

OBSERVATIONS ON TRAWL FISHING IN THE PALK BAY AND GULF OF MANNAR IN THE VICINITY OF MANDAPAM

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The fishing methods along the south-east coast of India with special reference to the Palk Bay and Gulf of Mannar in the vicinity of Mandapam include the operation of drift gill nets and bottom-set gill nets from plank-built boats, boat seines or bag nets from catamarans, shore seines, hooks and lines and traps, depending on the type of fish available at a particular locality. Operation of trawl nets from mechanised vessels in this area on a commercial scale is comparatively recent. Though a few small mechanised boats have been conducting trawling operations especially off Rameswaram for the past few years, no systematic survey of the fishing grounds has been carried out nor are the biological data for the commercially important fishes that could be caught in these nets available. During the course of their work on the biology of silver-bellies and prawns of this area, the authors had opportunity to make some general observations on the catches landed by the Indo-Norwegian Project medium boats and since such observations are lacking for this area till date, the information gathered during the year 1964 is given in this paper. Although quantitative data are also presented in this account to indicate the general trend, special attention has been paid to the qualitative analyses of the catches through an year since the chief aim of the paper is to provide information on the availability of various species of fish and prawns that could be commercially exploited.

HISTORICAL RESUME

The earliest trawling operations in Palk Bay were those of the vessel *Lady Havelock* in 1902 which caught considerable quantities of small fish, not typical of the bottom, and which showed that there is a considerable extent of ground suitable for trawling, containing abundant fish fauna (Herdman, 1903). These operations were followed by the trawling experiments conducted by S. S. *Violet* off the Coromandal coast (Hornell, 1916). The comments in this account regarding the availability of fish in the waters off Mandapam are very general and give no precise information regarding the qualitative composition of the catches. The trawling hauls were considered disappointing and the trawling master considered the bottom "too soft and without fish of any account—either none or very few". The difference, as explained by Hornell (1916), may partly be due to larger and heavier gear used by the vessel *Violet*. More recent observations are those of

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R. V. Varuna in January 1963 (Quarterly review, Jan.-Mar. 1963, Indo-Norwegian Project, Ernakulam) when a preliminary survey of the bottom and fishing potentialities in the Palk Bay and the Gulf of Mannar has been made. According to this survey, the bottom conditions in Palk Bay are favourable for bottom trawling and good catches have been obtained. The bottom in Gulf of Mannar showed considerable patches of rocks and corals with only limited area suitable for trawling operations. Very good catches of fish have been recorded in the Gulf of Mannar.

OBSERVATIONS

Area and seasons of operations:

The area of operation of the Indo-Norwegian Project boats in the Gulf of Mannar and Palk Bay extends from 79° 08' to 79° 23' longitude and 9° 06' to

