

An Account of Trawl Fishing off Kakinada

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In the present communication the authors have reviewed the trends of bottom trawling for the last one and a half decades off Kakinada. Performance of various designs of two-seam and four-seam trawls was also assessed. On an average the catch rate was found to be 33.3 kg h⁻¹. The five yearly landings were worked out for three periods, 1967-71, 1972-76 and 1977-81 at different depth ranges off Kakinada. The analyses reveal 1967-71 period to be the most productive. There is considerable reduction in the catch per unit effort during 1972-76 and 1977-81 periods. The catch rate was lowest during 1977-78. An attempt is made to correlate the catch with the increase in the number of fishing boats from year to year.

Periodic attempts were made along the east coast (Hornell, 1916; Sunder Raj, 1933; Chidambaram, 1953; John *et al.*, 1959) to introduce bottom trawling. But its impact as an established fishing method is of recent origin especially off the coast of Andhra Pradesh. Establishment of Off Shore Fishing Station at Vishakhapatnam has initiated bottom trawling as a means of exploiting living resources of the sea along the coast (Poliakov, 1963; Shariff, 1961).

Off Kakinada trawling was initiated by the Central Institute of Fisheries Technology, through its experimental exploratory fishing since 1964 and this has resulted in the establishment of this method as a major fishing technique from small medium class of fishing vessels along this coast (Sebastian *et al.*, 1965; Sreekrishna & Narayanappa, 1970; Narayanappa *et al.*, 1970). Presently, there are 1200 registered fishing boats engaged in bottom

trawling in this coast. An attempt is made in this communication to provide information regarding the availability of fishery resources and suitable trawl gear for their exploitation and also to correlate the catch rate with number of fishing vessels.

Materials and Methods

Data collected through experimental fishing with *Fish. Tech. No. VII* have been analysed for different conclusions. The particulars of the number of fishing vessels added to the fleet were collected from the Deputy Director of Fisheries (F.T.O), Kakinada.

Results and Discussion

The annual catch along with the fishing effort is given Table 1. In order to study the availability of

Table 1. Yearly catch from 1967-'81

Year	Efforts in trawling hours	Total catch			Catch h ⁻¹			% of prawn
		Prawn, kg	Fish, kg	Total, kg	Prawn, kg	Fish, kg	Total, kg	
1967	304	2655	14,853	17,508	8.73	48.85	57.58	15.21
1968	621	3149	41,009	44,158	5.07	66.03	71.10	7.13
1969	396	2503	25,543	28,046	6.32	64.50	70.82	8.92
1970	330	1936	22,647	24,583	5.86	68.62	74.78	7.83
1971	379	1159	16,461	17,620	3.05	43.43	46.48	6.56
1972	326	2282	14,041	16,323	7.00	43.07	50.07	13.98
1973	403	2048	16,473	18,521	5.08	40.87	45.95	11.06
1974	316	1571	5,939	7,510	4.97	18.79	23.76	20.91
1975	437	1667	11,300	12,967	3.81	25.85	29.66	12.84
1976	256	1121	10,413	11,534	4.38	40.67	45.05	9.72
1977	341	1980	3,502	5,482	5.80	10.27	16.07	36.10
1978	248	432	1,771	2,203	1.74	7.14	8.88	19.60
1979	342	834	4,905	5,739	2.44	14.34	16.78	14.54
1980	357	407	5,644	6,051	1.14	15.80	16.94	6.72
1981	354	388	5,038	5,426	1.09	14.23	15.32	7.11
Total	5410	24132	1,99,539	2,23,671	4.46	36.88	41.34	10.79
Average/year	360.6	1608.8	13,302.6	14,911.4	4.46	36.89	41.35	—

Table 2. Types of bottom trawls and their catch

Period	Type of net	Fishing effort, h	Catch, kg			Catch h ⁻¹			Prawn, %
			Prawn	Fish	Total, kg	Prawn	Fish	Total, kg	
1967-'71	18.36 m two seam	1,121.5	5,349	64,890	70,239	4.77	57.88	62.25	7.60
	16.16 m two seam	273.5	1,125	21,166	22,191	4.11	77.39	81.50	5.48
	30 m long wing four seam	469.5	3,376	24,540	27,916	7.19	52.22	59.41	12.05
	18.3 m four seam	113.0	193.00	9,163	9,356	1.76	81.08	82.78	2.06
	Total	1,977.0	1,0043	119,759	129,802	5.07	60.57	65.64	
1972-'76	Bulged-belly trawl	802.5	3,954	27,529	31,483	4.92	34.30	39.22	12.56
	Six seam trawl	407.0	1,828	13,646	15,474	4.49	33.52	38.01	11.80
	Long wing trawl	467	2,436	17,123	19,559	5.19	36.66	41.85	12.50
	Total/Average	1,676.5	8,218	58,292	66,516	4.90	34.83	39.73	
1977-'81	Bulged-belly trawl	1,068.8	3,206	12,613	15,819	3.00	11.80	14.30	20.27
	High opening trawl	319.0	416	5,892	6,308	1.30	18.47	19.77	6.65
	Vertical double trawl	84.5	57	935	992	0.57	11.06	11.73	5.78
	Parallel double trawl	120.0	213	1,290	1,503	1.63	9.92	11.55	14.17
	Twin trawl	87.0	132	676	808	1.63	7.74	9.37	16.33
	Average	1,689	4,024	214,406	25,430	2.35	12.67	15.02	

