RESULTS OF THE EXPLORATORY TRAWL FISHING OFF CANNANORE BY THE INDO-NORWEGIAN PROJECT VESSELS

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ABSTRACT

The offshore fishery resources off Cannanore have been assessed from the exploratory trawling data of the Indo-Norwegian Project Vessels during the 3-year period, from 1963-'64 to 1965-'66. The total landings, catch rate and depth-wise distribution of the important categories of the trawler catches are presented. Observations on length, sex, and maturity stages of the more important species recorded in the trawl catches are given. Results of the qualitative and gross quantitative analyses of the food and feeding habits of 31 species of fishes and 3 species of prawns are also included.

INTRODUCTION

Rao (1969), while dealing with the distribution pattern of the major exploited marine fishery resources of India, presented an overall picture of the distribution of the fishery resources of Cannanore area. But for this, no information is available about the potentiality of the fishing grounds off Cannanore, the depth-wise distribution of species, their seasonal fluctuations, species composition etc., in spite of over 10 years of mechanised fishing in this area, with the Moplah Bay as base. This account embodies the results of a study of the catch analyses of the Indo-Norwegian Project (INP) vessels (M-I, M-III, M-IV, *Norind*-I and *Ashtamudi*) operating from this base.

MATERIAL AND METHODS

Material for this study was collected from the INP vessels from November 1963 to April 1966 after which the Project was discontinued at Cannanore and the vessels were shifted to Cochin. The fishing operations were conducted between depths of 10 and 42 metres. The nature of sea-bed off Cannanore was found to be muddy. A 36 metre shrimp trawl was the gear employed by the Project vessels throughout the period of observations except for the purse-seine operations during February 1966 by the vessel M-IV.

Fish catches were sorted into three major categories namely, prawns, sharks and rays, and miscellaneous. Random samples were collected from the two landing centres, Moplah Bay and Thayil, and on board the vessels. Standard length for

fishes and total length for prawns were recorded. Five broad maturity stages were adopted for fishes *viz.*, immature, maturing, mature, spawning and spent and three stages for prawns, *viz.*, immature, maturing and mature. The extent of feeding was classified as full, ¾ full, ½ full, ¼ full, little and empty.

The area off Cannanore where fishing was carried out by INP vessels is shown in Fig. 1.

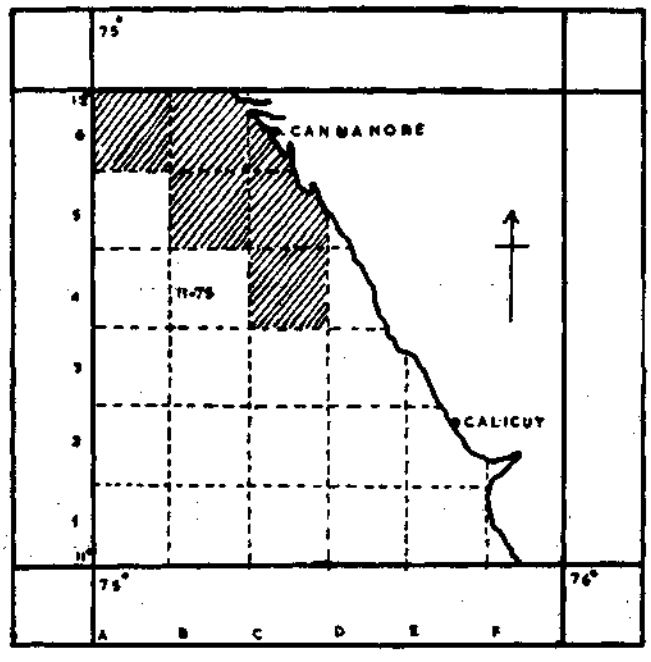

FIG. 1 Fishing grounds off Cannanore where the I.N.P. vessels operated during 1963-66.

RESULTS

Fishing effort and total yield

The average catch per hour of trawling (catch rate) throughout Cannanore region was 148.4 kg. (Table 1). A total catch of 267.1 tonnes was landed during the period in which prawns, sharks and rays and miscellaneous fishes constituted 100.7, 9.2 and 157.2 tonnes respectively. Of the five vessels *Norind* -I alone landed 45% of the total catch, whereas the catches of M-1, M-IV, M-III and *Ashtamudi* constituted 25.1%, 16.7% 10.7% and 2.5% respectively.

