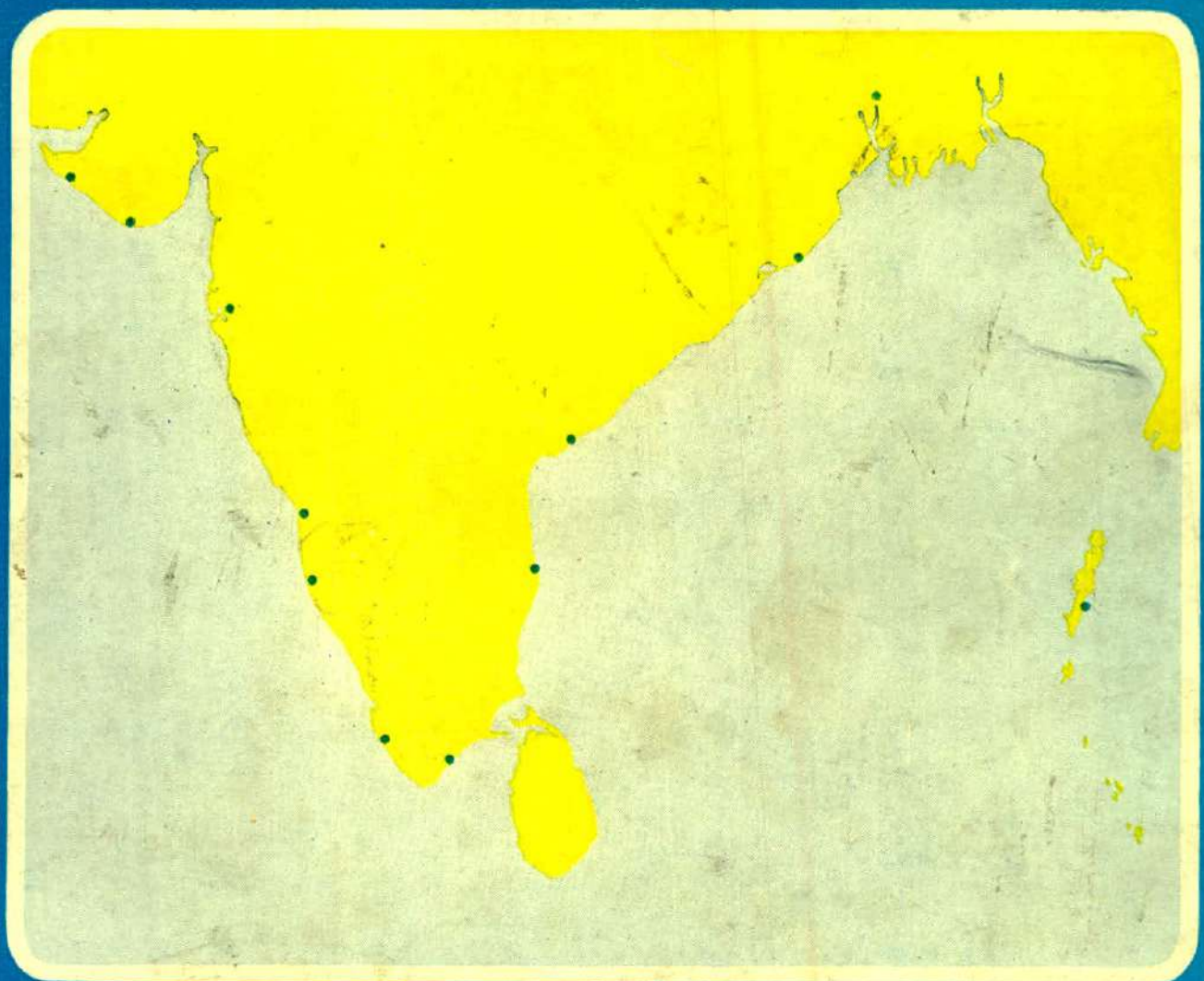
BULLETIN No. 9

RESULTS OF EXPLORATORY FISHING CONDUCTED DURING 1978-'79



EXPLORATORY FISHERIES PROJECT
GOVT OF INDIA

BULLETIN NO. 9

RESULTS OF EXPLORATORY FISHING CONDUCTED DURING 1978–79

Government of India
EXPLORATORY FISHERIES PROJECT
MINISTRY OF AGRICULTURE & IRRIGATION
(department of agriculture)
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P R E F A C E

This bulletin deals with the analysis of the results of exploratory fishing conducted by the Exploratory Fisheries Project vessels during the year 1978-79. This period was a very important mile-stone in the history of the Project. The induction of the first large vessel ' Matsya Nireekshani' acquired under Dutch aid programme into the mission of survey of the EEZ marks the beginning of a determined effort by the Project to survey the unexplored areas of EEZ. The credit of launching pelagic trawling in a major way in conjunction with fish locating and gear watching sophisticated electronic equipments also goes to 'Matsya Nireekshani'. The various results obtained from the analysis throws light on the characteristics of the fishery resources around the country. I hope that these information would be of use to the industry.

I am extremely grateful to Dr. M.S. Swaminathan, F.R.S., Secretary to the Government of India (A & RD), Sri P.S.Appu, former Additional Secretary to the Government of India (A & RD), Sri S.P. Mukherjee, Additional Secretary (A & RD), Sri R.K.Saksena, Joint Secretary (Fisheries) and Dr. T.A. Mammen, Joint Commissioner(Fisheries) for their keen interest in all matters relating to the organization and especially the publication of this bulletin.

I thank the officers and crew of the vessels for the excellent work done in the survey operations. My thanks are also due to other officers and staff at the bases and Head quarters especially those belonging to the Extension Wing, for their untiring efforts to bring out this bulletin.

Bombay
10th December, 1979

M.SWAMINATH
D I R E C T O R

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SUMMARY

Results of exploratory fishing operations conducted during 1978-79 is analysed and presented in this bulletin. During the year 23 vessels of the Project conducted exploratory demersal trawling from twelve bases. These vessels together expended a total of about 10,000 hours of fishing effort in bottom trawling, surveyed/resurveyed an area of about 39,000 sq.km.

During the period under review exploratory survey of the deeper waters of the Indian EEZ was commenced by commissioning the first large Dutch vessel 'Matsya Nireekshani'. The same vessel was deployed to introduce pelagic trawling in a big way and conduct "aimed fishing" by the application of sophisticated electronic equipments like Trawl eye (Net Sonde) and Sonar. The operations of pelagic trawling were mostly of training nature to induct the officers and crew to this new fishing method.

In addition to bottom trawling, pelagic trawling and other diversified fishing methods like purse-seining, tuna long lining, trolling were also conducted from selected bases covering an area of 3,000 sq.km. The results thus obtained are also analysed and presented in this bulletin.

Comparing the bottom trawl catch rates obtained by 17.5m of vessels, it is seen that the highest catch rate of 192 Kg/hr was recorded by the vessel Meena Netra of Goa base followed by Meena Grahi of Paradeep base (182 Kg/hr). Maximum effort was expended by the vessel Meena Utpadak of Cochin base (878 hrs) followed by Meena Sangrahak of Bombay base (700 hrs).

Percentage composition of the trawl catches obtained from different regions is analysed and presented. In Porbandar and Veraval region the main species constituting the catch were elasmobranchs, cat fish, dhoma, ghol, ribbon fish and squid, whereas from Bombay region the main species caught were elasmobranchs, dhoma, ghol, tam and karkara. In Goa region the main species netted were cat fish, ribbon fish, Nemipterus sp., Lactarius and elasmobranchs.

In south west coast comprising Mangalore and Cochin regions, the trawl catch consisted of cat fish, elasmobranchs, lizard fish, prawn and Nemipterids.

Perch, elasmobranchs, and cat fish constituted the trawl catches of Tuticorin region while Leiognathids, dhoma, elasmobranchs, lizard fish, jew fish and synagris were the main species representing the trawl catches of Madras region.

The main varieties obtained from Vizag region were cat fish, elasmobranchs, perch and pomfret. A reduction in the percentage of elasmobranchs and pomfret is noticed over the previous year. The main constituents of the trawl catch of Paradeep and Calcutta were elasmobranchs, dhoma, cat fish, wam, pomfret, koth and prawn. Presence of cat fish in the catch of Paradeep region and prawn and horse mackerel in appreciable quantities in the catches of Calcutta region deserves special mention. In Port Blair the main components were Leiognathids, upenoids, elasmobranchs, Nemipterids and caranx.

Relative abundance of important varieties in the different geographical divisions and in the different depth zones are analysed and presented. The seasonal variation with respect to quality and

quantity of catch is also studied. Along the north west coast three classes of vessels were operated of which only 17.5 m vessels have operated in all the regions viz. Porbandar, Veraval, Bombay and Goa and the highest catch rate was recorded from the area 14-74 (515 Kg/hr) off Goa by this class of vessels. In Porbandar region 17.5 m vessel identified the depth zone 50-59 m as productive and highest yielding monthswere December and January-March. Matsya Nireekshani registered the highest catch rate from the area 20-70 (717 Kg/hr) and the depth zone 50-59 m was found to be the productive zone. The months of February and March were the peak seasons. Along Bombay region Meena Bharati registered the highest yield from area 18-71(117 Kg/hr) and the productive zone was 30-39 m depth. The highest yielding months were December and February.

Along south west coast only 17.5 m vessels conducted survey operations. In Mangalore region the area 13-74 gave the highest yield of 148 Kg/hr from the depth zone 30-39 m. The highest yielding months were April (164 Kg/hr) and January. In Cochin region the area 9-75 recorded the highest catch/hr (199 Kg) and depth zone 90-99 m was found to be productive. The best fishing season was October (232 Kg/hr) followed by November, April and May.

In Tuticorin region the 17.5 m vessels registered the maximum yield from the area 7-77 (88 Kg/hr). The depth zone 30-39 m gave the highest yield and the most productive month was April(164 Kg/hr). Jheenga recorded the highest catch rate from area 8-78(79 Kg/hr) and the depth zone 30-39 m was found to be most productive with a catch rate of 175 Kg/hr. The highest yield was during July.

Along Madras region the area 14-80 was the highest yielding area with a catch rate of 109 Kg/hr and the depth zone 10-19 m was identified as the productive zone. The productive months were June-July.

In Vizag region the highest yield was obtained from area 18-84 (134 Kg/hr) and the productive zone was identified as 60-69 m from where a catch rate of 199 Kg/hr was obtained. This is well in conformity with the results obtained during last year. The highest catch rates were obtained during January (103 Kg/hr) followed by February, March and October-November. In Paradeep region, the area 19-85 registered the highest catch rate of 187 Kg/hr and the depth belt 20-29 m was found to be most productive. The highest yielding months were July followed by January, March and August. In Calcutta, Matsya Vigyani registered the highest catch rate from area 20-88 (120 Kg/hr) the 30-39 m depth belt was found to be most productive with a catch rate of 121 Kg/hr. The best fishing season was April (196 Kg/hr) and May (157 Kg/hr). The 17.5 m vessels recorded the highest yield from 20-87 (159 Kg/hr) and the productive depth zone was 20-29 m (69 Kg/hr). The best fishing season was March.

From Port Blair only one 17.5 m vessel has conducted bottom trawling. The area 11-92 gave the highest yield of 116 Kg/hr. The depth zone 20-29 m gave the highest yield of 209 Kg/hr. The productive months were November (207 Kg/hr) followed by April (201 Kg/hr). The month of December, October and August were also found to be productive periods.

Purse-seining was continued from Mangalore and Goa bases employing two 17.5 m vessels. A total of 61 sets were made expending an effort of about 617 hours including searching time. In Mangalore region the average catch /set obtained was 213 Kg/hr while in Goa region the catch/set recorded was 4516 Kg. The highest yielding months for Goa region was October and the single species caught was mackerel. In Mangalore the highest yielding months were October followed by November. The main varieties caught were mackerel and sardine.

Long lining was conducted only from Port Blair base from a 17.5 m vessel round the year except during April. A total of 560 hrs was expended operating 72,122 hooks. The highest hooking rate was registered from the area 11-92/6F (6.83 Kg/hr) followed by 12-93/3A(4.3 Kg/hr). The average hooking rate for the entire period of survey works out to about 2.7%. The months of May recorded the highest hooking rate of 5% followed by September (4.2%).

Trolling lines were operated from Port Blair from a 17.5 m vessel. The total fishing effort expended was about 278 hours.

In the operation of pelagic trawling by Matsya Nireekshani an effort of about 37 hours was expended and a total catch of about 3.5 tons of fish was landed. The average catch/hour works out to 96 Kg. Highest catch rate of 162 Kg/hr was obtained from the area 20-69. Two-boat and single boat mid water trawling from 17.5 m trawlers was also attempted from Cochin base during the year.

2. INTRODUCTION

This bulletin, the ninth in the series published by Exploratory Fisheries Project, deals with the results of exploratory fishing conducted by the Project vessels during the year 1978-79. The salient features of survey during this period was the commencement of exploratory survey of the Indian EEZ with the commissioning of the first Dutch aid vessel, introduction of pelagic/mid water trawling from Porbandar and Cochin and imparting training in the operation & management of large vessels under Dutch experts.

The major bulk of effort by the Project vessels was put in the survey of demersal fishery resources. About 10,000 hrs of actual fishing was expended in demersal fishery resources survey and an area of about 39,000 sq. km was surveyed/resurveyed. A total of 1,000 hrs of effort was expended in the survey of pelagic fishery resources and about 3,000 sq.km area was surveyed.

The survey of pelagic/mid water fishery resources was conducted by operating purse-seines from Goa and Mangalore, tuna long line and trolling line from Port Blair, single boat/pair boat mid water trawl from Cochin and Porbandar. Of these gears, the mid water trawl was successfully employed by the Project for the first time in conjunction with sophisticated fish detecting and trawl telemetering electronic equipments from the Dutch aid vessel. The crew received training in the operation of these gears under the Dutch experts.

The fishing capability of 17.5 m vessels which are the main stay of the survey fleet of the Project was further strengthened by replacing the mechanical trawl winches by more powerful hydraulic trawl winches obtained under Norwegian aid programme.

Considerable number of operational days were lost due to unprecedented weather disturbance along both the coasts and also due to lack of adequate infrastructural facilities at many of the bases of operation.

The catch and effort data collected during the exploratory survey operation with respect to different regions, depth layers and seasons for each class of vessel and gear has been analysed and presented with possible interpretation on the relative abundance of commercially important varieties of fishes. A comparative study of the results obtained during the previous years has also been attempted wherever possible. In short, the efforts of the Project during the period under report were mainly focussed on the following areas:

a) Filling up the gaps in the areas already surveyed

b) Extension of survey operations to new areas in deeper waters to locate new fishing grounds

c) Commencement of the programme of survey of EEZ by deploying large vessels

d) Intensification of sampling effort to identify and measure changes if any in stock abundance over medium and large range periods

e) Studying the fluctuations in the fish stock through time and space to enable application of the concept of scientific fishery management

f) Introduction of pelagic/mid water trawling in conjunction with electronic equipments

g) Popularisation of diversified fishing methods like purse-seining, long lining, trolling etc. a n d

h) Providing necessary on board work experience to CIFNET Trainees as part of "in-vessel training programme".

3. PROGRAMME OF SURVEY DURING 1978-79

The exploratory survey programme in respect of the vessels for 1978-79 is presented in Table I. Demersal trawling was mainly conducted from all the bases. In addition pelagic resources survey by purse-seining, tuna long lining, pelagic/mid water trawling and trolling lines was also conducted from selected bases.

There was not much deviation in the scheduled programme of the vessels. One significant event during the year was the addition of the Dutch vessel, Matsya Nireekshani (40.6 m O.A.L, 2030 B.H.P.) and the twentieth 17.5m vessel Meena Pradata to the fishing fleet of the Project and shifting of the base of operation from Kandla to Porbandar in view of the various infra-structural facilities available at Porbandar. The programme of work of the vessels has been chalked out setting priorities and fixing realistic targets and planning the activities and operational strategy.

Base	Name of the vessel	Area	Type of operation/Gear
PORBANDAR	Matsya Nireekshani	North west coast between lat. 15° N. 23°N and long. 67°E and 74°E	Demersal trawling/ Pelagic trawling
	Meena Udyog	22-68 22-69 18-72 19-72 21-69 21-68	Demersal trawling/24 m fish trawl
VERAVAL	Meena Prapi	21-69 20-69 20-70	Demersal trawling/ 24 m fish trawl
BOMBAY	Meena Bharati	17-72 18-71 20-70	Demersal trawling/ 35 m fish trawl
	Meena Sangrahak	16-72 17-71 17-72 18-71	Demersal trawling/ 24 m fish trawl
GOA	Meena Ayojak	14-74 15-73	Demersal trawling, purse-seining and hook and line fishing/ 28 m shrimp trawl 24 m fish trawl and 408 m x 45 m purse-seine
	Meena Netra	14-74 15-72 15-73	Demersal trawling/28 m shrimp trawl and 24 m fish trawl
MANGALORE	Meena Tarangini	13-73 13-74	Demersal trawling/ 27 m(90') shrimp trawl
	Meena Anaveshak	11-74 11-75 12-74	Demersal trawling and purse-seining/27 m(90') shrimp trawl and 340 m and 36 m purse-seine
COCHIN	Meena Utpadak	7-77 8-76 9-75	Demersal trawling/24 m fish trawl and 27 m(90') shrimp trawl
	Meena Sachetak	7-77 9-75 10-75	Demersal trawling/ 24 m fish trawl and 27m (90') shrimp trawl

(contd..)

Base	Name of the vessel	Area	Type of operation/Gear
TUTICORIN	Meena Niryantak	7-77 7-78 8-77	Demersal trawling/ 20 m and 24 m fish trawl
	Jheenga	7-77 8-78 9-78 9-79	Demersal trawling/ 20 m and 24 m fish trawl
	Meena Saudagar	7-77 8-77 9-78	Demersal trawling/ 24 m fish trawl
MADRAS	Meena Sitara	11-79	Demersal trawling/24 m fish trawl
	Meena Gaveshak	11-80 12-80 13-80	Demersal trawling/24 m fish trawl
VISAKHA-PATNAM	Meena Jawahar	15-80 15-81	Demersal trawling/24 m fish trawl and 28 m shrimp trawl
	Meena Shodak	16-81 16-82 17-83	Demersal trawling/ 24 m fish trawl and 27 m (90') shrimp trawl
PARADEEP	Meena Grahi	19-85 19-86 20-86	Demersal trawling/ 28 m shrimp trawl
	Meena Prasarak	19-86 19-86 20-86	Demersal trawling/ 28 m shrimp trawl
CALCUTTA	Matsyavigyani	20-87 20-88 21-87 21-88	Demersal trawling/45 m fish trawl and 43.6 m shrimp trawl
PORT BLAIR	Meena Khojini	Andaman waters	Bottom trawling, kalava handlining/24 m fish trawl, 28 m shrimp trawl and kalava hand line
	Meena Prayas	Andaman waters	Tuna long lining, trolling and kalava hand lining

TABLE I Exploratory fishing programme for 1978-79

4. VESSELS AND GEAR

The fishing fleet consisted of 20 indigenously constructed 17.5 m steel vessels, one 23 m indigenously constructed vessel Meena Bharati and 3 imported vessels, viz. Matsya Nireekshani (40.5 m O.A.L.), Matsyavigyani (32.38 m) and Jheenga (16.5 m). The major specification of the vessel Matsya Nireekshani is given in EEZ series No.1 whereas the details of the remaining vessels had already been furnished in Bull. Expl.Fish.Proj. - 4 .

Bottom trawl was the main type of gear operated during the year. The design and other constructional details of the gear operated by Matsya Nireekshani is given in the EEZ series No.1 published by EFP. Detailed specification of bottom trawls operated by the rest of the vessels are discussed in the special publication No.1 on the trawl gears operated by EFP.