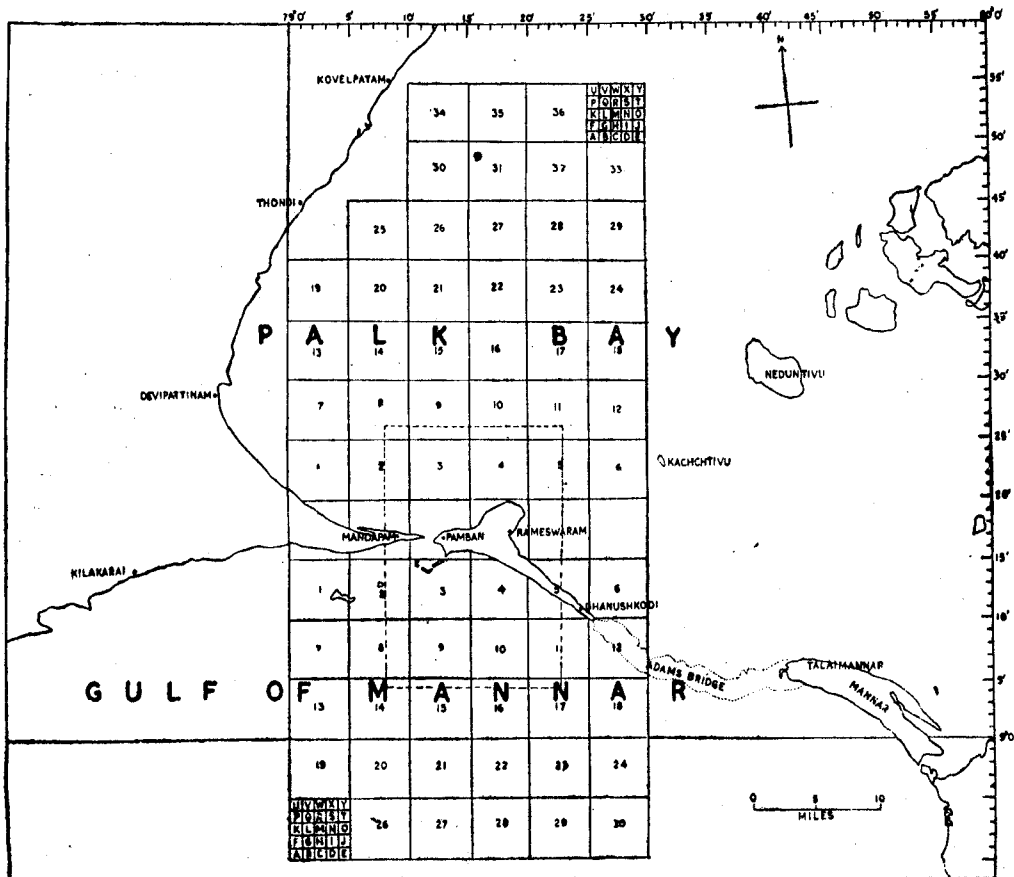


Fig. 1. Map showing area of operation of Indo-Norwegian Project boats in the Palk Bay and the Gulf of Mannar off Mandapam. The area covered during 1964 is marked within the present area by the dotted line.

9° 26' latitude, the season being November to March in the Gulf of Mannar and April to October in the Palk Bay. The areas of operation have since been extended.

Description of the boat and net:

The Indo-Norwegian Project medium boats are built of Norwegian soft wood with dimensions 35' 6" × 12' 0" × 5' 9" and draught of 5' 0". Each boat has a wheel house and is provided with a union semi-diesel engine 20 B.H.P. The vessel is fitted with mechanical winch, echo-sounder and wireless telephone. A fish hold with a capacity of 2½ tons is also provided. The vessel has a speed of 7 knots and trawling speed of 2.5 knots. For lack of space and limited load capacity the boats are put only on daily fishing trips between 6 a.m. and 4 p.m. For the same reasons the range of operation is also limited.

The other trawl used by these boats is in the form of an elongated bag consisting of (i) wings-29 ft. (3" mesh) (ii) belly-65 ft (2" mesh) and (iii) cod end—12 ft. (1½" mesh). The overall length of the net is 106 ft. The head rope measures 52 ft. and the foot rope 68 ft.

Quantitative Analysis :

The catch of each boat is grossly classified as (i) silver-bellies, (ii) prawns, (iii) rays, (iv) sharks, (v) cat fish and (vi) mixed fish.

The catches of the two vessels M2 and M3 have been first analysed separately for each smaller area and then combined for each larger area and quarterwise as the vessels and gear are similar in all respects. The total catch per hour of trawling and catch per hour of trawling of the six categories mentioned above area-wise and quarterwise are presented in Table I. As the smaller areas represented by alphabets in the map are 1 × 1 mile in area and the trawling speed of the vessel 2.5 knots per hour it is possible that during each haul more than one smaller square would have been covered. Therefore only catch data of larger areas represented by numbers in the figure are considered to give a fairly satisfactory picture of the relative fishery potentialities of the areas. The best records of catch (up to a maximum of three places) in the smaller areas are given month wise separately for the two boats (Table II). The details for Gulf of Mannar and Palk Bay have been kept separate for the conditions in the two regions are known to be different.

