ON THE RESULTS OF EXPLORATORY PURSE SEINING BETWEEN COCHIN AND GOA

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ABSTRACT

Of the nine fishing squares covered along the Cochin-Goa coast by the purse seiners operated by the Integrated Fisheries Project, Cochin, and the Exploratory Fisheries Project at Mangalore and Goa during the period, January 1975 to June 1978, the areas 6-76, 10-76 and 15-73, between the latitude 9°10'-15°40'N and longitude 73°30'-76°30'E, were explored intensively. Out of the total of 10,81,951 kg of fishes landed as a result, 72% of the catch comprised of oil sardine.

INTRODUCTION

Purse seining, recently started in Indian waters, is confined at present mainly along the west coast. The initial steps of intensive and systematic purse seining were commenced by the erstwhile INP in the past (Menon 1971) and was followed by the Exploratory Fisheries Project in recent years. Varghese (1973, 1976) has given various technical details of purse seiners and the feasibility of its operation indicating the catch trend of two IFP purse seiners fished off Cochin. Jayaraj (1978) indicated good scope for commercial purse seiners along the Karnataka coast. The necessity for the introduction of more commercial purse seiners along the Goa coast has been stressed by Dhawan (1978) in a recent study. Apart from these details, nothing is known on the area-wise catch particulars of the purse seiners along the west coast. Hence an attempt has been made in the present investigation to assess the potentiality of the fishing grounds so far charted by the exploratory purse-seine operations in the Arabian Sea by the Integrated Fisheries Project, Cochin, and the Exploratory Fisheries Project from Mangalore and Goa bases, with special reference to their catch trend during the period, January 1975 of June 1978.

FISHING OPERATIONS

The exploratory purse seining along the waters from Cochin to Goa were mainly conducted between the latitude 9°10'-15°40'N and longitude 73°30'-76° 30'E covering a total of nine major areas and their 37 subareas (Fig. 1). The catch composition of the purse seiners revealed the predominance of four pelagic species viz., the Indian oil sardine, *Sardinella longiceps*, the Indian mackerel,

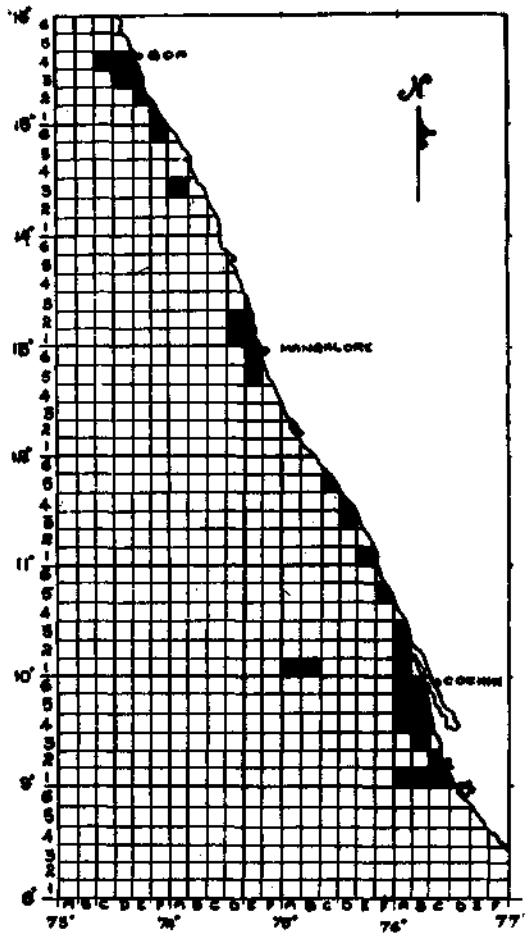

FIG. 1. Map showing the areas operated by the purse seiners from Cochin, Mangalore and Goa bases.

Rastrelliger kanagurta, the tuna and the carangids besides the miscellaneous fishes comprising anchovies, silverbellies, *Ambassis* spp., catfishes etc. The area-wise catch trend of the purse seiners from various bases are discussed hereunder so as to get a complete picture of the result of their operations along the coast under investigation.