In addition to bottom trawling, the Project vessels have also conducted purse-seining from Goa and Mangalore, long lining and trolling from Port Blair base, and mid water trawling from Cochin and Porbandar.

5. RESULTS OF DEMERSAL FISHERY RESOURCES SURVEY

Exploratory demersal trawling was conducted from the 12 bases of the Project deploying 23 vessels. The newly acquired vessel Matsya Nireekshani was placed for operation from Porbandar base and Meena Pradata, the 20th 17.5 m vessel was operated from Calcutta. Except from this there was no change in the placement of vessels from that of the previous year.

During the year 1978-79 the vessels have together operated for about 2300 days expending about 10,000 hours of fishing effort. The total area covered was 39,000 sq.km. Table II gives the summary of bottom trawling operations of the vessels during 1978-79.

The maximum fishing effort was expended by the vessel Meena Utpadak of Cochin base (878 hrs) followed by Meena Sangrahak of Bombay base (700 hrs). The other vessels which have put in appreciable fishing effort in the order were Meena Tarangini of Mangalore base (648 hrs), Meena Shodak of Vizag base (623 hrs), Meena Ayojak of Goa base(589 hrs) and Meena Sachetak of Cochin(588 hrs). The vessel Meena Netra of Goa base, Meena Sitara and Meena Gaveshak of Madras base, Meena Grahi of Paradeep and Matsyavigyani of Calcutta base could expend only fishing effort less than 300 hrs each due to various operational constraints.

Comparing the catch rates obtained by the 17.5 m vessels, it was observed that the highest catch/hr of 192 Kg was recorded by the vessel Meena Netra of Goa base followed by Meena Grahi of Paradeep base (182 Kg/hr). Of the remaining vessels Meena Udyog of Porbandar base, Meena Ayojak of Goa base, Meena Utpadak and Meena Sachetak of Cochin base and Meena Prasarak of Paradeep base recorded catch rates between 100-157 Kg/hr. The catch rate obtained by the rest of the vessels was less than 100 Kg/hr.

5.1. Species composition

The percentage composition of important species of fishes caught from different regions have been discussed in the ensuing. A comparison with the trend observed during the previous year has been attempted wherever possible.

Base	Vessel	Area surveyed	Fishing effort (hrs)	Catch/ hr (Kg)
PORBANDAR	Matsya Nireek-shani	22-68, 21-69, 21-68, 20-70, 20-69, 20-71	103	611
	Meena Udyog	21-68, 20-71, 20-70, 18-72, 21-69	300	106
VERAVAL	Meena Prapi	20-70, 21-70, 21-69, 18-72, 19-72, 20-69	479	62
BOMBAY	Meena Bharati	18-72, 17-72, 19-72, 19-71, 18-71, 20-70	410	80
	Meena Sangrahak	17-72, 18-72, 18-71, 19-71, 17-71	700	66
GOA	Meena Netra	15-73, 16-72, 16-73	227	192
	Meena Ayojak	14-73, 15-73, 16-73	589	157
MANGALORE	Meena Tarangini	12-74, 13-74, 12-75, 11-75	648	69
	Meena Anaveshak	12-74, 13-74	557	69
COCHIN	Meena Utpadak	9-75, 9-76, 10-76, 10-75	878	124
	Meena Sachetak	9-76, 9-75, 10-75, 10-76, 8-76	588	146
TUTICORIN	Meena Niryantak	8-77, 8-78, 8-76, 7-77	460	93
	Meena Saudagar	8-78	383	79
	Jheenga	8-78, 8-76	515	72
MADRAS	Meena Sitara	13-80, 14-80, 12-80	284	64
	Meena Gaveshak	13-80, 14-80, 12-80	253	66
VISAKHA-PATNAM	Meena Jawahar	17-83, 18-83, 18-84, 17-82, 16-82	519	78
	Meena Shodak	17-83, 18-83, 18-84, 17-82, 16-82	623	58
PARADEEP	Meena Grahi	20-85	199	182
	Meena Prasarak	20-86, 20-87, 19-85, 19-86	438	114
CALCUTTA	Matsyavigyani	20-88, 19-86, 20-86, 20-87	181	79
	Meena Pradata	20-88, 20-87, 21-87	121	66
PORT BLAIR	Meena Khojini	11-92, 12-92	475	114

TABLE II. Catch per hour and area surveyed by the Project vessels by bottom trawling

Fig. 1 illustrates the composition of trawl catch obtained from Porbandar and Veraval region.

The trawl catch of Porbandar region mainly consisted of elasmobranchs, cat fish, dhoma, ghol, ribbon fish and squid.

It is seen from the fig. that elasmobranchs represented 21%, squid 16%, ribbon fish 6%, ghol and cat fish 5% each and dhoma 4%. Occurrence of ribbon fish and squid in appreciable quantity in the total catch of this region is noteworthy.

The composition of catch obtained from Veraval shows that dhoma occupied 29.6% of the total catch followed by elasmobranchs(13.7%), ribbon fish (9.2%), squid (8.7%), cat fish and ghol (2.3% each). A drastic reduction in the percentage of ribbon fish (by 20%) is noticed from the previous year. Occurrence of elasmobranchs in appreciable percentage during the year under report is also a noteworthy feature.

The important species constituting the trawl catches of Bombay and Goa regions are given in fig. 2. The major components of Bombay region in the order of abundance were cat fish (26%), elasmobranchs (18.3%), dhoma (7.7%), ghol (4%), tam and karkara 2.5% and 2.2% respectively. Comparing to the results obtained during previous year, all the varieties except karkara showed a declining trend. In Goa region it is seen that cat fish (38.5%), ribbon fish (30.2%), rani fish (Nemipterus sp.(6.5%), Lactarius (3.3%) and elasmobranchs (3%) were the major components of bottom trawl catch. Ribbon fish registered an increase compared to the previous year. All the remaining varieties showed a declining trend.

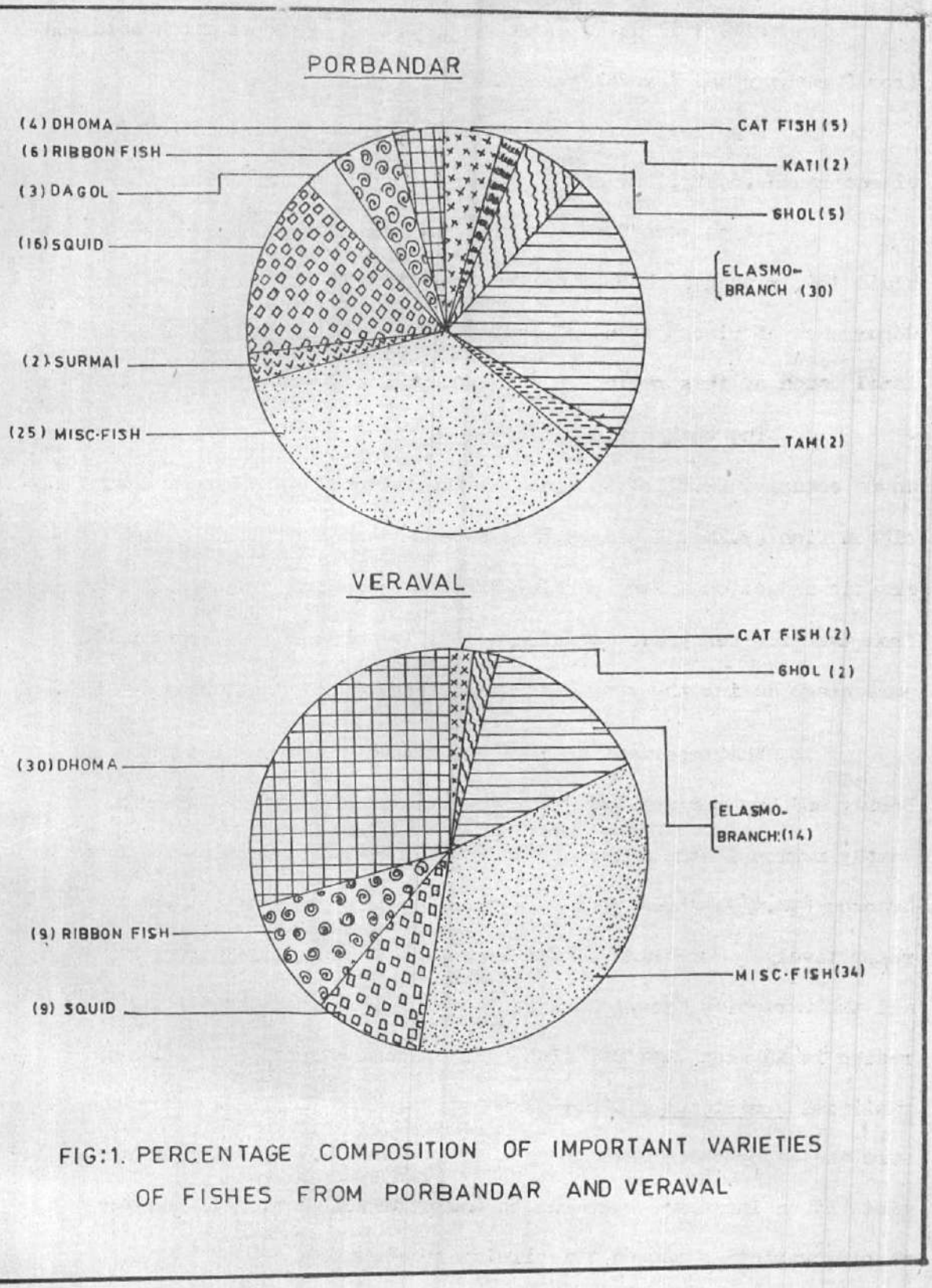

FIG:1. PERCENTAGE COMPOSITION OF IMPORTANT VARIETIES OF FISHES FROM PORBANDAR AND VERAVAL

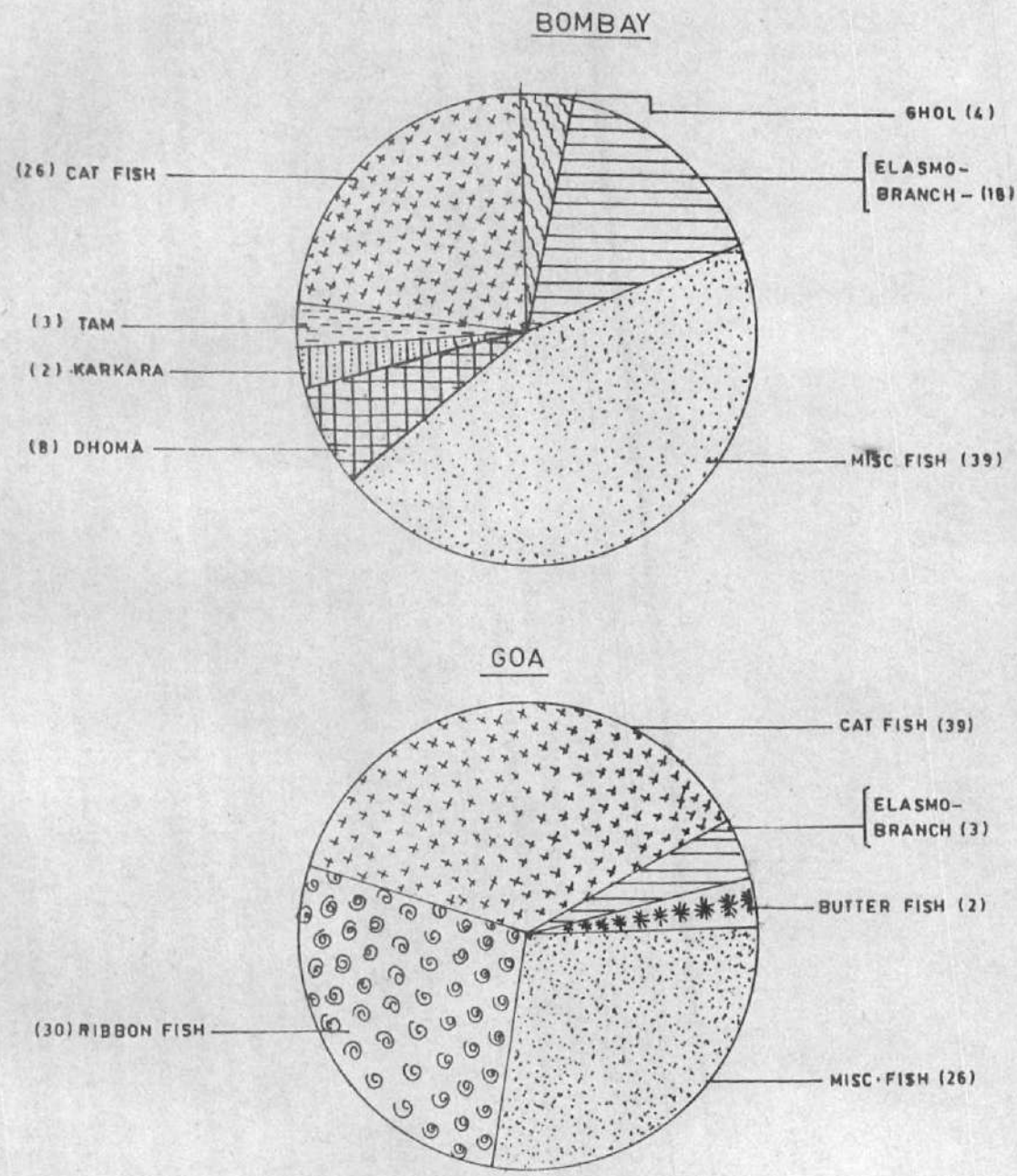

FIG: 2 PERCENTAGE COMPOSITION OF IMPORTANT VARIETIES OF FISHES FROM BOMBAY AND GOA

While examining the catch composition of north west coast as a whole it is observed that the composition of elasmobranchs was steady in Porbandar and Bombay regions as in the previous year. Occurrence of this variety in Veraval and Goa region which was quite insignificant during the last year, deserves special mention. Cat fish showed its consistency increasing from north to south. Presence of other important varieties like prawns, pomfret, wam and perch in all the regions were quite insignificant. Occurrence of squids in Porbandar and Veraval regions and rani fish and butter fish in Goa region is noteworthy.

Fig. 3 gives the percentage composition of important varieties of fishes obtained from south west coast, viz. Mangalore and Cochin region. Catch from Mangalore region was mainly constituted by cat fish (21%), elasmobranchs(3.4%), lizard fish (4.7%) and prawn (1.3%). Cat fish and elasmobranchs did not show much fluctuation from that of the previous year whereas dhoma and ribbon fish showed a decreasing trend. Total absence of kilimeen is another significant feature.

In Cochin region cat fish constituted the major share of catch (26.9%) followed by elasmobranchs (20.6%), kilimeen (20%) and lizard fish (9%). There was not much variation in the pattern of occurrence in respect of these species from that of the previous year except for kilimeen and lizard fish. The former showed an increasing trend (by 13%) while the latter showed a decline by 3%. Presence of squid (1.8%) deserves special mention. Prawn represented 0.1% of the catch.

The catch composition of Tuticorin, Madras and Vizag is illustrated in fig. 4. The main constituents of the trawl catches of Tuticorin were perch (31%), elasmobranchs (27.7%), cat fish (4.4%) and carangids (2%). Elasmobranchs and perch did not show much variation while sciaenids were totally absent. Presence of cat fish and carangids in the catches of Tuticorin is noteworthy.

In Madras region the main constituents of catch were Leiognathids (28%), followed by dhoma (8%), elasmobranchs (7%), lizard fish (6.7%), jew fish (5%) and synagris (4.3%). Leiognathids showed an increase by 12% while elasmobranchs and lactarius sp. showed a declining trend.

The main varieties constituting the trawl catch of Vizag region were cat fish (10.7%), elasmobranchs (6.4%), perch (2.5%) and pomfret (1.7%). A reduction in the percentage of elasmobranchs and pomfret is noticed.

The catch composition of Paradeep, Calcutta and Port Blair is illustrated in fig.5. The important varieties constituting the trawl catch of Paradeep region were elasmobranchs (13%), koth (7.8%), dhoma (5.8%), wam and cat fish (3% each) and prawn (1.6%). An increase is noticed in the percentage of elasmobranchs, wam and koth while surmai and prawn showed a decline by 6% and 1.4% respectively. Presence of cat fish (3%) in the catches of this region is significant.

The catch composition of Calcutta region was elasmobranchs (21%), cat fish (9.6%), prawn (4.1%), horse mackerel(5.3%), pomfret(2%), wam (2%) and karkara (1.5%). Elasmobranchs and cat fish showed remarkable increase in their percentage compared to that of the previous year. Presence of prawn and horse mackerel in appreciable percentages was also observed.

