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

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CONTENTS

Cover photo: *Mexican trawlers and mechanised boats at the fishing harbour Visakhapatnam.*

INDUSTRIAL FISHERIES OFF VISAKHAPATNAM COAST BASED ON EXPLORATORY SURVEYS DURING 1972-1978*

Consequent upon the decommissioning of motor trawlers *M.T. Ashok* and *M.V. Champa* during the years 1970/71, exploratory surveys for ground fish fisheries along the Andhra-Orissa coast were continued by two 17.5 m trawlers *M. V. Meena Shodhak* and *M. V. Meena Jawhar* mostly with 24 m fish and occasionally 35 m shrimp otter trawls commencing from the years 1972/73.

The logs maintained by the respective captains of the vessels as well as observations made by the scientists of the Research Centre either on board the vessels or at the time of unloading of the catches at the jetty were the chief sources for the data considered in the present account. Such surveys besides providing information on the spatial and seasonal distribution of fish and fisheries in the regions surveyed further generate data useful for assessing resource potential.

The results of surveys carried out in areas (Fig.1) lying between latitude zones 15°40′ N and 19° 40′ N and in depths ranging from 10 to 90 m are presented here for the period from 1972 to 1978. In tables IA and IB are presented details of exploratory fishing operations respectively of *M. V. Meena Shodhak* and *M. V. Meena Jawhar*. Category-wise total catches, catch-rates with percentages and months of abundance in respect of each vessel are presented in tables II A and II B. Areas/latitudes of abundance in terms of annual catch-rate with respect to each major category of fish are presented in tables III A and III B respectively of *M. V. Meena Shodhak* and *M. V. Meena Jawhar*. Depth-wise distribution of each major category of fish in respect of each vessel is presented in tables IV A and IV B.

The salient findings of these surveys could be summed up as follows:-

1. A 17.5 m vessel of the type detailed for exploratory surveys could yield an average catch of 54 tonnes per annum of demersal fish returning 404 kg/day, 147 kg/haul, 82.9 kg/hr and 0.21 kg/hr/H. P., expending 133 days and 649.22 hrs of fishing and making 367 hauls per annum.

2. In the catches of both the vessels, the miscellaneous-small group of fishes dominated over the other categories in all the years. Catfishes invariably held the second place, while either rays or the miscellaneous-big group of fishes held the third place. The last place being held by prawns, the fifth place was occupied by sharks and skates. Excepting prawns which were abundant in the period June-September, all the other categories were either abundant in January-March or October-December periods. While catfishes comprised two species with almost equal

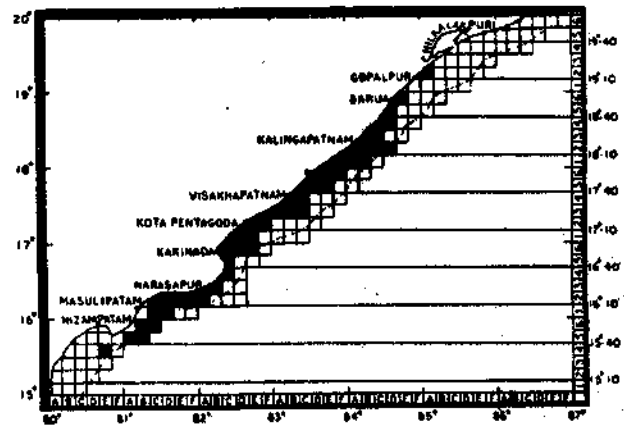

Fig. 1: Map of the north Andhra-Orissa coast. Areas surveyed are shaded.

contribution, prawns were represented by three species with *Metapenaeus monoceros* contributing the maximum (*ca* 60%), *Penaeus monodon* the least and *P. indicus* ranking between the two (Table V).

* Prepared by staff of Waltair Research Centre of C. M. F. R. Institute.

Table IA: *Details of exploratory trawling surveys carried out by the Government of India vessel M. V. Meena Shodhak during the years from 1972 to 1978 (Base: Visakhapatnam).*

		1972	1973	1974	1975	1976	1977	1978
1.	No. of days out of Port	79	131	151	147	132	88	135
2.	No. of days of fishing	79	130	150	147	128	84	120
3.	No. of hauls	193	286	407	426	420	237	312
4.	Effort (Hrs.)	323.02	475.47	686.90	786.79	775.70	421.69	594.58
5.	Catch (Kg)	36629.25	42363.25	56146.25	45524.85	47744.40	47467.05	35669.85
6.	Depth range (m)	26–59	22–64	24–64	20–62	20–62	20–62	20–88
7.	Catch/day out of Port (Kg)	463.70	323.40	377.80	309.70	361.70	539.40	264.20
8.	Catch/day of fishing (Kg)	463.70	323.40	371.80	309.70	373.00	565.10	297.20
9.	Catch/haul of fishing (Kg)	189.80	148.10	137.90	106.90	113.70	203.30	114.30
10.	Catch/hour of fishing (Kg)	113.40	89.10	81.70	57.90	61.60	112.60	60.00
11.	Catch/hour/H. P. of fishing (Kg)	0.57	0.45	0.41	0.29	0.31	0.56	0.30
12.	Remarks	No fishing: 1 & 2	No fishing: 2 & 3			No fishing: 1,8,9 & 10	No fishing: 9,10 & 11	No fishing: 10
13.	No. of latitude zones/No. of areas explored	4/20	5/12	3/14	7/27	7/27	7/27	8/29
14.	Extent of the area explored (Sq. Km.)	6531.98	3919.19	4572.39	8818.17	8818.17	8818.17	9471.37
15.	Important categories of fish	E,C,B,F,A,D	E,C,B,F,A,D	E,C,F,B,A,D	E,C,B,D,F,A	E,C,F (A,B),D	E,F,C,B,A,D	E,C,B,F,A,D

Table IB: *Details of exploratory trawling surveys carried out by the Government of India vessel M. V. Meena Jawhar during the years from 1973 to 1978 (Base: Visakhapatnam).*

		1973	1974	1975	1976	1977	1978
1.	No. of days out of Port	113	191	176	161	163	114
2.	No. of days of fishing	111	190	175	158	160	101
3.	No. of hauls	247	449	506	539	432	314
4.	Effort (Hrs.)	418.18	838.68	928.43	886.16	755.37	548.83
5.	Catch (Kg)	24924.75	69862.70	77557.00	72272.70	83753.75	60034.55
6.	Depth range (m)	24–63	18–65	18–64	18–60	15–78	18–85
7.	Catch/day out of Port (Kg)	220.60	365.80	440.60	448.90	513.80	522.00
8.	Catch/day of fishing (Kg)	224.50	365.80	440.60	457.40	523.50	594.60
9.	Catch/haul of fishing (Kg)	100.90	155.60	153.30	134.10	193.90	191.20
10.	Catch/hour of fishing (Kg)	59.60	83.30	83.50	81.60	110.80	109.40
11.	Catch/hour/H.P. of fishing (Kg)	0.30	0.42	0.42	0.41	0.55	0.51
12.	Remarks	No fishing: 1,2,3 & 5			No fishing: 8 & 9	No fishing: 10	No fishing: 6,7 & 8
13.	No. of latitude zones/No. of areas explored	4/9	4/19	6/26	7/31	5/25	7/40
14.	Extent of the area explored (Sq. Km)	2939.39	6205.38	8491.57	10124.56	8164.97	13063.95
15.	Important categories of fish	E (BC) (FA)D	E,C,F,A,B,D	E,C,B,F,A,D	E,C,F,B,A,D	E,C,F,B,A,D	E,C,F,B,A,D

Although about 24 species constituted the miscellaneous-small category which consisted of fish measuring less than 30 cm, *Leiognathus* spp. took the pride of place among them with a contribution of 13.4%. Those that contributed 5% and more were few in number and they were *Upeneus* spp. (11.8%); *Johnius aneus* (8.6%); *Nemipterus japonicus* (8.2%); *Trichiurus* spp. (7.6%); *Pomadasys hasta* (5.9%) and *Saurida tumbil* (5.6%). The miscellaneous-big category of fishes consisted of fish measuring greater than 30 cm and about 17 species formed the group, chief among them being *Pomadasys hasta* (27.4%). *Stromateus niger* and *Muraenesox* spp. contributed between 5 to 10% of the miscellaneous-big landings.

3. The area/latitudinal-wise distribution of the different categories of fish revealed the following features: for sharks and skates the richest latitude zones were 16° 40′, 18° 40′ and 18° 10′ and for rays 15° 40′, 16° 40′, 16° 10′ and 18° 40′. Thus the latitude zones 16° 40′ and 18° 40′ were important for elasmobranch resources. Catfish were abundant south of Visakhapatnam viz., in the latitude zones of 18° 10′, 18° 40′ and 17° 40′ in that order of abundance. Prawns showed a similar distribution with the highest catch rate in latitude zone 18° 10′ followed by 17° 40′ and 18° 40′. The zones 15° 40′ followed by 18° 10′ and 18° 40′ were most favourable for miscellaneous-small while 16° 10′ followed by 16° 40′ and 15° 40′ for miscellaneous-big. When the catch rate of all fish was considered, the zone 15° 40′ was found the richest. But it must be emphasized that the zone 15° 40′ was fished only in 1978 with a total effort of a meagre 9.25 hrs. The zone 18° 10′ which was fished in all the years expending considerable effort (2295.30 hrs) should be considered as more important notwithstanding the second place it occupied in terms of the catch rate. Zones 16° 10′ and 16° 40′ which were fished for four

Table II A: *Total catches in Kg (1); catch rates in Kg/hr (2); percentages (3); and months of abundance (4) in respect of major categories of fishes (A to F) as obtained from exploratory surveys of M. V. Meena Shodhak during the years from 1972 to 1978.*

	1972				1973				1974			
	1	2	3	4	1	2	3	4	1	2	3	4
Sharks & Skates (A)	1439.0	4.5	3.9	3,6,10	1151.0	2.4	2.7	1,8,12	1540.0	2.2	2.7	3,6,9,11
Rays (B)	2742.0	8.5	7.5	4,6,8,10	3571.5	7.5	8.4	1,8,12	2827.0	4.1	5.0	2,6,9,11
Catfish (C)	5601.0	17.3	15.3	6,8,10	4917.5	10.3	11.6	1,5,9,12	14035.5	20.5	25.0	3,6,12
Prawns (D)	1166.75	3.7	3.3	6,8,10	330.75	0.7	0.8	1,7,12	361.75	0.5	0.6	3,6,9,11
Miscellaneous—small (E)	24019.50	74.2	65.5	4,6,8,10	30659.0	64.5	72.3	1,10,12	33005.0	48.0	58.9	2,4,6,9,11
Miscellaneous—big (F)	1661.00	5.2	4.5	3,8	1733.5	3.7	4.2	8,11	4377.0	6.4	7.8	3,6,7,11
All fish	36629.25	113.4			42363.25	89.1			56146.25	81.7		