The catch rates obtained in the Palk Bay and Gulf of Mannar are compared with the catch rates from productive areas (elsewhere) on the East coast and those

TABLE I

Trawl fishing in the Palk Bay and Gulf of Mannar during the year 1964. Total catch and catch-per-unit of effort (in parentheses) area-wise and quarterwise

Area	Nature of Bottom	Depth (fathoms)	Fishing effort (hours)	Silverbellies (Kg.)	Prawns (Kg.)	Rays (Kg.)	Sharks (Kg.)	Catfish (Kg.)	Mixed fish (Kg.)	Total (Kg.)
<i>REGION—PALK BAY</i>		<i>I Quarter (March only)</i>								
8	Mud	6	1.00	300 (300.00)	..	..	..	..	4 (4.00)	304 (304.00)
2	"	6	6.00	860 (143.33)	..	30 (5.00)	..	..	42 (7.00)	932 (150.33)
<i>REGION—PALK BAY</i>		<i>II Quarter (April, May and June)</i>								
2	Mud	6	206.88	30019 (145.10)	58 (0.28)	1692 (8.17)	..	..	950 (4.59)	32719 (158.15)
3	"	6	71.25	12202 (171.25)	23 (0.32)	37 (5.20)	..	..	535 (7.50)	13131 (184.29)
4	"	6	23.50	2400 (102.12)	3 (0.12)	85 (3.61)	..	..	61 (2.59)	2549 (108.46)
5	"	6	4.50	170 (37.77)	2 (0.44)	60 (13.33)	..	..	38 (8.44)	270 (60.00)
8	"	6	41.82	9240 (220.94)	..	223 (5.33)	..	..	181.5 (4.34)	11907.5 (284.73)
9	"	6	9.83	980 (99.69)	3 (0.30)	53 (5.39)	..	..	49 (4.98)	1085 (110.37)
11	"	6	2.00	150 (75.00)	..	60 (30.00)	..	..	10 (5.00)	220 (110.00)

TABLE I (Contd)

Area	Nature of Bottom	Depth (fathoms)	Fishing effort (hours)	Silverbellies (Kg.)	Prawns (Kg.)	Rays (Kg.)	Sharks (Kg.)	Catfish (Kg.)	Mixed fish (Kg.)	Total (Kg.)
<i>REGION—PALK BAY</i>			<i>III Quarter (July, August and September)</i>							
2	Mud	6	181.38	410.84 (226.50)	..	1201 (6.62)	..	15 (0.82)	447 (2.46)	42747 (235.67)
3	..	6	95.49	25071 (262.55)	..	597 (6.25)	..	10 (0.10)	369 (3.86)	26047 (272.77)
8	Mud	6	43.66	11779 (269.78)	..	396 (9.07)	..	..	99 (2.26)	12274 (281.10)
9	..	6	15.50	4960 (320.00)	..	101 (6.51)	..	..	126 (8.12)	5187 (334.64)
10	..	6	2.00	160 (80.00)	..	11 (5.50)	..	..	3 (1.50)	174 (87.00)
<i>REGION—PALK BAY</i>			<i>IV Quarter (October only)</i>							
2	Mud	6	25.83	7880 (305.07)	..	138 (5.34)	..	..	54 (2.09)	8072 (312.50)
3	..	6	8.41	2050 (243.75)	..	33 (3.92)	..	..	34 (4.04)	2117 (251.72)
8	..	..	4.25	1110 (261.17)	..	11 (2.58)	..	..	14 (3.29)	1125 (264.70)
<i>REGION—GULF OF MANNAR</i>			<i>I Quarter (January, February and March)</i>							
3	Mud	..	3.75	17.5 (4.66)	..	..	..	..	..	17.5 (4.66)

4	.	.	.	.	..	2.00	..	..	8	..	..	13.5	21.5
									(4.00)			(6.75)	(10.75)
9	.	.	.	.	..	38.43	7031	259	58	..	..	761.5	81095
							(182.95)	(6.73)	(1.51)			(19.81)	(211.02)
14	.	.	.	.	11-13	2.00	390	17	..	..	..	22.5	429.5
							(195.00)	(8.50)				(11.25)	(214.75)
15	.	.	.	.	12-13	63.28	16967	704	71	382	..	1736	198.60
							(268.12)	(11.12)	(1.12)	(6.03)		(27.43)	(313.84)
16	.	.	.	.	14	1.25	250	5	..	..	..	10	265
							(200.00)	(4.00)				(8.00)	(212.00)
8	.	.	.	.	11-13	10.41	3875	108.5	..	..	..	344	4327.5
							(372.23)	(10.42)				(33.04)	(415.70)