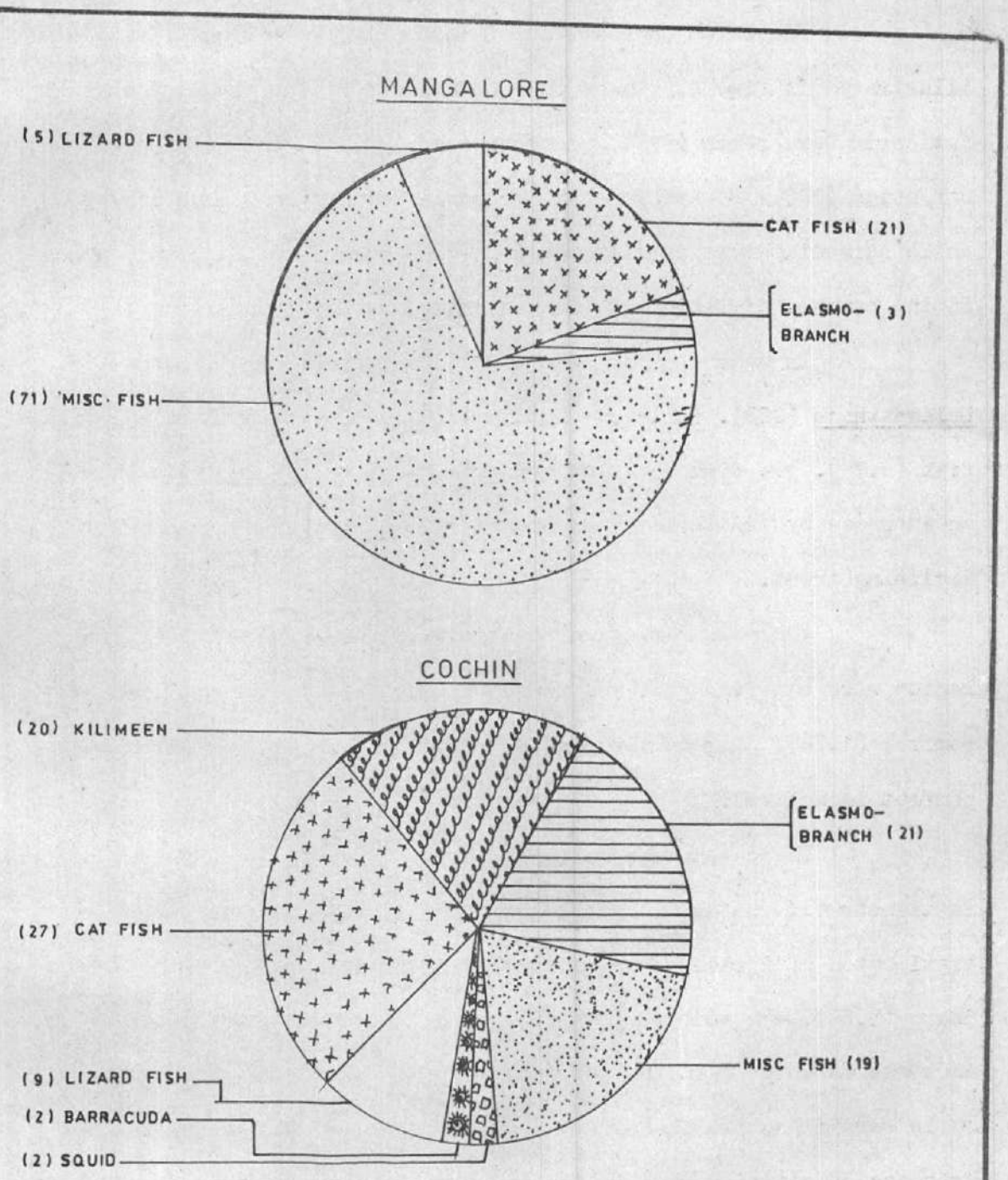

FIG:3/PERCENTAGE COMPOSITION OF IMPORTANT VARIETIES OF FISHES FROM MANGALORE AND COCHIN

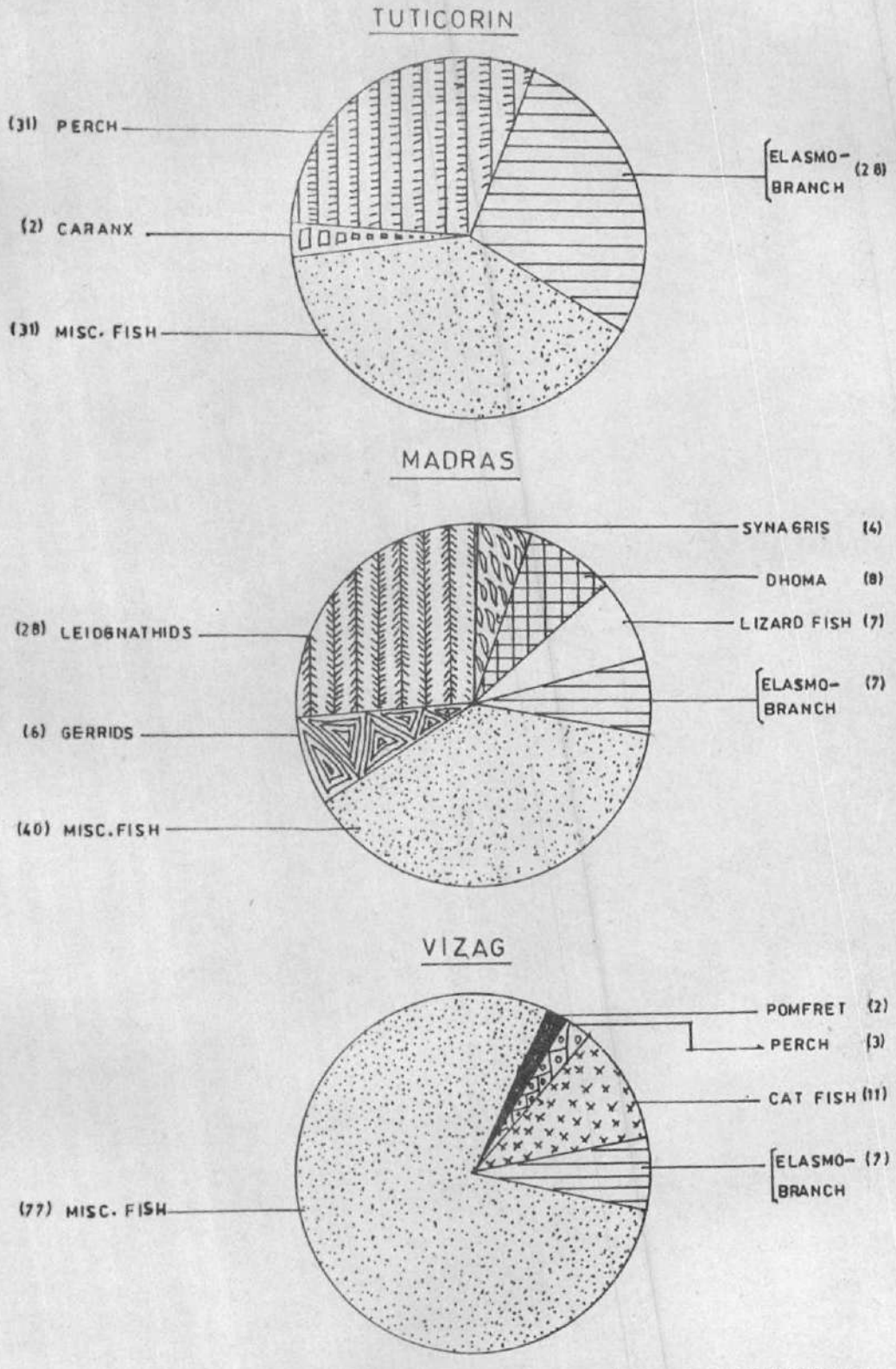

FIG: 4. PERCENTAGE COMPOSITION OF IMPORTANT VARIETIES OF FISHES FROM TUTICORIN MADRAS AND VIZAG

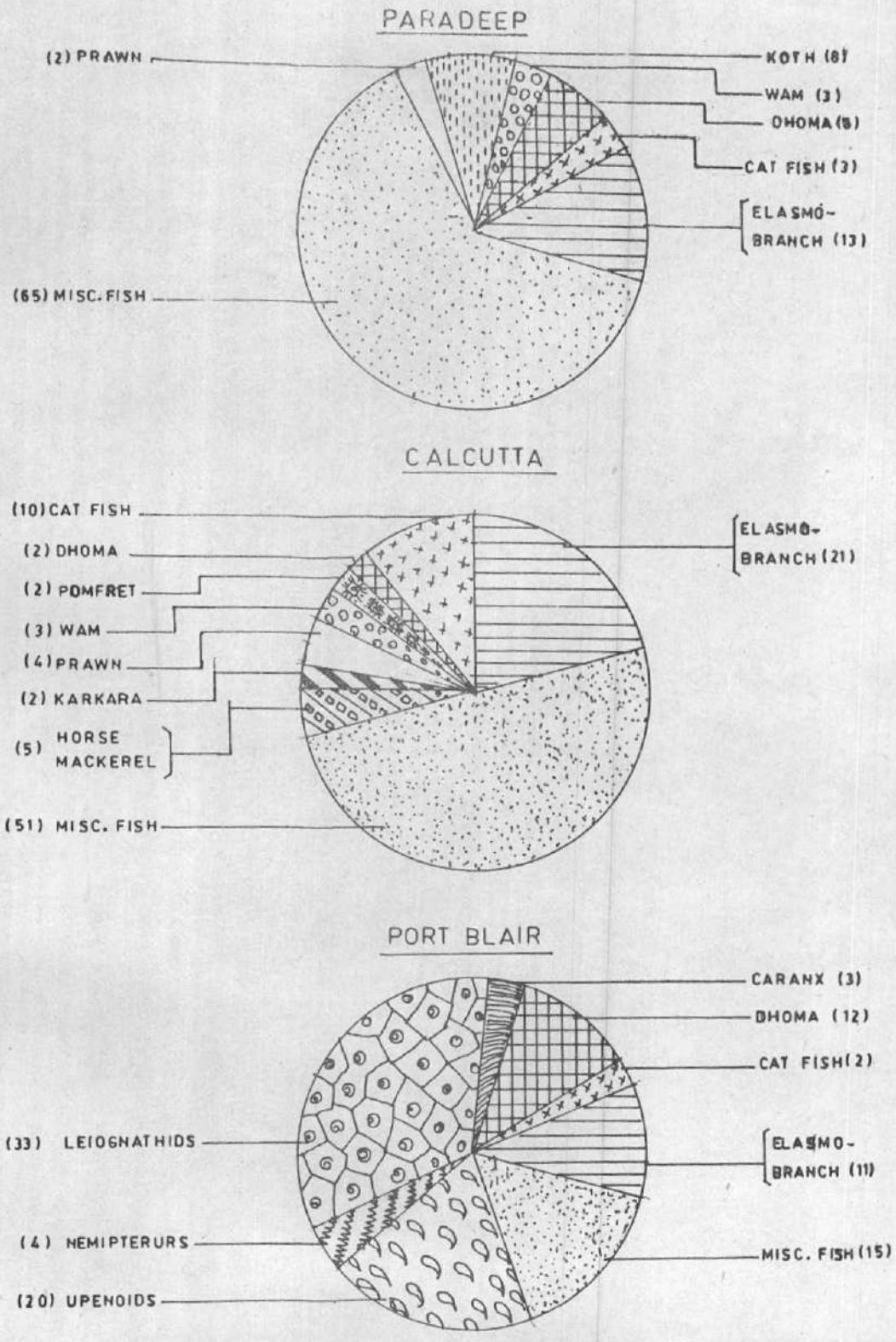

FIG 5 PERCENTAGE COMPOSITION OF IMPORTANT VARIETIES OF FISHES FROM PARADEEP, CALCUTTA AND PORT BLAIR

In Port Blair the main components of the catch were Leiognathids (33%), upenoids (19.5%), elasmobranchs (11%), Nemipterus(3.6%) and caranx (2.6%). A decrease by 6% and 5% respectively is noticed in the case of Leiognathids and upenoids, compared to the previous year.

5.2. Relative abundance by area

The catch per effort obtained for different species of fish from the major areas surveyed by different types of vessels is analysed and presented in this chapter. The main types of vessels operated during the year were 17.5 m class vessels, Jheenga (16.5 m), Meena Bharati (22.5 m), Matsya Vigyani (32.3 m) and Matsya Nireekshani(40.5 m). For convenience of analysis and clarity of presentation of the data, the entire area of operation has been divided into five zones viz. north west coast, south west coast, lower east coast, upper east coast and Andaman & Nicobar islands. The demarcation of the different zones have been given in the earlier bulletin (Bull. Expl.Fish Proj.6).

5.2.1. North West coast

Three types of vessels viz. 17.5 m class, Matsya Nireekshani and Meena Bharati conducted bottom trawling along this coast. These vessels have put in an effort of 1600 hrs covering an area of about 9000 sq.km.

Table III to VI gives the areawise catch/hr of important varieties by bottom trawling along the north west coast. The 17.5 m vessels have surveyed 16 major squares along this coast expending a total fishing effort of 1026 hrs. The areas intensively surveyed were 15-73 (483 hrs), 18-72(407 hrs) and 20-70(313 hrs). In all the remaining areas the effort put in was less than 200 hrs.

Particulars	Area					
	20-69	20-70	20-71	21-68	22-68	21-69
Depth (m)	49-60	51-64	58-60	53-56	54-64	39-62
Fishing effort (hrs)	13.25	38.33	1.67	4.25	4.75	41.08
Varieties						
Elasmobranchs	44.2	281.9	357.1	65.1	71.9	68.4
Wam	-	2.8	12.8	-	-	2.9
Pomfret	8.3	6.4	1.4	-	-	1.3
Ghol	4.8	21.6	50.7	10.8	13.4	20.1
Tam	49.0	7.1	-	1.2	6.7	2.6
Karkara	5.9	4.2	-	7.2	16.8	14.0
Surmai	3.2	4.5	-	4.8	9.6	27.2
Squid	81.7	116.0	-	120.4	96.6	88.6
Ribbon fish	20.9	89.6	358.1	20.4	15.1	25.1
Cat fish	14.4	9.6	-	18.1	28.0	17.2
Dagol	3.8	0.3	-	21.6	24.7	50.8
Caranx	1.5	1.0	-	14.6	6.7	9.7
Dhoma	28.5	67.9	109.2	-	-	3.4
Kati	-	25.1	32.1	4.8	6.7	0.6
Karli	-	-	-	-	-	8.0
Chorinemus	-	6.5	-	-	-	5.1
Sea bream	32.6	21.4	-	2.4	6.7	27.4
Horse mackerel	4.5	12.6	-	-	9.8	9.5
Miscellaneous	39.0	127.4	-	60.7	146.6	171.8
T o t a l:	342.3	805.9	921.4	352.1	459.3	554.2

TABLE III. Area-wise catch/hr (in Kg) of important varieties obtained by Matsyanireekshani

Particulars	Area					
	22-68	21-69	21-68	20-71	20-70	20-69
Fishing effort (hrs)	93	181	38	3	313	9
Varieties						
Elasmobranchs	8.0	8.2	6.6	13.3	5.6	10.6
Wam	4.5	0.9	0.5	6.7	0.6	0.8
Cat fish	5.8	3.4	1.9	-	0.7	-
Karkara	0.2	0.3	-	-	-	-
Tam	0.7	0.4	1.4	-	1.2	-
Ghol	3.7	8.4	15.9	-	1.1	0.3
Dhoma	6.1	13.5	21.0	-	22.2	18.9
Pomfret	-	2.2	1.7	-	0.8	1.1
Surmai	-	1.5	1.6	-	0.4	-
Lactarius	-	-	-	-	0.2	-
Koth	1.8	-	-	-	0.2	-
Ribbon fish	-	4.9	-	-	5.8	-
Perch	-	0.3	-	-	4.4	1.3
Kati	7.9	0.3	1.1	-	0.4	-
Squid	0.5	25.3	6.1	-	5.8	11.7
Other quality fish	1.3	3.0	1.0	-	4.5	9.9
Miscellaneous fish	3.9	39.0	4.0	-	1.6	21.1
TOTAL	43.8	111.6	62.8	20.0	55.8	76.2

TABLE IV. Area-wise catch/hr (in Kg) of important varieties obtained by 17.5 m trawlers off Porbandar and Veraval

Particulars	Area												
	19-72	19-71	18-72	18-71	17-72	17-71	20-70	19-72	19-71	19-70	18-72	18-71	17-72
	17.5 m VESSELS						MEENA BHARATI						
Fishing effort(hrs)	28.	6	407	185	186	9	20	27	82	2	64	182	34
Varieties													
Elasmo-branchs	64.3	-	16.7	5.2	15.8	8.9	-	8.9	10.4	-	10.8	11.5	12.1
Prawn	-	-	-	-	-	-	-	-	-	-	-	-	-
Wam	1.2	-	0.8	-	-	-	-	-	0.1	-	-	0.1	-
Cat fish	-	3.3	15.4	31.6	7.5	-	-	-	-	-	14.9	41.6	-
Karkara	-	2.5	1.7	1.5	1.9	-	-	0.2	0.1	-	0.5	2.2	5.0
Tam	3.6	-	1.1	1.7	2.0	-	-	0.4	1.5	-	1.7	2.6	-
Ghol	4.1	-	3.1	2.4	0.2	-	-	1.1	1.6	-	3.1	2.2	-
Dhoma	7.7	-	6.1	0.1	4.9	-	-	0.6	0.9	-	1.5	9.8	17.5
Pomfret	-	-	0.6	0.6	0.5	-	-	-	-	-	0.3	0.3	-
Surmai	-	-	0.2	0.3	2.7	-	-	-	-	-	0.5	0.4	-
Lactarius	-	-	-	-	-	-	-	-	-	-	0.9	-	-
Dara	-	-	-	-	-	-	-	-	-	-	0.4	-	-
Other quality fish	104.3	6.7	10.7	11.2	5.0	-	-	7.4	17.4	-	11.3	15.7	4.6
Miscellaneous fish	2.5	10.0	11.3	18.0	12.9	-	5.5	7.2	17.0	25.0	24.9	31.0	20.0
Total:	187.7	22.5	67.7	72.6	53.4	8.9	5.5	25.8	49.0	25.0	70.8	117.4	59.2

TABLE V. Area-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels and Meena Bharati off Maharashtra and Gujarat coasts

Particulars	Area							
	16-72	16-73	15-73	14-74	14-73	13-74	12-75	12-74
	GOA					MANGALORE		
Fishing effort(hrs)	16	12	483	12	35	260	27	558
Varieties								
Elasmobranchs	31.4	27.1	4.7	-	7.3	2.2	4.8	2.7
Prawn	0.9	-	1.4	8.6	5.3	0.6	-	1.0
Wam	1.9	-	0.1	-	-	-	-	-
Cat fish	133.5	98.8	71.5	385.0	219.6	18.2	7.4	13.3
Kilimeen	-	-	11.3	-	16.1	-	-	-
Butter fish	-	-	8.6	23.4	5.1	-	-	-
Ribbon fish	46.9	45.8	57.7	44.2	141.1	-	-	0.5
Jew fish	-	-	0.2	-	3.5	0.7	-	0.4
Horse mackerel	-	-	4.0	-	0.9	-	-	-
Pomfret	1.2	-	2.3	5.7	2.0	-	-	-
Squid	-	-	1.1	-	0.8	-	-	-
Barracuda	-	-	0.3	-	-	-	-	-
Lizard fish	-	-	-	-	-	3.4	0.2	3.7
Perch	-	-	3.2	4.3	1.3	-	-	-
Sciaenids	-	-	0.6	-	-	-	-	-
Lactarius	-	-	-	-	-	1.1	2.4	1.2
Carangids	-	-	0.3	-	-	-	-	-
Other quality fish	-	-	2.5	21.3	3.7	3.1	2.5	2.7
Miscellaneous fish	15.6	3.1	36.2	22.8	61.0	55.8	47.2	56.0
Total	231.4	174.8	199.0	515.3	467.7	85.1	64.5	82.0

TABLE VI. Area-wise catch/hr (in kg) of important varieties obtained by 17.5 m vessels off Goa and Karnataka coasts

The highest catch rate was obtained from the area 14-74(515 Kg/hr) followed by 14-73 (468 Kg/hr), 16-72(231 Kg/hr), 15-73 (199 Kg/hr) and 19-72(188 Kg/hr). A remarkable increase in the catch/hr is noticed in respect of the areas 14-73, 15-73 and 20-69 over the previous year. The remaining areas however show a fall in the catch rate.

The vessel Matsya Nireekshini surveyed six major areas viz. 20-69, 20-70, 20-71, 21-68, 22-68 and 21-69 along the Gujarat coast. The area 21-69 was intensively surveyed by putting about 40 hours of fishing followed by 20-70 with an effort of 38 hours. In the rest of the areas the fishing effort expended varied between 2 hrs to 13 hrs. Of the six areas surveyed, the area 20-71 yielded maximum catch rate of 921 Kg/hr. The second highest catch rate of 806 Kg/hr was obtained from the area 20-70. The remaining areas also yielded appreciable catch rates ranging between 340 and 554 Kg/hr.

Seven major areas were surveyed by Meena Bharati along the north west coast. The maximum effort was expended in the area 18-71(182 hrs) followed by 19-71 (82 hrs) and 18-72 (64 hrs). The area 18-71 recorded the highest catch rate of 117 Kg/hr while the area 18-72 obtained a catch/hr of 71 Kg. Rest of the areas yielded catch rate of less than 50 Kg/hr.

It may be mentioned that 17.5 m vessels operated along all the three regions viz. Gujarat, Maharashtra and Goa. Of all the areas surveyed by this class of vessels along the north west coast, the areas off Goa region registered the highest catch rate. The area 19-72 off Maharashtra and 21-69 off Gujarat also yielded comparatively better catch rates. A substantial increase in the catch rate is noticed in respect of the areas 14-74 and 14-73 off Goa region. The catch rate obtained from the area off Gujarat however showed a decline except the area 20-69, compared to the results obtained during last year.

