lower percentages of 3.9, 2.5 and 2.0 respectively. The peak breeding period for *P. stylifera* was May and December.

Tuticorin (Fig. 7)

The prawn fishery was much better during 1979 than in the previous year, the total landings of the present year being almost double (404.03 t.) that of the previous year (244.72 t.) This was mainly due to the increase in the catches of *P. semisulcatus*. The peak prawn landings took place in May–October and December. But, the maximum effort was expended during May and September. During the months of March, May, August and September the catches were nearly twice that of the previous year, while in June and July it was thrice this quantity. The month of May registered the highest landings of the year (39.05 t.). As interesting feature of this year's catch composition is that *M. dobsoni* formed a considerable portion of the fishery unlike previous years, forming 6.7% of the total annual prawn catches.

The catch per unit effort was nearly double in June and July while in other months there was marginal increase except in February and August when the CPUE was less than that of the previous year.

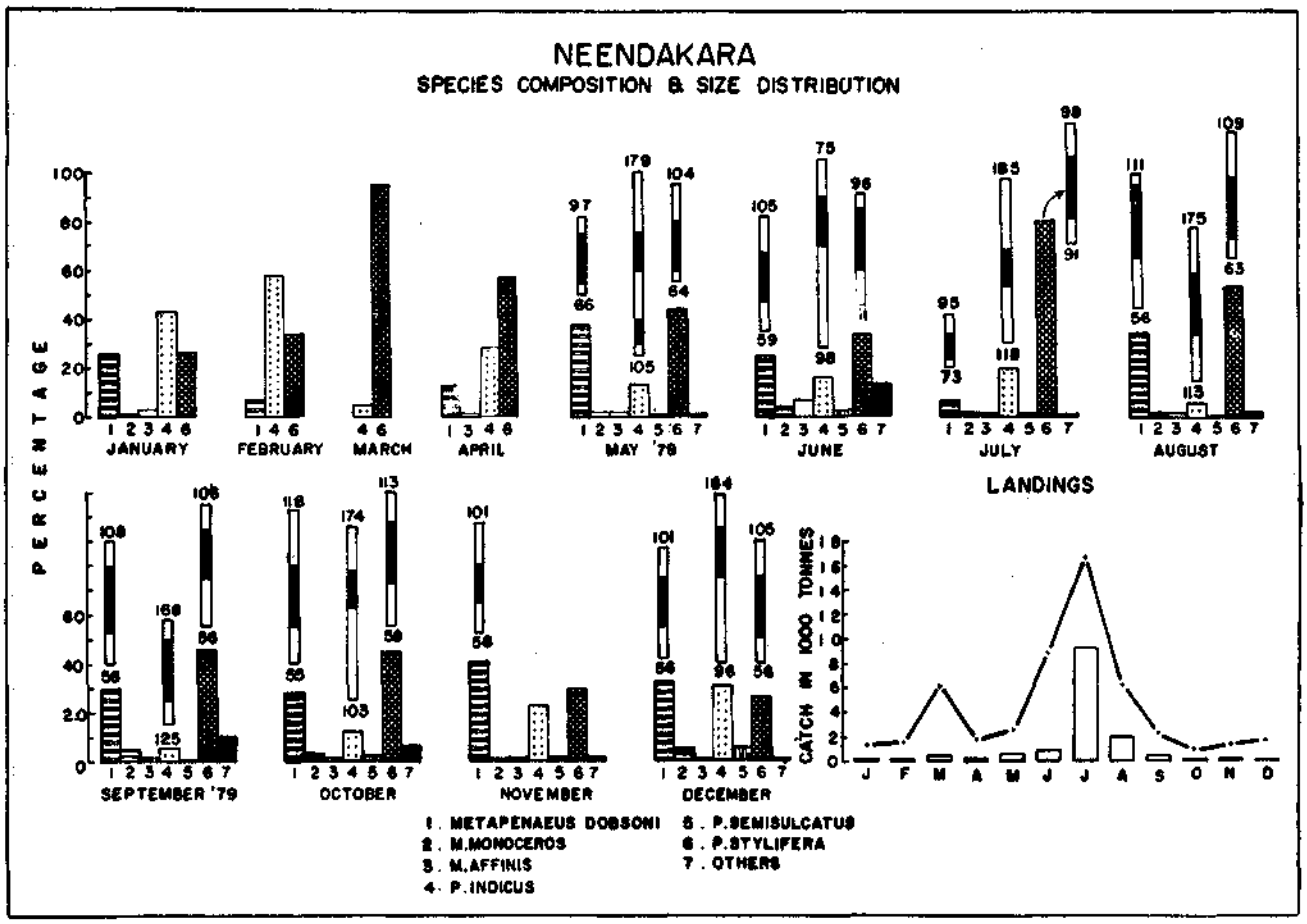

Fig. 6. Catch trend, species composition and size distribution of important species of prawns at Neendakara during 1979.