Cochin base

The areas between the latitude 9°10'-12°50'N and longitude 75°10'-76°30'E covering five major areas and their 21 subareas were purse-seined from this base. Six vessels in the M series viz., M-2, M-3, M-11, M-12, M-13 and M-14 participated in the purse seining off Cochin apart from NORIND-2, SAMUDRADEVI and KALAVA-2 during the period. M-2, M-3 and NORIND-2

were the main vessels that conducted fishing operations for a longer period, the remaining series of vessels were auxiliary to them during the operations. As the efficiency of the M-series vessels were same, with 36' and 48 h.p., their catch and effort were pooled and shown under M-type vessels. The M-type vessels and NORIND-2 were the only boats using the purse seines constantly during the period of study. Since SAMUDRADEVI and KALAVA-2 conducted purse-seine operations only a limited period during 1976 and 1977, results could not be ascertained and hence excluded from the scope of the paper. Owing to the different efficiencies of NORIND-2 and M-type vessels, the results of their operations have been shown separately on a regional and seasonal basis for the purpose of comparison and discussion.

Areawise catch trend of NORIND-2: This vessel operated throughout the period of observation except for few months and covered 21 subareas of five major areas (Table 1). The major area 9-76 was explored intensively covering 10 subareas in which maximum effort of 148.58 h was expended in 6A landing 54,621 kg of fish for a catch rate of 367.62 kg/h followed by 6B yielding a catch of 41,086 kg and showed an increased catch rate of 477.74 kg/h. The least catch and effort were from 1A and 2C. A total of 1,35,087 kg of fishes was obtained from 9-76 to the extent of 326.16 h indicating a catch rate of 411.65kg/h.

Only one subarea viz., 1A of 10-75 was fished by NORIND-2 during the period from which 14,060 kg of oil sardine was obtained for an effort of 19.00 h.

In the major area 10-76, five subareas were covered; 1A predominating both in catch and effort while 1B showing high catch rate. A total of 222.00 h was expended in this major area yielding 1,73,504 kg of fishes with a catch rate of 781.55 kg/h. In various subareas of the major area 11-75, least efforts ranging from 1.00-5.50 h were expended; the catch varying between 50 kg and 6,485 kg. One subarea viz., 6E of 12-74 was also explored by NORIND-2 to the extent of 2.50 h for 5,000 kg of oil sardine.

During the period as a whole, NORIND-2 landed a total of 3,43,926 kg of fishes for the effort of 594.41 h indicating a catch rate of 581.54 kg/h; 80% of the catch comprised of oil sardine.

Areawise catch trend of M-type vessels: In an earlier study, Varghese (1976) indicated the catch trend of M-2 and M-3 boats during 1970-'71 to 1975-'76 period from Cochin base. During the period under investigation, two major squares viz., 9-76 and 10-76 were explored by the M-type vessels; the four subareas in the former yielding a total of 2,60,676 kg of fish to the extent of 325.92 h and a catch rate of 799.82 kg/h (Table 2). Intensive operation appeared to be in the subarea 6B. Though two subareas viz., 1A and 1B of 10-76 were fished, the entire catch of 2,39,416 kg of fishes were obtained from the former. The M-type vessels from the two major areas explored landed 5,00,092 kg of fish for 628.17 h and recorded a catch rate of 796.11 kg/h; 90% of the catch comprising oil sardine.

TABLE 1. *Area-wise catch data of* NORIND-2 *during* 1975-78 *period from Cochin base.*