	1975				1976				1977				1978			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Sharks & Skates (A)	743.0	0.9	1.7	1,3,6,9,12	3096.0	4.0	6.5	2,6	1346.5	3.2	2.8	1,7	643.5	1.1	1.8	3,11
Rays (B)	2142.0	2.7	4.7	1,3,7,9,12	3127.0	4.1	6.5	3,6,12	3589.0	8.5	7.6	1,7	2648.0	4.5	7.4	3,11
Catfish (C)	6705.0	8.5	14.7	1,3,5,9,12	7294.0	9.4	15.4	3,6,12	5898.0	14.0	12.4	1,5	3605.0	6.1	10.1	3,12
Prawns (D)	1923.35	2.5	4.2	5,10	639.9	0.8	1.3	3,7	93.85	0.2	0.2	8	182.45	0.3	0.5	6
Miscellaneous—small (E)	32298.0	41.1	70.9	1,4,9,12	29513.5	38.0	61.8	3,6,12	28537.20	67.7	60.1	1,7	26333.0	44.3	73.8	3,11
Miscellaneous—big (F)	1713.5	2.2	3.8	1,3,6,10,12	4074.0	5.3	8.5	3,6,12	8002.5	19.0	16.8	1,5	2257.9	3.7	6.3	3,11
All fish	45524.85	57.9			47744.4	61.6			47467.05	112.6			35669.85	60.0		

Table II B: *Total catches in kg (1); catch rates in kg/hr (2); percentages (3); and months of abundance (4) in respect of major categories of fishes (A to F) as obtained from exploratory surveys of M. V. Meena Jawhar during the years from 1973 to 1978.*

	1973				1974				1975			
	1	2	3	4	1	2	3	4	1	2	3	4
Sharks & Skates (A)	1070.0	2.6	4.4	7,12	3398.5	4.1	4.9	3,5,8,11	2447.0	2.6	3.2	3,6,10
Rays (B)	1702.0	4.1	6.9	7,12	1995.0	2.4	2.8	1,5,9,11	4095.0	4.4	5.3	2,5,12
Catfish (C)	1723.0	4.1	6.9	7,10	16278.5	19.4	23.3	3,7,10	11508.0	12.4	14.9	3,5,9
Prawns (D)	218.75	0.5	0.8	7,12	837.7	1.0	1.2	3,5,9,10	1026.0	1.1	1.2	4,7,9
Miscellaneous—small (E)	19272.0	46.1	77.3	8,11	41219.0	49.1	59.0	1,4,7,12	54436.0	58.6	70.2	2,5,7,10
Miscellaneous—big (F)	939.0	2.2	3.7	7,11	6134.0	7.3	8.8	3,4,6,12	4045.0	4.4	5.2	2,5,10
All fish	24924.75	59.6			69862.7	83.3			77557.0	83.5		

	1976				1977				1978			
	1	2	3	4	1	2	3	4	1	2	3	4
Sharks & Skates (A)	1646.0	1.9	2.3	3,12	2581.0	3.4	3.1	2,6	1730.5	3.2	2.9	1,11
Rays (B)	3502.5	4.0	4.8	3,12	6286.5	8.3	7.5	1,6	4435.5	8.1	7.4	3,11
Catfish (C)	10754.5	12.1	14.9	2,6,11	13434.0	17.8	16.0	3,6	4882.0	8.9	8.1	6,12
Prawns (D)	699.7	0.8	1.0	3,7,10	217.35	0.3	0.3	8,9	82.4	0.2	0.1	3,9
Miscellaneous—small (E)	48767.5	55.0	67.5	1,6,12	50420.9	66.7	60.2	2,8	44393.45	80.8	73.9	1,11
Miscellaneous—big (F)	6902.5	7.8	9.5	2,6,12	10814.0	14.3	12.9	2,6	4510.7	8.2	7.5	3,11
All fish	72272.7	81.6			83753.75	110.8			60034.55	109.4		

Table III A: *Areas of abundance in terms of annual catch rate (kg/hr) in respect of major categories of fishes as obtained from the exploratory surveys of M. V. Meena Shodhak during the years from 1972 to 1978 (Base: Visakhapatnam).*

Latitude	Areas	SHARKS & SKATES									RAYS								
		1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15°40′																			
	15–81/A5							0.0	0.00								21.1	21.10	
	15–81/B5							0.0	0.00	0.00							34.7	34.72	28.57
16°10′																			
	16–81/E2							0.0	0.00								12.8	12.80	
	16–82/F2						1.8		1.76							18.5		18.51	
	16–82/A2		0.0			0.0	0.0		0.00			71.4			22.2	20.7		39.80	
	16–81/C1							15.6	15.60								40.0	40.00	
	16–81/D1							5.5	5.45								10.9	10.90	
	15–81/B6							0.0	0.00								50.0	50.00	
	15–81/C6							4.0	4.00	2.48							16.7	16.66	25.83
16°40′																			
	16–82/C5		8.6			0.0	7.9	0.3	3.46			39.1			27.4	22.7	4.6	16.79	
	16–82/C4					0.0	6.3	0.0	1.97						0.0	30.5	9.6	12.46	
	16–82/B3		0.0				4.8		3.17	3.01		35.3				12.7		20.51	16.51
17°10′																			
	16–82/C6		0.0		3.7	0.0	0.0	0.0	0.28			88.6		5.2	5.2	42.8	11.5	32.29	
	17–82/C1				0.0			0.1	0.08					3.3			1.7	2.08	
	17–82/D1				3.2	0.0	0.0	2.0	1.28					0.0	0.0	0.0	1.8	0.71	
	17–82/D2				3.4		0.0	0.2	0.46					11.4		0.0	7.0	6.68	
	17–82/E2					0.0	0.0	0.0	0.00						0.0	2.4	0.0	1.06	
	17–82/F2	0.0			0.0		0.0		0.00	0.37	7.0			0.0		8.0		5.69	12.41
17°40′																			
	17–82/F3	0.0			0.0		0.5	0.0	0.14		6.3			0.0		0.0	0.0	0.70	
	17–83/A3	1.0	0.0	1.6	0.4	0.01	0.8	0.0	0.68		4.2	31.0	0.1	3.5	0.0	0.5	0.0	2.84	
	17–83/B3	0.0	7.4	3.8	0.5	6.6	1.3		3.40		0.0	9.2	2.2	0.1	0.9	0.9		1.98	
	17–83/C3			0.8		0.0	7.3		4.82				0.0		4.1	0.1		0.66	
	17–83/B4	2.4	2.3	2.3	0.5	0.9	1.3	0.4	1.12		1.1	6.5	3.2	2.3	0.7	1.5	1.0	1.98	
	17–83/C4	0.6	0.8	2.0	0.7	0.1	2.1	0.4	1.11		0.7	2.9	3.6	1.4	1.7	10.0	1.1	3.19	
	17–83/D4			0.0	0.0		0.6		1.26				0.9	0.0		0.6		0.43	
	17–83/C5	5.7	1.6	2.1	0.8	0.5	10.1	0.9	1.83		11.9	7.6	3.9	4.2	1.0	7.2	1.1	4.08	
	17–83D5	2.1	2.8	2.8	2.3	1.1	1.4	1.4	2.26		3.7	5.1	5.4	5.2	3.0	1.4	2.9	4.43	
	17–83/E5	9.8			0.0	0.0		1.5	2.15	1.61	17.8			0.0	0.0		6.1	5.69	3.36
18°10′																			
	17–83/D6	5.1	6.3	2.4	0.8	6.4	10.0	0.3	4.66		7.6	2.7	14.1	1.8	2.2	3.6	0.2	4.49	
	17–83/C6				0.0				0.00					4.2				4.19	
	17–83/E6	4.9	3.1	0.4	0.3	12.1	0.0	1.5	5.60		15.5	1.8	5.2	1.2	0.7	0.0	5.0	3.93	
	17–83/F6	0.0		5.1	2.6	0.6	0.0		1.51		23.1		0.0	0.0	7.6	8.5		6.65	
	18–83/F1	2.4			0.0	0.9	1.0	2.5	1.53		25.2			3.0	1.6	16.8	13.7	11.67	
	18–84/A1	6.4			1.3	0.6	2.5	5.8	2.97		13.3			3.7	8.0	9.7	16.8	9.76	
	18–84/B1				7.4			5.0	6.24					6.9			50.0	27.58	
	18–84/A2	8.7		0.9	0.0	1.4	3.0	2.0	2.91		13.3		3.0	3.3	5.2	14.4	10.2	9.93	
	18–84/B2	14.6		1.5	4.6	7.6	7.8	9.6	8.20		1.2		2.3	6.5	17.5	23.4	34.1	14.07	
	18–84/C2	0.0			1.5				0.67		10.3			9.6				10.00	
	18–84/D2	0.0							0.00	4.28	0.0							0.00	7.05
18°40′																			
	18–84/B3	3.1			0.0	2.9	0.0	0.0	2.70		36.2		3.6		20.4	28.6	62.5	22.84	
	18–84/C3	0.0			7.2	31.3			25.51		0.0			0.0	13.5			10.56	
	18–84/C4					0.5			0.50						7.5			7.50	
	18–84/D4					0.0			0.00						16.5			16.49	
	18–84/D5					109.1			109.13	13.17					34.9			34.86	18.59
19°10′																			
	18–84/E6					0.0			0.00						0.0			0.00	
	19–85/A2				2.9				2.88	1.68				0.0				0.00	0.00
19°40′																			
	19–83/A3				0.0				0.00	0.00				0.0				0.00	0.00
All Latds./Areas		4.5	2.4	2.2	0.9	4.0	3.2	1.1	2.45	2.45	8.5	7.5	4.1	2.7	4.1	8.5	4.5	5.08	5.08