II & III Quarters, no fishing in Gulf of Mannar

IV Quarter (November and December only)

9	.	.	.	.	Mud	11-12	21.75	5100	120	38	20	..	865	6143
							(234.48)	(5.51)	(1.74)	(0.91)			(39.77)	(282.43)
10	.	.	.	.	..	11-12	22.83	7065	216	35	280	..	543.5	8139.5
							(309.46)	(9.46)	1.53	(12.26)			(23.80)	(356.52)
14	.	.	.	.	..	11	1.00	230	..	..	..	..	20	250
							(230.00)						(20.00)	(250.00)
15	.	.	.	.	..	12-13	7.00	1955	40	35	..	..	338	2368
							(279.28)	(5.71)	(5.00)				(48.28)	(338.28)

TABLE II

Trawl fishing in the Palk Bay and Gulf of Mannar during the year 1964. Best records (first three places) of catch and catch-per-unit of effort, area-wise and month-wise for the two boats M₂ and M₃

INP M ₂					INP M ₃				
Month	Region	Catch-per-unit of effort (Kg.)	Total catch (Kg.)	Area	Month	Region	Catch-per-unit of effort (Kg.)	Total catch (Kg.)	Area
Jan	Gulf of Mannar	261.50	723	9B	Jan	Gulf of Mannar	Limited data only.		
Jan	"	200.33	663	9J	Feb	"	385.60	964	8E
Feb	"	587.41	3618.5	15W	Feb	"	312.50	675	15W
Feb	"	463.85	770	9F	Feb	"	239.81	518	15U
Feb	"	454.33	681.5	9E	Mar	"	389.00	778	15T
Mar	"	469.37	3968	15Y	Mar	"	258.47	1357	15Y
Mar	"	375.50	651	15U	Mar	"	253.82	1858	15X
Mar	"	297.28	3196	15Y	Mar	Palk Bay	305.00	305	2J
Mar	Palk Bay	Limited data only.			Mar	"	304.00	304	8D
Apr	"	221.66	665	8D	Apr	"	164.52	3580	2T
Apr	"	178.13	1336	2Y	Apr	"	157.94	2644	8D
Apr	"	171.75	687	8E	Apr	"	148.79	3632	2J
May	"	324.66	1461	2X	May	"	1360.84	2259	2J
May	"	255.00	510	2E	May	"	400.00	800	3Q
Jun	"	606.27	2122	3R	May	"	309.32	2886	8D

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Jun.	533.50	2134	3Q	Jun.	937.00	937	3U
Jul.	665.00	1330	2R	Jun.	406.50	813	2X
Jul.	550.00	1100	311	Jun.	361.28	2800	8D
Jul.	.	.	.	.	480.66	721	9C	Jul.	.	.	.	.	508.80	636	3W
Aug.	.	.	.	.	543.87	4351	3Q	Jul.	.	.	.	.	493.33	700	8E
Aug.	.	.	.	.	482.80	2651	2E	Jul.	.	.	.	.	411.23	4660	8D
Aug.	.	.	.	.	473.00	2365	3B	Aug.	.	.	.	.	1005.00	1005	3N
Sep.	.	.	.	.	255.63	3579	2E	Aug.	.	.	.	.	744.32	2233	2N
Sep.	.	.	.	.	247.00	1482	2N	Aug.	.	.	.	.	531.00	797	2S
Sep.	.	.	.	.	209.04	2822	2D	Sep.	.	.	.	.	474.75	547	2Y
Oct.	.	.	.	.	480.50	561	3F	Sep.	.	.	.	.	329.32	1976	2T
Oct.	.	.	.	.	403.50	817	2T	Sept.	.	.	.	.	296.83	1781	8D
Oct.	.	.	.	.	387.16	2323	2E	Oct.	.	.	.	.	906.00	1659	2Y
Nov.	.	.	.	.	499.00	499	15U	Oct.	.	.	.	.	478.50	957	2S
Nov.	.	.	.	.	450.00	900	9J	Oct.	.	.	.	Palk Bay	311.00	622	3U
Dec.	.	.	.	.	555.00	1110	16U	Nov.	.	.	.	Gulf of Mannar	420.00	840	10A
Dec.	.	.	.	.	496.80	621	15P	Nov.	.	.	.	.	254.00	508	9B
Dec.	.	.	.	.	409.78	2868.5	10A	Dec.	.	.	.	.	483.50	967	9D
								Dec.	.	.	.	.	349.64	3437	10A
								Dec.	.	.	.	.	272.00	476	15W

Trawl fishing in Palk Bay and Gulf of Mannar

on the West Coast as revealed by the exploratory fishing operations by the Government of India Fishing Vessels and other fishing vessels for the year 1964-65 in Table III.