resources at different depth ranges the catch of prawn and fish per trawling is given in Fig. 1 while the percentage composition of prawn in Fig. 2. The types of trawling gear experimented along with the catch particulars during the three five yearly periods are given in Table 2. Monthly and quarterly catch rate is given in Table 3.

The annual landings from bottom trawls have been on the increase from 1967 to '70 and showed a declining trend since then. Thus the catch was 57.61 kgh⁻¹ in 1967 which increased to 74.48 kgh⁻¹ in 1970. But catch was only 46.49 kgh⁻¹ in 1971 which has gone down to 15.3 kgh⁻¹ in 1981, while the lowest catch of 8.92 kgh⁻¹ was recorded in 1978. (Table 1).

However, the average catch of 41.6 kgh⁻¹ for the entire period compares well with that recorded by Muthu *et al.* (1975) that is 52.7 kgh⁻¹ for *Sorrah* type boat (10.97 m) during 1968-'70 and the average catch rate of 38.8 kgh⁻¹ during 1969-'78 (Anon 1981) for all types of boats operated off Kakinada.

The decline in catch rate (Table 1) may be due to the increase in the number of boats operated off Kakinada from year to year. The number of boats registered at Kakinada were only 22 in 1967 while it increased to about 1200 in 1981.

Prawn catches

The prawn catches also showed a declining trend from 1967 when it was at its peak with 8.76 kgh⁻¹ while it was 1.09 kgh⁻¹ during 1981 with an average of 4.46 kgh⁻¹ for the entire period. Muthu *et al.* (1975) have reported that the catch of prawn by *Soraha* type boat varied from 5.80 to 13.74 kgh⁻¹ with an average of 6.59 kgh⁻¹ during 1968-1970. The present observa-

tions for a period of 15 years compare well with these observations. Similarly the percentage composition of prawn observed by Muthu *et al.* (1975) for *Sorrah* type of boats was 12.49% (for 1968-70) is well comparable with the present findings of 10.79% of prawn of the total catch for the entire period (1967-81).

Catch rate of prawns and fish at different depths

Figs. 1 and 2 show that the prawn catch is maximum at 11-15 m depths off Kakinada. The observation is in conformity with earlier studies of Sreekrishna & Narayanappa (1970) and Muthu *et al.* (1975). Thus the prawn catch as well as composition has steadily decreased from 11-15 m depths with increase in depths of fishing. Slight fluctuations in catch rate at higher depth ranges observed might be due to the fact that at these depths

Table 3. Monthly and quarterly total catch rate

Month	Catch per trawling hour, kg			Quarterly catch h ⁻¹ kg
	Prawn	Fish	Total	
January	2.67	26.26	28.93	45.55
February	2.53	56.74	59.27	
March	3.27	49.90	53.17	
April	5.63	41.15	46.78	
May	5.46	26.34	31.80	
June	6.37	24.77	31.14	31.30
July	4.31	19.84	24.65	30.91
August	4.73	31.31	36.04	
September	3.89	42.70	46.59	
October	2.91	27.43	30.34	
November	1.17	29.28	29.99	
December	2.71	25.50	27.67	27.12

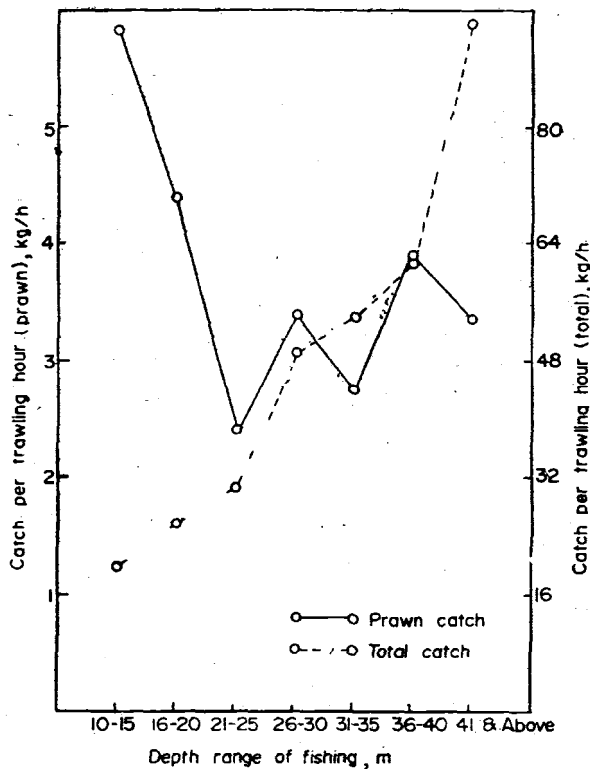


Fig. 1. Catch per hour and total of prawn at different depths

prawn catch was dominated by *Penaeus indicus*, *Metapenaeus monoceros* which were observed to be caught in shoals.