Table III A. Continued

Latitude	Areas	CATFISH 1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	PRAWNS 1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15° 40′																			
	15–81/A5							0.0	0.00								0.0	0.00	
	15–81/B5							0.0	0.00	0.00							0.0	0.00	0.00
16° 10′																			
	16–81/E2							16.0	16.00								0.0	0.00	
	16–82/F2						6.2		6.17							0.0		0.00	
	16–82/A2		8.6			3.2	8.1		7.43			0.6			0.0	0.0		0.21	
	16–81/C1							14.0	14.00								0.0	0.00	
	16–81/D1							5.4	5.45								0.0	0.00	
	15–81/B6							10.0	10.00								0.0	0.00	
	15–81/C6							13.3	13.33	9.97							0.0	0.00	0.07
16° 40′																			
	16–82/C5		7.8			13.1	13.6	2.9	7.89			0.6			0.0	0.02	0.0	0.07	
	16–82/C4					11.1	17.9	3.7	10.98						0.0	0.04	0.0	0.01	
	16–82/B3		2.2				5.2		4.15	7.85		0.5				0.1		0.23	0.09
17° 10′																			
	16–82/C6		7.9		0.5	15.6	11.8	4.8	7.24			0.5		0.1	0.0	0.0	0.02	0.12	
	17–82/C1				0.0			2.1	1.58					0.1			0.1	0.06	
	17–82/D1				0.0	10.0	1.6	0.6	3.36					0.1	0.0	0.0	0.1	0.04	
	17–82/D2				0.6		2.0	7.8	6.53					0.2		0.0	0.0	0.02	
	17–82/E2					10.4	32.3	0.0	16.08						0.0	0.0	0.0	0.00	
	17–82/F2	0.0			2.3		3.5		2.62	7.24	0.0			22.9		0.0		6.15	0.55
17° 40′																			
	17–82/F3	9.5			0.6		12.5	0.0	4.79		0.0			6.0		0.6	0.0	2.32	
	17–83/A3	2.6	11.6	6.3	1.6	2.5	33.1	0.0	5.97		4.3	0.0	3.4	1.8	0.7	0.1	0.0	1.95	
	17–83/B3	240.0	4.6	43.2	1.0	0.8	17.2		30.14		0.0	0.04	0.3	0.2	0.7	0.1		0.28	
	17–83/C3			13.9		0.0	17.5		14.17				0.0		0.4	0.2		0.18	
	17–83/B4	3.9	7.9	4.0	1.8	2.1	21.2	2.7	4.69		1.4	0.3	0.8	2.0	1.2	0.4	0.4	0.98	
	17–83/C4	2.3	4.2	9.8	3.7	4.1	4.8	1.5	5.34		2.9	0.7	0.4	1.6	1.3	0.5	0.01	0.88	
	17–83/D4			4.4	3.7		5.5		4.68				0.0	0.5		0.0		0.17	
	17–83/C5	11.9	1.5	38.5	10.3	6.9	2.7	2.9	14.29		2.2	0.8	0.4	2.3	1.0	0.3	0.7	1.02	
	17–83/D5	4.1	21.5	9.5	11.4	11.1	25.0	5.4	15.21		2.8	0.8	0.3	1.6	0.5	0.1	0.0	0.80	
	17–83/E5	0.0			11.4	8.4		12.1	9.48	10.49	5.8			11.4	0.0		0.0	2.08	0.95
18° 10′																			
	17–83/D6	29.7	5.5	4.7	21.5	5.5	14.6	2.0	15.04		3.4	0.7	0.7	1.7	1.3	0.01	1.0	1.77	
	17–83/C6				0.6				0.60					0.0				0.00	
	17–83/E6	11.1	3.4	5.5	16.1	32.1	18.1	47.3	19.83		1.5	0.3	0.7	6.1	0.9	0.01	0.0	2.12	
	17–83/F6	15.5		0.0	34.8	4.0	38.5		19.92		3.4		0.0	11.9	0.1	0.0		5.61	
	18–83/F1	19.7			1.7	11.6	10.2	12.9	11.29		6.3			6.1	0.2	0.004	0.01	1.04	
	18–84/A1	35.1			23.6	10.0	10.2	12.2	16.94		24.5			6.5	0.01	0.005	0.0	4.63	
	18–84/B1				0.0			0.0	0.00					0.1			0.0	0.05	
	18–84/A2	17.6		18.2	2.0	10.7	18.6	33.6	19.59		3.9		0.0	0.1	0.2	0.004	0.0	0.60	
	18–84/B2	15.8		21.7	3.3	11.5	44.9	39.6	17.84		4.3		0.0	0.2	0.1	0.5	0.0	0.89	
	18–84/C2	14.5			9.6				12.22		14.6			0.1				7.96	
	18–84/D2	16.7							16.67	16.36	10.0							10.00	1.99
18° 40′																			
	18–84/B3	12.8		25.7		13.3	62.9	312.5	17.17		3.1		0.0		0.04	0.0	0.0	0.53	
	18–84/C3	13.3			0.0	15.6			13.45		3.3			0.2	0.2			0.47	
	18–84/C4					16.3			16.25						0.0			0.00	
	18–84/D4					4.8			4.80						0.2			0.22	
	18–84/D5					7.2			7.21	14.60					0.1			0.07	0.41
19° 10′																			
	18–84/E6					23.3			23.33						0.7			0.67	
	19–85/A2				0.0				0.00	9.78				1.0				0.96	0.84
19° 40′																			
	19–83/A3				0.0				0.00	0.00				0.7				0.75	0.75
All Latds./Areas		17.3	10.3	20.5	8.5	9.4	14.0	6.1	11.82	11.82	3.6	0.7	0.5	2.5	0.8	0.2	0.3	1.16	1.16

Table III A. Continued

Latitude	Areas	MISCELLANEOUS FISH—SMALL									MISCELLANEOUS FISH—BIG								
		1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15° 40′																			
	15–81/A5							94.9	94.94								23.2	23.21	
	15–81/B5							86.8	86.81	90.48							13.9	13.89	18.10
16° 10′																			
	16–81/E2							64.0	64.00								17.8	17.76	
	16–82/F2						50.3		50.30							26.8		26.80	
	16–82/A2		65.7			63.3	35.9		51.59			10.0			63.9	27.7		27.18	
	16–81/C1							90.0	90.00								38.2	38.20	
	16–81/D1							72.7	72.72								24.2	24.18	
	15–81/B6							75.0	75.00								22.5	22.50	
	15–81/C6							83.3	83.33	62.81							19.5	19.50	24.91
16° 40′																			
	16–82/C5		50.3			58.1	101.9	30.9	57.28			19.6			53.2	45.5	4.0	24.10	
	16–82/C4					66.9	120.4	35.3	73.90						87.8	40.4	2.0	46.79	
	16–82/B3		32.7				94.9		73.34	65.20		20.7				46.8		37.78	33.06
17° 10′																			
	16–82/C6		65.0		37.5	21.1	68.5	34.4	46.32			21.6		0.0	10.4	33.2	5.4	13.94	
	17–82/C1				67.3			42.6	48.75					0.0			2.8	2.08	
	17–82/D1				77.2	15.0	8.2	23.1	26.32					0.0	26.7	3.3	0.6	8.36	
	17–82/D2				46.9		10.0	55.8	50.33					0.0		3.5	5.7	4.96	
	17–82/E2					7.8	22.0	28.4	22.48						13.0	13.4	2.5	8.92	
	17–82/F2	97.0			85.7		20.0		49.54	41.34	3.0			2.9		7.2		5.38	8.62
17° 40′																			
	17–82/F3	9.5			59.9		15.0	29.6	34.13		1.3			0.0		7.5	20.1	7.25	
	17–83/A3	67.1	19.4	33.6	47.9	11.0	70.3	14.4	43.12		3.2	5.8	6.3	2.3	0.3	90.0	2.4	11.76	
	17–83/B3	20.0	37.9	53.6	22.1	9.7	64.7		46.37		6.0	1.8	7.5	2.8	0.9	8.9		6.20	
	17–83/C3			83.8		4.1	61.8		58.17				3.3		0.0	12.0		8.50	
	17–83/B4	36.4	41.3	30.1	44.9	16.6	49.2	35.5	36.74		3.5	4.0	7.6	1.3	0.4	2.4	1.2	2.45	
	17–83/C4	47.2	37.7	47.9	37.9	21.3	59.3	16.8	38.34		0.7	2.4	7.2	1.1	1.6	3.1	0.5	3.11	
	17–83/D4			31.1	17.1		57.2		38.27				6.7	0.0		2.8		2.55	
	17–83/C5	68.4	78.9	47.2	33.5	27.9	39.3	41.4	46.52		5.4	3.2	4.6	0.8	1.1	3.4	1.1	2.55	
	17–83/D5	37.3	65.3	49.6	42.6	42.6	69.3	78.6	53.99		2.2	2.9	5.6	0.7	1.1	20.8	0.3	3.88	
	17–83/E5	93.3			18.3	36.3		44.0	46.43	43.68	0.0			4.0	2.2		4.5	3.28	3.40
18° 10′																			
	17–83/D6	88.2	59.8	79.8	29.3	57.3	49.9	31.8	61.04		3.6	3.9	8.3	0.7	1.7	16.9	0.6	3.47	
	17–83/C6				12.0				11.98					0.0				0.00	
	17–83/E6	65.9	104.4	16.0	33.5	36.9	36.7	24.7	47.71		6.2	2.9	2.4	2.5	1.2	3.5	5.7	2.88	
	17–83/F6	56.3		63.3	29.7	79.7	102.7		54.79		2.2		0.0	4.1	4.5	3.4		3.71	
	18–83/F1	277.6			68.8	31.1	58.9	77.6	74.58		1.5			2.5	6.1	16.7	15.4	11.69	
	18–84/A1	72.2			60.7	40.1	98.9	116.7	77.40		13.7			12.8	11.7	23.5	8.6	14.11	
	18–84/B1				106.0			250.0	175.06					16.1			5.0	10.79	
	18–84/A2	176.8		81.4	125.8	64.4	178.0	65.3	116.67		8.8		24.6	43.4	9.1	92.8	5.3	34.28	
	18–84/B2	88.7		104.6	110.7	74.2	100.6	148.7	91.58		19.4		27.0	15.8	27.1	27.8	29.3	24.35	
	18–84/C2	20.7			146.6				78.89		3.3			4.8				4.00	
	18–84/D2	16.7							16.67	68.88	13.3							13.33	9.87
18° 40′																			
	18–84/B3	119.4		98.8		55.8	57.2	312.5	69.13		11.6		19.2		13.8	25.7	6.3	14.17	
	18–84/C3	33.4			21.6	44.7			40.82		3.3			0.0	12.2			9.84	
	18–84/C4					36.9			36.88						23.4			23.38	
	18–84/D4					26.2			26.24						22.5			22.49	
	18–84/D5					31.3			31.25	53.51					11.8			11.78	14.79
19° 10′																			
	18–84/E6					35.3			35.33						1.3			1.33	
	19–85/A2				59.1				59.13	49.16				14.9				14.90	9.22
19° 40′																			
	19–83/A3				54.9				54.89	54.89				6.8				6.77	6.77
All Latds./Areas		74.4	64.5	48.0	41.1	38.0	67.7	44.3	50.28	50.28	5.2	3.7	6.4	2.2	5.3	19.0	3.7	5.86	5.86