Although the catch was high in 1964 the catch rate was high in 1963 with catch/hour of trawling at 264.9 kg. It is to be noted that 37.7% of the catch was contributed by prawns, only 3.5% by sharks and rays and the rest by miscellaneous groups. The catch/hour of prawns was 151.3 kg. The catch/hour of fish never exceeded 110 kg

TABLE 1. *Yearwise catch details of the Indo-Norwegin Project vessels at Cannanore*

Year	Fishing effort in hours	Total number of hauls	Total catch in kg	Catch in kg		
				Prawns	Sharks & rays	Miscellaneous
1963	318.10	278	84294.00 (264.99)	48151.00 (151.37)	1893.00 (6.00)	33252.00 (107.66)
1964	662.05	592	108537.00 (163.94)	35474.00 (53.587)	4066.00 (6.14)	65003.00 (98.18)
1965	513.70	506	56591.00 (110.16)	8694.00 (16.72)	21.02 (4.09)	45888.00 (89.33)
1966	306.00	306	17666.00 (57.73)	8479.00 (27.70)	1156.00 (3.80)	8031.00 (26.24)
Total	1799.85	1682	267089.00 (148.40)	100698.00 (55.94)	9217.00 (5.12)	157174.00 (87.33)

Figures in parentheses represent catch/hour in kg.

during this period. The catch rate of sharks and rays was more or less steady, whereas that of miscellaneous category of fishes showed a declining trend (Table 1).

Area-wise catch

The area-wise distribution of the different groups has been presented in Fig. 2. The catch rate was high in 11-75/5C and 6B (158 kg and 150 kg respectively), low in 6C, 5B and 4C (between 100-120 kg) and still lower in area 6A (80.2 kg).

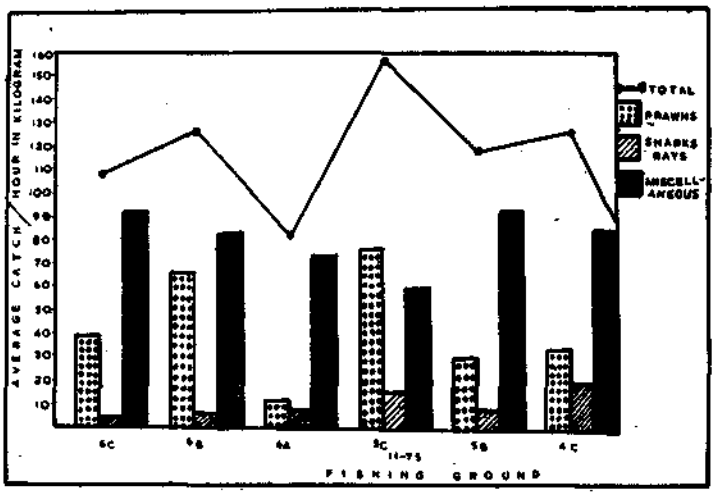

FIG. 2 Catch rates obtained in different fishing grounds off Cannanore during November 1963 to April 1966.

With regard to the composition of catches in the different areas it was observed that 11-75/ 5C was the best ground for the prawns, *Metapenaeus dobsoni, M. affinis* and *Parapenaeopsis stylifera*, which formed respectively 58.6%, 8.2% and 33.2% of the prawn catches. Here the prawn catch (62%) was always better than the fish catch (38%). In the sub-area 6B the prawn catches were less and comprised *Parapenaeopsis stylifera* (59.4%), *Metapenaeus dobsoni* (32.0%) and *M. affinis* (8.6%) and the ratio between fish and prawn in the catch was 17:18. The prawn catch was also less in 6C, 4C and 5B and was represented only by *Metapenaeus dobsoni*, and the ratio of fish to prawn was 18.7. In area 6 A the prawn catch was poor and only *Parapenaeopsis stylifera* was recorded along with the miscellaneous fish, the ratio between fish and prawn in the catch being 22:3.

The catch rate of the miscellaneous fishes in the areas 6C, 6B, 6A, 5C, 5B and 4C were 90.4, 88.4, 78.2, 64.4, 94.5 and 88.4 kg respectively. Elasmobranchs were abundant in areas 5C and 4C.

Depth-wise catch

Variations in the catch rate of the different categories at depth intervals of 9 metres each are presented in Table 2. The trawling operations were conducted between depths of 10-42 metres. The highest catch rate of 159.7 kg was obtained

TABLE 2. *Depth-wise catch of the different categories of the catch*

Depth range (m)	Average catch per hour in kg			Total
	Prawns	Sharks and Rays	Miscellaneous	
10—18	90.2	5.8	63.7	159.7
19—27	62.5	5.0	81.5	149.0
28—36	55.0	7.2	90.2	152.4
37—45	15.0	11.5	108.5	135.0

between depths, 10-18 metres. Here prawn catch rate was 90.2 kg, the catch being contributed by *Parapenaeopsis stylifera* (68%) and *Metapenaeus dobsoni* (32%). Prawn catch declined between 19 and 36 metres depth beyond which it was very poor. A gradual increase in the catch rate of elasmobranchs was noted from 10 to 45 metres depth. The catch rate of miscellaneous fishes also improved with increase in depth. However, the catch of quality fish was very poor beyond 36 metres where the bulk of the catches was constituted by *Grammoplites scaber, Nemipterus japonicus* and *Tachysurus jella*, along with huge quantities of *Squilla* species.