TABLE III

Catch rates of (in Kg) trawl fishing by Government of India vessels and other vessels along the East and West coasts of India during the year 1964-65.

Period*	Catch-per-hour		Period	Catch-per-hour
	M.L. Sagar Pravasi & M.L. Sagar kumari				M.L. Sagar Pravasi and M.L. Sagar kumari
VERAVAL				
1st Quarter	.	179.29	3rd Quarter	294.76
2nd Quarter	.	70.43	4th Quarter	205.00
BOMBAY				
	Catch-per-hour			
	M.F.V. Jeenga	M.F.V. Bumili	M.L. Meera	M.L. Kalyani
1st Quarter	219.75	109.09	73.60	No fishing.
2nd Quarter	66.66	No fishing	No fishing	No fishing.
3rd Quarter	307.65	377.10	147.79	315.46
4th Quarter	215.10	137.20	39.17	200.53
MANGALORE				
	M.V. Tarpon	M.V. Sagar Vihari	M.V. Samudra	
1964-65	83.41	101.21	114.63	
ERNAKULAM				
	Govt of India vessels	INP Vessels	Cochin Company	
1964-65	113.39	120.88	67.94†	
VISAKHAPATNAM				
	M.T. Ashok	M.V. Champa	M.V. Seahorse	
1964-65	170.5	83.5	60.5	
TUTICORIN				
	M.T. Kalyani V.		M.V. Sagarsundar	
1964-65	98.79		134.88	

*1st quarter: April-Jun; 2nd quarter: July-September; 3rd quarter: October-December; 4th quarter: January-March.

†Average for January, February and March.

TABLE III (Contd.)

MANDAPAM	INP M2 and M3		Period	INP M2 AND M3	
	Palk Bay	Gulf of Mannar		Palk Bay	Gulf of Mannar
1st Quarter**	227.16	197.53	3rd Quarter	242.24	No fishing
2nd Quarter	145.14	No fishing	4th Quarter	276.30	306.80

**Quarters according to calendar year.

Total catch: The gross catch per hour of trawling does not seem to be very different in the two regions. Catch per unit of effort was highest in square No. 8 in Gulf of Mannar and in 9 in Palk Bay (Table I). On the average, maximum yield per hour of trawling was obtained in the last quarter in both the Gulf of Mannar and the Palk Bay (Table III).

Silver-bellies: All species of silver-bellies have been considered together. As judged from the catch-per-unit of effort silver-bellies dominate the catches as a single category both in the Gulf of Mannar and in the Palk Bay. The catch rate in the two regions does not seem to be much different. The maximum catch-per-unit of effort was recorded in square No. 8 in the Gulf of Mannar and in 9 in the Palk Bay. The maximum catch of silver-bellies coincides with the peak catches in the two regions (Table I).

Prawns: The catches of prawns are better in the Gulf of Mannar than in the Palk Bay, maximum yield being in square No. 15 in the former and in 5 in the latter (Table I).

Rays: The catches have been generally better in the Palk Bay than in the Gulf of Mannar. Maximum catch was obtained in square No. 15 in the Gulf of Mannar and in 11 in the Palk Bay (Table I).

Sharks: Practically no sharks have been caught in Palk Bay. In the Gulf of Mannar a few sharks were caught with a maximum in square No. 15 (Table I).

Catfish: The catches were generally poor during the year. They were caught in both the regions but often included under mixed fish as the quantities were negligible. However, maximum was recorded in square No. 2 in Palk Bays (Table I).