The dominant sizes of *P. semisulcatus* ranged from 113–168 mm. The spawning season was during June to December as in the previous year (Fig. 10) with peak breeding activity in August and October.

Mandapam (Fig. 7)

The total landing of prawns during this year was only 396.6 t. as against the previous year's 560.2t. This was mainly due to the reduction of the landings of *P. semisulcatus*, which is the major component of the prawn fishery, to less than half of the previous year. *M. affinis* accounted for 40% of the total catch of 1979 while it was only about 4% in 1978, bringing about a noticeable change in species composition in the fishery. The CPUE was only about half (15.66 kg/hr) that of the previous year (31.81 kg/hr).

The dominant sizes of *P. semisulcatus* were 103–113 mm in males and 123–143 mm in females. Maximum percentage of mature females were noticed in February (76.2%) (Fig. 10).

Small quantities of *Metapenaeopsis stridulans* and *Trachypenaeus pescadoreensis* also formed part of the prawn landings during the months of May to August 1979.

Madras (Fig. 7)

The prawn landings of 1979 amounted to 173 t. forming 7.2–22.9% of the total marine landings. This was lesser than the catch of prawns in 1978. The maximum quantity of prawns were caught in September although percentage occurrence of prawns in total marine catch was maximum in February. The catch per hour was high during the months of January, October, November and December as in the previous year.

During the year *P. indicus* (45.7%), *M. dobsoni* (33.9%) *P. monodon*(11.6%) and *P. semisulcatus* (8.7%) constituted the catches. The larger sizes of *P. indicus* were in the range 106–145 mm although the sizes ranged from 93 mm to 203 mm. In *P. semisulcatus* the size variation was from 93 mm to 223 mm with modal sizes in 128–168 mm group. Mature females were in maximum percentage in August in the case of *P. indicus*