Seasonal variations in the catch composition

The best trawling period in this area was from November to January when 72.8% of the season's catches was obtained. *Cynoglossus semifasciatus* dominated

the catch in November, *Parapenaeopsis stylifera* and *Opisthopterus tardoore* in December, *Sciaena glaucus* and *Lactarius lactarius* in January, *P. stylifera, Thrissocles mystax* and *Leiognathus splendens* in February, *Leiognathus bindus* in March and *Tachysurus jella, Nemipterus japonicus. Grammoplites scaber* and *C. semifasciatus* in April.

Catch ratio

Ratios of the average catch rate of the species of Commercial value to 'other fishes' in relation to depth at which fished are presented in Table 3. Species with economic value are represented by *Metapenaeus affinis, Parapenaeopsis stylifera,*

TABLE 3. *The catch ratio of species of economic value to other fishes in relation to depth*

Depth (m)	10—18		18—27		27—36		36—42	
	Catch/ hour in kg	%	Catch/ hour in kg	%	Catch/ hour in kg	%	Catch/ hour in kg	%
Species of economic value	68.4	73.8	62.4	78.8	27.4	32.4	22.8	16.4
Other species	19.2	26.2	10.6	21.2	38.7	67.6	74.2	83.6
Total	87.6	100.0	73.0	100.0	66.1	100.0	97.0	100.0

Sardinella fimbriata, Thrissocles mystax, Opisthopterus tardoore, Otolithus argenteus, O.ruber, Rastrelliger kanagurta, Saurida tumbil, Polydactylus indicus, Lactarius lactarius. Leiognathus splendens and *Leiognathus bindus.* It could be seen from the table that the ratio of species of economic value to 'other species' decreased with increase in depth. Depth zone of 10-27 metres with an average catch rate of 65.4 kg appears to be a better trawling zone compared with the 28-42 metre depth zone with a catch rate of only 25.1 kg. Catch rate of other species dominated in the deeper zone between 37 and 45 metres depth.

BIOLOGICAL NOTES ON SOME SPECIES

During the course of the present investigation, although 71 species of fishes and 3 species of prawns were recorded in the trawl catches only 3 species of prawns and 31 species of fishes, on the basis of their abundance in landings and economic value were selected for biological studies.

Size range and Sex

Mature ones of *Metapenaeus dobsoni* (85-90 mm) and of *Parapenaeopsis stylifera* (90-95 mm) and immature ones of *Metapenaeus affinis* (130-145 mm) were noted.

It was observed that *Thrissocles mystax* (90-98 mm), *Opisthopterus tardoore* (130-150 mm), *Sciaena glaucus* (130-146 mm), *Saurida tumbil* (250-300 mm), *Lactarius*

lactarius (220-235 mm), *Leiognathus brevirostris* (100-110 mm), *Pampus argenteus* (210-225 mm), *Nemipterus japonicus* (220-250 mm) and *Caranx kalla* (120-130 mm), in advanced stage of maturity were found in the shallow regions indicating the possibility of spawning of these species in shallow regions of the Bay. The few specimens of the Indian mackerel, *Rastrelliger kanagurta* (220-225 mm) examined were in maturity stages II and III. *Sardinella fimbriata* (140-160 mm), *Dussumieria acuta* (120-130 mm), *Cynoglossus semifasciatus* (100-105 mm), *Otolithus argenteus* (120-150 mm) *Grammoplites scaber* (160-180 mm) with maturing gondas were recorded. Specimens in maturity stage I were noted in *Sciaena macropterus* (60-70 mm) *Secutor ruconius* (90-100 mm) and *Scoliodon palasorrah* (250-270 mm). Indeterminate individuals of *Scoliodon sorrakowah* (184-261 mm), *Stolephorus commersonii* (61-73 mm), *Kowala coval* (110-120 mm), *Otolithus ruber* (92-133 mm), *Pampus argenteus* (159-225 mm). *Polydactylus indicus* (110-115 mm), *Leiognathus splendens* (60-174 mm), *L. bindus* (85-103 mm), *L. equulus* (80-111 mm), *Trichiurus savala* (90-110 mm), *Tachysurus jella* (81-185 mm), *Lethrinus nebulosus* (55-95 mm) and *Upeneus sulphureus* (105-163 mm) were also recorded.