Sub-areas	Depth range (m)	Fishing effort in h	Catch and (catch per hour in kg) oil sardine	Mackerel	Tuna	Carangids	Misc.	Total
Major area: 9-76								
1A	16	1.00	150 (150.00)	——	——	——	——	150 (150.00)
4A	15-16	1.75	——	——	——	602 (34.40)	——	602 (34.40)
5A	16-27	16.33	5446 (333.50)	10 (0.61)	260 (15.92)	——	153 (9.37)	5869 (359.40)
6A	9-23	148.58	51170 (344.39)	1691 (11.38)	133 (0.89)	——	1627 (10.95)	54621 (367.62)
1B	9-15	22.00	475 (22.59)	31 (1.41)	——	——	1324 (60.18)	1830 (83.18)
3B	13	2.00	786 (393.00)	126 (63.00)	——	——	30 (15.00)	942 (471.00)
4B	15-20	10.00	1180 (118.00)	76 (7.60)	——	——	3830 (383.00)	5086 (508.60)
5B	9-23	39.50	23529 (595.67)	150 (3.79)	150 (3.79)	126 (3.19)	611 (15.47)	24566 (621.92)
6B	11-27	86.00	31244 (363.30)	3673 (42.71)	811 (9.43)	——	5358 (62.30)	41086 (477.74)
2C	16	1.00	——	330 (330.00)	——	——	5 (5.00)	335 (335.00)
Total	9-27	328.16	113980 (347.33)	6087 (18.55)	1354 (4.13)	728 (2.22)	12938 (39.43)	135087 (411.65)
Major area : 10-75								
1A	9-12	19.00	14060	——	——	——	——	14060 (740.00)
Major area : 10-76								
1A	9-18	168.50	108950 (646.50)	10589 (62.84)	6568 (38.98)	6011 (35.67)	5374 (31.89)	137492 (815.98)
2A	10-21	37.75	11444 (303.15)	2 (0.05)	420 (11.13)	4426 (117.25)	6159 (163.15)	22451 (594.73)
3A	18	6.00	——	——	——	——	21 (3.50)	21 (3.50)

TABLE I. (*Continued*)

Sub-areas	Depth range (m)	Fishing effort in h	Catch and (catch per hour in kg) Oil sardine	Mackerel	Tuna	Carangids	Misc.	Total
1B	9-16	8.75	12075	1328	——	——	12	13415
			(1380.00)	(151.77)			(1.37)	(1533.14)
2B	16	1.00	25	——	——	——	100	125
			(25.00)				(100.00)	(125.00)
Total	9-21	222.00	132494	11919	6988	10437	11666	173504
			(596.82)	(53.69)	(31.48)	(47.01)	(52.55)	(781.55)
Major area : 11-75								
5C	11	1.00	50	——	——	——	——	50
			(50.00)					(50.00)
3D	12	5.50	6485	——	——	——	——	6485
			(1179.09)					(1179.09)
4D	10-12	2.00	1030	——	——	——	——	1030
			(515.00)					(515.00)
1E	10-18	5.25	31	——	——	——	5969	6000
			(5.90)				(1136.95)	(1142.86)
Major area : 12-74								
6E	13	2.50	5000	——	——	——	——	5000
			(2000.00)					(2000.00)
Major areas : (9-76, 10-75 & 10-76)								
9-76/1C	11-16	9.00	2610	——	——	——	100	2710
			(290.00)				(11.11)	(301.11)
All areas	8-27	594.41	275740	18006	8342	11165	30673	343926
			(466.24)	(30.45)	(14.11)	(18.88)	(51.86)	(581.54)

Excluding 400 kg of miscellaneous fishes fished off Alleppey for an effort of 2.00 hours.

A comparative study on the purse seining by NORIND-2 and M-type vessels revealed that an increased catch of 56,166 kg was landed by the latter for a difference of 33.76 h and incidently catch rate was also more. The operation of NORIND-2 appeared more intensive in that it covered more area though poor catch rate resulted in majority of subareas fished. When NORIND-2 confined the intensive operation in 6A of 9-76, the M-type vessels largely concentrated in 6B. But in the case of major square 10-76, intensive operation was noticed in the subarea 1A by both the vessels. A high catch rate obtained by M-type boats was particularly noticeable from 9-76 and 10-76. From the studies made it appears reasonable to assume that subareas 6A and 6B of 9-76 followed by 1A of 10-76 are best suited for intensive purse seining due to the high catch rate obtained.

TABLE 2. *Area-wise catch data of* M-type *vessels during* 1975-78 *period from Cochin base.*