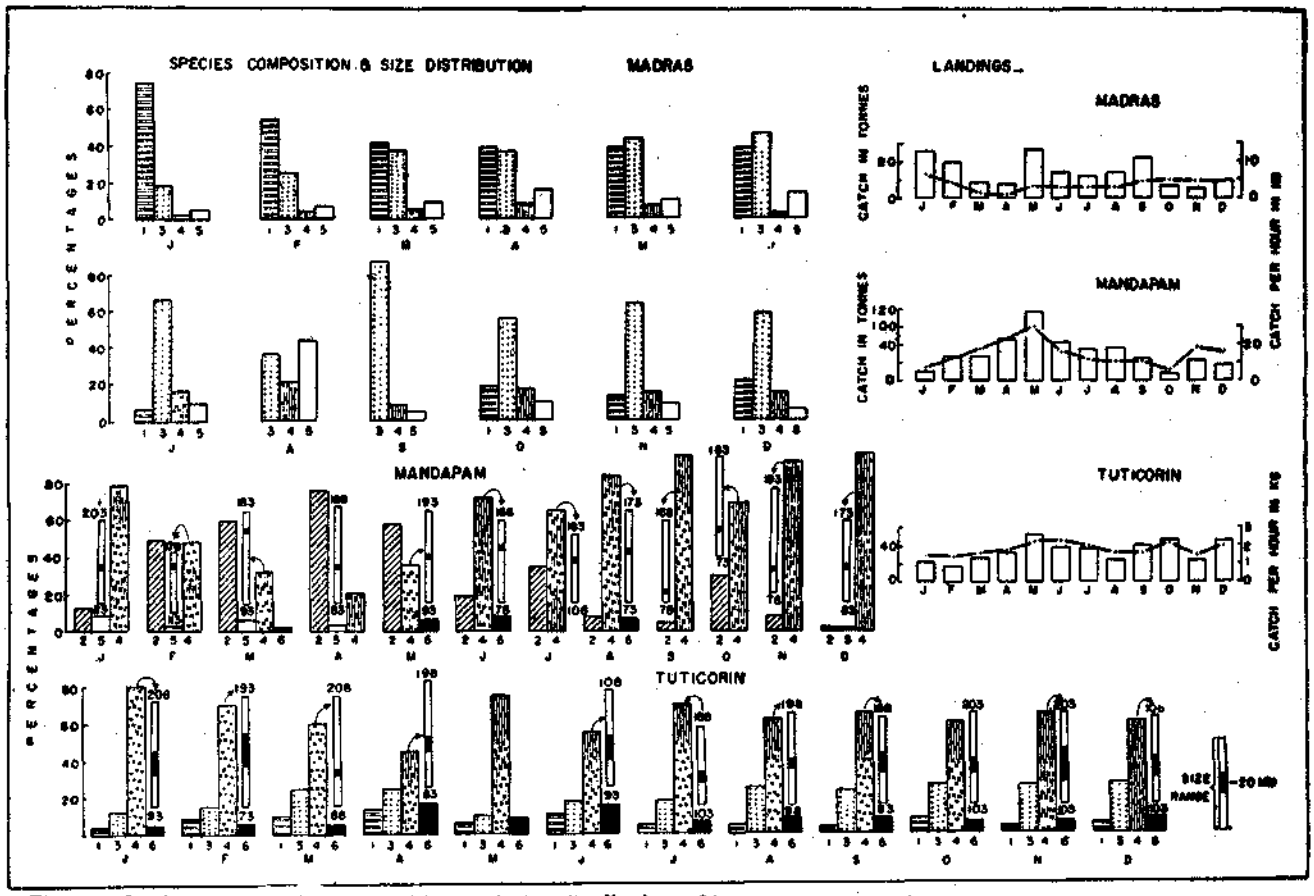

Fig. 7. Catch trend, species composition and size distribution of important species of prawns at Tuticorin, Mandapam and Madras during 1979. 1. *M. dobsoni*, 2. *M. affinis*, 3. *P. indicus*, 4. *P. semisulcatus*, 5. *P. monodon*, 6. Others.

(90.0%) and July to September in *P. semisulcatus* (Fig. 10).

Kakinada (Fig. 8)

Prawn fishery was better during this year than the previous year. The total prawn landings in 1979 was more (2396.05 t.) than that of the previous year (2026 t.). This was mainly due to the increased catches in the months of April to July. The CPUE was less during the present year (4.72 kg/hr) than that of the previous year (5.38 kg/hr). The maximum catch per hour of 8.97 kg was registered in May during the year 1979 while it was maximum (17.52 kg/hr) in August 1978. Highest effort was put in during January, giving a catch rate of only 3.23 kg/hr.

The most important species constituting the prawn catches were *Solenocera crassicornis*, *Acetes* spp., *M. dobsoni*, *Palaemon styliferus* and *M. monoceros*., in the order of abundance. The catches were dominated by penaeid prawns in all the months except August.

The major sizes ranged in length from 68 to 88 mm in *M. dobsoni* while the size range was from 43 to 115 mm. In *M. monoceros* the modal sizes were of the size range 68 to 78 mm.

Waltair (Fig. 9)

In the total prawn landings at Waltair there was only a marginal increase of 49 t. from previous year. The maximum catch was recorded in November followed by July and December. The catch per unit effort was less (2.9 kg/hr) during this period than that of previous year (3.5 kg/hr). The total effort expended during 1979 was more (2,99,914 hr) than the previous year (1,89,327 hr). The species represented in the fishery were M. monoceros (42.3%), *P. indicus* (22.9%) and *P. monodon* (6.2%) in the order of importance.

The modal size of *M. monoceros* was of 143–158 mm length while in *P. indicus* this size was 148–198 mm.

Puri (Fig. 9)

There was a marked decline in the prawn catches of this centre during the year 1979 in comparison to