Table III A: Continued

Latitude	Areas	ALL FISH 1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	EFFORT 1972	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15°40′																			
	15–81/A5							139.2	139.24								2.37	2.37	
	15–81/B5							135.4	135.42	137.14							2.88	2.88	5.25
16°10′																			
	16–81/E2							110.6	110.56								6.25	6.25	
	16–82/F2						103.6		103.62							5.67		5.67	
	16–82/A2		156.3			152.6	92.4		126.22			3.50			1.58	4.34		9.42	
	16–81/C1							197.8	197.80								2.50	2.50	
	16–81/D1							118.7	118.73								2.75	2.75	
	15–81/B6							157.5	157.50								1.00	1.00	
	15–81/C6							136.8	136.83	126.07							3.00	3.00	30.59
16°40′																			
	16–82/C5		126.0			151.8	191.6	42.7	109.59			3.58			3.83	8.83	14.13	30.37	
	16–82/C4					165.8	215.6	50.6	146.11						5.83	4.75	4.67	15.25	
	16–82/B3		91.4				164.5		139.18	125.71		4.59				8.67		13.26	58.88
17°10′																			
	16–82/C6		183.6		46.9	52.3	156.3	56.1	100.20			5.08		1.92	1.92	4.67	11.12	24.71	
	17–82/C1				70.7			49.4	54.64					1.50			4.50	6.00	
	17–82/D1				80.5	51.7	13.1	28.2	40.07					1.58	3.00	1.83	4.17	10.58	
	17–82/D2				62.5		15.5	76.5	68.98					1.75		2.00	16.00	19.75	
	17–82/E2					31.2	70.1	30.9	48.55						1.92	5.91	5.29	13.12	
	17–82/F2	107.0			113.8		38.7		69.38	70.39	1.00			1.75		3.75		6.50	80.66
17°40′																			
	17–82/F3	26.6			66.5		36.1	49.7	49.33		1.58			5.09		4.00	3.54	14.21	
	17–83/A3	82.4	67.8	51.3	57.5	14.5	194.8	16.8	66.35		11.83	2.58	17.75	39.25	9.96	9.67	6.25	97.29	
	17–83/B3	266.0	60.9	110.6	26.7	19.6	93.1		88.37		2.50	6.75	44.57	7.91	12.84	25.16		99.73	
	17–83/C3			101.9		8.6	99.1		86.50				3.59		2.42	10.58		16.59	
	17–83/B4	48.7	62.3	48.0	52.8	21.9	76.0	41.2	47.97		55.34	38.00	62.43	122.61	56.18	46.17	151.78	532.51	
	17–83/C4	54.4	48.7	70.9	46.4	30.1	79.8	20.3	51.98		7.25	54.27	199.80	183.74	126.76	92.16	75.66	739.64	
	17–83/D4			43.1	21.3		66.6		46.34				2.25	4.09		5.42		11.76	
	17–83/C5	105.5	93.6	96.7	51.9	38.4	63.0	48.1	70.30		31.83	132.91	221.26	161.25	108.77	34.84	151.23	842.09	
	17–83/D5	52.2	98.4	73.2	63.8	59.4	118.0	88.6	80.58		24.84	177.28	85.17	64.23	93.15	31.83	3.50	480.00	
	17–83/E5	126.7			45.1	46.9		68.2	69.11	63.48	2.25			1.75	3.58		8.25	15.83	2849.65
18°10′																			
	17–83/D6	137.6	78.9	110.0	55.8	74.4	95.0	35.9	90.47		90.03	25.10	29.16	69.84	112.95	19.09	20.66	366.83	
	17–83/C6				16.8				16.77					1.67				1.67	
	17–83/E6	105.1	115.9	30.2	59.7	83.9	58.4	84.2	82.08		34.25	21.83	9.08	45.26	65.86	7.17	6.00	189.45	
	17–83/F6	100.5		68.4	83.1	96.5	153.1		92.00		5.42		1.58	13.58	10.58	1.17		32.33	
	18–83/F1	332.7			82.1	51.5	103.6	122.1	111.80		6.34			10.00	21.24	26.84	38.25	102.67	
	18–84/A1	165.2			108.6	70.4	144.8	160.1	125.81		10.91			21.44	18.74	18.92	18.00	88.01	
	18–84/B1				136.5			310.0	219.71					2.17			2.00	4.17	
	18–84/A2	229.1		128.1	174.6	91.0	306.8	116.4	183.98		13.16		4.67	6.08	19.83	26.25	24.50	94.49	
	18–84/B2	144.0		157.1	141.1	138.0	205.0	261.3	156.91		12.58		3.92	10.76	31.76	10.25	4.17	74.44	
	18–84/C2	63.4			172.3				113.73		2.42			2.08				4.50	
	18–84/D2	56.7							56.67	108.43	1.50							1.50	959.06
18°40′																			
	18–84/B3	186.2		147.3		106.2	174.4	693.8	126.54		6.49		1.67		29.59	1.75	0.16	39.66	
	18–84/C3	53.3			29.0	117.5			100.65		1.50			2.08	13.08			16.66	
	18–84/C4					84.6			84.60						8.00			8.00	
	18–84/D4					70.2			70.24						6.67			6.67	
	18–84/D5					194.4			194.40	115.08					4.16			4.16	75.15
19°10′																			
	18–84/E6					60.6			60.67						1.50			1.50	
	19–85/A2				77.9				77.88	70.67				2.08				2.08	3.58
19°40′																			
	19–83/A3				62.4				62.41	62.40				1.33				1.33	1.33
All Latds./Areas		113.4	89.1	81.7	57.9	61.6	112.6	60.0	76.66	76.66	323.02	475.47	686.90	786.79	775.70	421.69	594.58	4064.15	4064.15

Table III B: *Areas of abundance in terms of annual catch rate (kg/hr) in respect of major categories of fishes as obtained from the exploratory surveys of M. V. Meena Jawhar during the years from 1973 to 1978 (Base: Visakhapatnam)*

Latitude	Areas	SHARKS & SKATES								RAYS							
		1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15°40′																	
	15–80/E4						0.0	0.00							44.4	44.45	
	15–81/A5						0.0	0.00	0.00						28.6	28.57	37.50
16°10′																	
	16–81/E2				0.0		0.0	0.00					13.3		0.01	6.15	
	16–81/D2						0.0	0.00							0.0	0.00	
	16–81/C2						0.0	0.00							14.3	14.29	
	16–81/F2				3.0			3.00					6.0			6.00	
	16–82/A2				3.3	3.0		3.08					0.0	30.0		23.08	
	16–81/C1						0.0	0.00							11.1	11.11	
	16–81/D1						0.0	0.00							14.3	14.29	
	15–81/B6						0.0	0.00							12.5	12.50	
	15–81/C6						0.0	0.00	1.35						0.0	0.00	11.54
16°40′																	
	16–82/C5	0.0			0.0	0.0	0.0	0.0		4.4			10.0	36.9	15.3	23.95	
	16–82/C4	0.0			0.0	25.4	0.7	11.96		0.0			40.0	71.7	13.5	40.59	
	16–82/A3				0.0			0.00					0.0			0.00	
	16–82/B3				1.9	1.4	3.5	1.80	20.98				3.8	21.6	0.0	13.33	26.86
17°10′																	
	16–82/C6	0.0		1.6	0.0	0.0	0.7	0.44		15.0		8.0	6.1	5.4	0.7	6.03	
	16–82/D6					2.9	0.0	1.43						17.1	0.0	8.57	
	16–82/E6						0.0	0.00							50.0	50.00	
	17–82/C1			3.5			0.0	2.33				5.0			0.0	3.33	
	17–82/D1			6.0		2.0	0.0	2.92				6.7		6.8	0.0	5.30	
	17–82/E1			7.5			0.0	4.00				0.0			5.7	2.67	
	17–82/D2		1.3	5.7	1.8	1.0	0.0	1.53			5.0	5.7	5.5	18.4	4.4	10.09	
	17–82/E2		2.5	1.0	1.2	0.8	0.0	1.12			9.5	5.0	3.7	7.0	1.1	5.30	
	17–82/F2				6.0		0.0	2.18	1.57				6.7		10.5	9.10	7.15
17°40′																	
	17–82/F3			3.9	2.3	0.8	0.0	2.20				5.6	3.5	0.8	1.3	3.33	
	17–83/A3		13.7	0.9	0.5	1.2	0.0	0.95			17.1	1.0	2.3	1.4	1.8	1.84	
	17–83/B3		2.4	1.7		0.9	0.4	1.67			0.6	3.3		2.1	0.0	1.27	
	17–83/C3	0.0				0.0		0.00		15.0				1.0		6.60	
	17–83/B4	1.8	2.3	0.3	0.8	1.4	0.5	1.12		3.4	1.8	0.7	1.9	2.4	2.1	1.84	
	17–83/A4		4.8	0.9	0.9			2.80			0.0	3.3	0.4			1.18	
	17–83/C4	0.0	5.3	0.7	0.8	1.1	0.2	2.65		2.4	2.2	0.9	0.9	1.0	2.0	1.56	
	17–83/C5	2.4	4.1	0.7	1.3	0.7	0.2	2.32		4.3	2.9	0.7	3.0	2.1	0.03	2.87	
	17–83/D5	6.0	6.7		0.3	1.3	0.0	3.87		4.9	3.2		0.3	2.1	0.0	3.19	
	17–83/E5						0.0	0.00	1.99						1.7	1.67	2.15
18°10′																	
	17–83/D6	1.8	0.6	0.8	6.2	3.4	0.0	3.45		2.1	0.0	0.4	2.9	6.9	15.4	3.15	
	17–83/C6		0.0					0.00			38.0					37.97	
	17–83/E6		0.2	2.4	1.1	5.3	1.0	1.78			0.2	3.9	3.7	8.1	2.9	3.76	
	17–83/F6			8.6	3.3	0.0	0.0	2.42				0.0	5.3	13.0	16.3	10.42	
	18–83/E1		2.4	16.8	1.3	4.3	2.5	7.57			0.6	25.6	8.5	15.4	9.8	13.11	
	18–83/F1		8.0	10.3	3.6	8.4	2.6	6.54			1.3	11.9	8.6	12.1	8.8	9.88	
	18–84/A1		1.3	1.3	1.3	11.0	3.1	4.75			2.0	5.6	8.9	20.4	11.4	12.09	
	18–84/A2		3.2	2.6	1.9	4.7	5.3	3.68			2.1	11.6	8.0	19.1	11.8	11.76	
	18–84/B2		0.0	1.6	1.4	9.7	14.0	9.15			2.5	13.7	3.9	10.3	13.2	10.98	
	18–84/C2						48.1	48.08	5.01						14.4	14.42	9.08
18°40′																	
	18–84/B3		3.1	1.6	1.4		7.7	2.77			1.5	14.0	6.4		18.5	10.37	
	18–84/C3						2.2	2.19							13.6	13.55	
	18–84/C4		1.2	1.9	0.0		5.0	2.14			2.5	12.2	0.0		13.3	8.27	
	18–84/D4				0.0			0.00					5.7			5.71	
	18–84/D5			0.0	0.0			0.00	2.08			35.6	5.7			17.39	10.90
19°10′																	
	18–84/E6			6.5	0.0			2.47	2.48			2.5	4.6			3.81	3.81
All Latds./Areas		2.6	4.1	2.6	1.9	3.4	3.2	2.94	2.94	4.1	2.4	4.4	4.0	8.3	8.1	5.03	5.03

Table: III B Continued.