Mixed fish: The catches were comparatively better throughout the season in the Gulf of Mannar than in the Palk Bay, maximum being in square No. 15 in the former region and in 5 in the latter (Table I).

Particulars of catch of each vessel separately, quarter-wise and the value of fish and prawns are shown in Table IV.

TABLE IV*

Results of fishing by the vessels M2 and M3 during the year 1964

Quarter	Vessel	Total effort (hours operated)	Fish		Prawns		Total catch	
			wt (kg)	Value Rs.	wt (kg)	Value Rs.	wt (kg)	Value Rs.
Jan.-Mar.	M2	82.4	24763	4472	701	641	25464	5113
	M3	47.7	10019	1647	432	362	10451	1949
Apr.-Jun.	M2	223.58	33471	2562	98	43	33569	2605
	M3	224.95	38071	2682	10	5	38081	2687
Jul.-Sep.	M2	191.92	48583	2036	..	..	48583	2036
	M3	204.83	51000	2119	..	..	51000	2119
Oct.-Dec.	M2	50.75	14927	1939	133	75	15060	2014
	M3	57.67	16129	1944	253	144	16382	2088

* Particulars from the quarterly reviews of the Indo-Norwegian Project, Ernakulam.

Qualitative analysis:

The six categories of the catches of Indo-Norwegian Project vessels have been analysed qualitatively and the following genera and species wherever possible have been identified.

Silver-bellies: While the catches of silver-bellies in the Gulf of Mannar are contributed by a number of species together, none of them being significantly more abundant than the other, the catches in the Palk Bay are dominated by a single species of *Leiognathus** the contribution by all the other species together being less than 10% of the total.

The composition of this group in the two regions is given in Table V along with the total size range so far observed for each species.

TABLE V

Composition of silver-bellies

S. No.	Species	Size range (mm)	
		Gulf of Mannar	Palk Bay
1	<i>Leiognathus</i> *	60-85	25-112
2	<i>L. lineolatus</i>	69-100	65-75
3	<i>L. brevisrostris</i>	60-75	35-105
4	<i>L. oblonga</i>	55-75	40-85
5	<i>L. daura</i>	67-99	Not available
6	<i>L. bindus</i>	72-88	50-60
7	<i>Secutor insidiator</i>	70-85	70-80
8	<i>S. ruconius</i>	45-65	42-62
9	<i>Gazza minuta</i>	75-105	90-110

*New species, being described.

Two other species of silver-bellies, viz. *L. fuscatus* and *L. equulus*, are caught occasionally in other nets in the area but while the former is not at all represented in the trawl catches, only stray specimens (110 mm fork length) of the latter are recorded.

Mixed fishes: Since a number of species comprise this group, it has not been possible to note the size range for each individual species in this study. The following species, almost all of them common to both regions have been identified and are arranged in alphabetical order below:

1. *Anadontostoma chacunda* 2. *Apogon quadrifasciatus* 3. *Caranx armatus* 4. *C. kalla* 5. *C. melampygus* 6. *Chirocentrus nudus* 7. *Chorinemus lysan* 8. *Cynoglossus* 9. *Drepane* 10. *Ephippus orbis* 11. *Eupleurogrammus intermedius* 12. *Gerrhes filamentosus* 13. *Ilisha ilisha* 14. *Johnius spp.* 15. *Kurtus indicus* 16. *Lactarius lactarius* 17. *Lepturacanthus savala* 18. *Nemipterus japonicus* 19. *Otolithus argenteus* 20. *O. maculatus* 21. *Pampus argenteus* 22. *Parastromateus niger* 23. *Poly-nemus sextarius* 24. *Pomadasy argyreus* 25. *P. hasta* 26. *P. trimaculatus* 27. *Pseudorhombus* 28. *Sardinella albelli* 29. *S. gibbosa* 30. *Saurida tumbil* 31. *Scomberomorus guttatus* 32. *S. lineolatus* 33. *Selaroides leptolepis* 34. *Sphyraena obtusata* 35. *Stolephorus indica* 36. *Therapon puta* 37. *Thrissoctes malabaricus* 38. *Trichiurus lepturus* 39. *Upeneus bensasi* 40. *U. vittatus*.