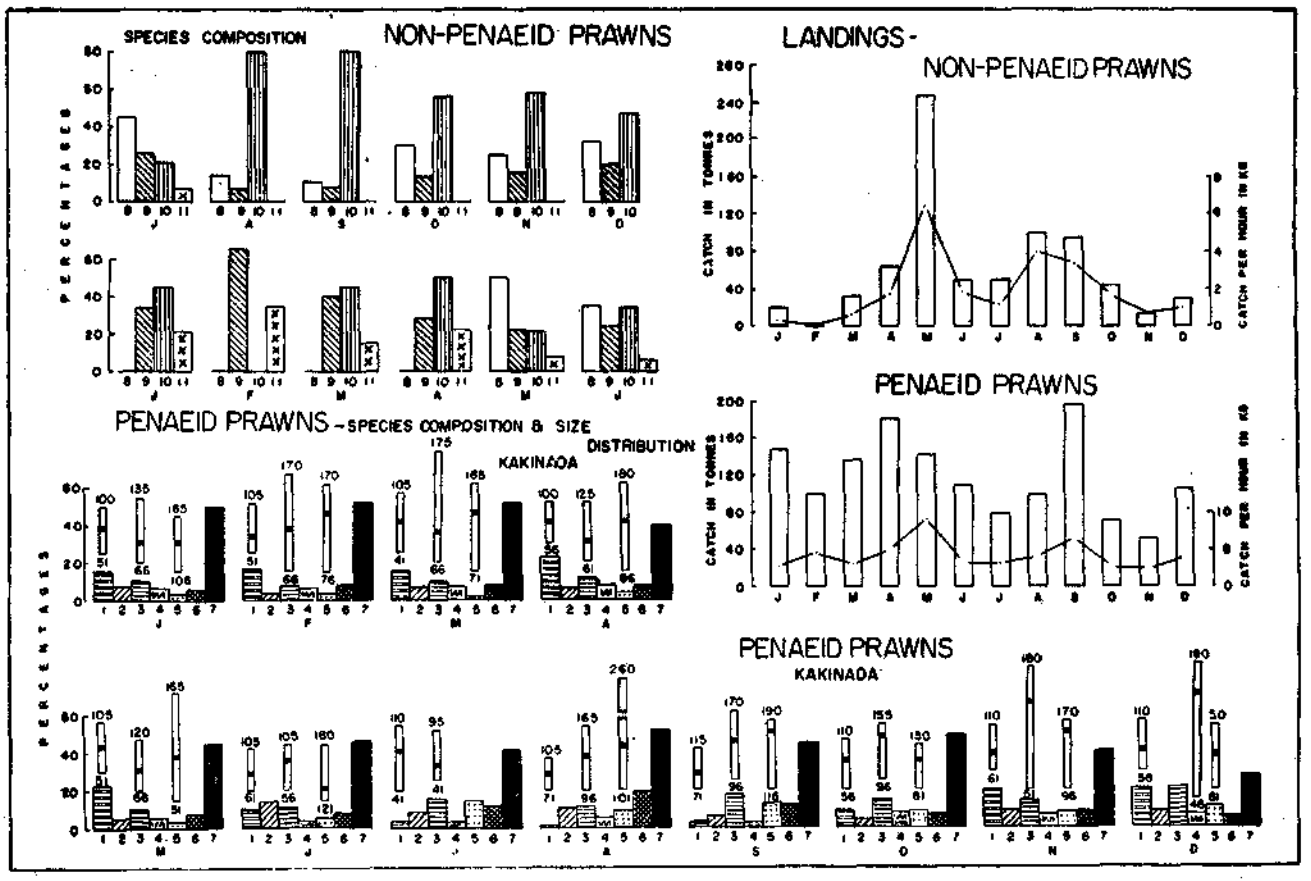

Fig. 8. Catch trend, species composition and size distribution of important species of prawns at Kakinada during 1979. 1. *M. dobsoni*, 2. *M. affinis*, 3. *M. monoceros*. 4. *M. brevicornis*, 5. *P. indicus*, 6. *P. stylifera* 7. Others, 8. *Acetes spp.*, 9. *P. styliferus*, 10. *P. tenuipes*, 11. *H. ensirostris*.