Latitude	Areas	CATFISH 1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	PRAWNS 1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15° 40′																	
	15–80/E4						2.2	2.22							0.0	0.00	
	15–81/A5						2.9	2.86	2.50						0.0	0.00	0.00
16° 10′																	
	16–81/E2				6.7		0.0	3.08					0.0		0.0	0.00	
	16–81/D2						0.0	0.00							0.0	0.00	
	16–81/C2						0.0	0.00							0.0	0.00	
	16–81/F2				7.0			7.00					0.0			0.00	
	16–82/A2				0.0	9.0		6.92					0.0	0.0		0.00	
	16–81/C1						0.0	0.00							0.0	0.00	
	16–81/D1						0.0	0.00							0.0	0.00	
	15–81/B6						0.0	0.00							0.0	0.00	
	15–81/C6						0.0	0.00	3.46						0.0	0.00	0.00
16° 40′																	
	16–82/C5	8.5			10.0	5.4	2.2	5.79		0.0			0.0	0.02	0.2	0.06	
	16–82/C4	0.0			6.7	7.5	1.2	4.23		0.0			0.0	0.1	0.3	0.17	
	16–82/A3				2.9			2.86					0.0			0.00	
	16–82/B3				3.8	3.8	2.5	3.64	4.71				0.0	0.0	0.0	0.00	0.08
17° 10′																	
	16–82/C6	12.5		13.3	3.1	4.1	26.3	10.86		0.0		0.0	0.0	0.0	0.8	0.15	
	16–82/D6					5.7	0.0	2.85						0.0	0.0	0.00	
	16–82/E6						2.5	2.50							0.0	0.00	
	17–82/C1			5.0			2.5	4.17				0.0			0.0	0.00	
	17–82/D1			12.7		6.5	1.6	7.53				0.0		0.0	0.0	0.00	
	17–82/E1			5.0			0.0	2.67				0.0			0.0	0.00	
	17–82/D2		0.0	2.9	2.7	5.6	2.2	3.26			2.5	0.0	0.0	0.0	0.0	0.47	
	17–82/E2		3.8	5.0	7.8	3.6	1.1	4.37			0.3	0.0	0.0	0.0	0.0	0.07	
	17–82/F2				16.7		2.3	7.51	5.45				0.0		0.0	0.00	0.13
17° 40′																	
	17–82/F3			14.0	7.5	4.8	2.3	8.37				0.1	0.0	0.0	0.0	0.02	
	17–83/A3		22.9	6.6	6.9	8.1	1.5	6.30			0.1	2.0	1.4	0.03	0.7	1.29	
	17–83/B3		82.9	5.7		14.4	26.7	48.30			0.0	0.7		0.0	0.0	0.11	
	17–83/C3	0.0				13.3		8.00		2.0				0.0		0.80	
	17–83/B4	3.1	5.3	1.7	4.7	4.6	3.2	3.67		0.4	2.8	2.5	1.8	0.5	0.8	1.64	
	17–83/A4		6.3	11.6	2.7			7.41			5.7	3.6	0.6			4.04	
	17–83/C4	9.2	20.4	13.1	5.8	6.4	26.3	14.9		0.0	0.5	0.6	1.3	0.3	0.3	0.61	
	17–83/C5	3.5	21.7	21.7	13.0	13.8	3.4	13.97		0.5	10.5	0.3	1.0	0.7	0.03	0.58	
	17–83/D5	9.6	14.2		7.7	34.8	0.5	14.22		0.9	0.0		0.2	0.1	0.0	0.52	
	17–83/E5						61.1	61.07	11.00						0.0	0.00	1.00
18° 10′																	
	17–83/D6	3.5	24.0	75.8	11.5	18.5	18.0	27.45		0.9	0.04	2.6	0.6	0.1	0.2	1.02	
	17–83/C6		0.0					0.00			0.00					0.00	
	17–83/E6		13.3	3.0	12.2	20.2	1.7	8.30			0.0	0.2	0.1	0.2	0.1	0.10	
	17–83/F6			5.7	6.7	73.0	0.0	11.27				0.0	0.0	0.0	0.0	0.00	
	18–83/E1		5.8	3.0	3.2	12.9	7.9	5.38			0.4	0.04	4.1	0.0	0.0	0.53	
	18–83/F1		18.6	13.6	16.3	23.9	5.6	14.82			0.8	0.06	0.0	0.1	0.03	0.08	
	18–84/A1		40.7	5.7	5.5	59.2	16.9	27.14			0.1	0.2	0.0	0.01	0.1	0.09	
	18–84/A2		88.8	7.4	38.4	33.8	7.6	22.64			0.1	0.02	0.0	0.2	0.0	0.04	
	18–84/B2		5.0	3.1	19.4	116.4	11.1	36.16			0.0	0.0	0.0	0.1	0.04	0.04	
	18–84/C2						24.0	24.04	19.81						0.0	0.00	0.23
18° 40′																	
	18–84/B3		4.6	3.2	6.9		6.2	5.04			0.0	0.0	0.0		0.0	0.00	
	18–84/C3						1.3	1.29							0.0	0.00	
	18–84/C4		8.8	1.9	11.4		6.7	5.93			0.0	0.0	0.0		0.0	0.00	
	18–84/D4				34.3			34.29					0.0			0.00	
	18–84/D5			133.3	10.0			58.26	11.86			3.1	0.0			1.22	0.14
19° 10′																	
	18–84/E6			0.0	12.3			7.62	7.62			0.0	0.0			0.0	0.00
All Latds./Areas		4.1	19.4	12.4	12.1	17.8	8.9	13.39	13.39	0.5	1.0	1.1	0.8	0.3	0.2	0.70	0.70

Table III B Continued

Latitude	Areas	MISCELLANEOUS FISH—SMALL 1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	MISCELLANEOUS FISH—BIG 1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15°40′																	
	15–80/E4						111.1	111.11							13.3	13.33	
	15–81/A5						114.3	114.28	112.50						6.9	6.86	10.50
16°10′																	
	16–81/E2				33.3		14.3	23.08					30.0		14.3	21.54	
	16–81/D2						57.1	57.14							5.7	5.71	
	16–81/C2						114.3	114.29							45.7	45.71	
	16–81/F2				38.0			38.00					23.4			23.40	
	16–82/A2				13.3	50.0		46.15					40.0	48.0		46.15	
	16–81/C1						88.9	88.89							58.7	58.67	
	16–81/D1						14.3	14.28							71.4	71.43	
	15–81/B6						100.0	100.00							6.5	6.50	
	15–81/C6						114.3	114.29	57.31						28.6	28.57	34.50
16°40′																	
	16–82/C5	19.4			50.0	40.8	26.8	34.94		3.0			42.3	25.4	3.5	18.52	
	16–82/C4	0.0			53.3	117.2	32.9	71.37		0.0			68.0	42.5	3.1	22.93	
	16–82/A3				5.7			5.71					26.9			26.86	
	16–82/B3				30.5	32.8	20.0	30.48	45.97				32.6	15.9	8.0	20.24	20.62
17°10′																	
	16–82/C6	30.0		47.2	169.2	31.7	15.0	53.19		6.0		2.9	10.8	11.5	1.9	7.33	
	16–82/D6					8.6	114.3	61.43						9.7	0.0	4.86	
	16–82/E6						25.0	25.00							6.0	6.00	
	17–82/C1			10.5			15.5	12.17				0.5			1.5	0.83	
	17–82/D1			54.0		22.7	16.1	31.84				9.2		6.3	1.2	6.18	
	17–82/E1			16.0			0.0	8.53				1.0			0.6	0.80	
	17–82/D2		151.3	16.0	27.6	39.1	26.7	53.86			15.0	0.0	3.6	11.3	2.2	8.14	
	17–82/E2		84.1	18.0	20.6	34.9	25.6	38.91			27.8	1.0	6.6	22.9	4.1	14.51	
	17–82/F2				16.7		12.6	14.06	39.74				16.7		4.9	9.21	9.36
17°40′																	
	17–82/F3			93.5	35.5	36.8	14.9	51.79				1.8	8.5	8.3	1.4	5.21	
	17–83/A3		57.2	60.1	44.4	61.6	21.9	49.62			31.4	0.3	1.5	6.6	3.2	2.69	
	17–83/B3		40.5	59.0		68.8	31.4	48.16			1.5	1.3		10.1	0.2	3.10	
	17–83/C3	25.0				50.0		40.00		2.5				5.7		4.40	
	17–83/B4	33.6	24.8	30.9	26.3	46.3	32.6	33.01		2.6	3.6	0.7	3.7	2.9	0.7	2.38	
	17–83/A4		29.0	80.0	15.3			43.42			10.2	1.7	1.4			5.71	
	17–83/C4	24.0	42.9	34.6	28.8	37.3	26.8	37.17		0.0	7.1	1.0	1.5	3.7	1.4	4.15	
	17–83/C5	45.3	54.5	49.0	41.3	28.5	28.1	45.61		1.7	4.8	0.9	3.6	2.8	1.1	2.98	
	17–83/D5	56.8	21.2		44.1	28.7	10.0	44.52		4.5	15.5		2.7	3.2	1.5	4.84	
	17–83/E5						45.3	45.33	39.65						4.0	4.00	3.19
18°10′																	
	17–83/D6	94.1	51.4	36.0	61.0	42.1	200.9	61.23		2.3	6.6	3.7	5.7	16.0	3.1	6.20	
	17–83/C6		65.2					65.19			6.3					6.33	
	17–83/E6		157.1	62.2	73.5	85.3	63.1	76.21			18.8	5.2	7.7	10.2	4.4	7.49	
	17–83/F6			50.3	108.0	37.0	0.0	34.79				7.4	54.0	12.0	0.0	12.85	
	18–83/E1		60.7	86.7	134.8	64.6	88.9	83.52			20.2	7.5	9.0	13.4	12.2	12.50	
	18–83/F1		121.7	117.6	73.5	124.1	103.1	104.84			17.0	12.8	13.1	25.5	10.6	15.02	
	18–84/A1		133.3	100.3	45.8	105.0	101.3	95.44			16.0	18.3	11.9	37.4	22.1	24.01	
	18–84/A2		61.2	113.9	138.7	205.8	157.8	149.00			25.0	10.0	22.0	52.6	11.2	21.45	
	18–84/B2		61.5	47.0	119.5	90.6	95.2	90.58			36.5	8.9	8.6	34.4	10.3	16.13	
	18–84/C2						50.5	50.48	101.52						12.0	12.02	15.07
18°40′																	
	18–84/B3		20.0	28.9	28.8		129.2	43.55			22.5	4.5	9.8		7.7	9.53	
	18–84/C3						59.4	59.35							3.8	3.75	
	18–84/C4		17.5	52.5	22.9		101.7	49.45			20.5	32.5	24.0		3.0	22.07	
	18–84/D4				342.9			342.86					11.4			11.43	
	18–84/D5			145.3	31.4			76.00	61.92			6.2	26.0			18.26	13.34
19°10′																	
	18–84/E6			15.0	55.4			40.00	40.00			5.5	21.5			15.43	15.43
All Latds./Areas		46.1	49.1	58.6	55.0	66.7	80.8	59.08	59.08	2.2	7.3	4.4	7.5	14.3	8.2	7.62	7.62