Only a few of the above mentioned species contribute to a sizeable percentage of the mixed fish group. Of these, mention may be made of (i) sciaenids, (ii) *Saurida tumbil*, (iii) *Pampus argenteus* and (iv) *Lactarius lactarius* in the Gulf of Mannar and the above four classes and *Nemipterus japonicus* in the Palk Bay. The four classes common to both the regions occur almost through the year, whereas the occurrence of *N. japonicus* is seasonal in the Palk Bay from August to October. Therefore, the composition of mixed fishes of commercial importance is more or less similar in both the regions.

Catfish: Although more than six species are noticed both from Palk Bay and Gulf of Mannar, the following three are the most common species: (i) *Arius dussumieri*, (ii) *Tachysurus caelatus* and (iii) *T. Thalassinus*. The first two of these, more common in the Palk Bay, move in great shoals occasionally.

Sharks: This group includes the following species: 1. *Carcharhinus melanopterus*. 2. *Pristis microdon*. 3. *Rhynchobatus djiddensis*. 4. *Scoliodon palasorrah*.

Rays: Include the following species: 1. *Aetomylaeus nichofii*. 2. *Gymnura micrura* 3. *G. poecillura* 4. *Himantura bleekeri* 5. *H. uarnak* 6. *Pastinachus sephen* 7. *Urogymnus*.

Both sharks and rays are available in the Gulf of Mannar whereas the rays appear to be the more common in the Palk Bay.

Prawns: Though prawns form a good portion of the catches at various fishing centres along the east coast of India, practically no information is at present available on the species composition and resources at this part of the coast. As many as ten species contribute to the catches in this area, of which *Penaeus indicus*, and *P. semisulcatus* in the Gulf of Mannar and *Metapenaeus affinis* in the Palk Bay have been found to be the most common and important species from the fishery point of view. The species composition of prawns is shown in Table VI.

TABLE VI
Composition of prawns

S. No.	Species	Sex	Size range (mm)	
			Gulf of Mannar	Palk Bay
1	<i>Penaeus indicus</i>	Male	138-185	129-180
		Female	138-205	116-155
2	<i>P. semisulcatus</i>	Male	112-226	92-156
		Female	123-184	85-184
3	<i>P. canaliculatus</i>		Not available	Stray specimens only.
4	<i>P. merguensis</i>		Stray specimens only	Stray specimens only.
5	<i>P. monodon</i>		Stray specimens only	Not available.
6	<i>Metapenaeus affinis</i>	Male	125-148	72-153
		Female	104-170	66-145
7	<i>M. lysionassa</i>		Not available	Stray specimens only.
8	<i>M. dobsoni</i>		Not available	Stray specimens only.
9	<i>Parapenaeopsis stylifera</i>		Stray specimens only	Not available.
10	<i>P. maxillipedo</i>		Stray specimens only	Not available.

The total weight and percentage composition of the important groups of fishes and prawns quarterwise during the year 1964 are summarised in Table VII.

TABLE VII*

Percentage composition of important groups of fishes and prawns landed by the Indo-Norwegian Project boats during the year 1964

S. No.	Species	First quarter		Second quarter		Third quarter		Fourth quarter	
		Total weight (kg)	per-cent-age	Total weight (kg)	per-cent-age	Total weight (kg)	per-cent-age	Total weight (kg)	per-cent-age
1	Prawns	1133	8.1	108	0.15	..	..	386	1.23
2	Mixed fish	2865	8.0	1909	2.67	1115	1.12	1628	5.18
3	Sharks and Rays	642	1.8	3011	4.20	..	2.87	650	2.07
4	Pomfrets	284	0.8	..	..	..	..	307	0.97
5	<i>Lactarius</i>	284	0.8	..	..	..	..	141	0.45
6	Silver-bellies	30562	85.1	66622	92.98	95460	95.86	28272	89.92
7	<i>Nemipterus</i>	40	0.1	..	..	..	..	..	..
8	Catfish	..	..	..	..	151	0.15	36	0.11
9	Others	389	1.1	..	..	..	..	22	0.07

*Particulars from the quarterly reviews of the Indo-Norwegian Project, Ernakulam.