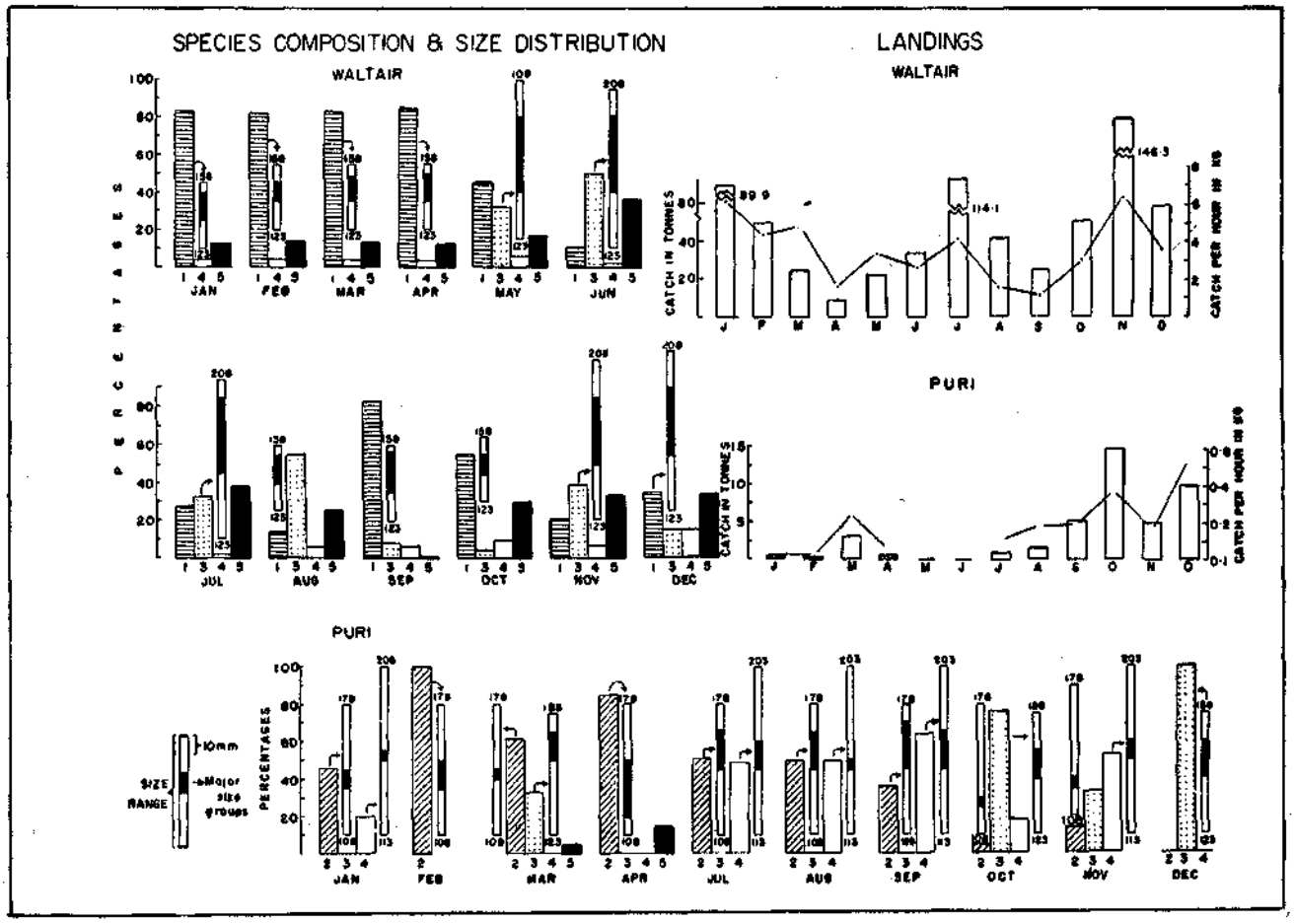

Fig. 9. Catch trend, species composition and size distribution of important species of prawns at Waltair and Puri during 1979. 1. *M. monoceros*, 2. *M. affinis*, 3. *P. indicus*, 4. *P. merguiensis*, 5. Others.