The area-wise catch/hour details of important varieties obtained by M.V.Matsya Nireekshani is given in the Table III. The area 20.71 recorded the highest catch rate in respect of elasmobranchs(337.1 Kg) followed by 20-70(281.9 Kg). Appreciable quantities of squid have been obtained from all areas surveyed, the average catch/hr has been worked out between 81.7 Kg/hr and 120.4 Kg/hr (21-68). The highest catch rate of ghol has been obtained from the area 20-71 (50.7 Kg) and all other areas yielded catch rate between 10 and 21 Kg/hr. Tam, karkara and surmai have been recorded from all areas, where the highest catch rate of the above species were 49 Kg (20-69), 16.8 Kg (22-68), 27.2 Kg (21-69) respectively. Very good catches of ribbon fishes has been obtained from the area 20-71, where the average catch rate has been worked out to 358.1 Kg followed by 20-70 (89.6 Kg). The species like cat fishes, dagol, caranx, dhoma, sea bream have been recorded from all areas, the highest catch/hr for the above species have been obtained from the areas 22-68(28 Kg), 21-69(50.8 Kg), 21-68(14.6 Kg), 20-71(109.2 Kg) and 20-69 (32.6 Kg) respectively. Highest catch rate of prawn was recorded from the area 14-74 (8.6 Kg/hr) and 14-73(5.3 Kg/hr) off Goa region. The areas 20-70(22 Kg/hr) and 20-79 (19 Kg/hr) surveyed by the 17.5 m vessels also recorded appreciable catch rate for this variety.

The area 14-73 recorded the highest catch/hr of 141 Kg for ribbon fish by the 17.5 m vessels. All the areas surveyed along Goa region showed better catch rates for this variety.

The highest catch rate for cat fish was registered from the areas off Goa region viz. 14-74 (385 Kg/hr), 14-73 (220 Kg/hr) and 15-73 (72 Kg/hr). The area 18-71 (42 Kg/hr) surveyed by Meena-Bharati also showed better results for this variety. Wam recorded

the highest catch rate of 10 Kg/hr from the area 19-72 while ghol recorded the highest yield of 21 Kg/hr from the area 20-70.

Squid which is gaining more importance in the export market was found to be fairly distributed along Gujarat region.

Of the three regions surveyed along north west coast, the areas off Gujarat and Maharashtra regions gave better yield for elasmobranchs, pomfret, dhoma, wam, squid and ghol whereas Goa region was found to be richer in respect of prawn, cat fish and ribbon fish.

5.2.2. South west coast

This region comprises of Kerala and Karnataka coasts. Only 17.5 m vessels were available for operation along this coast. Table 6 and 7 gives the effort and catch/hr obtained from different areas in respect of some of the important varieties along this coast. Substantial effort was expended in the area 9-76(845 hrs), 12-74(558 hrs), 9-75(304 hrs), 13-74(260 hrs) and 10-75 (191 hrs) respectively. In the rest of the areas the effort put in was less than 50 hrs. The highest catch rate was recorded from the area 9-75 (199 Kg/hr) followed by 10-75 (190 Kg/hr) and 8-76 (157 Kg/hr). All the remaining areas recorded catch rates less than 100 Kg/hr.

The important varieties caught from this region were elasmobranchs, cat fish, kilimeen, lizard fish, caranx and cuttle fish. The highest catch rate for elasmobranchs was obtained from the area 9-75 (41 Kg/hr). The areas 10-75 (39 Kg/hr), 8-76 (28 Kg/hr) and 9-76 (23 Kg/hr) also yielded better results for the variety. Area 10-75 recorded the highest catch rate for cat fish (87 Kg/hr). Better catch rates for kilimeen and lizard fish was obtained from the area 9-75.

Particulars	Area							
	8-78	8-77	7-77	8-78	8-77	12-80	13-80	14-80
	TUTICORIN (17.5 m vessels)			JHEENGA		MADRAS (17.5 m vessels)		
Fishing effort (hrs)	807	10	25	460	53	134	338	65
Varieties								
Elasmobranchs	18.9	13.0	19.9	30.0	11.6	1.4	4.5	12.8
Perch	31.4	20.4	19.0	24.7	1.4	0.5	0.6	2.8
Cat fish	0.5	0.8	3.2	0.2	0.2	-	-	-
Sciaenids	0.9	0.4	4.1	0.3	-	4.1	4.3	12.1
Caranx	2.4	1.0	0.9	0.7	1.7	-	-	-
Synagris	-	-	-	-	-	5.1	2.5	-
Lactarius	-	-	-	-	-	0.2	2.3	4.4
Leiognathids	-	-	-	-	-	14.1	17.1	34.2
Lizard fish	-	-	-	-	-	3.5	4.8	4.4
Pomfret	-	-	-	-	-	0.4	0.1	1.6
Gerrids	-	-	-	-	-	1.8	5.9	-
Jew fish	-	-	-	-	-	3.7	3.8	-
Cuttle fish	-	-	-	-	-	0.1	0.2	-
Ribbon fish	-	-	-	-	-	0.3	0.1	-
Other quality fishes	16.7	3.4	17.4	11.8	6.4	1.7	1.3	6.9
Miscellaneous fish	16.2	14.7	23.8	11.0	10.9	21.4	14.5	29.3
Total	87.0	53.7	88.3	78.8	32.2	58.3	62.1	108.5

TABLE VIII. Area-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels and Jheenga off Tamilnadu coast

Table 9-11 gives the effort expended and catch/hr obtained for different varieties of fishes from this region. The maximum effort was expended by the 17.5 m vessels in the area 17-83 (720 hrs) and 20-86(605 hrs) respectively.

The main species caught from this coast were elasmobranchs, cat fish, prawn, perch, pomfret and wam. The area 19-85 recorded the highest catch rate for elasmobranchs (44 Kg/hr) followed by 20-87(39 Kg/hr). Highest catch rate for cat fish (21 Kg/hr) was obtained from the area 20-87. The area 18-73 yielded the highest catch rate for perch and pomfret (5 Kg/hr each). Wam was recorded in off Orissa coast. A catch rate of about 6 Kg/hr was obtained for this variety from the area 19-85. A remarkable decrease in the catch rate of ribbon fish is noticed. Also a decreasing trend is noticed in respect of elasmobranchs and perch compared to the previous year while the other varieties showed an increasing trend.

An appreciable increase is noticed in the catch rate of prawn obtained by Matsya Vigyani along the West Bengal region. The area 20-86 registered a catch rate of 6.1 Kg/hr against 3.9 Kg/hr obtained during the previous year. Other areas which registered better catch rates for prawn were 20-88 (2.6 Kg/hr), 19-86 (4.6 Kg/hr) and 20-87(2.3 Kg/hr). The 17.5 m vessels also recorded a catch rate of 2.4 Kg/hr from the area 19-85, 2.2 Kg/hr from 20-86 and 1.9 Kg/hr from 20-87 for this variety.

Occurrence of horse mackerel in appreciable quantities in the trawl catches of this coast is another noteworthy feature. The area 20-87 and 20-88 yielded a catch rate of 14 Kg/hr and 10 Kg/hr respectively for this variety.

Particulars	Area				
	18-84	18-83	17-83	17-82	16-82
Fishing effort (hrs)	200	58	720	62	93
Varieties					
Elasmobranchs	10.3	7.7	2.0	3.3	5.8
Cat fish	10.9	4.0	8.5	1.4	3.9
Prawn	-	-	0.2	-	0.1
Crab & cray fish	-	-	0.3	0.1	-
Eel	0.5	1.2	-	-	0.4
Perch	4.5	5.0	0.7	1.2	1.0
Pomfret	3.6	4.9	0.2	-	0.1
Sciaenids	0.1	-	-	0.1	-
Ribbon fish	0.6	-	0.4	0.2	-
Horse mackerel	0.3	1.0	0.1	-	-
Other quality fishes	4.2	3.0	1.1	2.4	2.2
Miscellaneous fish	98.9	85.4	37.1	28.4	24.1
Total:	133.9	112.2	50.6	37.1	37.6

TABLE IX. Area-wise catch/hr (in Kg) of important varieties obtainedby 17.5 m vessels off Andhra coast

Particulars	Area						
	20-88	20-87	20-86	19-86	21-87	20-88	20-87
	MATSYAVIGYANI				17.5 m VESSEL		
Fishing effort(hrs)	52	15	73	41	10	90	22
Varieties							
Elasmobranchs	13.8	38.6	11.2	12.8	35.5	4.4	57.4
Prawn	2.6	2.3	6.1	4.6	-	0.8	1.9
Cat fish	7.9	8.0	10.3	7.1	1.8	0.9	21.2
Pomfret	1.1	1.7	2.3	1.7	1.7	1.5	0.5
Karkara	0.8	4.3	0.7	0.9	0.7	-	6.0
Eel	0.7	1.5	2.9	5.1	-	0.6	-
Dhoma	-	-	4.9	-	-	0.3	-
Koth	-	1.7	0.8	0.2	-	-	-
Horse mackerel	-	-	0.3	0.2	-	9.8	13.9
Miscellaneous fish	93.2	31.1	25.6	15.1	21.2	25.8	54.9
Total	120.1	89.2	65.1	47.7	60.9	44.1	155.3

TABLE X. Area-wise catch/hr (in Kg) of important varieties obtained by Matsyavigyani and 17.5 m vessels off West Bengal coast

Particulars	Area			
	20-87	20-86	19-86	19-85
Fishing effort(hrs)	2	605	4	11.0
Varieties				
Elasmobranchs	5.0	17.6	18.0	43.6
Cat fish	-	4.2	-	5.7
Perch	-	0.8	-	-
Pomfret	-	1.2	0.5	3.7
Karkara	-	0.1	-	-
Wam	-	4.2	-	5.5
Koth	2.0	10.6	4.0	28.5
Caranx	0.5	0.8	3.8	-
Prawn	-	2.2	0.3	2.4
Lobster	0.5	0.2	0.8	0.5
Surmai	-	0.2	0.3	0.3
Lactarius	-	1.6	-	12.2
Red snapper	-	-	3.0	-
Dhoma	-	8.3	-	-
Karkara	-	0.1	-	-
Leiognathids	-	-	-	-
Nemipterus sp.	-	-	-	-
Upenoids	-	-	-	-
Perch	-	-	-	-
Gerrids	-	-	-	-
Lizard fish	-	-	-	-
Sciaenids	-	-	-	-
Carangids	-	-	-	-
Miscellaneous fish	10.5	87.1	12.8	84.5
Total	18.5	139.2	43.5	186.9

TABLE XI. Area-wise catch/hr(in kg) of important varieties obtained by 17.5 m vessels off Orissa coast

5.2.5. Andaman and Nicobar waters

Only one 17.5 m vessel conducted bottom trawling from the Port Blair base. A total of 467 hrs was expended in bottom trawling. Only two major areas viz. 11-92 and 12-93 were surveyed. The average catch/hr obtained from these areas were 116.8 Kg/hr and 35 Kg/hr respectively. The area 11-92 was extensively surveyed putting the maximum effort of 464 hrs.

Table XII gives the areawise catch/hr in respect of the important varieties obtained from this region.

The catch mainly consisted of elasmobranchs, cat fish, perch, leiognathids, upenoid, squids, carangids and Nemipterus sp. The area 11-92 recorded the highest catch rates in respect of elasmobranchs (13 Kg/hr), leiognathids (38 Kg/hr), upenoids (23 Kg/hr), squid (14 Kg/hr) and nemipterids (4 Kg/hr) while the area 12-93 registered highest catch rates of gerrids and perch. Comparing to the results obtained from the area 11-92 during last year, there is an increase in the catch rate of elasmobranchs, nemipterids and carangids while all other varieties showed a decrease during the year.

5.3. Relative abundance by area and depth

5.3.1. North west coast

As stated elsewhere, three classes of vessels viz. 17.5 m vessels, Matsya Nireekshani and Meena Bharati operated along this coast. The 17.5 m vessel operated upto a depth of 70 m along Gujarat coast, 100 m along Maharashtra and 80 m along Goa coast. Matsya Nireekshani and Meena Bharati surveyed upto a depth of 70 m and 100 m respectively.

It is seen from Fig. 6 which illustrates the catch/hr

Particulars	Area	
	12-93	11-92
Fishing effort(hrs)	3	464
Varieties		
Elasmobranchs	11.0	13.4
Cat fish	-	2.2
Perch	-	1.0
Pomfret	-	-
Karkara	-	-
Wam	-	-
Koth	-	-
Caranx	-	-
Prawn	-	-
Lobster	-	-
Surmai	-	-
Lactarius	-	-
Red snapper	-	-
Dhoma	-	-
Karkara	-	-
Leiognathids	9.3	38.1
Nemipterus sp.	1.0	4.2
Upenoids	3.0	22.7
Perch	2.0	-
Gerrids	8.7	0.8
Lizard fish	-	0.9
Sciaenids	-	14.0
Carangids	-	3.1
Miscellaneous fish	-	16.4
Total	39.9	116.8

Table XII. Area-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels off Andaman & Nicobar

of trawling by area & depth obtained by the 17.5 m vessels along this coast, that among all the areas surveyed by the 17.5 m vessels, the area 20-70 yielded the highest catch rate of 477 Kg/hr followed by 18-72 (307 Kg/hr) from the depth belt of 20-29 m. All the depth zones of the area 19-72 (30-60 m) also yielded appreciable catch rates ranging between 178-191 Kg/hr. The 50-99 m depth range was found to be productive in respect of the area 21-69.

Meena Bharati recorded the highest catch rate of 150 Kg/hr from 30-39 m depth zone of the area 18-72. The depth zone 80-89 m was found to be productive in regard to the area 18-71. Fig. 7 shows the catch/hr of trawling obtained by Matsya Nireekshani and Meena Bharatialong the north west coast by area and depth.

Table 13 to 17 gives the depth wise catch/hr of important varieties obtained by the above three classes of vessels along the north west coast. It is seen from the table that from Porbandar region 50-59 m depth zone was found to be productive with a catch rate of 98 Kg/hr. The depth zone 20-29 m yielded the highest rate of elasmobranchs (16 Kg/hr) and wam (8 Kg/hr) while the depth zone 50-59 m was productive in respect of pomfret (4 Kg/hr), ghol (10 Kg/jr) dhoma (18 Kg/hr) and squid (22 Kg/hr). Matsya Nireekshani obtained the highest yield from the depth zone 60-69 m (747 Kg/hr). This depth zone was found to be productive in respect of most of the varieties like elasmobranchs (241 Kg/hr), pomfret (10 Kg/hr), ribbon fish (137.5 Kg/hr) and dhoma (66.9 Kg/hr). The highest catch rate of squid and sea bream was obtained from 50-59 m depth belt.