DISCUSSION AND CONCLUSIONS

Hornell (1916) pointed out that the trawling operations in the Palk Bay in 1902 and later in 1907 have yielded somewhat different results one from the other but they have been explained as due to differences in the gear used during each of those operations. The data from the exploratory fishing by Indo-Norwegian Project boats in the Gulf of Mannar and the Palk Bay presented in this paper (Table III) indicate that the trawling grounds in these areas are not absolutely barren as was believed in 1907 but support an year round fishery of fairly high magnitude. The catch rates here are generally higher than those elsewhere along the East Coast and are comparable to those from productive areas on the West Coast (Table III). It should however be pointed out that as also remarked in 1902, all the fish that may be available in this area are not typical of the bottom but also include those that skim slightly over the bottom.

Quantitative analyses have revealed that as far as known, squares No. 5 and 9 in the Palk Bay and 8 and 15 in the Gulf of Mannar are more productive than other areas.

The results of qualitative analyses show that many of the species recorded now have also been noticed earlier and that the trawling grounds off Mandapam

in the Palk Bay and Gulf of Mannar are potential sources primarily of silverbellies, with seasonal and limited fisheries for sciaenids, *Saurida tumbil*, prawns, catfishes, *Lactarius lactarius* and *Nemipterus japonicus*. Comparatively better catches of prawns are expected in the Gulf of Mannar than in the Palk Bay. It is possible that certain other species of fishes and prawns may occur in the trawl catches which would not have been noticed by the authors but those species are not expected to be important from the fishery point of view. From the present trend, it also appears possible to increase the catches of prawns with intensified fishing during November to March in the Gulf of Mannar.

Herdman (1903) stated that the shallow areas of Palk Bay apparently serve as valuable nursery for young fishes. During this study young ones of *Chorinemus lysan* (12.2 cm total length) and *Scomberomorus guttatus* (16.5 cm total length) have been noticed in September and May respectively in Palk Bay. Juveniles of *Pomadasys argyreus* (10 cm total length) and *Drepane punctata* (7 cm total length) have been recorded during November and December in the Gulf of Mannar. These instances indicate that the spawning grounds of these commercially important fishes are probably not far from the area of operations and that certain areas of Gulf of Mannar also serve as nurseries for young fishes.

Prasad (1958) in a study of the plankton of the inshore waters at Mandapam suggested that the waters of Gulf of Mannar are inherently rich in nutrient salts and may even be richer than the waters of Palk Bay with the potentiality to produce a greater biomass. In their studies on organic production in the Gulf of Mannar in the vicinity of Mandapam, Prasad and Nair (1960; 1963) have stated that compared to intensely exploited waters, the present yield from this zone is only about one-seventh to one-tenth of a possible exploitable stock. Recent exploratory fishing hauls by R.V. *Varuna* details of which were given by the above authors also indicate such potentialities of the areas.

Based on the above observations on organic production and resources of the areas and the results of quantitative, qualitative and biological observations on the commercial catches through an year presented in this paper, it seems possible that the trawling grounds off Mandapam in the Palk Bay and Gulf of Mannar would yield better catches with an increase in the effort. With the range of operation extended to deeper waters in the Palk Bay, more typical bottom dwelling fishes like *Epinephelus* spp. and *Lethrinus* spp. often caught in this area on hook and line may be fully exploited.

SUMMARY

The results of trawling operations of the Indo-Norwegian Project boats off Mandapam in the Palk Bay and Gulf of Mannar during the year 1964 have been analysed qualitatively and quantitatively along with some biological observations.

The trawling grounds off Mandapam are potential sources primarily of silverbelies, followed by sciaenids, catfishes, *Saurida tumbil*, *Pampus argenteus*, *Lactarius lactarius*, *Nemipterus japonicus* and prawns. Better catches of prawns are expected from Gulf of Mannar than from Palk Bay. While both sharks and rays are common in the Gulf of Mannar, rays appear to be more common than sharks in the Palk Bay. Based on a comparison of catch rates the more productive areas in the two regions are indicated. There are indications that the present rate of production could be stepped up with an increase in effort. With extended operations typical bottom dwelling perches known to abound in the vicinity could profitably be exploited. The prospects of trawling operations in the area are generally encouraging since the catch rates compare well with those from more productive areas elsewhere along the Indian coast.

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