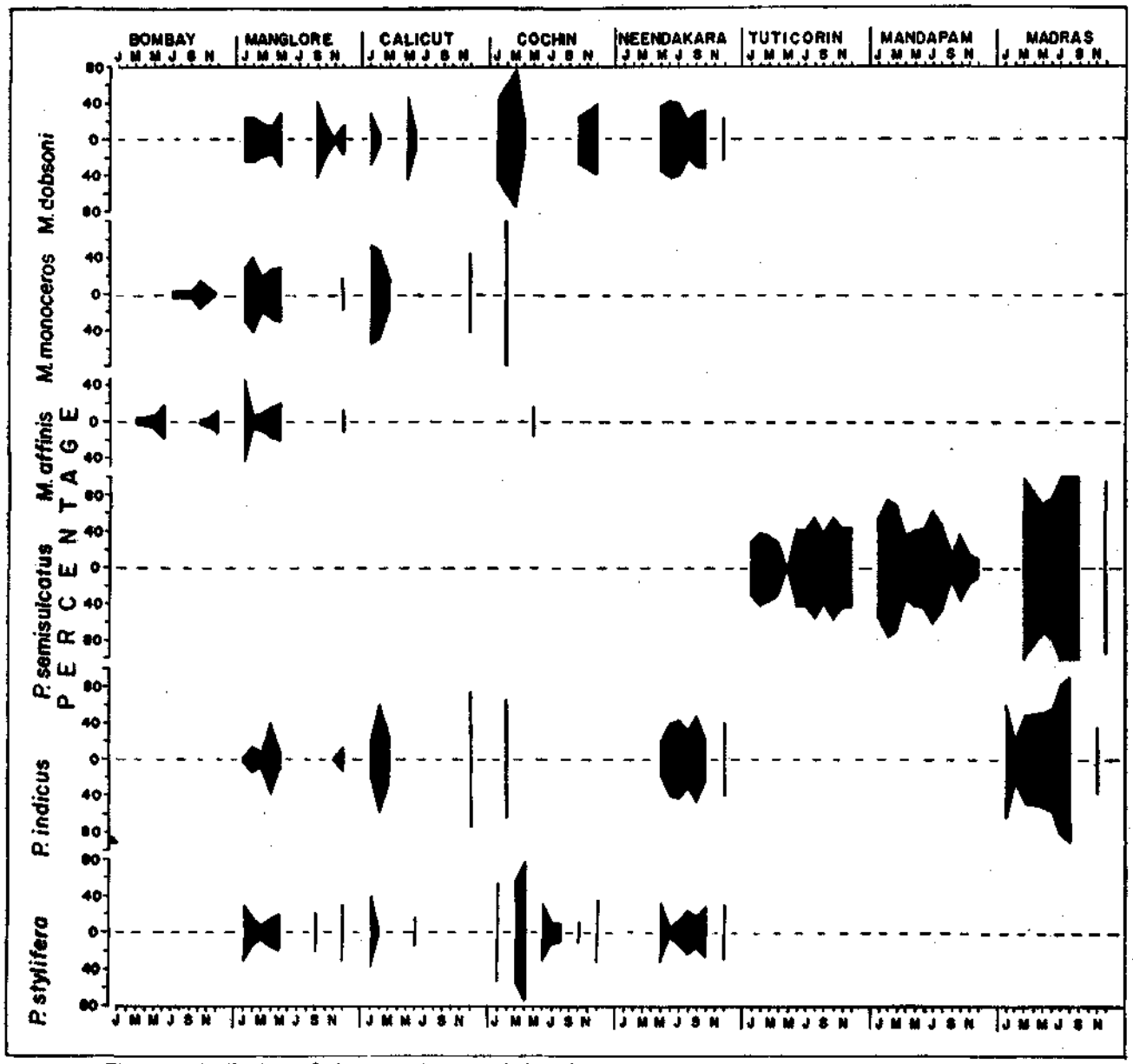

Fig. 10. Distribution of the spawning population of important species at selected centres during 1979.

that of 1978. The total catch during the present year was only half (52.07 t.) of the previous year's catch (107.87 t.). There was decrease in the effort expended during this year (2,93,131 hr) from that of previous year (3,60,137 hr). The CPUE was also less by about 40%. Although the fishing season started with good catches in October, the rest of the season was very poor.

P. indicus was the major constituent of the prawn fishery amounting to 63.3% of the total prawn catches, followed by *P. merguiensis* (21.8%) and *M. affinis* (14.1%). The landings of other species viz., *P. monodon* (0.4%), *M. dobsoni* (0.4%) and *M. lysianassa* (0.04%) were negligible.

The major sizes were 148–173 mm in *P. indicus*, 148–168 mm in *P. merguiensis* and 133–148 mm in *M. affinis*. The maximum percentage of mature females of *P. indicus* was observed in March (90.0%) with a subsidiary peak in December.

The stranding of a young sperm whale near Quilon*

Stranding of a whale at Puthenthuruth Island in the Ashtamudi lake near Quilon on 25th November was reported in the local news papers. A visit was made to the spot to examine the specimen. The location was about 2.5 km from the Neendakara bar mouth. Local inquiries revealed that the animal was alive and making distressing sounds at the time of its first sighting at about 2 m depth region. It was tied up with a rope and dragged ashore by the fishermen (Figs. 1 & 2).

A slight injury was noticed at the base of the caudal fluke. The abrasion was probably caused by its entanglement and subsequent escape from a drift net. A piece of synthetic webbing with the float line cord was found attached to the caudal peduncle.

From the morphometric characters, enormous size of the head and tiny lower jaw (fig. 3) the animal was identified as a sperm whale belonging to the suborder Odontoceti, under the order Cetacea, family Physeteridae and species *Physeter macrocephalus* Linnaeus which is a synonym of *Physeter catodon* Linnaeus. The external body measurements of the specimen are given below:

Morphometric characters	Measurements (cm)
Total length (snout to notch of caudal flukes)	555
Projection of snout (mid point) beyond tip of lower jaw	40
Tip of snout to blow hole	21
Tip of snout to angle of gape	103
Tip of snout to centre of eye	112
Tip of snout to tip of flipper	219
Tip of snout to anterior insertion of flipper	160
Tip of snout to centre of genital opening	305
Tip of snout to centre of anus	365
Notch of flukes to centre of anus	180
Notch of flukes to centre of genital opening	243
Length of fluke (dorsal) on the outer curvature	70
Length of fluke (dorsal) on the inner curvature	65
Distance between extremities of flukes	110
Width at insertion of flukes	29
Length of flipper from anterior insertion to tip	62
Greatest width of flipper	28
Depth at anal region	69
Depth at origin of flipper	93
Depth at origin of dorsal	96
Maximum depth	107
Depth of head front	70
Tip of lower jaw to centre of anus	321
Length of lower jaw	66
Maximum width of lower jaw between teeth	17
Width of tongue	16
Width of mouth (angle to angle)	50
Length of blow hole	18
Width of blow hole	4
Antero-posterior length of eye slit	6
Dorso-ventral diameter of eye	3
Distance between centre of eye and cleft of mouth	36
Length of genito-anal slit	31
Distance between genital opening and anus ..	51
Distance between umbilicus and centre of genital opening	49
Distance between hind border of genital opening and anterior border of anus	51

Fig. 1 & 2. Stranded whale being dragged ashore.