Sub-areas	Depth range (m)	Fishing effort in h	Catch and (catch per hour) in kg					
			oil sardine	Mackerel	Tuna	Carangids	Misc.	Total
Major area : 9-76								
1A	16	2.00	3585 (1792.50)	——	——	——	——	3585 (1792.50)
6A	9-11	5.00	109 (21.80)	1396 (279.20)	——	——	——	1505 (301.00)
4B	18	10.50	4154 (395.62)	2 (0.19)	——	——	55 (5.24)	4211 (401.05)
6B	9-25	308.42	235255 (762.77)	9911 (32.13)	4422 (14.34)	——	1787 (5.79)	251375 (815.04)
Total	9-25	325.92	243103 (945.90)	11309 (34.70)	4422 (13.57)	——	1842 (5.65)	260679 (799.82)
Major area : 10-76								
1A	9-22	301.25	217978 (723.58)	17809 (59.12)	2850 (9.46)	——	779 (2.59)	239416 (794.74)
1B	12-22	1.00	——	——	——	——	——	Nil
Total	9-22	302.25	217978 (721.18)	17809 (58.92)	2850 (9.43)	——	779 (2.58)	239416 (792.11)
All areas	9-25	628.17	461081 (734.01)	29118 (46.35)	7272 (11.58)	——	2621 (4.17)	500092 (796.11)

TABLE 3. *Area-wise catch data of* M. V. MEEN ANWESHAK *during* 1975-78 *from Mangalore base.*

Sub-areas	Depth range (m)	Fishing effort in h	Catch and (catch per hour) in kg					
			oil sardine	Mackerel	Tuna	Carangids	Misc.	Total
Major area : 12-74								
5E	15-25	21.25	———	———	———	———	2002 (94.21)	2002 (94.21)
6E	11-30	118.33	6890 (58.23)	1027 (8.68)	159 (1.34)	———	23475 (198.39)	31551 (266.64)
Total	11-30	139.58	6890 (49.36)	1027 (7.36)	159 (1.14)	———	43477 (311.48)	51553 (369.34)
Major area : 13-74								
1D	18-20	16.00	1780 (111.25)	———	———	———	———	1780 (111.25)
2D	14-30	123.00	7080 (57.56)	24423 (198.56)	———	———	5134 (41.74)	36637 (297.86)
1D & 2D	20	32.00	———	———	———	———	———	Nil
1E	10-22	114.00	14150 (124.12)	16 (0.14)	———	———	68502 (600.89)	82668 (725.16)
2E	12-15	10.58	———	———	———	———	14740 (1393.19)	14740 (1393.19)
Total	10-30	295.58	23010 (77.85)	24439 (82.68)	———	———	88376 (298.99)	135825 (459.52)
Major areas : 12-74 & 13-74								
12-74/6E & 13-74/1E, 2E	10-12	5.50	9860 (1792.83)	———	———	———	———	9860 (1792.73)
All areas	10-30	440.66	39760 (90.23)	25466 (57.79)	159 (0.36)	———	131853 (299.23)	197238 (447.60)

TABLE 4. *Area-wise catch data of* M. V. MEENA AYOJAK *during* 1976-78 *from Goa base*

Sub-areas	Depth range (m)	Fishing effort in h	Catch and (catch per hour) in kg					
			oil sardine	Mackerel	Tuna	Carangids	Misc.	Total
Major square : 14-73								
6F	23	1.75	——	——	——	——	58	58
							(33.14)	(33.14)
Major sqaure : 14-74								
3A	22-23	5.75	137	——	——	——	——	137
			(23.83)					(23.83)
Major square : 15-73								
4C	12	1.58	45	——	——	——	——	45
			(28.48)					(28.48)
3D	24-30	6.50	100	——	——	1152	118	1370
			(15.38)			(177.23)	(18.15)	(210.77)
4D	26-30	1.33	——	——	——	——	12	12
							(9.02)	(9.02)
2E	15-20	7.08	408	——	——	——	138	546
			(57.63)				(19.49)	(77.12)
3E	12-33	48.67	8224	——	——	2789	14280	25293
			(168.97)			(57.30)	(293.40)	(519.67)
3D & 3E	12-54	9.58	1040	——	——	——	——	1040
			(108.56)					(108.56)
4E	13-16	3.57	——	——	——	——	1850	1850
							(51.82)	(51.82)
1F	14-18	14.92	1517	——	——	532	8295	10344
			(101.68)			(35.66)	(555.97)	(693.30)
Total	12-33	93.23	11334	——	——	4473	24693	40500
			(121.57)			(47.98)	(264.86)	(434.00)
All areas	12-33	100.73	11471	——	——	4473	24751	40695
			(113.88)			(44.41)	(245.72)	(404.00)