Contrary to the prawn catch the fish catch was observed to increase with increase in the depth of fishing. This might be due to the change in the distribution of prawn and fish at different depths (Narayanappa *et al.* 1968).

Seasonal abundance

Table 3 shows that good catch rate was obtained during February, March and April after which there was a slow decline up to July. Though there was some increase in August and September, the catch decreased constantly. Thus highest catch rate was recorded in February while the lowest in December. The better catch during February to April may be due to the presence of *Decapcturus* sp., *Penaeus indicus* and *Nemipterus* sp. among trawl catch during this period (Narayanappa *et al.* 1968, Muthu, *et al.*, 1975). The analyses of the catch rate showed that the first quarter of the year was the most productive with a catch rate of 45.55 kg h^{-1} followed by the second quarter with 31.30 kg h^{-1} while the third quarter gave a catch rate of 30.91 kg h^{-1} and the last quarter 27.12 kg h^{-1} . These results are in conformity with the observations on the commercial trawl catch off Kakinada from 1969-78 (Anon 1981).

Effective bottom trawls

During the span of fifteen years a variety of trawls were experimented with the sole aim of improving the catches through bottom trawling.

The initial experimentation was mainly to tap the bottom resources with emphasis on prawn. Thus of the nets experimented during 1967-71, the long-wing trawl (Satyanarayana & Narayanappa, 1972) gave better rate of prawn catch when compared with the other nets experimented (Table 2) while the catch rate of other bottom resources was on par with the nets experimented. The 18.36 m four-seam net (Satyanarayana & Narayanappa, 1972) gave more off bottom fish.

Owing to decrease in prawn catch from the years 1972-1976, attempts were made to introduce bulged-belly and six seam trawls along with long-wing trawl. On an average the three types of trawls proved to be equally effective in terms of total landings. But prawn catch was almost equal in long-wing and bulged-belly while it was less with six seam trawl. But the bulged-belly designs gave better catch of off bottom fish than the long-wing trawl.

The bulged-belly trawl which was effective was further experimented with high opening trawl for better exploitation and also with new trends in bottom trawling, namely, twin trawls. These studies (Table 2) revealed that the high opening trawl was more effective in giving more catch rate in total.

Catch trend and relation with no. of boats

Text Fig. 3 shows the relation between catch per hour with *Fish Tech. No. 7* and *Sorrah* (11.80 OAL) type of boats and the number of boats operated (registered) at Kakinada.

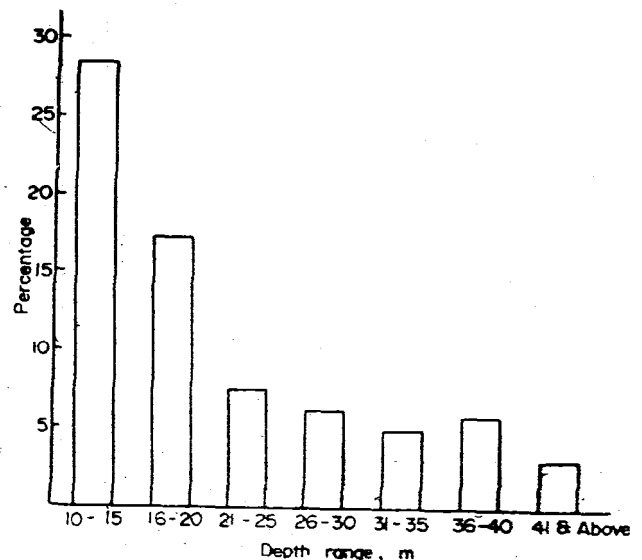


Fig. 2. Percentage composition of prawn at different depths

There is steady increase in the number of boats operated from year to year. But the catch rate has not increased with increase in the number of boats. There is a steady decline in catch from the years 1969 to 1974 after which there is some increase in catch rate up to the years 1976, after which again the declining trend of the catch rate has continued. The trend of catches during years with *Fish Tech No. 7* is found to be almost similar to that with commercial fishing vessel of similar type of boat (*Sorrah* operated off this area). The increasing trend observed during 1974-76 may be due to extension of grounds (Anon 1981) slightly beyond the area operated earlier.

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