Fig. 3. Lower jaw of the whale.

The head of the whale measured approximately 1/3 of its body length. The characteristic massive, squared off head had an abruptly blunt snout. The colour of the body was dark bluish grey. It was a female specimen weighing about 2 tonnes. The size of the animal and nature of the under developed teeth on the jaws lead to the inference that it was a young specimen. A.E. Daugherty (1965) in "Marine Mammals of California" reported the length of the baby sperm whale at birth as 12 to 14 feet.

The stranding of young sperm whale is quite rare. There were three earlier reports of the stranding of the species along the Indian coasts, twice from Madras (Blanford, W.T. 1891, *The fauna of British India, Ceylon and Burma* Mammalia: 571 and James D.B. and S. Manivasagam, 1980, *J. mar. biol. Ass. India*, 18 (2): 309–402) and once from Karwar (Raja B. T. A. and M. V. Pai, 1973, *Indian J. Fish.*, 20 (2): 641–645). In the present instance it is strange that the young live specimen of a strictly oceanic species should have run up to an inshore area and got stranded finally in the backwaters. It is interesting to note that the specimen at Karwar was also washed ashore at Kodibag where the Kali river meets the sea. Sprem whales are known to have a very wide distribution and capable of descending to great depths. The spermaceti organ located in the head and the high body oil content are considered responsible for their capacity for deep diving.

The spermaceti oozing from the head wounds made by the fishermen as well as the blubber from the body was collected by them for extracting the oil. Ambergris, a waxy substance obtained from the adult sperm whale's intestine, is of high commercial value as a fixative in the perfume industry. It appears as a hardened matter formed by mixing of some indigestible relics of food with its dung. The present specimen being quite young, this valuable material may not have developed.

It is reported that the entire skeleton of the whale has been purchased by the Department of Marine Sciences, University of Cochin, for their museum. The help of Shri Mathew, Deputy Director, Department of Fisheries, Kerala is gratefully acknowledged.

* By V. N. Bande, G. Luther, S. Lazarus and A. A. Jayaprakash, C. M. F. R. I.

The energy from the sea removes its salt

Tapping the oceans which cover nearly three-quarters of the globe, for freshwater has long been a dream. Scientists all over the world have been at work to find out an easy way of desalination of the sea water. Now an invention at University of Delaware, developed in part with funds from the National Oceanic and Atmospheric Administration (NOAA) Academic Sea Grant Program may make this dream come true.

Called the Delbuoy, the unique desalination buoy-pump makes use of the wave force to pressure sea water through a specially constructed membrane that separates the salt from the water. The filtering process called "reverse osmosis" produces water free of every type of impurity, even chemical pollutants. The interesting aspect of the invention is that the energy for the freshwater production comes from the sea itself. The roll of the waves moves the buoy, activating the submerged pump, forcing the sea water into the reverse osmosis filter at a pressure of about 365 kg per 6.5 sq. cm. producing approximately 1500 gallons of fresh water a day.

In a joint programme scientist from the University of Delaware and the University of Puerto Rico will be testing a 15-foot diameter pototype of the Delbuoy off the Peurto Rican port of Mayaguez. If all goes well, the oceanographers will have a desalination device specifically designed for this area. While a single Delbuoy would not be able to produce enough water for a particular area, a large number or cluster of these easy-to-maintain pumps would provide the necessary output.

The inventors have designed the unit to emphasise long life and reliability. To protect the device in times of coastal storms the scientists have provided a weak link just below the buoy that will break in times of stress. This sacrificial engineering permits the more expensive pumping parts of the unit to drop to the bottom of the sea, where they are safe from the storm and could be recovered afterwards.

International Exchange News 24 (3): 1980

Strength of chain

It is commonly known that if a rope, either natural or synthetic, is tightly bent round too tight a turn, it suffers a considerable reduction in strength because on the inside of the curve it is compressed and in the outside it is stretched over the compressed portion. Thus in effect the rope is destroying itself. The same applies to wires and chains tightly curved round winch drums. This has been reported at the 1980 Offshore Technology Conference in Houston, Texas by two research workers investigating the weakening of stud link chain subjected to strain while passed around varying diameters of drums. The most important of their observations was that when the drum surface diameter was more than seven times the chain diameter there was no real problem of weakening, but when the drum surface diameter was less there was significant weakening of the chain.