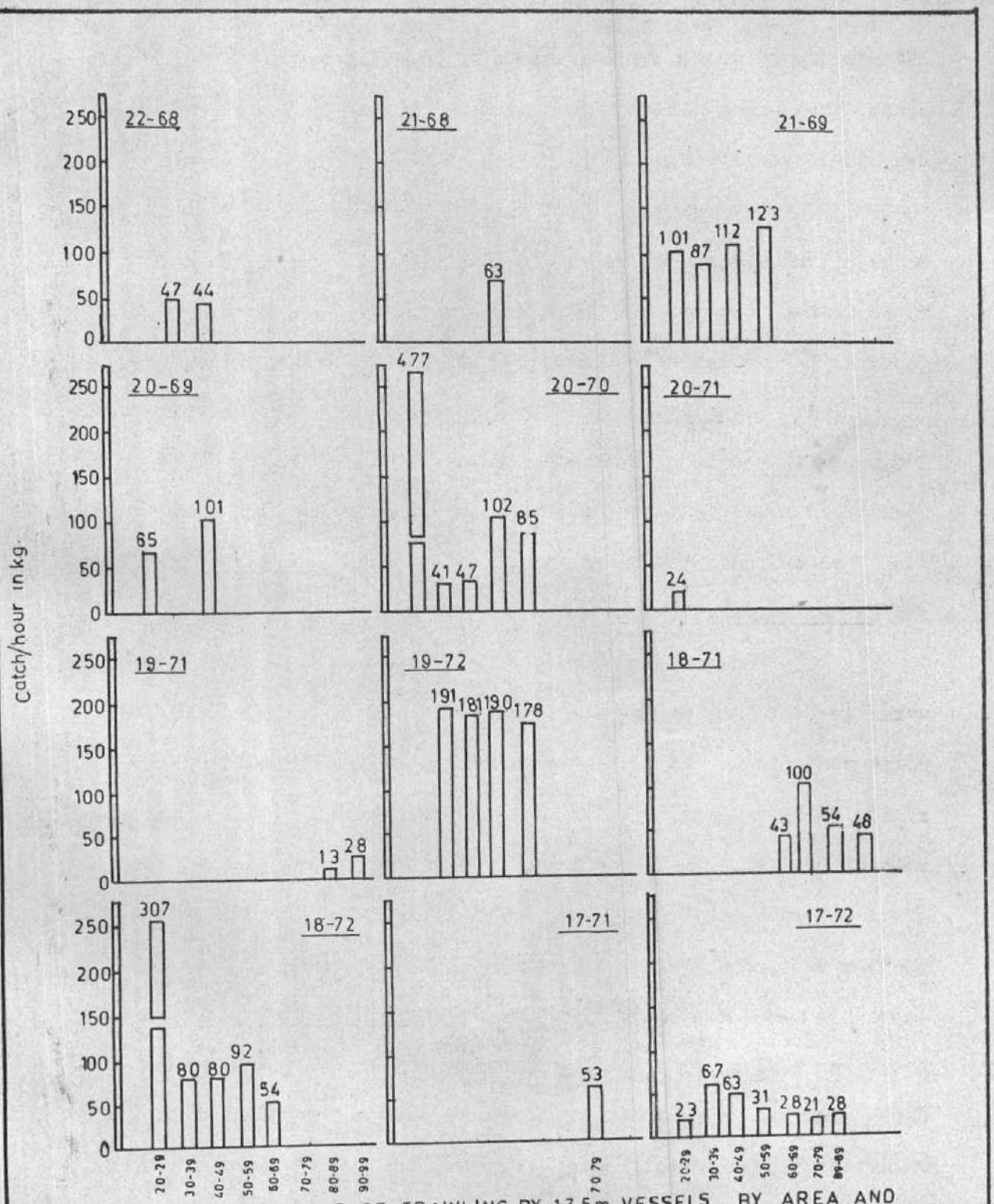

FIG:6 CATCT PER HOUR OF TRAWLING BY 17.5m VESSELS BY AREA AND DEPTH ALONG THE NORTH-WEST COAST

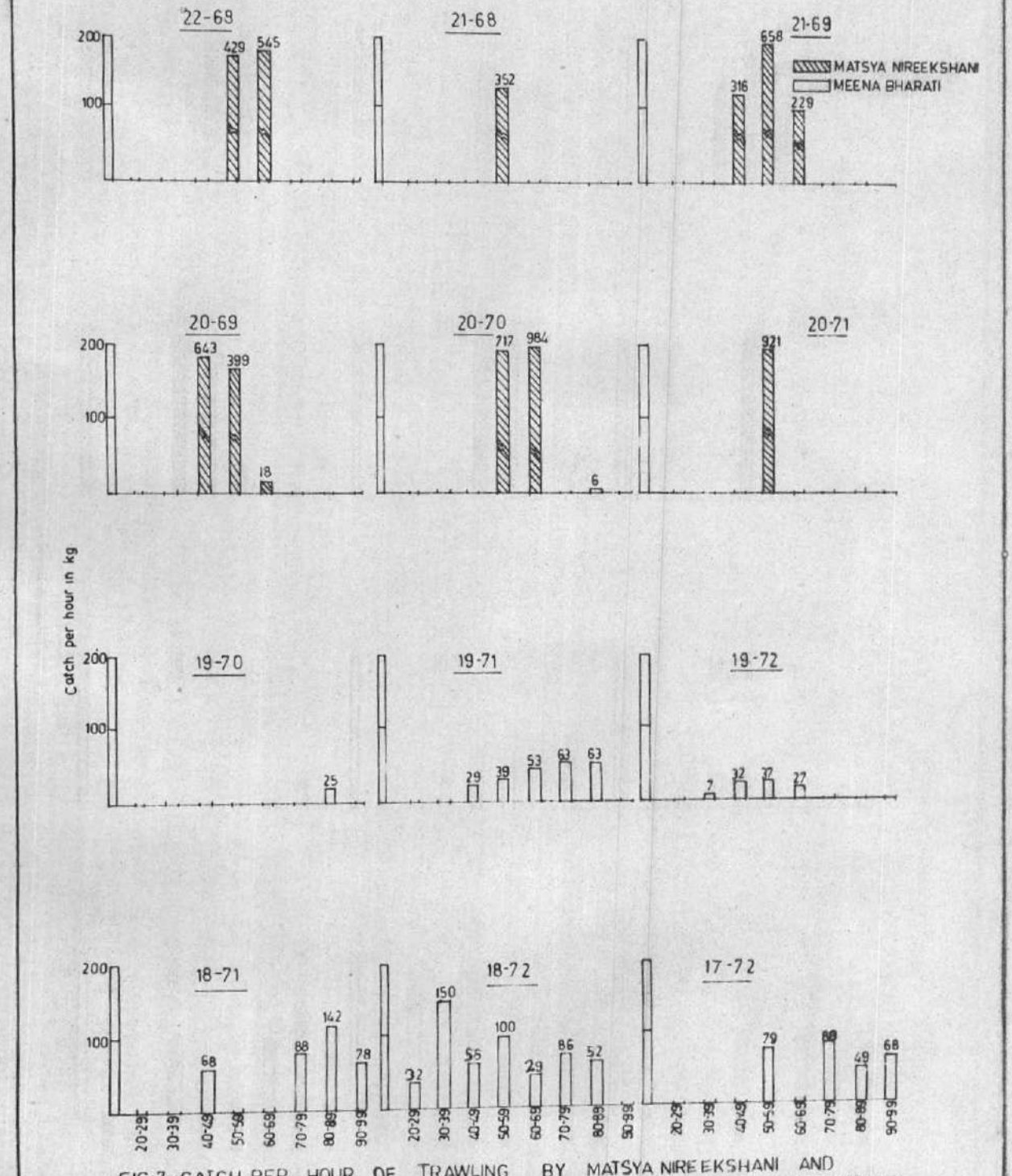

FIG:7- CATCH PER HOUR OF TRAWLING BY MATSYA NIREEKSHANI AND MEENA BHARATI BY AREA AND DEPTH FROM THE NORTH-WEST COAST

Particulars	Depth range (m)		
	40-49	50-59	60-69
Fishing effort(hrs)	10.1	72.50	20.25
Varieties			
Elasmobranchs	67.9	132.4	240.9
Wam	3.9	2.4	1.7
Pomfret	-	3.6	10.3
Ghol	1.9	20.9	17.4
Tam	6.5	13.0	4.9
Karkara	10.1	9.9	4.7
Surmai	13.9	15.4	6.7
Squid	50.0	110.0	76.4
Ribbon fish	7.9	30.8	137.5
Cat fish	13.2	12.3	15.1
Dagol	26.1	26.9	6.4
Caranx	6.9	6.0	1.9
Dhoma	-	24.2	66.9
Koth	-	1.1	-
Kati	-	2.5	42.1
Karli	1.4	4.9	-
Dara	-	-	14.2
Squid	-	2.2	0.5
Barracuda	-	0.7	-
Elacate	-	0.5	-
Chorinemus	-	6.3	-
Sea bream	2.9	31.4	4.9
Horse mackerel	2.9	5.9	25.3
Sciaenids	1 - 6	35.6	67.4
Miscellaneous fish	134.6	135.1	69.4
Total	350.1	602.0	747.2

TABLE XIII. Depth-wise catch/hr (in Kg) of important varieties obtained by Matsya Nireekshani

Varieties	Depth range (m)			
	20-29	30-39	40-49	50-59
Elasmobranchs	16.0	3.9	8.5	8.2
Pomfret	-	-	0.5	3.8
Wam	8.0	4.2	2.9	0.7
Ghol	-	11.3	8.4	9.9
Kati	-	4.6	4.4	0.5
Karli	-	-	0.2	0.4
Cat fish	-	17.2	5.2	1.0
Sea bream	-	0.3	1.0	0.2
Tam	-	-	0.5	1.3
Karkara	-	-	0.2	0.5
Elacate	-	-	-	-
Dhoma	-	5.4	6.0	17.7
Ribbon fish	-	-	1.4	1.9
Carangids	-	1.1	0.1	0.2
Squid	-	3.9	14.3	21.9
Surmai	-	0.4	0.3	2.7
Perch	-	0.5	0.1	-
Koth	-	2.8	0.4	-
Other quality fishes	-	-	0.2	0.3
Miscellaneous fish	-	28.2	28.7	26.8
TOTAL	24.0	83.8	83.3	98.0

TABLE XIV. Depth-wise catch/hr (in Kg) of important varieties obtained by Meena Udyog(17.5 m vessel) off Porbandar

Varieties	Depth range (m)				
	20-29	30-39	40-49	50-59	60-69
Elasmobranchs	22.1	5.5	4.1	11.8	-
Wam	2.2	0.1	0.5	2.4	-
Tam	-	-	1.1	2.9	-
Ghol	6.3	1.2	0.8	1.3	-
Dhoma	121.0	21.4	18.1	29.7	30.0
Pomfret	-	0.1	1.0	2.1	-
Surmai	1.0	0.3	0.6	-	-
Cat fish	-	0.1	0.9	0.5	-
Koth	1.0	-	-	0.6	-
Ribbon fish	6.1	5.7	4.0	14.1	20.0
Perch	1.4	0.3	3.1	13.8	-
Kati	-	0.8	-	0.4	-
Squid	0.5	4.6	7.8	9.8	22.0
Lobster	0.4	0.1	0.2	0.1	-
Other quality fish	11.9	3.6	4.9	6.8	9.0
Miscellaneous fish	5.4	1.9	1.9	4.1	4.0
Total	179.3	45.7	49.0	100.4	85.0

TABLE XV. Depth-wise catch/hr (in Kg) of important varieties obtained by Meena Prapi off Veraval

Varieties	Depth range (m)							
	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Bombay 17.5 m vessels)								
Elasmobranchs	10.7	29.1	19.0	3.8	8.3	5.1	3.7	-
Wam	0.4	1.1	0.2	0.4	-	-	-	-
Cat fish	1.8	12.9	19.4	20.0	7.5	39.0	27.6	13.9
Karkara	0.3	2.6	1.0	1.6	1.9	2.4	0.1	0.6
Tam	2.3	1.3	1.1	1.6	1.4	2.4	1.0	-
Ghol	3.8	1.2	2.3	3.2	1.4	4.4	0.6	-
Dhoma	5.0	8.2	5.5	1.8	0.9	0.5	-	-
Pomfret	0.9	0.4	0.9	-	0.3	1.2	-	-
Surmai	-	0.6	2.8	0.7	-	0.5	-	-
Other quality fishes	2.6	6.0	14.0	40.3	15.0	19.5	1.6	2.3
Miscellaneous fish	1.7	17.2	12.1	8.9	11.6	18.0	15.8	9.6
Total	29.5	80.6	78.3	82.3	48.3	93.4	50.4	26.4
Bombay (Meena Bharati)								
Elasmobranchs	-	16.9	12.7	15.2	7.2	8.6	31.1	1.6
Wam	-	-	-	-	0.3	-	0.3	-
Cat fish	12.8	15.4	2.2	7.2	0.5	11.4	89.2	28.8
Karkara	-	2.7	-	0.1	-	2.3	5.2	1.0
Tam	-	2.3	0.7	1.8	2.3	0.9	6.3	0.8
Ghol	-	6.2	1.8	4.8	0.8	0.2	6.2	-
Dhoma	-	3.1	1.1	2.0	-	7.2	23.8	8.2
Pomfret	-	0.4	0.3	-	-	0.3	0.6	-
Surmai	-	1.2	0.3	0.1	-	0.2	1.0	-
Other quality fishes	-	1.9	16.8	3.5	14.3	23.0	32.6	9.0
Miscellaneous fish	19.2	17.3	5.8	27.2	17.8	25.6	68.5	26.5
Total	32.0	67.4	41.8	61.9	43.2	79.7	264.8	75.9

TABLE XVI. Depth-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels and Meena Bharati off Maharashtra coast

Varieties	Depth range (m)						
	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Elasmobranchs	0.7	2.2	5.6	10.4	12.6	16.5	44.3
Prawn	0.2	0.6	3.8	1.2	1.5	6.7	0.8
Wam	-	0.1	0.3	-	0.1	1.3	1.3
Cat fish	5.8	41.6	134.2	172.1	140.4	115.4	237.5
Nemipterids	9.0	9.7	11.4	23.3	14.6	-	-
Butter fish	4.8	5.8	11.7	11.8	9.6	15.7	-
Ribbon fish	24.1	35.5	69.1	170.1	122.5	52.5	50.0
Jew fish	-	0.1	0.1	1.8	2.2	-	-
Horse mackerel	-	1.2	0.2	-	2.3	-	-
Pomfret	0.2	0.2	3.0	1.1	1.8	7.3	1.8
Squid	-	0.3	2.6	-	0.9	-	-
Barracuda	-	0.3	0.2	-	0.2	-	-
Seer fish	-	0.1	0.1	-	0.1	-	-
Perch	-	0.1	0.9	-	0.7	-	-
Sciaenids	-	0.3	0.8	3.5	-	-	-
Carangids	-	0.4	0.2	-	-	-	-
Other quality fishes	1.2	1.5	3.1	7.7	6.6	1.1	-
Miscellaneous fish	0.3	32.9	50.6	35.4	29.1	46.2	31.3
Total	46.3	132.9	297.9	438.4	345.1	262.7	367.0

TABLE XVII. Depth-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels off Goa

In Veraval region 20-29 m depth zone gave the highest catch rate of 179 Kg/hr. This depth zone gave the highest yield in respect of elasmobranchs (22 Kg/hr), ghol (6 Kg/hr) and dhoma (121 Kg/hr). Highest yield of ribbon fish (20 Kg/hr) and squid (22 Kg/hr) was obtained from 60-69 m depth while perch was found to be abundant in 50-59 m depth.

In Bombay region the 17.5 m vessels recorded the highest catch/hr from the depth zone of 70-79 m (93 Kg/hr) while Meena Bharati obtained the highest catch rates from 80-89 m depth zone. Of the different depth zones surveyed by 17.5 m vessels, the depth zone 30-39 m was found to be productive for elasmobranchs (29 Kg/hr) and dhoma (8 Kg/hr). The depth zone 70-79 m yielded highest catch rate of cat fish (39 Kg/hr), ghol (4 Kg/hr), tam and karkara (2 Kg/hr each) and pomfret (1 Kg/hr). Meena Bharati yielded the highest catch rate from the depth range of 80-89 m in respect of most of the varieties viz. elasmobranchs(31 Kg/hr), cat fish (89 Kg/hr), karkara (5 Kg/hr), tam and ghol (6 Kg/hr each) and dhoma (24 Kg/hr).

In Goa region the depth zone 40-49 m registered the highest catch rate of 438 Kg/hr. The same depth zone recorded the highest catch rate during last year also (341 Kg/hr). The depth range of 70-79 m registered highest catch rate for elasmobranchs (44 Kg/hr), cat fish(238 Kg/hr) and wam (1 Kg/hr) while 60-69 m depth zone gave highest yield for prawn(6.7 Kg/hr) lactarius sp. (16 Kg/hr) and pomfret (7 Kg/hr). Highest catch rate of rani fish (23 Kg/hr) and ribbon fish was recorded from 40-49 m depth zone. Appreciable catch rate for prawn registered from different depth zones in this region deserves special mention. The present catch rate shows a remarkable increase compared to the results obtained during previous years.

5.3.2. South west coast

Fig. 8 shows the catch/hr obtained from the different depth zones off the south west coast. The 17.5 m vessels surveyed upto a depth of 60 m off Karnataka region and upto 110 m off Kerala region. In Karnataka region the depth zone 30-39 of the area 13-74 recorded the highest catch rate of 148 Kg/hr. The depth zones, 30-39 and 40-49 m of the area 12-74 also gave better catch rates of 140 Kg/hr and 142 Kg/hr respectively. In Kerala region the depth zone 90-99 m of the area 9-75 recorded the highest yield of 414 Kg/hr. Other areas which gave better catch rates of above 300 Kg/hr were 10-75 (70-100 m) and 9-76 (50-59 m).

Table XVIII and XIX gives the depth-wise catch/hr (in Kg) of prawn and other important varieties obtained along the south west coast. During previous year the survey along Karnataka was restricted only to a single depth range viz. 20-39 m and therefore a comparative study on the depth-wise productivity could not be attempted. Of the five depth zones surveyed during the year, the 30-39 m zone gave the highest yield of 143 Kg/hr. The same depth belt was found productive in respect of elasmobranchs (5 Kg/hr), lizard fish (11 Kg/hr) and dhoma (1 Kg/hr). 50-59 m depth range gave better yield for lactarius sp. (3 Kg/hr) and cat fish (27 Kg/hr). Ribbon fish which recorded a catch rate of 27 Kg/hr during 1976-77 showed a drastic fall upto 1 Kg/hr during 1977-78 has further shown decrease and was sparingly available in the 10-19 m depth zone. Occurrence of prawn at the rate of 2.4 Kg/hr in the depth range of 10-19 m is worth mentioning.

Varieties	Depth range (m)				
	10–19	20–29	30–39	40–49	50–59
Elasmobranchs	0.1	2.6	5.3	4.3	3.2
Prawn	2.4	–	0.1	–	–
Lactarius	0.2	1.4	2.1	1.3	2.7
Ribbon fish	0.8	0.2	–	–	–
Nemipterids	–	–	–	–	–
Cat fish	13.8	7.1	23.6	23.6	27.1
Lizard fish	–	0.7	10.9	2.2	2.7
Horse mackerel	–	–	–	–	–
Dhoma	–	0.3	1.2	–	1.1
Other quality fishes	0.2	2.2	7.0	2.8	1.6
Miscellaneous fish	25.2	53.0	93.0	57.5	53.1
Total	42.7	67.3	143.2	91.7	91.5

TABLE XVIII. Depth-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels off Karnataka

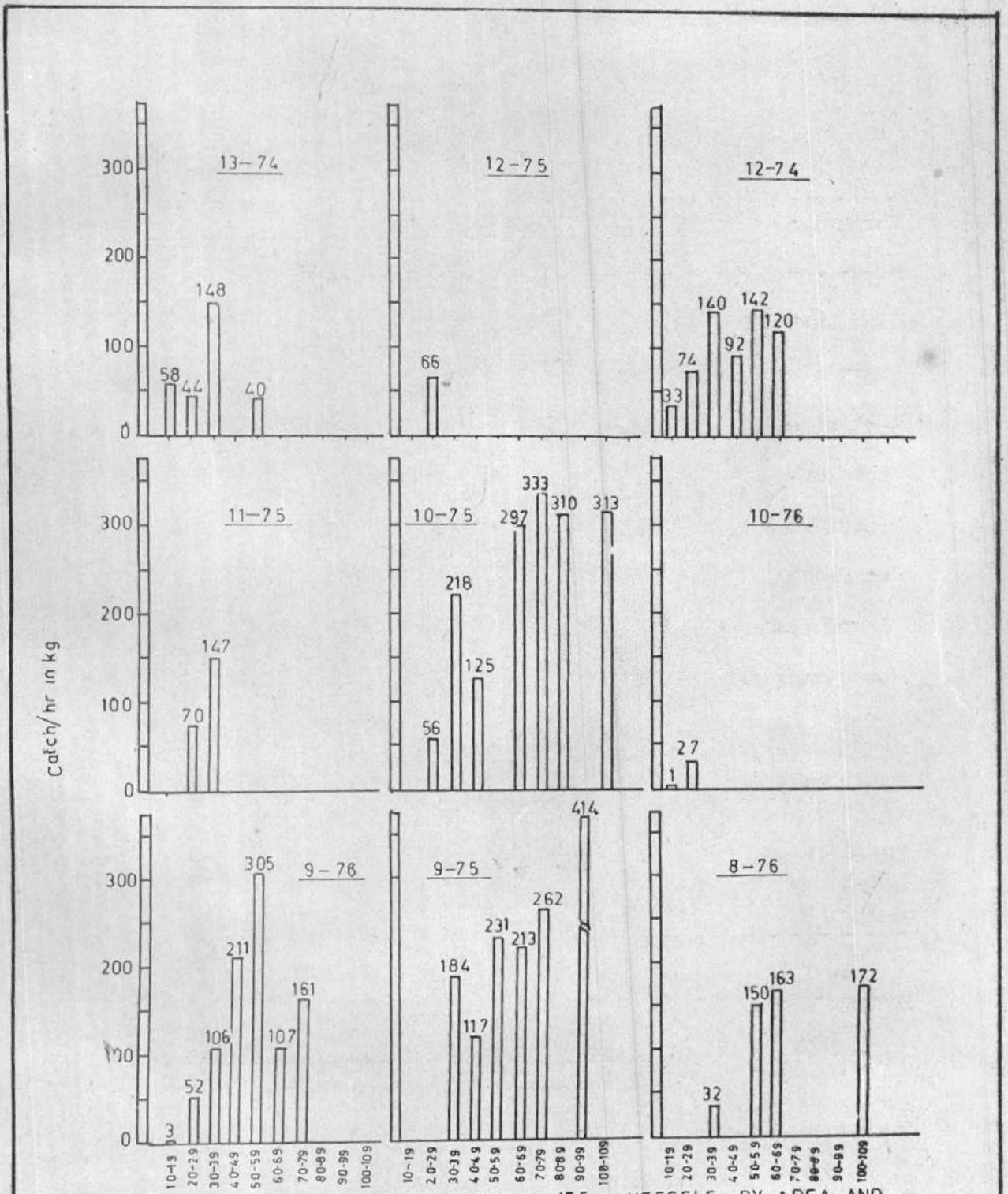

FIG:8. CATCH PER HOUR OF TRAWLING BY 17·5 m. VESSELS BY AREA AND DEPTH FROM THE SOUTH-WEST COAST

Varieties	Depth range (m)									
	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109
Elasmobranchs	0.1	6.4	29.3	49.6	46.7	26.0	5.0	25.3	-	23.3
Prawn	-	-	0.2	-	0.3	1.9	-	-	-	-
Kilimeen	-	13.9	16.2	38.7	43.6	54.7	124.4	-	413.8	-
Cat fish	-	14.8	46.8	37.2	74.9	10.1	0.5	52.0	-	40.0
Flat fish	-	0.1	1.0	0.5	0.7	0.9	-	5.3	-	2.3
Lizard fish	0.4	2.3	3.4	31.4	31.9	16.5	22.7	-	-	-
Lactarius	0.2	0.1	0.2	-	-	-	-	-	-	-
Horse mackerel	-	0.6	0.4	1.6	0.4	0.3	-	-	-	-
Perch	-	0.6	0.3	0.3	2.0	1.2	-	-	-	-
Barracuda	0.1	0.5	3.0	5.4	5.8	1.9	0.2	5.0	-	2.7
Caranx	-	0.4	1.1	1.1	2.5	4.9	0.5	6.7	-	11.3
Seer fish	-	0.1	0.1	-	0.2	-	-	-	-	-
Pomfret	-	0.3	-	0.1	0.4	-	-	-	-	-
Jew fish	-	1.0	1.4	0.3	0.5	5.7	-	-	-	-
Cuttle fish	-	0.9	2.8	2.0	6.3	2.6	1.0	2.0	-	-
Other quality fishes	-	0.9	0.4	0.8	0.4	0.3	-	-	-	-
Miscellaneous fish	1.8	7.4	31.0	10.2	13.4	76.9	49.9	213.0	-	158.0
Total	2.6	50.3	137.6	179.2	231.0	203.9	204.2	310.3	413.8	237.6

TABLE XIX. Depth-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels off Kerala

In Kerala region the highest catch rate of 414 Kg/hr was obtained from 90-99 m depth zone and kilimeen was the only variety netted from this depth zone. This high catch rate of kilimeen is significant and requires further investigation. This variety was found to be fairly distributed in the depth range of 20-80 m also. The depth range 50-59 m gave better catch rates in respect of cat fish (75 Kg/hr), lizard fish(32 Kg/hr), perch (2 Kg/hr), barracuda (7 Kg/hr) and cuttle fish(6 Kg/hr). 40-59 m depth zone recorded highest catch rate for elasmobranchs (50 Kg/hr) and horse mackerel (2 Kg/hr). A catch/hr of 1.9 Kg forprawn and 5 Kg/hr for carangids was obtained from 60-69 m depth zones. Generally speaking the depth range of 20-70 is found to be more productive in respect of most of the important varieties in this region.