An attempt was also made to compare the quarterwise landings and catch rate of both type of vessels during the period. Thus, NORIND-2 exhibited a high catch rate in the first quarters of 1975, 1976 and 1977, but in 1978 it was in the fourth quarter. Inspite of the high catch rate in the first quarter of 1978, the M-type vessels revealed increased catch rate in the third quarter of 1975 and in the second quarters of 1976 and 1977. But the picture becomes more clear when the effort and the catch data of all the vessels are pooled together. Thus, during the period under observation, first quarters of 1975, 1977 and 1978 experienced high catch rate, whereas it was high only in the second quarter in 1976. The seasonal abundance of M-type boats noticed agrees with the findings of Varghese (1976) who has recorded uniform catch rates in the case of M-3 boat during pre-monsoon and post-monsoon periods.

Mangalore base

M. V. MEENA ANVESHAK of the Exploratory Fissheries Project conducted purse seining off Mangalore during the period, the result of which are shown in Table 3. The vessel did not conduct purse seining for nearly 24 months during the period.

Two subareas, 5E and 6E of the major area 12-74 were fished by the vessel to the extent of 138.58 h landing 51,553 kg of fish for a catch rate of 369.34 kg/h in which intensive operation was confined in the latter. The major area 13-74 yielded 1,35,825 kg of fish indicating a catch rate of 459.52 kg/h. Though subarea 1E yielded more catch, the highest catch rate was from 2E. From the entire areas explored, MEENA ANVESHAK landed 1,97,238 kg of fish for a catch rate of 447.60 kg/h. From comparative catch trend of the areas explored it is seen that the major area 13-74 yielded more catch rate. Intensive and extensive operation in more areas appears to be essential to arrive at definite conclusions.

Goa base

The purse seining by M. V. MEENA AYOJAK of the Exploratory Fisheries Project was confined to only seven months during 1976-78 period. The subareas 6F and 3A of the major area 14-73 and 14-74 respectively showed poor catch and catch rate; whereas major area 15-73 was fished intensively covering seven subareas and landed 40,500 kg of fish for a catch rate of 434.41 kg/h (Table 4). During the entire period, MEENA ANVESHAK expended 100.73 h and landed 40,695 kg of fish indicating a catch rate of 404 kg/h. Due to discontinuous operations of the vessel, seasonal abundance of the catch could not be ascertained.

REMARKS

Of the 37 subareas in nine major areas covered by the vessels all along the coast from Cochin to Goa, the maximum catches were obtained from the

area 9-76 and 10-76 mainly due to intensive coverage by the vessels of Cochin base. Area 11-75 was particularly interesting due to the high catch rate of 986.55 kg/h. Out of the total of 10,81,951 kg of fishes landed during the period of study, 72% of the catch comprised of oil sardine.

The investigations of Integrated Fisheries Project have shown that purse seining is the most effective method to exploit oil sardine and mackerel. Extensive trials with various designs of small crafts show that 36' vessel and a skiff will be the smallest sized vessel required for economic purse seining along the south west coast (Varghese 1976). The present investigations based on catch trend show that M-type vessels with 36' were effective for purse seining especially for oil sardine and mackerel. These resources are abundant up to 55 m depth but good concentrations appear most frequently in waters shallower than 30 m (PFP 1976).

ACKNOWLEDGEMENTS

We are grateful to Dr. K. Alagaraja and Mr. G. Venkataraman, C.M.F.R. Institute, Cochcin, for reading the manuscript and offering suggestions.

REFERENCES

DHAWAN, M. RAJINDER. 1978. Purse seine operation and its prospects in Goa. *Abstract No. 7 CMFRI Special publication 5.*

JAYARAJ, M. 1978. Karnataka's break through in diversification of mechanised fishing. *Seafood Export Jour.* 10(1): 5-9.

MENON, M. K. 1971. Purse seining oil sardines from medium vessels. *Souvenir, CIFO.*

P.F.P. 1976. Survey results 1974/75 Pelagic Fisheries Project, *Progress Report* (13): 103 pp.

VARGHESE, C. P. 1973. Purse seining. *Indian Seafood* 1: 12-15.

VARGHESE, C. P. 1976. Introduction of purse seine fishing in Indian coasts — operation from 36' and 57' vessels for sardines and mackerels. *See Food Export Jour.* 8(1): 11-21.