FNI 19 (7): July 1980

Potential oceanic squid resources

In a recent publication from the Fisheries Laboratory in Lowestoft the resources of large deep water squids have been estimated at between 8 and 60 times greater than squid resource from the world continental shelves which is about 8 to 10 million tonnes. But fishing for oceanic squids present huge technological problem which has not yet been solved.

Of the 24 species of oceanic squids thought to have economic potential, there are 5 dominant forms which approach the surface at night. For these, at least, it should be possible to develop fisheries using jigging and light attraction. In a trial cruise by a research vessel in the south west Atlantic, although oceanic ommastrephids were attracted to the light in waters of 1000 m depth, the jigging gear was found to be too light to catch the big squids. Therefore it appears that for commercial exploitation of deep water squids suitable gear must be developed and this is likely to be a large mid-water trawl.

FNI 19 (4): April 1980

Aquaculture yield in China much below estimate

Till recently it was believed that China produced nearly half her fish from pond culture and other types of aquatic farming, out of an estimated production of 6 to 7 million tonnes in a year. But a recent report from the Yellow Sea Aquatic Products Institute presents a very different picture. According to this report the estimated total production in 1978 is 4.65 million tonnes, out of which only 1.2 million tonnes (landed dry weight) was taken by fish and shellfish farming, contributing only about 25 per cent.

FNI 19 (6): June 1980

Rope five times stronger than steel

A new type of rope called combirope, claimed to offer several advantages to the fishing industry has been introduced by Roblon Ltd., Denmark. This is constructed with a core of Du Pont "Kevlar" aramid fibre with a braided outer cover of polyester. With this design it has been possible to produce a range of ropes which are 65% lighter and 15% smaller in diameter than stainless steel ropes of equivalent strength and having five times the strength of steel at the same weight.

By using these ropes for headlines and foot ropes of trawl nets the total trawl weights can be reduced by up to 20%. With the resultant lower drag, trawling at higher speeds will be possible, thus enhancing catch potential. The new rope cannot carrode and will not kink, thus overcoming two major causes of steel rope failure.

FNI 19 (6): June 1980

BOOKS

Zooplankton Community Analysis. By William M. Lewis, Jr. Springer-Verlag, New York, pp. 163, 1979.

The book is based on the premise that the study of ecological communities should be composite analysis of system properties and population properties backed by thorough understanding of the physical-chemical environment. This book has a case history format, which increases the opportunity for detailed analysis, although the author has attempted to maintain the

general perspective of a community ecologist and to draw extensively from the literature wherever it seems profitable to do so. The case history data are for lake *Lanao*, a large tropical lake in the Southern Philippines. As the author gave entirely original and unpublished data it can serve as reference book for the workers in the other tropical areas.

Fish phenology: Anabolic adaptiveness in teleost fishes. Edited by P. J. Miller. Academic Press, London, pp. 450, 1980.

The volume contains the proceedings of the Symposium No. 44 of the Zoological Society of London held on 6 and 7 April 1978. The book suggests a new definition of phenology, relates it to anabolism and explores it in teleost fishes. The basic topics include treatment of energy partitioning, accumulation, endocrine control and response to environmental influences. The timing, magnitude and fecundity of reproductive commitment is discussed for some of the many ecotypes successfully occupied by the teleosts. A wide range of habitats are considered as well as the phenological modifications required for the different life style, seasonality and size of various fishes. Two important areas of fish phenology not often reviewed, namely the nature of senescence affecting the duration of individual anabolism and the genetic transmission of growth and reproductive characteristics, are included. A series of topics developed from theoretical areas to applied sectors of fisheries and fish culture are featured, which will be invaluable for all research workers dealing with fish biology, ecology and fish culture.

Handbook of Phycological Methods: Developmental and Cytological Methods. Edited by Elisabeth Gantt. Cambridge University Press. Cambridge, pp. 425, 1980.

This is the third volume of the series entitled Handbook of Phycological Methods sponsored by Phycological Society of America. It is an introduction to studying both the development of algae and the structure of living and fixed cells by microscopic techniques. Sources of culture collections and suppliers of equipment and materials are listed in a separate appendix. This will be a reference book to researchers, teachers and professional biologists and to students in phycology, botany, cell biology, microbiology, plant physiology, marine biology and environmental monitoring.

Compiled and prepared by M. J. George, C. Suseelan, M. M. Thomas, N. S. Kurup, S. K. Dharmaraja and G. Subbaraju.
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