Food and Feeding

Our knowledge on the food and feeding of fishes from deeper regions is restricted to the works of Mohammed (1955), Kuthalingam (1963 *a*, *b*) Rao (1964) and Kagwade (1965). The results of the analysis of the stomach contents of 3 species of prawns and 31 species of fish obtained from the trawl catch are given in Table 4.

TABLE 4. *Results of food-analysis of the prawns and fishes caught off cannanore (Local names of fishes, wherever known, are given in parentheses)*

Sl. No.	Species	Dominant items of food	Extent of feeding
1	*Metapenaeus dobsoni* (Poovalan)	Copepods	little
2	*Metapenaeus affinis*	Crustacean remains	little
3	*Parapenaeopsis stylifera*	Copepod, mud and crustacean remains	1/4-full
4	*Scoliodon sorrakowah* (Poohi srave)	*Parapenaeopsis stylifera*	3/4-full
5	*Scoliodon palassorach* (Vellavan sravu)	*Parapenaeopsis stylifera*	3/4-full
6	*Sardinella fimbriata* (Chala mathi)	Diatoms	1/2-full

TABLE 4. (*Continued*)

Sl. No.	Species	Dominant items of food	Extent of feeding
7	*Stolephorus commersonii* (Netholi)	Copepods	1/4 - 1/2 full
8	*Dussumieria acuta* (Kola kayan)	Diatoms	little - 1/4 full
9	*Kovala coval* (Velturi)	Copepods	little - full
10	*Thrissocles mystax* (Nedu managu)	Copepods	full
11	*Opisthopterus tardoore* (Ampedda)	Copepods	1/4 - full
12	*Caranx kalla* (Cheeku para)	*Squilla* spp., and *Metapenaeus dobsoni*	3/4 - full
13	*Sciaena macropterus*	*Parapenaeopsis Stylifera*	full
14	*Sciaena glaucus* (Kathila kera)	*Synoglossus* sp. *Grammoplites scaber* and *Nemipterus* sp.	full
15	*Otolithus argenteus* (Koli)	*Parapenaeopsis stylifera*, *Metapenaeus dobsoni* and *Squilla* sp	empty - full
16	*Otolithus ruber* (Kora Koli)	*Penaeus* and *Metapenaeus dobsoni*	full
17	*Rastrelliger kanagurta* (Aila)	Copepods, diatoms and decapod larvae	full
18	*Saurida tumbil* (Aranameen)	*Saurida tumbil*, *Nemipterus japonicus*, *Tachysurs jella*, Trichiurus sp. *Stolephorus* and *Loligo*	full
19	*Pampus argenteus* (Vella avoil)	Copepods	little - 1/4 full
20	*Polydactylus indicus* (Norakudiyan or Vammen)	*Parapenaeopsis stylifera*, *Metapenaeus dobsoni and Penaeus indicus*	1/4 - 1/2 full
21	*Lactarius lactarius* (Adane)	*Thrissocles mystax*, *Pellona* sp., and *Stolephorus* sp.	3/4 - full

TABLE 4. (*Continued*)

Sl. No.	Species	Dominant items of food	Extent of feeding
22	*Leiognathus splendens* (Modan Mullan)	Copepods	little - 1/4 full
23	*Leiognathus bindus* (Nalla mullan)	Copepods	1/4 - full
24	*Leiognathus brevirostris*	*Squilla* larvae, Small penaeids and *Lucifer*	1/4 - 1/2 full
25	*Leiognathus equulus* (Pooelu mullan)	*Squilla* larvae, small peneaeids and *Lucifer*	1/4 - 1/2 full
26	*Secutor ruconius* (Thali mullan)	Copepods	little
27	*Secutor insidiator* (Chakkana mullan)	Diatoms	1/4 - 1/2 full
28	*Trichiurus savala* (Thalayan)	*Papapenaeopsis stylifera* and *Metapenaeus dobsoni*	full-gorged
29	*Tachysurus jella* (Koletha)	*Parapenaeopsis stylifera*, *Metapenaeus dobsoni* and and fishes	full-gorged
30	*Nemipterus japonicus* (Puthiappla Kora)	*Metapenaeus dobsoni, and Parapenaeopsis stylifera*	1/2 - full
31	*Grammpolites scaber* (Odu)	Prawns	1/4 - 1/2
32	*Cynoglossus semifasciatus* (Nalla manthal)	Copepods	full
33	*Lethrimus nebulosus* (Chempalli)	Copepods	empty - full
34	*Upeneus sulphureus* (Puthiappla)	*Parapenaeopsis stylifera*	empty - full

It is observed from the stomach analyses that there is a wide variation in the food and feeding habits between the different groups of fishes obtained from the trawl catches.

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