5.3.3. Lower east coast

As stated earlier 17.5 m vessels and Jheenga operated along this coast. Fig. 9 shows the catch/hr obtained by these vessels from different depth belts of all the areas surveyed. The 17.5 m vessel registered the highest catch per hour of 200 Kg/hr from 30-39 m depth belt of the area 8-78.

Table XX gives the depth-wise catch/hr of important varieties obtained by the above vessels from different depth belts. The 17.5 m vessels surveyed upto a depth of 70 m whereas Jheenga operated only upto a depth of 40 m. It is seen that the depth zone 30-39 m was identified as most productive by the 17.5 m vessel from where a catch rate of 175 Kg/hr was obtained. In respect of Jheenga the depth zone 20-29 m was found to be most productive with a catch rate of 103 Kg/hr. In Tuticorin region the depth zone 30-39 m yielded highest catch rate for elasmobranchs (42 Kg/hr), perch (95 Kg/hr) and carangids(2 Kg/hr) while the depth zone 40-49 m was productive for cat fish (3 Kg/hr) and sciaenids(4 Kg/hr). Jheenga recorded the highest catch/hr in respect of elasmobranchs(41 Kg/hr) and perch (46 Kg/hr) from the depth zone 20-29 m.

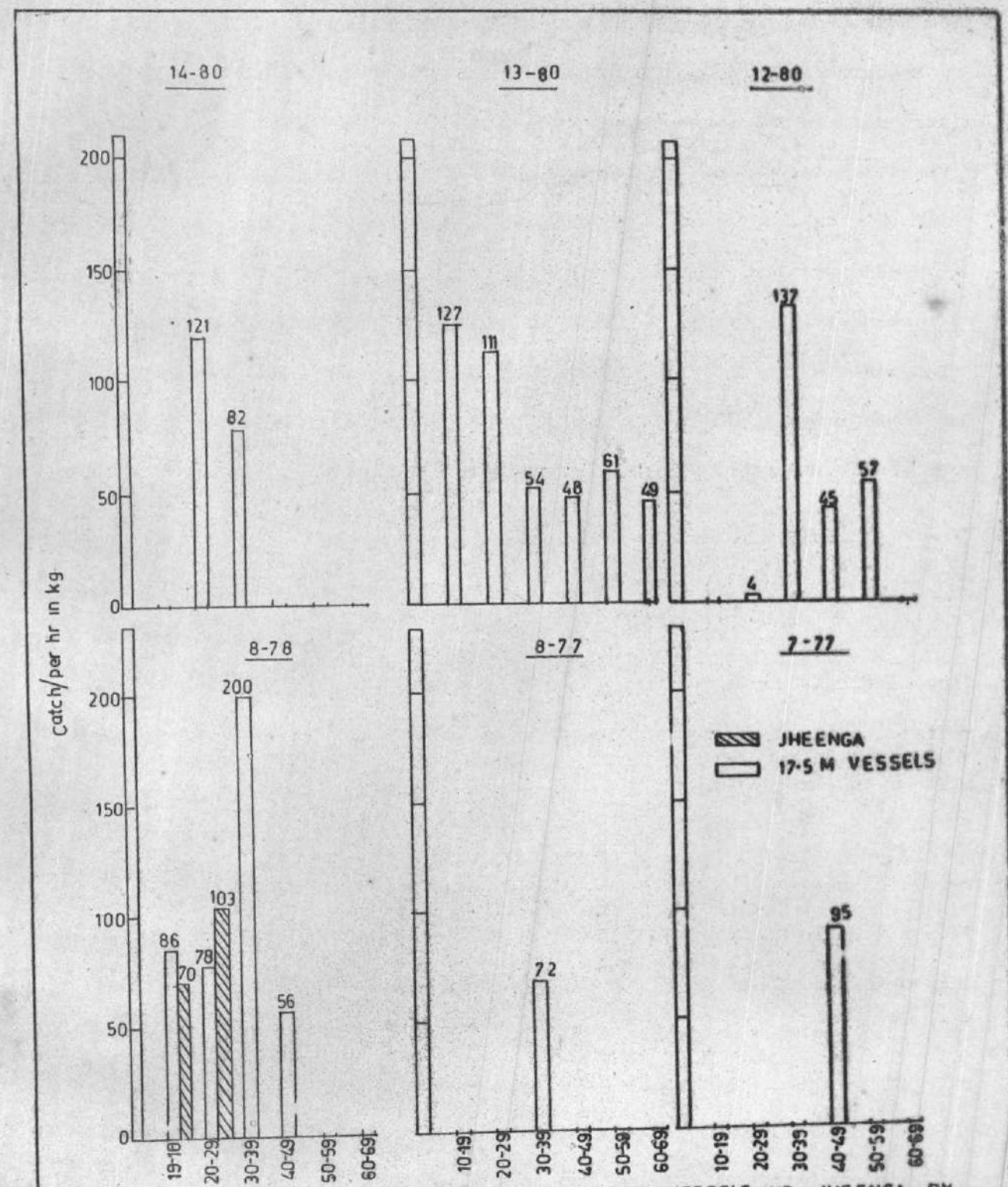

FIG-9 CATCH PER HOUR OF TRAWLING BY 17·5M VESSELS AND JHEENGA BY AREA AND DEPTH ALONG THE LOWER EAST COAST

Varieties	Depth range(m)						
	10-19	20-29	30-39	40-49	10-19	20-39	30-39
	17.5 M VESSELS				JHEENGA		
Elasmobranchs	18.6	16.2	41.7	19.5	26.1	41.0	11.5
Perch	25.8	32.9	94.8	20.9	17.2	45.5	1.4
Cat fish	0.7	0.2	0.4	3.0	0.3	-	0.2
Small Sciaenids	1.2	0.4	1.3	3.7	0.5	-	-
Seer fish	-	0.1	-	-	0.2	-	-
Carangids	3.0	1.4	2.2	1.0	0.6	0.8	1.6
Lobster	0.1	-	-	-	0.2	0.1	0.2
Other quality fish	17.2	15.3	18.8	16.7	11.0	14.0	6.3
Miscellaneous fish	19.0	10.9	15.6	23.7	14.4	1.9	10.8
TOTAL	85.6	77.4	174.8	88.5	70.3	103.3	32.1

MADRAS(17.5 M)

Varieties	10-19	20-29	30-39	40-49	50-59	60-69
Elasmobranchs	21.7	14.5	8.0	1.6	1.7	2.2
Synagris	-	-	0.2	0.5	-	-
Lactarius sp.	2.0	3.9	2.5	4.8	6.0	-
Leiognathids	21.5	32.2	27.2	15.4	14.2	18.7
Sciaenids	22.4	15.2	7.7	-	3.7	-
Lizard fish	1.5	2.1	3.9	5.6	5.1	-
Perch	5.2	2.9	2.5	-	-	-
Flat fish	0.7	0.6	0.3	-	-	-
Pomfret	0.3	1.2	0.5	0.4	0.1	-
Gerrids	-	-	7.1	4.2	3.3	24.4
Jew fish	-	-	-	3.7	5.4	-
Cuttle fish	-	-	-	0.1	-	3.5
Ribbon fish	-	-	-	-	0.4	-
Other quality fish	6.7	4.7	3.8	2.1	0.5	-
Misc fish	44.6	31.4	17.2	8.7	18.8	-
TOTAL	126.6	108.7	80.9	47.1	59.2	48.7

Table XX Depth-wise catch/hour(in kgs) of important varieties obtained by 17.5 m vessels and Jheenga off Tamil Nadu coast

In Madras region the 17.5 m vessels identified the depth zone 10-19 m as the most productive with a catch rate of 127 Kg/hr. This depth zone yielded the highest catch rate of elasmobranchs, sciaenids (22 Kg/hr each) and perch (5 Kg/hr). The highest catch rate for leiognathids (27 Kg/hr) and lizard fish (6 Kg/hr) was obtained from the depth zone 30-39 m and 40-49 m respectively.

5.3.4. Upper east coast

Matsyavigyani and 17.5 m vessel operated from this coast. Fig. 10 and 11 shows the catch/hr obtained by 17.5 m vessels and Matsyavigyani from the different depth belt along this coast.

The 17.5 m vessel identified the depth zone 60-69 m of the area 17-83 as comparatively more productive from where a catch rate of 199 Kg/hr was obtained. The 20-29 m depth zone of area 19-85 and 20-87 also yielded better results (187 /hr and 175 Kg/hr respectively). Matsyavigyani registered the highest catch rate from the depth zone 20-29 m of the area 20-88 followed by 30-39 m depth zone of area 20-86(121 Kg/hr).

Tables XXI and XXII gives the depthwise catch/hr of important varieties of fish obtained by 17.5 m vessels and Matsyavigyani along upper east coast. The 17.5 m vessel surveyed upto a depth of 70 m while Matsyavigyani surveyed upto 80 m depth. Of the different depth zones surveyed along Andhra coast by the 17.5 m vessels, the highest catch rate was obtained from 60-69 m zone (199 Kg/hr). The 60-69 m depth zone gave better yield for cat fish (51 Kg/hr) and perch (3 Kg/hr). 20-29 m depth zone was productive for elasmobranchs(12 Kg/hr) and pomfret (4 Kg/hr). A catch rate of 1.9 Kg/hr of prawn was obtained from 10-19 m depth. This zone was found productive in respect of ribbon fish also (4 Kg/hr).

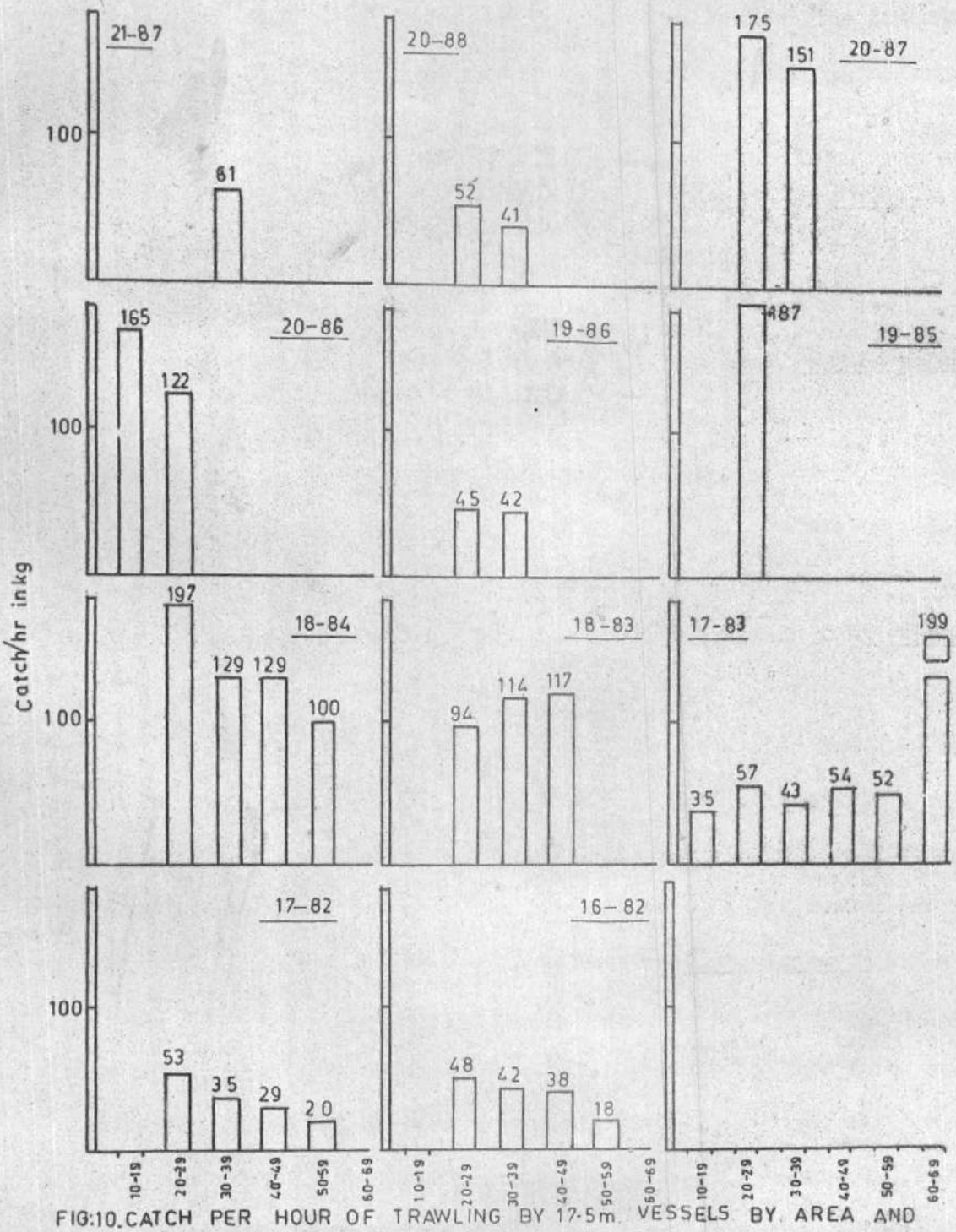

FIG:10. CATCH PER HOUR OF TRAWLING BY 17.5m VESSELS BY AREA AND DEPTH FROM THE UPPER EAST COAST

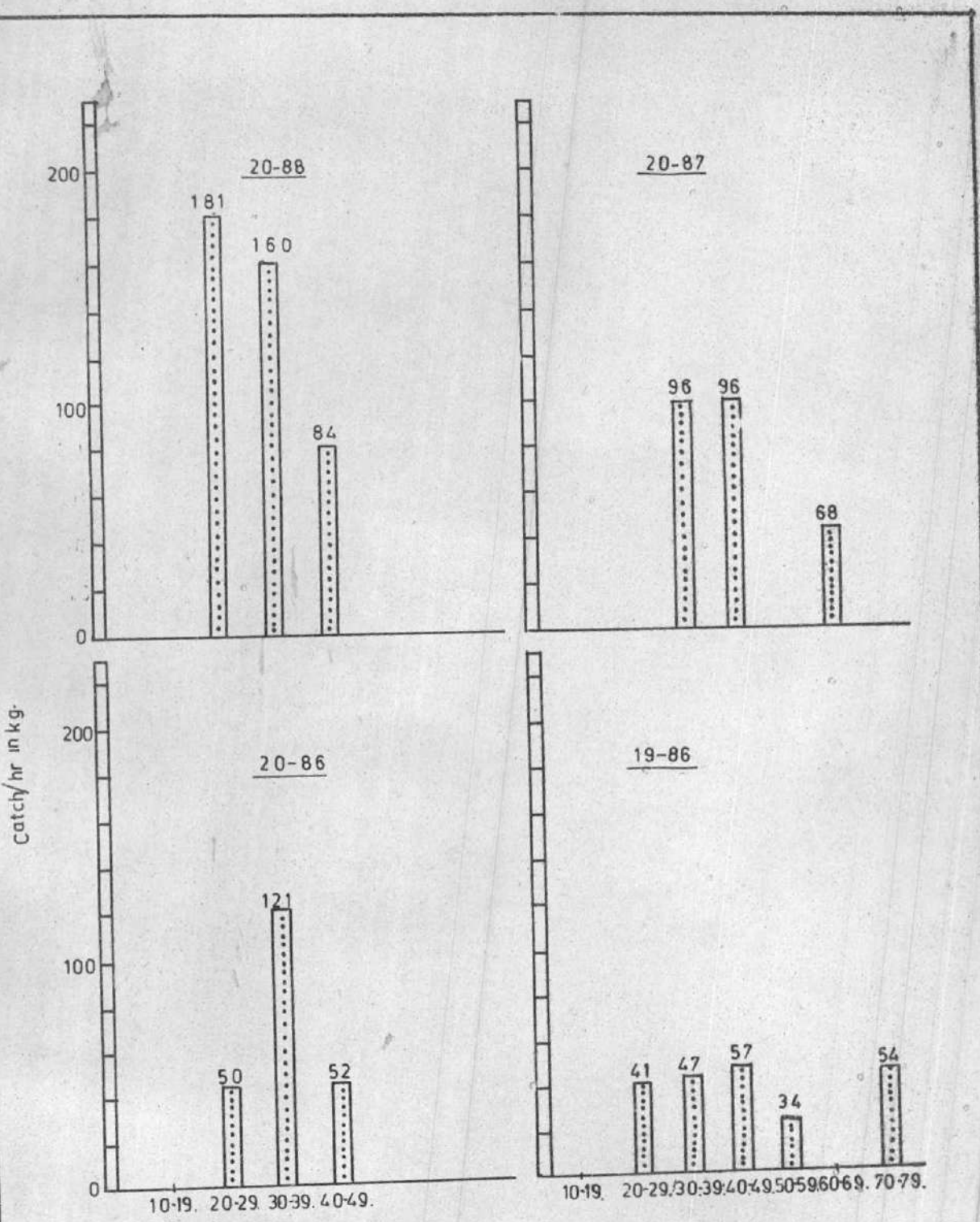

FIG 11 CATCH PER HOUR OF TRAWLING BY MATSYAVIGYANI BY AREA AND DEPTH FROM CALCUTTA

(VIZAG)

Varieties	Depth range (m)					
	10-19	20-29	30-39	40-49	50-59	60-69
Elasmobranchs	2.1	12.0	3.3	4.0	3.3	3.4
Cat fish	0.7	4.6	5.4	10.2	10.6	50.7
Prawn	1.7	0.1	0.2	0.1	-	-
Crab & cray fish	0.1	-	0.1	0.2	0.2	-
Eel	0.3	0.6	0.3	0.1	-	-
Perch	-	1.9	1.8	1.6	1.0	2.9
Pomfret	-	3.9	1.2	0.7	0.2	-
Sciaenids	-	0.2	-	-	-	-
Ribbon fish	4.1	0.5	0.3	0.5	0.1	-
Horse mackerel	-	0.2	0.1	0.3	0.3	-
Other quality fish	1.2	2.8	1.8	1.9	1.5	4.9
Miscellaneous fish	24.4	78.0	49.9	44.9	35.1	137.3
Total	34.5	104.8	64.4	64.5	52.3	199.2

(PARADEEP)

Varieties	Depth range (m)			
	10-19	20-29	30-39	40-49
Elasmobranchs	15.9	19.5	20.0	5.0
Cat fish	5.3	3.4	-	-
Perch	1.6	0.3	-	-
Pomfret	1.2	1.2	0.5	-
Wam	7.0	2.3	-	-
Koth	12.8	9.6	5.0	2.0
Caranx	0.3	1.0	2.5	0.5
Prawn	1.5	2.7	-	-
Lobster	0.1	0.2	1.5	0.5
Surmai	0.4	0.1	-	-
Lactarius	2.2	1.5	-	-
Dhoma	2.3	12.0	-	-
Karkara	-	0.2	-	-
miscellaneous fish	113.4	77.3	12.0	10.5
Total	164.0	131.3	41.5	18.5

TABLE XXI. Depth-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels off Andhra Pradesh and Orissa coasts

(Matsyavigyani)

Varieties	Depth range (m)					
	20-29	30-39	40-49	50-59	60-69	70-79
Elasmobranchs	15.3	19.8	11.9	5.2	30.6	26.7
Prawn	2.6	4.5	5.2	7.0	0.4	0.3
Cat fish	12.5	13.5	4.8	4.6	8.2	13.3
Pomfret	1.2	3.3	1.5	0.8	1.2	-
Karkara	0.8	1.7	0.9	0.8	2.0	-
Eel	3.5	2.1	2.4	3.9	2.0	3.3
Dhoma	-	7.2	0.4	-	-	-
Koth	-	1.0	0.4	0.8	2.5	-
Big sciaenids	0.7	-	0.1	-	-	-
Miscellaneous fish	37.7	67.9	38.3	11.2	21.6	10.0
Total	74.3	121.0	65.9	34.1	68.2	53.7

(17.5 m vessel)

Varieties	Depth range (m)	
	20-29	30-39
Elasmobranchs	13.8	17.5
Prawn	1.0	0.9
Cat fish	4.7	4.6
Dhoma	0.1	0.2
Pomfret	1.4	1.4
Wam	-	0.6
Koth	-	-
Horse mackerel	3.8	11.8
Karkara	-	1.5
Miscellaneous fish	43.9	26.3
Total	68.7	64.8

TABLE XXII. Depth-wise catch/hr (in Kg) of important varieties obtained by Matsyavigyani and 17.5 m vessel off West Bengal

Along Orissa and West Bengal coasts the 17.5 m vessel identified the depth belt 20-29 m as most productive. The catch rate obtained was 131 Kg/hr. The same depth zone gave highest yield in respect of elasmobranchs (20 Kg/hr), pomfret (1.2 Kg/hr), prawn 2.7(Kg/hr) and dhoma (12 Kg/hr). The depth zone 10-19 m gave the highest yield of 7 Kg/hr for wam. Matsyavigyani registered the highest catch rate of 121 Kg/hr from the depth zone 30-39 m. The same zone gave highest yield in respect of cat fish (14 Kg/hr), pomfret (3 Kg/hr) and dhoma (7 Kg/hr) while the depth zone 60-69 m registered the highest yield of elasmobranchs (31 Kg/hr) and karkara (2 Kg/hr). Among the different depth zones surveyed by the different classes of vessels along east and west coasts, the depth zone 50-59 m surveyed by Matsya Vigyani reocrded the highest catch rate of prawn (7 Kg/hr). Appreciable catch rates for this variety was obtained from the depth zones 40-49 m(5.2 Kg/hr), 30-39(4.5 Kg/hr) and 20-29 (2.6 Kg/hr).