Table III B Continued

Latitude	Areas	ALL FISH 1973	1974	1975	1976	1977	1978	All years Area	All years Lat.	EFFORT 1973	1974	1975	1976	1977	1978	All years Area	All years Lat.
15°40′																	
	15-80/E4						171.0	171.11							2.25	2.25	
	15-81/A5						152.6	152.57	163.00						1.75	1.75	4.00
16°10′																	
	16-81/E2				83.3		28.6	53.85					1.50		1.75	3.25	
	16-81/D2						62.8	62.85							1.75	1.75	
	16-81/C2						174.3	174.29							1.75	1.75	
	16-81/F2				77.4			77.40					5.00			5.00	
	16-82/A2				76.6	140.0		125.38					1.50	5.00		6.50	
	16-81/C1						158.7	158.67							2.25	2.25	
	16-81/D1						100.00	100.00							1.75	1.75	
	15-81/B6						119.0	119.00							2.00	2.00	
	15-81/C6						142.9	142.86	108.19						1.75	1.75	26.00
16°40′																	
	16-82/C5	35.3			112.3	108.6	48.0	83.26		5.67			3.00	16.00	6.25	30.92	
	16-82/C4	0.0			168.0	264.4	51.7	151.25		0.50			0.75	12.00	13.00	26.25	
	16-82/A3				35.5			35.43					1.75			1.75	
	16-82/B3				72.6	75.5	34.0	69.51	102.81				5.25	9.25	2.00	16.50	75.42
17°10′																	
	16-82/C6	63.5		73.0	189.2	52.7	45.4	78.00		2.00		3.75	3.25	7.25	4.00	20.25	
	16-82/D5					44.8	114.3	79.14						1.75	1.75	3.50	
	16-82/E6						83.5	83.50							2.00	2.00	
	17-82/C1			24.5			19.5	22.83				2.00			1.00	3.00	
	17-82/D1			88.6		44.3	18.9	53.77				7.50		10.00	4.75	22.25	
	17-82/E1			29.5			6.3	18.67				2.00			1.75	3.75	
	17-82/D2		175.0	30.3	41.2	75.4	35.5	77.35			4.00	1.75	5.50	8.00	2.25	21.50	
	17-82/E2		128.0	30.0	39.9	69.2	31.9	64.28			9.25	2.00	11.75	10.75	8.83	42.58	
	17-82/F2				62.8		30.3	42.06	63.79				3.00		5.25	8.25	127.08
17°40′																	
	17-82/F3			118.9	57.3	51.5	19.9	70.92				10.75	11.00	6.25	4.75	32.75	
	17-83/A3		142.4	70.9	57.0	79.0	29.1	62.69			1.75	38.50	24.25	15.25	17.00	96.75	
	17-83/B3		127.9	71.7		196.3	58.7	102.61			18.50	6.00		8.00	5.25	37.75	
	17-83/C3	44.5				70.0		59.80		2.00				3.00		5.00	
	17-83/B4	44.9	40.6	36.8	39.2	58.1	39.9	43.66		101.50	137.92	252.50	159.50	201.66	45.75	898.83	
	17-83/A4		56.2	101.1	21.3			64.56			21.50	15.00	8.50			45.00	
	17-83/C4	35.6	78.4	50.9	39.1	49.8	57.0	61.13		2.50	282.84	132.67	97.50	100.41	43.00	658.92	
	17-83/C5	57.7	88.4	73.3	63.2	48.6	32.8	68.33		235.09	269.34	105.42	161.91	89.40	23.75	884.91	
	17-83/D5	82.7	60.8		55.3	70.2	12.0	71.16		41.67	7.75		16.75	16.08	2.00	84.25	
	17 83/E5						112.1	112.07	58.98						7.50	7.50	2751.66
18°10′																	
	17-83/D6	104.7	82.6	119.5	87.9	87.0	237.6	102.59		27.25	6.50	45.67	75.75	30.00	6.50	191.67	
	17-83/C6		109.5					109.49			1.58					1.58	
	17-83/E6		190.2	76.9	98.3	129.3	73.2	97.71			12.75	45.50	54.25	14.25	29.25	156.00	
	17-83/F6			72.0	177.3	135.0	16.3	71.75				1.75	1.50	1.00	4.00	8.25	
	18-83/E1		90.1	139.6	160.9	110.6	121.3	122.61			16.50	21.50	6.00	3.50	12.75	60.25	
	18-83/F1		167.4	166.2	115.1	194.1	130.7	151.18			22.00	120.50	102.75	75.25	83.50	404.00	
	18-84/A1		193.4	131.4	73.4	233.0	154.9	163.52			7.50	21.25	19.50	36.66	38.75	123.66	
	18-84/A2		180.4	145.5	209.0	316.2	193.7	208.57			9.75	62.17	74.00	52.00	95.42	293.34	
	18-84/B2		105.5	74.3	152.8	261.5	143.8	163.05			2.00	12.75	14.25	22.66	43.75	95.41	
	18-84/C2						149.0	149.04	150.27						2.08	2.08	1336.24
18°40′																	
	18-84/B3		51.7	52.2	53.3		169.3	71.26			3.25	7.50	6.25		3.25	20.25	
	18-84/C3						80.1	80.13							7.75	7.75	
	18-84/C4		50.5	101.0	58.3		129.7	87.86			4.00	5.75	1.75		3.00	14.50	
	18-84/D4				394.3			394.29					1.75			1.75	
	18-84/D5			323.5	73.1			171.13	100.24			2.25	3.50			5.75	50.00
19°10′																	
	18-84/E6			29.5	93.8			69.33	69.33			2.00	3.25			5.25	5.25
All Latds./Areas		59.6	83.3	83.5	81.6	110.8	109.4	88.77	88.77	418.18	838.68	928.43	886.16	755.37	548.83	4375.65	4375.65

Table IV A: *Depth wise annual catch rate (kg/hr) in respect of major categories of fishes as obtained from the exploratory surveys of M. V. Meena Shodhak during the years from 1972 to 1978 (Base: Visakhapatnam).*

Depth range	1972	1973	1974	1975	1976	1977	1978	All years	Months of abundance
SHARKS & SKATES									
10–20					0.0	16.3		8.50	—
–30	3.0	1.0	0.0	0.2	1.3	2.3	3.4	1.29	1, 3 & 4.
–40	5.0	2.4	1.9	1.1	3.7	3.7	1.7	2.79	1 & 3.
–50	4.0	2.1	2.6	0.7	4.8	2.6	0.4	2.27	3, 6, 8 & 9.
–60	5.1	3.9	2.0	2.0	8.2	1.5	0.5	2.83	5 & 7.
–70	0.0	0.0	2.4	1.9	0.0	5.2	2.2	1.93	1 & 7.
80									
–90							3.3	3.00	
Total	4.5	2.4	2.2	0.9	4.0	3.2	1.1	2.45	
RAYS									
10–20					0.0	7.2		5.91	—
–30	15.7	10.5	0.0	1.5	2.5	4.0	13.4	4.56	3, 4 & 8.
–40	10.4	7.8	4.0	3.8	3.0	10.7	6.2	5.86	1, 3, 10 & 12.
–50	6.0	4.3	3.7	2.4	6.1	8.5	2.2	4.24	1, 3, 4 & 9.
–60	6.4	13.8	5.2	3.3	1.3	2.4	3.0	5.79	1, 3, 8 & 12.
–70	0.0	76.2	0.8	5.0	2.2	0.0	7.1	10.55	8.
–80									
–90							25.0	25.00	
Total	8.5	7.5	4.1	2.7	4.1	8.5	4.5	5.08	
CATFISH									
10–20					0.0	1.1		0.89	—
–30	9.0	0.1	4.3	0.8	2.5	2.7	10.1	2.66	3 & 5.
–40	19.4	13.6	55.5	9.6	9.8	19.3	7.8	16.46	11 & 12.
–50	13.2	10.4	6.9	10.5	11.3	11.4	4.1	9.31	5, 6 & 9.
–60	28.1	10.5	13.9	8.3	8.2	15.7	5.8	12.80	1, 5, 10 & 11
–70	10.0	8.1	69.7	4.1	5.6	24.6	3.1	35.41	3.
–80									
–90							12.5	12.50	—
Total	17.3	10.3	20.5	8.5	9.4	14.4	6.1	11.82	—
PRAWNS									
10–20					1.8	2.0		2.01	—
–30	1.0	1.5	0.0	3.2	1.5	0.8	0.0	1.92	7.
–40	3.1	0.4	0.8	1.6	1.0	0.09	0.2	0.95	3, 6 & 8.
–50	5.3	0.8	0.6	2.6	0.4	0.01	0.4	1.28	6 & 9.
–60	1.7	0.4	0.2	2.5	0.2	0.0	0.1	0.82	10.
–70	10.5	0.5	0.4	0.1	0.2	0.0	0.0	0.53	3 & 8.
–80									
–90									—
Total	3.6	0.7	0.5	2.5	0.8	0.2	0.3	1.16	—
MISCELLANEOUS FISH—SMALL									
10–20					9.3	32.1		28.13	—
–30	91.3	85.5	17.9	38.6	30.5	30.7	59.2	44.89	3, 6 & 9.
–40	92.6	90.5	52.9	43.5	44.1	85.3	52.6	59.13	3, 5, 8 & 11.
–50	67.8	56.8	48.4	39.2	33.2	52.3	35.8	45.31	4, 6 & 10.
–60	37.0	68.1	42.1	42.5	42.7	97.5	31.5	47.63	1,3,9, 10 & 12.
–70	25.0	50.9	76.1	86.7	4.4	112.3	87.6	69.23	3, 7, 8 & 12.
–80									
–90							81.3	81.25	—
Total	74.4	64.5	48.0	41.1	38.0	67.7	44.3	50.28	—
MISCELLANEOUS FISH—BIG									
10–20					0.0	1.4		1.17	—
–30	4.7	0.8	6.8	0.7	1.2	2.4	14.7	2.14	2, 3 & 5.
–40	6.3	4.8	4.1	0.8	5.6	32.2	4.6	8.35	3, 5, 11 & 12
–50	4.1	3.3	6.4	3.0	6.6	10.6	2.2	4.80	2,3 & 12.
–60	5.3	4.1	7.5	2.8	1.4	9.2	3.9	5.37	3 & 5.
–70	3.0	15.2	8.4	8.1	1.8	20.6	8.9	9.27	1,6,8 & 12.
–80									
–90							20.2	20.20	—
Total	5.2	3.7	6.4	2.2	5.3	19.0	3.7	5.86	—
ALL FISH									
10–20					11.1	54.1		46.61	—
–30	124.7	99.4	29.1	45.0	39.5	50.9	100.8	57.46	3, 6 & 8.
–40	136.8	119.5	119.2	60.4	67.2	151.2	73.1	93.54	5, 8 & 11.
–50	100.4	77.7	68.6	58.4	62.4	85.4	45.1	67.21	2, 6, 9 & 12.
–60	83.6	100.8	70.9	61.4	62.0	126.3	44.8	75.24	1, 5 & 11.
–70	48.5	150.9	157.9	105.9	14.2	162.7	108.9	127.62	7, 8 & 12.
–80									
–90							142.0	141.95	—
Total	113.4	89.1	81.7	57.9	61.6	112.6	60.0	76.66	—
EFFORT									
10–20					2.17	10.18		12.35	
–30	26.00	22.49	1.17	114.63	89.88	47.07	15.67	316.91	
–40	120.83	62.07	135.54	182.25	356.61	185.42	272.83	1315.55	
–50	128.27	301.08	316.04	372.60	289.70	153.28	274.13	1835.10	
–60	46.92	84.91	214.90	109.05	32.84	22.49	27.70	538.81	
–70	1.00	4.92	19.25	8.26	4.50	3.25	2.25	43.43	
–80									
–90							2.00	2.00	
Total	323.02	475.47	686.90	786.79	775.70	421.69	594.58	4064.15	

Table IV B: *Depth-wise annual catch rate (kg/hr) in respect of major categories of fishes as obtained from the exploratory surveys of M. V. Meena Jawhar during the years from 1973 to 1978 (Base: Visakhapatnam).*