5.3.5. Andaman and Nicobar waters

Table XXIII gives the depth wise catch/hr of important varieties obtained from different depth zones of Andaman & Nicobar waters. Four depth zones were surveyed by the 17.5 m vessels and the highest catch per hour was registered from 20-29 m depth zone (209 Kg/hr). This zone was identified as the most productive zone in respect of most of the important species viz. elasmobranchs (34 Kg/hr), cat fish (5 Kg/hr), leiognathids sp. (73 Kg/hr), Nemipterus sp. (8 Kg/hr), upenoids (44 Kg/hr), sciaenids (32 Kg/hr) and lizard fish (3 Kg/hr).

Varieties	Depth range (m) 20-39	30-39	40-49	50-59
Elasmobranchs	34.2	5.7	12.3	13.8
Cat fish	5.6	4.0	2.1	1.8
Leiognathids	72.5	18.5	34.3	45.8
Nemipterus	7.6	0.7	4.3	3.5
Lizard fish	2.6	-	0.7	1.2
Upenoids	44.3	21.7	20.9	24.6
Sciaenids	31.7	9.2	14.8	7.8
Perches	0.1	2.2	1.1	1.0
Carangids	2.5	8.0	3.0	3.2
Barracuda	-	-	0.2	0.2
Gerrids	-	-	1.1	0.3
Miscellaneous fish	7.6	48.0	17.1	13.0
Total	208.7	118.0	111.9	116.2

TABLE XXIII. Depth-wise catch/hr (in Kg) of important varieties obtained by 17.5 m vessels off Andaman and Nicobar Islands

5.3.6. Regional abundance by depth

The average catch rate (in Kg/hr) obtained by the 17.5 m vessels from the different depth zones of the five regions are presented below:-

Depth zone/Region (m)	North west coast	South west coast	Lower east coast	Upper east coast	Andaman & Nicobar
10-19	47	35	88	160	-
20-29	102	59	83	117	207
30-39	139	139	119	65	96
40-49	86	176	54	65	112
50-59	159	214	59	74	116
60-69	116	186	44	199	-
70-79	105	204	-	-	-
80-89	49	-	-	-	-
90-99	27	414	-	-	-
100-109	-	243	-	-	-
110-119	-	-	-	-	-

Along north west coast, the survey was conducted upto a depth of 100 m. While comparing the results obtained from different depth zones of this coast, it is seen that 50-59 m depth zone recorded the highest yield of 159 Kg/hr. The depth zones 30-39 m and 60-69 m also gave better results. An increase in the catch rate is noticed in respect of all the depth zones over the previous year. Along south west coast the depth zone 90-99 gave the highest yield of 414 Kg/hr followed by 100-109 m (243 Kg/hr), 50-59 m (214 Kg/hr) and 70-79 m (204 Kg/hr). The highest yield registered along the lower east coast was from the depth zone 30-39 m (119 Kg/hr). In the rest of the depth zone surveyed along this coast, the catch rate obtained was less than 100 Kg/hr. However a decreasing trend in the catch rate has been noticed in respect of all the depth zones compared to the last year. Along upper east coast the survey was conducted upto a depth of 70 m and the highest catch rate was registered from the depth zone of 60-69 m (199 Kg/hr). The 10-19 m depth zone of this coast which has recorded the highest yield during previous year (134 Kg/hr) gave the second highest yield of

160 Kg/hr during the year. In Andaman and Nicobar waters, the survey was conducted in four depth zones viz. 20-29 m, 30-39 m, 40-49 m and 50-59 m. Of these the 20-29 m zone was found to give the maximum yield of 207 Kg/hr. The other zones also gave comparatively better results.

5.4. Seasonal variation in catch

5.4.1. Quantitative variation

Monthwise fluctuation in the catch rates obtained by different classes of vessels from different regions is discussed in this chapter. As discussed earlier, 24 vessels were available for operation during the year, of which the vessels Matsya Nireekshani and Meena Udyog (17.5 m) based at Porbandar have conducted the survey only for few months. Matsya Nireekshani was commissioned for regular operation during February '79. Meena Udyog operated only during June, December and January-March. The regular operation was interrupted mainly due to shifting of the base from Kandla to Porbandar. Of the five months of operation, the vessel Meena Udyog obtained the highest catch rate of 198 Kg/hr during December.

Fig. 12 gives the month-iwse catch/hr obtained by 17.5 m vessels and Meena Bharati along the north west coast. In Veraval region the month of December recorded the highest catch rate of 135 Kg/hr followed by October (127 Kg/hr.) During all the remaining period, the catch rate obtained was less than 100 Kg/hr. The 17.5 m vessel operated from Bombay throughout the year except during August. Highest catch rate of 99 Kg/hr was obtained during December. During April, October and November, the yield was comparatively better. The period June-September yielded poor catch rate. Meena Bharati operated only for 7 months during the year. Highest catch rate was recorded during the month of December (168 Kg/hr) followed by February (133 Kg/hr) and January (109 Kg/hr).

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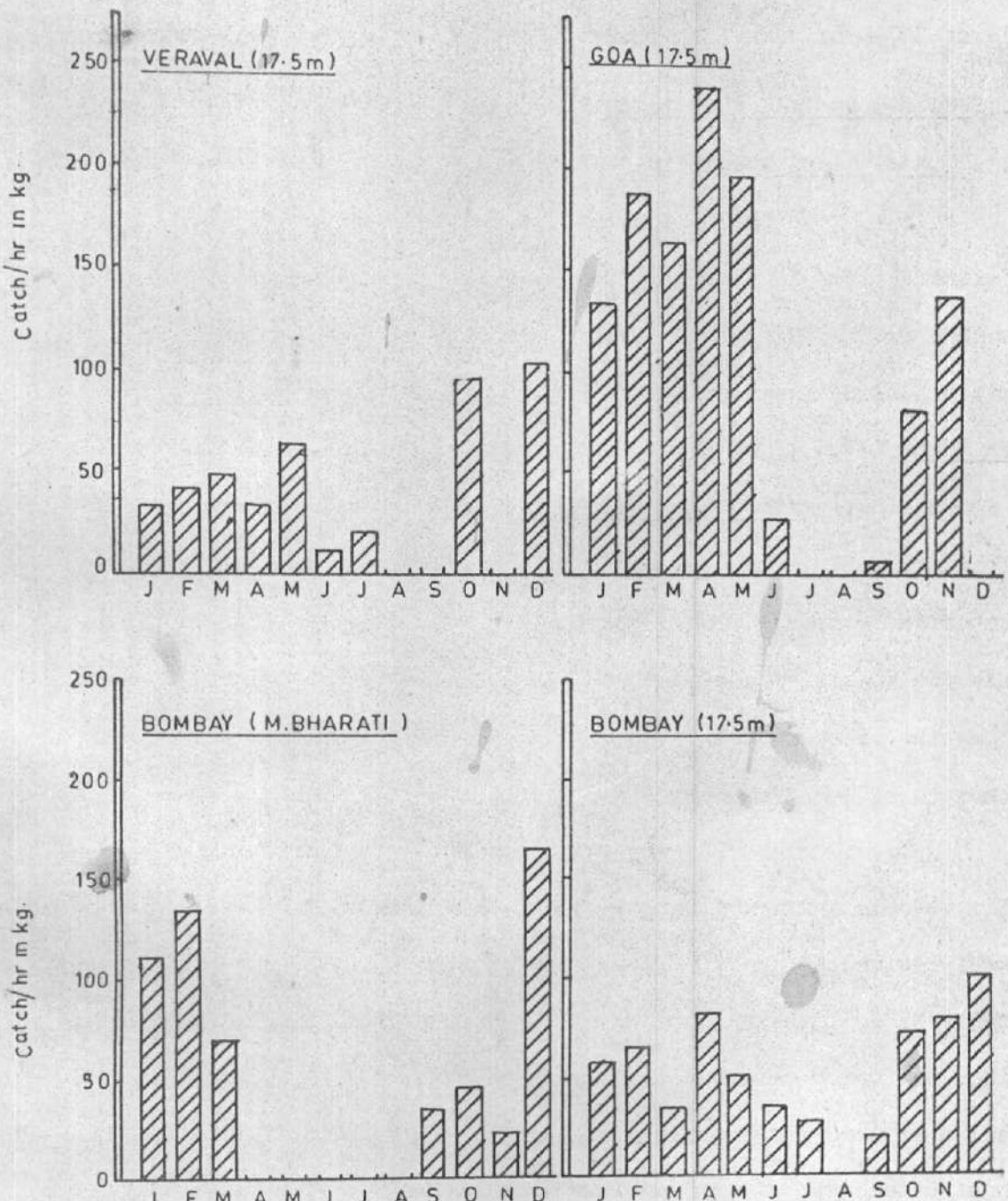

FIG.12. MONTH-WISE CATCH PER HOUR OF TRAWLING OBTAINED BY DIFFERENT CLASSES OF VESSELS FROM THE NORTH-WEST COAST

Along Goa region the 17.5 m vessel operated all the months except July-August and December. The month of April recorded the highest catch rate of 320 Kg/hr followed by May (264 Kg/hr). The period January-May can be identified as most productive periods for this region.

Fig. 13 and 14 gives the month-wise catch/hr (in Kg) obtained along Mangalore, Cochin and Tuticorin regions. The 17.5 m vessels operated along Mangalore throughout the year except during February. The highest catch rate was obtained during April (164 Kg/hr). The month of January and March also yielded better catch rates. From Cochin region the 17.5 m vessels operated throughout the year. The highest yielding month was October (232 Kg/hr). The months of November, April and May also yielded better results. Except during the months July, August and December, the catch rate obtained ranged between 100-200 Kg/hr.

In Tuticorin region, the 17.5 m vessel operated throughout the year while Jheenga did not operate during March and April. The 17.5 m vessels recorded the highest yield during October whereas Jheenga gave the highest yield during July which is well in conformity with the results of previous year (Fig. 14). The catch rate obtained by 17.5 m vessel during all the remaining months ranged between 50-100 Kg/hr. The catch distribution in respect of Jheenga also showed a more or less same trend during all the months.

In Madras region the months of July and June were the peak months with a catch rate of 126 Kg/hr and 93 Kg/hr respectively. The months of September, January and March yielded poor catch rates. Fig. 15 shows the month-wise catch/hr obtained by 17.5 m vessel from

Madras and Vizag regions. In Vizag region the month of January was found to be the peak season with a catch rate of 103 Kg/hr. February-March and October-November were the next high yielding months with an average catch rate of 86 Kg/hr.

The 17.5 m vessels operated from Paradeep during January to August. The month of July recorded the highest catch rate of 189 Kg/hr. The next high yielding months were January(183 Kg/hr), March (155 Kg/hr) and August (150 Kg/hr).

Fig. 16 shows the month-wise catch rate obtained from Paradeep and Port Blair regions. In Calcutta the 17.5 m vessel and Matsya-vigyani operated only for a few months and hence a comparative study is not made. However Matsyavigyani obtained the highest catch rate during April (196 Kg/hr) followed by May (157 Kg/hr). The 17.5 m vessel operated from January-March and the highest catch rate of 97 Kg/hr was recorded during March. In Port Blair region the 17.5 m vessel operated throughout the year obtaining the highest catch rate during November (207 Kg/hr) followed by April (201 Kg/hr). The months of December, October and August are also identified as productive months.

5.4.2. Qualitative variation

Month-wise fluctuation of some of the important varieties of fish in each region has been analysed and presented in the ensuing.

In Porbandar, Matsya Nireekshani operated only during two months and hence a comparative study on the identification of peak season is not made.

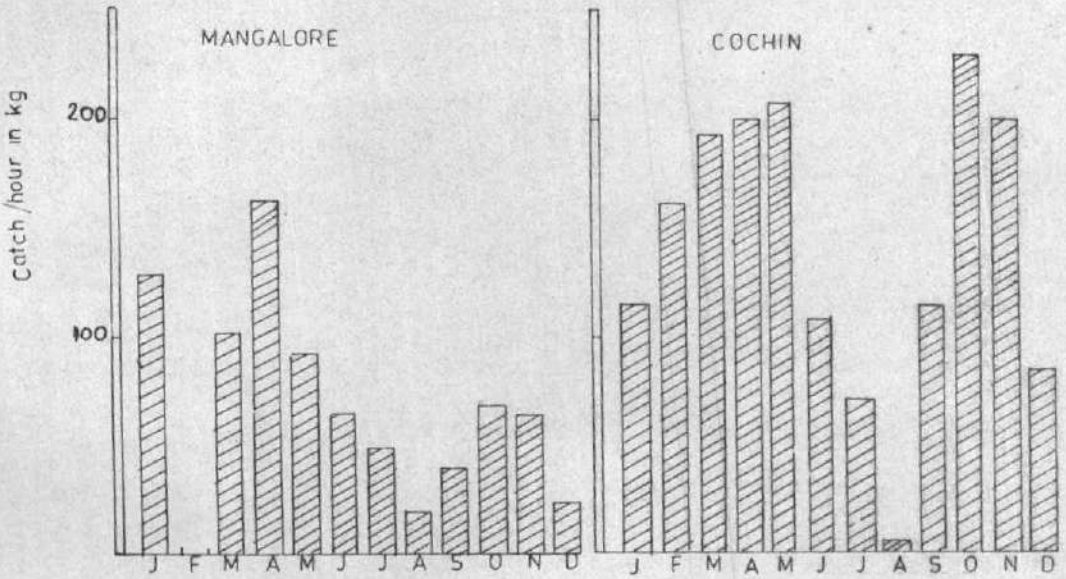

FIG 13 MONTH-WISE CATCH PER HOUR OF TRAWLING OBTAINED BY 17.5m VESSELS FROM THE SOUTH-WEST COAST

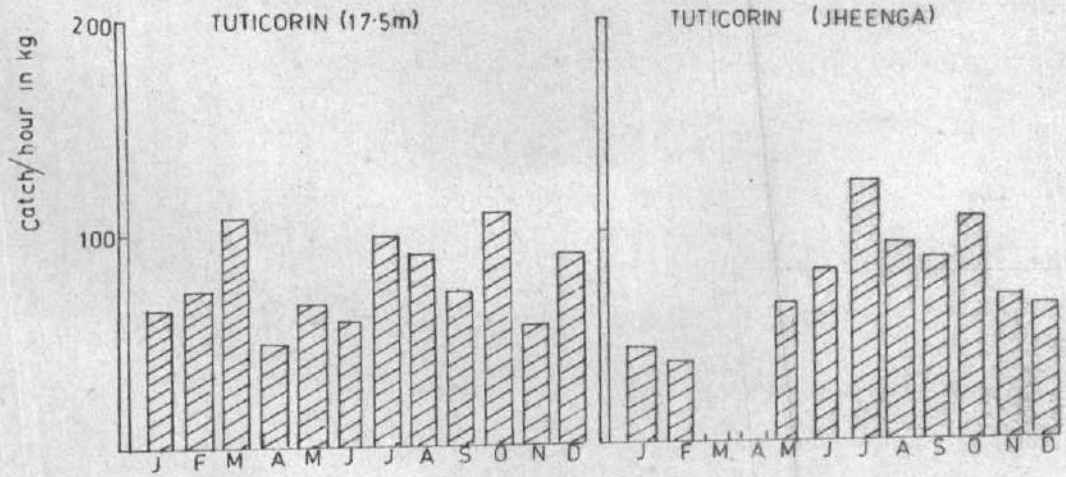

FIG 14 MONTH-WISE CATCH PER HOUR OF TRAWLING OBTAINED BY DIFFERENT CLASSES OF VESSELS FROM TUTICORIN

The 17.5 m vessel operated from January-March, June and December in this region. The highest yielding months in respect of important varieties are as follows:

December -Elasmobranchs (34 Kg/hr), cat fish (78 Kg/hr), karkara (5 Kg/hr)

January -Wam (4 Kg/hr), kati (7 Kg/hr)

February -Ghol (13 Kg/hr), dhoma (29 Kg/hr), surmai (2 Kg/hr)

March -Ribbon fish (4 Kg/hr), squid (32 Kg/hr)

From the above, the month of December and February are identified as the best fishing season in Porbandar region.

In Veraval region, the survey was conducted during nine months. The following months are identified as the productive months for some of the important varieties.

May -Elasmobranchs (28 Kg/hr) cat fish (7 Kg/hr) and karkara (4 Kg/hr)

June -Ghol (3 Kg/hr)

December -Wam (5 Kg/hr) dhoma (59 Kg/hr) Tam (9 Kg/hr) and perch (32 Kg/hr)

March -Ribbon fish and squid (12 Kg/hr each)

The months of May and December can be identified as the best fishing season in Veraval region.