Depth range	1973	1974	1975	1976	1977	1978	All years	Months of abundance
SHARKS & SKATES								
10–20		2.0		0.7	7.0	0.0	2.35	1.
–30	1.7	6.5	1.1	1.2	2.4	8.1	2.87	1 & 2.
–40	2.1	3.5	4.5	2.5	3.8	3.0	3.33	2 & 4.
–50	2.5	5.0	0.9	1.1	2.9	1.8	2.66	2 & 7.
–60	5.7	2.3	2.5	0.7	1.0	0.8	2.11	7 & 10
–70		2.7	0.0		39.4	0.0	14.70	6.
–80					1.8		1.82	1.
–90						0.0	0.00	
Total	2.6	4.1	2.6	1.9	3.4	3.2	2.94	
RAYS								
10–20		2.0	6.0	7.8	6.8	0.0	6.58	3 & 6.
–30	5.0	3.8	4.0	5.5	9.4	12.6	7.26	2 to 4.
–40	3.1	1.2	6.3	3.9	7.6	7.8	5.34	3 to 6
–50	4.7	2.8	2.7	2.5	6.6	7.2	4.12	1 & 3.
–60	1.6	2.3	0.9	4.9	7.3	5.9	3.26	1.
–70		0.2	0.0		66.5	0.0	23.57	6.
–80					36.4		36.36	1.
–90						0.0	0.00	
Total	4.1	2.4	4.4	4.0	8.3	8.1	5.03	
CAT FISH								
10–20		4.0	0.0	4.2	1.7	1.5	3.15	1, 4 & 12.
–30	0.0	11.5	10.0	24.5	10.2	5.8	12.96	2 & 4.
–40	1.2	22.7	13.9	11.3	14.0	5.1	12.01	5 & 7.
–50	4.6	13.2	11.1	6.9	29.3	13.9	13.06	2, 5 to 9.
–60	13.2	30.6	15.1	7.3	10.8	3.1	20.33	4, 9 & 10.
–70		20.9	0.0		8.1	100.9	30.30	3.
–80					7.3		7.27	1.
–90						0.0	0.00	
Total	4.1	19.4	12.4	12.1	17.8	8.9	13.39	
PRAWNS								
10–20		3.8	0.0	1.4	0.7	0.3	1.25	3.
–30	0.4	0.4	2.1	0.3	0.4	0.0	0.75	4 & 8.
–40	0.3	1.6	0.9	1.0	0.2	0.3	0.76	4 & 6.
–50	0.6	1.2	1.0	0.5	0.3	0.1	0.74	4 & 5.
–60	0.0	0.2	1.2	0.1	0.3	0.01	0.32	10.
–70		0.1	0.0		0.0	0.0	0.00	
–80					0.0		0.00	
–90						0.0	0.00	
Total	0.5	1.0	1.1	0.8	0.3	0.2	0.71	
MISCELLANEOUS FISH—SMALL								
10–20		42.0	132.3	47.4	21.2	14.0	42.37	1 & 12.
–30	35.2	48.3	64.2	51.1	97.2	141.8	81.48	2, 4 & 11.
–40	61.6	74.9	72.8	65.7	65.7	90.9	71.08	1, 2, 7 & 10.
–50	38.6	42.5	41.1	36.6	54.3	59.5	44.59	2, 3 & 7.
–60	64.7	45.6	38.0	27.4	49.8	23.5	42.35	1, 2 & 10.
–70		54.4	12.5		79.4	71.1	62.70	1, 7 & 12.
–80					25.5		25.46	1.
–90						114.3	114.29	
Total	46.1	49.1	58.6	55.0	66.7	80.8	59.08	
MISCELLANEOUS FISH—BIG								
10–20		6.0	4.2	4.7	3.2	3.0	4.26	1 & 12.
–30	0.0	14.4	3.2	8.5	15.8	9.3	9.42	4.
–40	2.2	10.7	6.0	9.1	15.1	9.4	9.05	2, 4, 10 & 12.
–50	2.4	4.8	2.2	4.9	13.0	8.1	5.52	2, 3 & 12.
–60	1.0	9.3	7.2	5.6	9.5	3.5	7.62	1 to 3.
–70		11.9	0.0		33.0	5.8	17.02	1.
–80					41.8		41.82	1.
–90						0.0	0.00	
Total	2.2	7.3	4.4	7.8	14.3	8.2	7.62	
ALL FISH								
10–20		59.8	142.5	66.2	40.6	18.8	59.96	1 & 12
–30	42.3	84.9	84.6	91.1	135.4	177.6	114.74	2 & 4.
–40	70.5	114.6	104.4	93.5	106.4	116.5	101.57	1 to 3, 7 & 12.
–50	53.4	69.5	59.0	52.5	106.4	90.6	70.69	2 to 5 & 7.
–60	86.2	90.3	64.9	46.0	78.7	36.8	75.99	1 to 3 & 10.
–70		90.3	12.5		227.4	177.8	148.34	6, 7 & 12.
–80					112.8		112.73	
–90						114.3	114.29	
Total	59.6	83.3	83.5	81.6	110.8	109.4	88.77	
EFFORT								
10–20		2.50	1.67	20.00	9.08	2.00	35.25	
–30	9.00	22.58	140.25	143.25	154.34	91.50	560.92	
–40	109.12	142.76	413.75	489.25	281.72	197.25	1633.85	
–50	274.56	440.85	309.17	210.91	247.23	194.83	1677.55	
–60	25.50	221.49	61.59	22.75	52.25	57.00	440.58	
–70		8.50	2.00		8.00	4.50	23.00	
–80					2.75		2.75	
–90						1.75	1.75	
Total	418.18	838.68	928.43	886.16	755.37	548.83	4375.65	

Table V: *Species composition in terms of percentages with respect to major categories of fishes.*

Categories/Species	Name of the Vessel *M. V. Meena Jawhar (M. J.)* 1973–78	%	*M. V. Meena Shodhak (M. S.)* 1972–78	%	M. J. + M. S. 1972–78	%	Rank
1	2	3	4	5	6	7	8
SHARKS & SKATES	12873.0	3.3	9959.0	3.2	22832.0	3.3	V
RAYS	22016.5	5.7	20646.5	6.6	42663.0	6.1	IV
CAT FISH	58580.0	15.0	48056.0	15.4	106636.0	15.2	III
Tachysurus tenuispinis	27600.5	7.1	25763.9	8.3	53364.4	7.6	1
Tachysurus thalassinus	30971.0	7.9	22292.1	7.1	52263.1	7.6	2
Other Cat fish	8.5	0.002	—		8.5	0.001	3
PRAWNS	3081.9	0.8	4698.8	1.5	7780.7	1.1	VI
Metapenaeus monoceros	1974.21	0.5	2565.34	0.8	4539.55	0.6	1
Penaeus indicus	343.29	0.1	1284.55	0.4	1627.84	0.2	2
Penaeus monodon	399.50	0.1	720.35	0.2	1119.85	0.2	3
Other Prawns	364.90	0.1	128.56	0.1	493.46	0.1	4
MISCELLANEOUS FISH SMALL	258508.85	66.6	204365.2	65.6	462874.05	66.1	I
Leiognathus spp.	31959.3	8.2	29818.8	9.6	61778.1	8.8	1
Upeneus spp.	28819.4	7.4	25998.9	8.3	54818.3	7.8	2
Other sciaenids	21580.2	5.6	22627.6	7.3	44207.8	6.3	3
Johnius aneus	26670.5	6.9	13177.8	4.2	39848.3	5.7	4
Nemipterus japonicus	21275.4	5.5	16459.6	5.3	37735.0	5.4	5
Trichiurus spp.	18441.4	4.7	16564.6	5.3	35006.0	5.0	6
Pomadasys hasta	21044.9	5.4	6445.7	2.1	27490.6	3.9	7
Saurida tumbil	12532.1	3.2	13471.0	4.3	26003.1	3.7	8
Johnius carutta	9617.8	2.5	7254.0	2.3	16871.8	2.4	9
Caranx malabaricus	9335.5	2.4	7489.5	2.4	16825.0	2.4	10
Cynoglossus spp.	6228.2	1.6	6941.9	2.2	13170.1	1.9	11
Psenus indicus	8077.1	2.1	3746.0	1.2	11823.7	1.7	12
Lactarius lactarius	7729.0	2.0	3738.8	1.2	11467.8	1.6	13
Squids & cuttle fish	4333.85	1.1	2885.2	0.9	7219.05	1.0	14
Polynemus spp.	1789.1	0.5	2093.2	0.7	3882.3	0.6	15
Other clupeoids	1385.9	0.4	1670.4	0.5	3056.3	0.4	16
Other carangids	1271.4	0.3	1292.2	0.4	2563.6	0.4	17
Ilisha filigera	1251.0	0.3	776.9	0.3	2027.9	0.3	18
Decapterus russelii	1113.0	0.3	728.8	0.2	1841.8	0.3	19
Crabs	338.3	0.1	781.25	0.3	1119.55	0.2	20
Drepane punctata	403.2	0.1	389.0	0.1	792.2	0.1	21
Ephippus orbis	311.6	0.1	158.2	0.1	469.8	0.1	22
Lobsters	25.3	0.01	44.35	0.01	69.65	0.01	23
Selar spp.	57.0	0.01	—		57.0	0.01	24
Others	22918.4	5.9	19810.9	6.4	42729.3	6.1	25
MISCELLANEOUS FISH BIG	33345.2	8.6	23819.4	7.7	57164.6	8.2	II
Pomadasys hasta	11225.8	2.9	4459.8	1.4	15685.6	2.2	1
Stromateus niger	1625.5	0.4	3126.5	1.0	4752.0	0.7	2
Muraenesox spp.	2805.6	0.7	1452.6	0.5	4258.2	0.6	3
Other sciaenids	1979.1	0.5	1070.2	0.3	3049.3	0.4	4
Lutjanus spp.	1096.8	0.3	1651.3	0.5	2748.1	0.4	5
Other carangids	1448.2	0.4	814.55	0.3	2262.75	0.3	6
Stromateus argenteus	1694.7	0.4	455.5	0.2	2150.2	0.3	7
Scomberomorus spp.	1026.3	0.3	695.8	0.2	1722.1	0.2	8
Squids & cuttle fish	365.2	0.1	1346.2	0.4	1711.4	0.2	9
Drepane punctata	1004.7	0.2	448.8	0.1	1453.5	0.2	10
Psettodes erumei	336.7	0.1	497.95	0.2	834.65	0.2	11
Leiognathus equulus	445.2	0.1	263.2	0.1	708.4	0.1	12
Serranus spp.	108.0	0.03	499.9	0.2	607.9	0.1	13
Chirocentrus dorab	176.3	0.1	234.1	0.1	410.4	0.1	14
Lactarius lactarius	216.0	0.1	162.8	0.1	378.8	0.1	15
Polynemus spp.	222.5	0.1	34.9	0.01	257.4	0.1	16
Argyrops sp.	59.2	0.02	69.2	0.02	128.4	0.02	17
Others	7509.4	1.9	6536.1	2.1	14045.5	2.0	18
ALL FISH	388405.45		311544.90		699950.35		
EFFORT	4375.65		4064.15		8439.80		

years occupy the third and fourth places respectively, with reference to catch rates.

A detailed analysis of the data would reveal that the richest areas for the major categories were as follows: Sharks and Skates: 18-84/D5; Rays:15-81/B6 and 16-82/E6; Catfish: 17-83/D5; Miscellaneous-small: 18-84/D4; Miscellaneous-big: 16-81/D1 and for all fish: 18-84/D4.

Table VI: *Latitude-wise estimated resources (in kg) in respect of the six major categories of fishes. Figures in brackets are potential yields in kg per sq. km.*

Categories	15°40′ off Nizam-patnam	16°10′ off Nar-sapur	16°40′ off Kaki-nada	17°10′ off Penta-goda	17°40′ off Visakha-patnam	18°10′ off Kalinga-patnam	18°40′ off Baruva	19°10′ off Gopal-pur	19°40′ off Puri	All latitudes
Sharks & Skates	Nil	36183 (16)	40930 (31)	26346 (9)	51928 (14)	149058 (38)	115248 (71)	11340 (17)	Nil	431033 (25)
Rays	256579 (262)	355556 (155)	235455 (180)	218128 (74)	80357 (22)	260773 (66)	204652 (125)	11973 (18)	Nil	1623473 (92)
Cat fish	8545 (9)	128857 (56)	64138 (49)	151194 (51)	311566 (87)	581358 (148)	178015 (109)	44781 (69)	Nil	1468454 (83)
Prawns	Nil	738 (1)	949 (1)	6883 (2)	28140 (8)	30381 (8)	3956 (2)	1793 (3)	1978 (6)	74818 (4)
Miscellaneous—small	791179 (807)	1112820 (487)	573869 (439)	957011 (326)	1209713 (337)	2781153 (710)	749906 (459)	230550 (353)	144759 (443)	8550960 (485)
Miscellaneous—big	117174 (120)	541272 (237)	275119 (211)	215280 (73)	95733 (27)	407932 (104)	187378 (115)	68094 (104)	17854 (55)	1925836 (109)
All fish	1173477 (1198)	2175426 (952)	1190460 (911)	1574842 (535)	1777437 (495)	4210655 (1074)	1439155 (881)	368531 (564)	164591 (504)	14074574 (798)

The contribution of prawns in general was insignificant in view of the fact that fish trawl and not shrimp trawl was employed most of the time during these explorations. None the less, from the available data it was seen that squares 18-84/D2, 18-84/C2 and 17-82/F2, bear potential resources for prawn exploitations.

4. The depth-wise distribution of the catch rates (Tables IV A & B) revealed the following features: Sharks and skates were abundant in the 60-70 m depth zone by *M. V. Meena Shodhak*, whereas the catches of *M. V. Meena Jawhar* showed a more or less uniform distribution through the vertical. Rays, catfish and miscellaneous-big abound the 60-70 m depth. Prawns were relatively more abundant in shallower depths-10-20 m. Miscellaneous-small favoured the medium depths of 20-30 and 30-40 m. For all categories together, the relatively deeper zone of 60-70 m appeared most favourable, especially during June-August and December in spite of the low effort deployed.

In 1978 for the first time the depth zone of 80-90 m was explored. Both the vessels obtained good catches of miscellaneous fish-small, whereas only *M. V. Meena Jawhar* netted good quantities of rays, sharks and skates, catfish and miscellaneous fish-big. Prawns were negligible in these depths.

Through the years 1972-78, the maximum effort by both the vessels was deployed in the depth zone 40-50 m followed by 30-40 m.

5. In the entire region explored, a potential yield of 0.8 t/sq km could be expected (Table VI). In the zone off Visakhapatnam (17° 40′) the potential yield was the lowest (0.5 t/ sq km). With this zone as the reference point, a progressive increase in the potential yield was observed in zones south of Visakhapatnam so that the highest yield was recorded in the southern most zone off Nizampatnam (15°40′: 1.2 t/ sq km). The yield (1.1 t/sq km) in the zone off Kalingapatnam (18°10′) immediately north of Visakhapatnam was also comparable with that of the 15°40′ zone. But in zones further north, although a progressive decrease in the yields was noticed, the yields were higher than that observed off Visakhapatnam (17° 40′). It is possible that the yields might have been higher than presently estimated, were the data generated by 200 and odd small mechanised trawlers operating off Visakhapatnam available. Such lacunae only emphasise the importance of and the need for systematic monitoring of data both from commercial and experimental operations in order to enable meaningful projections.

The analysis is based on the results of the Exploratory Fisheries Project survey vessels stationed at Visakhapatnam. The help and co-operation of the Exploratory Fisheries Project personnel are gratefully acknowledged.

ALL INDIA CENSUS OF MARINE FISHERMEN POPULATION AND AVAILABLE INFRASTRUCTURE FACILITIES

The Central Marine Fisheries Research Institute has been engaged in research on various aspects of marine fisheries since 1947. The results of the research investigations have significantly contributed to the development of marine fisheries. Also fishermen as well as fishing industry have been considerably benefited. The Institute has in the past carried out frame surveys of marine fishing villages along the coast of India. The data collected through census will be useful in planning and development of infrastructure facilities such as fishing harbours, ice plants, cold storages, boat building and repairing yards, diesel bunks etc and for providing civic and social needs such as drinking water, electricity, dispensaries, educational institutions and transport in the fishing villages.

The Institute proposes to undertake the next all India census of fishermen population and available infrastructure facilities during May-June 1980. The census will start on 19th May 1980 and will last for about a month. At household level, information on the educational and occupational status of fishermen, the number of crafts and gears possessed, type of ownership and other allied items will be collected. In addition, information on items such as ice plants, cold storages, boat building yards and transport and credit facilities available in the villages will also be collected. The field enumerators engaged by this Institute will be visiting the villages for the collection of census data during this period. The whole-hearted co-operation of all concerned is earnestly solicited in this venture.

NEWS—INDIA AND OVERSEAS

Madras yard constructs purse seiner for Sri Lanka

A small GRP hull purse seiner 34 ft (10.36 m) long has been constructed in a boat yard at Madras as part of the effort to boost the output of Sri Lanka's inshore fishing fleet. Main engine is an Ashok Leyland diesel which gives a speed of up to eight knots. It is reported to have cost about Rs. 3,50,000 made available as a loan from the Bank of Ceylon.

The boat will be used for catching pelagic fish with the help of light attraction. She may also be employed in prawn fishing or gill netting.

Cage for fish farming

One of the most striking exhibits at the French Fishery Exhibition in Nantes in June 1979 was a large REP cage for fish farming. REP marine specialises in submerged structures which can be positioned at a required depth to take advantage of the best temperatures, currents and other factors favourable to the species cultured.

Fabricated of glass reinforced plastic and aluminium with plastic mesh, the cage on show measured 10 m long and 5.1 m high and weighed 600 kg. It has a capacity of 150 cubic metres and can take upto 3000 kg of stock.

Fish Farming International 6 (3): Sept. 1979.

Centre for integrated farming of fish, livestock and crops in China.

An Asian regional aquaculture lead centre for integrated farming of fish, livestock and crops is being established at Wuxi near Shanghai in China as a co-operative enterprise of the Government of China and the FAO of the United Nations through the Aquaculture Development and Co-ordination programme. Work on construction of the Centre to be developed in stages had been commenced on a 25 acre site. The starting date is March 1980. The Chinese Government has allocated 7 million Yuan (about US $ 5 million) for the project. FAO will provide scientific advisers and other specialists, equipments and fellowships.

The idea behind the Centre is to promote the adoption of the traditional Chinese practice of integrated fish farming with ducks, pigs and vegetables or grain crops, a highly profitable system used by the Chinese through centuries. The centre will investigate the ways in which optimum levels of production

can be achieved in matters like the size of ponds, the stocks of fish, the number of birds and animals and the varieties of grains and vegetables used. It will be the training centre in Asia for such integrated farming and will disseminate information on the best ways and practices for adoption in the countries of the region.

Fish Farming International 6 (3): Sept. 1979.

Tuna tagging programme

The South Pacific Commission (SPC) Skipjack programme which began in September 1977 has surveyed skipjack resources in the waters of 18 countries and territories in the Central and Western Pacific. About 90,000 tagged fish had been released. Recaptures upto mid-July 1979 totalled 2,588, of which 140 had made international migrations.

The longest migration was 2,406 nautical miles between New Caledonia and the Trust Territory of the Pacific Islands. During its 438 days at large this fish travelled at a minimum rate of 5.5 miles a day and grew in a length from 49 to 64 cm.

Fishing News International 18 (9): Sept. 1979.

Two boats in one

In Cape Town, South Africa a combination purse seiner/stern trawler on which neither rig is a compromise and from which either gear can be shot at a moment's notice is taking shape. The boat will be permanently rigged for both purse seining and trawling, each with the full capabilities of a specialised single purpose seiner or trawler. No alterations to the fishing rig will be necessary before shooting either net, so that the skipper can select his gear while at sea.

The vessel, scheduled for delivery by the middle of this year, is 40 m long, 9 m broad and has a maximum draught aft of 4.9 m. Both trawl and purse seine gears are handled by hydraulically driven combination split winches mounted immediately aft of the forward superstructure.

Fishing News International 18 (9): Sept. 1979.

Turtle farming

The world's only turtle farm, producing turtles on a commercial scale is located in the Cayman Islands of Jamaica, south of Cuba. From this farmed turtle steak, a rare delicacy, is being exported to U.S.A.. U. K. and other places.

Fish Farming International 6 (3): Sept. 1979,

BOOKS

Turtles: Perspectives and research. Edited by Marion Harless and Henry Morlock. A Wiley Interscience Publication, John Wiley & Sons, New York: pp 695, 1978.

All aspects of turtle biology ranging from care and management of turtles to conservation requirements and techniques are brought together in this publication. In separate sections covering field and laboratory methods, vital functions and sensory processes, reproduction and embryology, behavioural aspects and population ecology, a vast range of information, some of which previously unpublished, on turtle evolution, zoogeography, biology and behaviour are included.

Techniques for housing, handling and treating turtles in research situations are explained in full; as are guidelines for management and conservation in natural habitats. In addition, central nervous system, sensory systems and behavioural and physiological data are summarised for easy reference. This presentation will be useful to wildlife biologists, herpetologists, comparative psychologists and physiologists, turtle hobbyists and medical and veterinary students and researchers.

Fishes of Hawaii. By S. W. Tinker. Hawaiian Service Inc., Honolulu, Hawaii, pp 532, 1978.

This book is intended to serve as a handbook of the marine fishes of Hawaiian Islands and the warm waters of the surrounding tropical, Central Pacific Ocean. It would be useful to fishermen, amateur naturalists and others interested in identifying their specimens and learning a little about them. A fairly complete presentation of the classification of fishes in the larger categories above the families except for the suborders is included. Family groups with representatives in the Hawaiian area are listed, including 172 families. The author has made it simple enough for beginners so that through it they may be able to move on to more complex materials. A brief glimpse of the history of ichthyology given in the introductory part would be useful to students to know the names of a few of the many great men who have studied the fishes of the world and helped to classify them.

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