Meena Bharati and 17.5 m vessel operated from Bombay region and the maximum catch rate obtained during different months are as follows:-

Meena Bharati

January - Elasmobranchs (23 Kg/hr) Tam (6 Kg/hr) and ghol(5 Kg/hr)

February- Cat fish (53 Kg/hr) Karkara (5 Kg/hr) and dhoma(23 Kg/hr)

September-Cat fish (13 Kg/hr)

17.5 m vessel

November -Elasmobranchs (54 Kg/hr) Tam (7 Kg/hr) and dhoma(12 Kg/hr)

December -Cat fish (55 Kg/hr) pomfret (2 Kg/hr)

In Goa region the 17.5 m vessels operated during all the months except August, December and March and the productivity during different months are as follows:-

April - Ribbon fish (130 Kg/hr) lactarius(34 Kg/hr) nemipterids(79 Kg/hr) and pomfret (1 Kg/hr)
May - Elasmobranchs (10 Kg/hr) and horse mackerel (4 Kg/hr)
June - Prawn (3 Kg/hr)
November - Cat fish (170 Kg/hr).

The months of April and May are found to be productive in this region.

In Mangalore region, the 17.5 m vessel operated throughout the year except during February and the following months are identified as productive in respect of the important varieties.

April - Elasmobranchs (6 Kg/hr) lizard fish (21 Kg/hr)
May - Dhoma (4 Kg/hr)
August - Prawn (7.7 Kg/hr)
October - Ribbon fish (2 Kg/hr)
January - Cat fish (50 Kg/hr) and lactarius sp. (2 Kg/hr)

In Cochin region the 17.5 m vessels operated round the year.

The following months are identified as productive months.

April - Elasmobranchs (64 Kg/hr) and Barracuda (9 Kg/hr)
May - Lizard fish (44 Kg/hr) and horse mackerel (2 Kg/hr)
June & July - Prawn (2.6 Kg/hr)
October - Kilimeen (128 Kg/hr) and cuttle fish (28 Kg/hr)
November - Cat fish (100 Kg/hr), perch (2 Kg/hr) and pomfret (1.3 Kg/hr)

In Tuticorin region both the 17.5 m vessels and Jheenga identified July and October as productive months:

17.5 m vessels

July - Elasmobranchs (37 Kg/hr)

October - Perch (44 kg/hr)

February - Sciaenids (4 Kg/hr)

March - Cat fish (28 Kg/hr)

Jheenga

July - Elasmobranchs (62 Kg/hr)

October - Perch (40 Kg/hr).

In Madras region the period May to August and December were found to be the best season for the important varieties and the catch rate obtained during the period is as follows:-

May - Perch (4 Kg/hr)

June - Elasmobranchs (10 Kg/hr) and pomfret (1 Kg/hr)

July - Synagris (18 Kg/hr) lactarius sp. (2 Kg/hr) and sciaenids (24 Kg/hr)

August- Lizard fish (14 Kg/hr)

December-Leiognathids (62 Kg/hr)

From the foregoing it is seen that the months of June-July can be identified as the best fishing season in this region.

In Vizag region the 17.5 m vessels operated throughout the year and the productivity of different months are as follows:-

April	-	Elasmobranchs	(10 Kg/hr)		
September	-	Prawn	(5 Kg/hr)	ribbon fish	(3 Kg/hr)
October	-	Wam	(2 Kg/hr)	pomfret	(13 Kg/hr)
March	-	Cat fish	(24 Kg/hr)	perch	(5 Kg/hr)

In Paradeep region only July and March are found to be the productive months and the catch rates obtained in respect of different species are as follows:-

July - Elasmobranchs (28 Kg/hr), dhoma (41 Kg/hr), pomfret (2 Kg/hr) Prawn (7 Kg/hr)

February - Cat fish (10 Kg/hr)

March - Perch (4 Kg/hr) wam (11 Kg/hr) and koth (32 Kg/hr)

In Calcutta region the operation by Matsyavigyani and 17.5 m vessels was restricted to a few months and hence a comparative study on the monthwise fluctuation is not taken up.

6. RESULTS OF PELAGIC FISHERY RESOURCES SURVEY

Pelagic fishery resources survey was conducted from Porbandar, Goa, Mangalore and Cochin. Purse-seining was carried out from Goa and Mangalore, long lining and trolling from Port Blair, pair boat mid water trawling from Cochin and single boat midwater trawling from Porbandar and Cochin. The results of the survey are discussed below.

6.1. Long lining

Long lining was conducted from Port Blair from a 17.5 m trawler Meena Prayas. The survey was carried out throughout the year except during April. A total of 560 hours of fishing effort was expended in four major squares viz. 10-92, 11-92, 11-93 and 12-93. Maximum effort of 311 hrs was expended in area 11-92 followed by area 11-93 with 228 hours. Altogether 15 small squares were sampled during the period under survey (Fig. 17). Carcharias spp was the

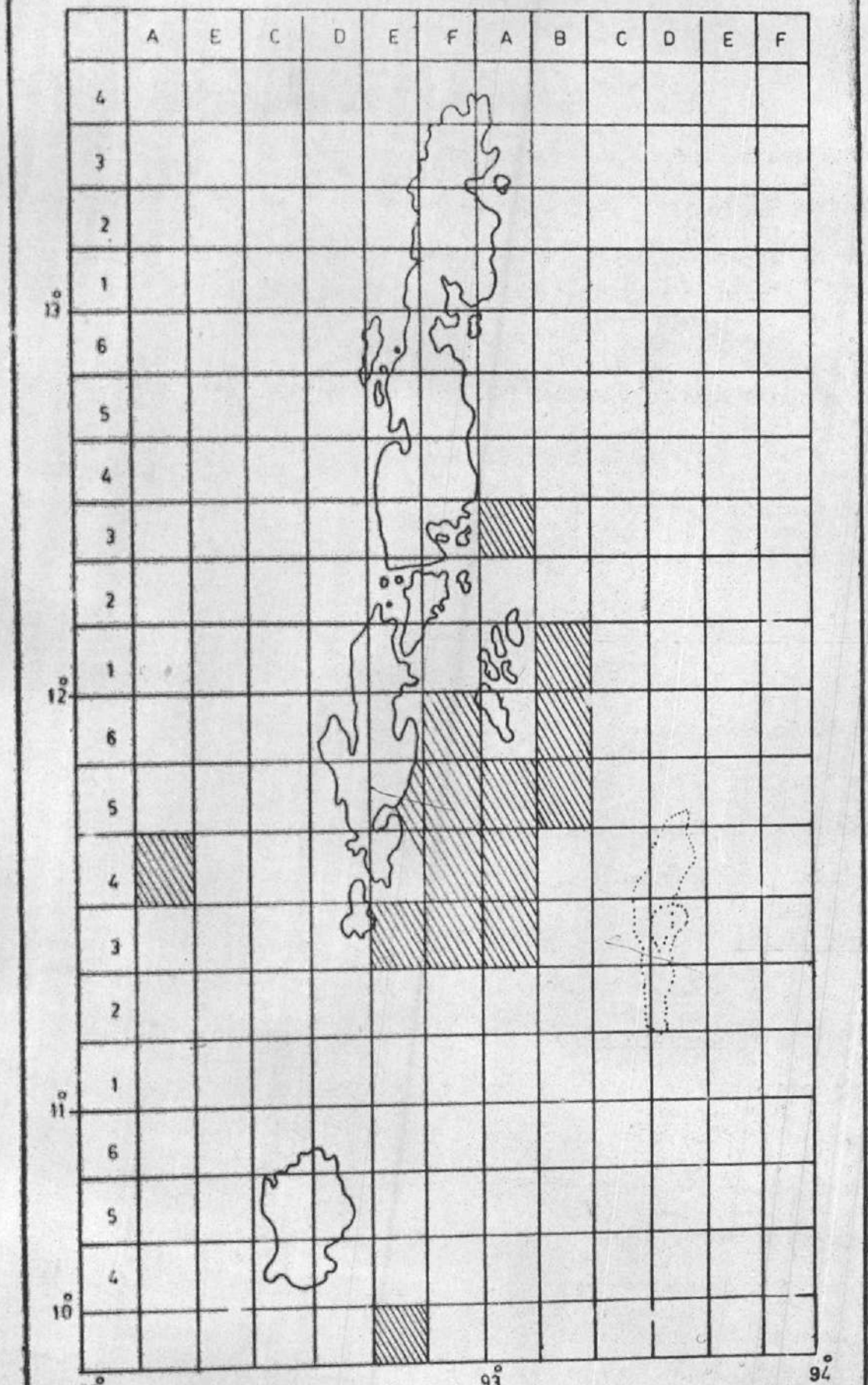

FIG-17 AREA COVERED BY LONG LINING FROM PORT BLAIR

most common variety of shark caught. The following table gives the area-wise results of operation of long lining conducted from Port Blair.

Area-wise results of long lining

Area	Sub-area	Fishing effort (hrs)	No.of hooks operated	Total catch (Kg)	Hooking rate(%)	No.of fish caught			
						Shark	Marlin	Barracuda	Tuna & Miscellaneous
10-92/	3E	7.75	150	268	4.0	3	3	-	-
11-92/	3E	9.10	170	327	2.9	5	-	-	-
	3F	24.90	585	685	3.1	16	2	-	-
	4A	4.10	120	211	1.7	1	1	-	-
	4F	94.33	2,472	2073	2.3	48	9	-	-
	5E	7.92	200	364	3.5	4	3	-	-
	5F	147.73	3,490	3739	2.5	72	13	1	-
	6F	23.15	530	233	6.8	34	2	-	-
Sub-total		311.23	7,567	7632	2.8	180	30	1	-
11-93	3A	9.43	130	205	0.8	1	-	-	-
	4A	46.05	795	1187	2.3	12	9	1	-
	5A	152.76	2,800	5906	2.7	43	30	1	1
	5B	12.75	240	166	2.1	3	2	-	-
	6B	7.25	150	280	1.3	2	-	-	-
Sub-total		227.64	4,115	7744	2.6	61	41	2	1
12-93	1B	9.00	150	200	0.7	1	-	-	-
	3A	3.35	140	60	4.3	4	-	1	1
Sub-total		12.35	290	260	2.4	5	-	1	1
Grand total		558.97	12,122	15904	2.7	249	74	4	2

It may be seen from the table that the highest hooking rate of 6.8% was obtained from the area 11-92/6F. The second highest hooking rate of 4.3% was obtained from area 12-93/3A. The areas 10-92/3E and 11-92/5E also yielded better hooking rates. The hooking rates from different major areas ranged between 2.4% and 4.0%. The average hooking rate for the period under survey worked out to about 2.7%.

- - - - -Table-below-furnishes-the month-wise results of long lining conducted from Port Blair.

Month	Fishing effort (hrs)	No.of hooks operated	Total catch (in Kg)	Hooking rate(%)	No.of fish caught			
					Shark	Marlin	Barra-cuda	Misc.
May '78	30.20	160	358	5.00	5	3	-	-
June	85.35	2160	2908	2.87	55	7	-	-
July	37.30	1072	1253	2.43	18	7	1	-
August	63.40	2140	996	2.99	61	3	-	-
September	52.30	1060	1498	4.15	41	3	-	-
October	19.10	505	197	1.39	5	1	1	-
November	45.15	665	1192	2.41	10	5	1	-
December	14.75	205	1540	3.41	6	1	-	-
January '79	82.33	1445	2707	3.18	16	29	1	-
February	66.58	1295	1675	1.93	20	4	-	1
March	64.51	1415	1580	1.70	12	11	-	1
Total	558.97	12,122	15,904	2.71	249	74	4	2

Out of the eleven months surveyed, the fishing effort expended was high during the months June to January. Highest hooking rate of 5% was obtained during May. The second highest hooking rate of 4.15% was obtained during the month of September. During the rest of the months the hooking rate ranged between 1.39% and 3.41%.

6.2. Trolling

Trolling lines were operated from the 17.5 m trawler Meena Prayas from Port Blair during the year as an auxiliary method while steaming out to the fishing grounds and back for long lining. A total effort of 278 hours were expended. The areas surveyed were 11-93, 10-92 and 11-92 (Fig. 18). The results of the survey are summarised and presented below:-

Area-wise details of trolling

Area/Sub-area	Fishing effort (hrs)	Total catch (Kg)	Species composition				
			Caran-gids	Perch	Barra-cuda	Tam	Misc.
11-93/ 1A	4.00	6	-	-	-	6	-
2A	7.00	-	-	-	-	-	-
3A	3.66	-	-	-	-	-	-
5A	29.80	27	-	6	4	14	3
Sub-total	44.46	33	-	6	4	20	3
10-92/ 4E	2.66	4	-	4	-	-	-
5E	3.00	-	-	-	-	-	-
6E	3.00	-	-	-	-	-	-
Sub-total	8.66	4	-	4	-	-	-
11-92/ 6E	7.25	2	-	2	-	-	-
3F	13.50	-	-	-	-	-	-
4E	22.03	22	9	-	7	4	2
4F	12.25	5	-	-	-	-	5
5E	87.30	52	-	27	-	16	9
5F	78.12	236	6	16	2	5	207
5A	4.25	-	-	-	-	-	-
6A	7.30	8	-	-	8	-	-
6E	29.08	7	3	-	-	2	2
6F	17.25	20	-	14	-	2	4
Sub-total	278.33	352	18	59	17	29	229

6.3. Purse-seining

Purse-seining was conducted from Goa and Mangalore during Sept. '78 to January '79. From Goa, the vessel Meena Ayojak conducted purse-seining for about four months. The main area surveyed was 15-73. The results are furnished in Tables XXIV and XXV.

From Mangalore, the vessel Meena Anaveshak carried out purse-seining for 5 months. A total of 58 sets were made expending about 421 hours including 360 hours spent for searching the shoal. The total catch landed was about 13 tonnes of fish out of which about 76% was mackerel. The percentage of sardine in the total catch was about 21. Table XXV gives the month-wise and area-wise results of operation of purse-seining from Mangalore. It may be seen from the table that the catch/set varied between 47 Kg during December '78 and 329 Kg in October '78. The average catch/set obtained was 213 Kg. It may be mentioned in this context that the results of purse-seining obtained during this year was comparatively poorer as compared to the previous year.

6.4. Midwater trawling

One remarkable achievement of the Project during the period under report was the commencement of pelagic/midwater trawling from two of the bases of the Project. The vessel Matsya Nireekshani conducted pelagic/midwater trawling with much success. This was perhaps for the first time any Indian vessel to employ this fishing method successfully. Initially the operations were much of a training nature when the crew got themselves acquainted with the gear and technique of operation under the Dutch fishing experts. The two 17.5 m vessels of Cochin base conducted pair boat midwater trawling and also one of the 17.5 m vessels viz. Meena Sachetak also attempted single boat midwater trawling. The operations were greately assisted by the fishing experts of FAO/UNDP Pelagic fisheries Project.

FIG-18 AREA COVERED BY TROLLING LINE FROM PORT BLAIR

Particulars		Area 12-74	13-74	15-73
Sets made	No.	52	6	3
	Effort(hrs)	53.50	6.00	9.25
Time spent for searching		325.00	36.00	186.50
Total fishing effort (in hrs)		378.50		195.75
Total catch (in Kg)		31308	1048	13,550
Varieties				
Horse mackerel		9314	40	13,550
Sardine		1551	1008	-
Cat fish		70	-	-
Miscellaneous fish		373	-	-
Catch/set		217	175	4,517

TABLE XXIV. Area-wise details of purse-seining

Region	Month	Sets made No.	Sets made Effort (hrs)	Time spent for searching	Total fishing effort (Kg)	Total catch	Catch composition Mackerel	Sardine	Cat fish	Misc.
Mangalore	Sept. '78	1	1.00	8.00	9.00	-	-	-	-	-
	October	25	26.50	103.00	129.50	8,228	6,855	1,008	70	295
	November	17	17.00	96.00	113.00	3,480	2,499	981	-	-
	December	12	12.00	116.00	128.00	564	-	486	-	78
	Jan. '79	3	3.00	38.00	41.00	84	-	84	-	-
Sub-total		58	59.50	361.00	420.50	12,356	9,354	2,559	70	373
Goa	Oct. '78	1	6.50	19.50	26.00	13,550	13,550	-	-	-
	Nov.	-	-	37.00	37.00	-	-	-	-	-
	Dec.	2	2.75	100.00	102.75	-	-	-	-	-
	Jan. '79	-	-	30.00	30.00	-	-	-	-	-
Sub-total		3	9.25	186.50	195.75	13,550	13,550	-	-	-

TABLE XXV. Month-wise results of purse-seining

The operations from both the bases have proved to be promising and it is hoped that a great deal can be achieved by this method of fishing in the years to come. The results obtained during these operations are summarised and presented in the ensuing.

The vessel Matsya Nireekshani conducted a few cruises of mid water/pelagic survey during January-March '79. She expended about 37 hours of fishing effort with a total catch of 3.5 tons of fish. Six major areas viz. 21-69, 21-68, 22-68, 19-69, 20-70 and 20-69 were surveyed by pelagic trawling. Maximum effort of 15 hrs was put in the area 21-69. In the remaining areas the effort expended was less than 10 hrs. Highest catch rate of 162 Kg/hr was netted from area 20-69 followed by 21-69 (135 Kg/hr). Table XXVI gives the area-wise catch/hr of important species obtained by pelagic fishing by Matsya Nireekshani.

Table XXVII gives the percentage composition of different species obtained by pelagic trawling by Matsya Nireekshani. It may be seen from the table that elasmobranchs occupied the major share of the total catch viz. 50.9%. Miscellaneous varieties constituted the next highest percentage of 15 followed by Tam (13 %). Sardine, surmai, cat fish and chorinemus were represented by about 4% each while ribbon fish and Anchovy were present in 1% each. All the other varieties were represented in negligible quantities.

Pair boat midwater trawling was attempted from Cochin using two 17.5 m trawlers viz. Meena Utpadak and Meena Sachetak during the period under survey. A total of about 40 hours of fishing effort was expended. In addition the vessel Meena Sachetak conducted single boat midwater trawling also. Since the data collected is of very preliminary nature detailed discussion is not attempted.

Particulars	Area/(catch/hr in Kg)					
	21-69	21-68	22-68	19-69	20-70	20-69
Fishing effort(hrs)	14.60	2.10	8.60	3.0	4.30	5.50
Varieties						
Elasmobranchs	96.3	-	26.7	-	22.8	6.7
Pomfret	1.2	-	0.8	-	-	1.4
Ghol	-	-	1.2	-	-	-
Tam	-	-	-	-	-	82.4
Ribbon fish	3.4	-	-	-	3.5	-
Karli	-	-	1.7	-	-	-
Chorinemus	9.3	-	-	-	-	-
Surmai	3.2	-	5.8	-	-	6.4
Sardine	-	-	17.4	-	-	-
Anchovy	1.9	-	1.2	-	-	-
Prawn	-	-	0.6	-	-	-
Cat fish	8.6	-	-	-	-	-
Kati	-	-	1.2	-	-	-
Miscellaneous	11.3	-	0.6	-	-	64.9
Total	135.2	-	57.2	-	26.3	161.7

TABLE XXVI. Area-wise catch/hr (in Kg) of pelagic trawling obtained by Matsya Nireekshani

Varieties	Catch/hour	% composition
Elasmobranchs	49.2	50.9
Pomfret	0.9	0.9
Ghol	0.3	0.3
Tam	12.6	13.0
Squid	-	0.1
Ribbon fish	1.8	1.9
Karli	0.4	0.4
Chorinemus	3.8	3.9
Surmai	3.6	3.8
Sardine	4.3	4.4
Anchovy	1.0	1.1
Prawn	0.1	0.1
Cat fish	3.5	3.6
Kati	0.3	0.3
Miscellaneous	14.7	15.3

TABLE XXVII. Percentage composition of different varieties and their respective catch/hr obtained by Matsya Nireekshani by pelagic trawling