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Perch resources of the shelf waters in the EEZ of India

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ABSTRACT

The present paper deals with the distribution and abundance of perch resources in the Indian EEZ, based on trawling operations by *FORV Sagar Sampada* during cruises 1-90. Perches are available at depths 23-250 m; including the 27 stations along the Andaman Sea these were present in 151 stations. Trawling at depths within 100 m was more productive than beyond 100 m. The species composition also showed different pattern from within 100 m and beyond 100 m depth. The total yield of perches from the bottom trawling operations was 12 tonne with an average catch of 86.67 kg/hr. Though west coast registered a higher catch than the east coast, the catch rate was found to be better from the east coast. Good perch grounds were located between 18° to 20°N and 84° to 87° E at 60-70 m depth off the northeast coast.

INTRODUCTION

Despite the innumerable innovations that have taken place, production from the marine sector is below the estimated assessments of potential yield. In the Exclusive Economic Zone of 2.02×10^6 km², concerted efforts are being made for a better and rational exploitation of the less exploited areas. The present surveys conducted by *FORV Sagar Sampada* are aimed at unravelling the unexploited and underexploited regions of the Indian EEZ. Perches, constituting one of the important components of the demersal resources, offer immense scope for exploitation along the coasts. The present paper deals with the distribution and abundance of perches in the EEZ of India, based on the data collected during cruises 1-90 of *FORV Sagar Sampada*.

MATERIALS AND METHODS

The material for the study was collected by chalute bottom trawl, star model bobbin trawl, large granton trawl and also the CIFT designed High Speed Demersal Trawl (HSDT I-III). Perches were caught from 151 trawling stations in the depth range 23 to 130 m. Total catch, species composition etc, were recorded at each trawling station. The area surveyed was divided into northwest, southwest, northeast, southeast and Andaman and Nicobar regions. Depthwise distribution and abundance was studied by grouping the stations covered under different depth zones of 0-50, 51-100 and 101-150 m. Standing stock was estimated using the swept area method of Gulland (1971).

RESULTS

Distribution of perches in the Indian EEZ

Perches form one of the underexploited demersal finfish resources distributed widely along the shelf and upper slope regions of the EEZ. The average catch rate of perches in the present study was 121.02 kg/hr (Table 1). Fairly high catch rates of 143.51 kg/hr was noticed from the Andaman Sea. The average catch rate from the southwest region was 193.04 kg/hr. The southeast including the Gulf of Mannar yielded a good catch rate of 130 kg/hr; from the northeast coast also fairly good catch rate of 124 kg/hr was obtained. The northwest region was found to be the least productive, with average catch per hour of 39.24 kg.

Geographical abundance

Very high production rate of the order of 900 kg/hr was obtained at depth less than 50 m in the area 7° 49'N and 77°3' off Cape Comorin. Again off Cape Comorin at 07°49'N, 77°10'E, high catch rates of 830 kg/hr were yielded. The highest production rates of 1486 kg/hr and 1640 kg/hr were obtained from 11°44'N, 92°39'E and 19°54'N, 86°46'E respectively. In the shallower depths of up to 50 m, high density pockets were located at stations 11°39'N, 79°54'E, 12°41'N, 80°23'E and

Table 1— Regionwise catch and catch per unit effort (in kg) of perches in the Indian EEZ

Region	Total catch (in kg)	Catch per unit in kg effort
Southwest	6801	193.04
Northwest	961	39.24
Northeast	2511	124.0
Southeast	2340	130.05
Andamans	1839.7	69.2

07°48'N, 77°34'E where the catch rates were 460, 288 and 264 kg/hr respectively. Productive areas were noticed in many stations along the southwestern regions (Table 2) in latitudes 7°, and 8°, where the catch ranged from 300 to 858 kg/hr. At many stations on the Wadge Bank and off Quilon the entire catch was constituted by perches. Off Marmagoa and at 15°N a few stations in the 101-150 m, depth zone 70% of the catch was constituted by perches. Along Ratnagiri coast at few stations 80% of the catch realised was shared by perches. In the Andaman Sea also high density pockets were located at 10°45'N, 92°19'E, 06°42'N, 93°56'E and 11°44'N, 92°46'E where the catch ranged between 300 and 1496 kg/hr. Along the northeast region (Table 3) in the depth zone 51-100 m highly productive areas were located at 18°49'N, 84°47'E, 18°02'N, 84°14'E, 16°04'N, 81°31'E, where the catch per hour ranged between 200 and 310 kg/hr forming 76-78% of the entire catch. In the southeastern region, in the Gulf of Mannar, off Madras and Cuddalore, good perch grounds were located mostly in the 51-100 m depth zone where the catch constituted exclusively of perches. At 14°11'N, 80°22'E the catch per hour obtained was 402 kg/hr and at 12°41'N, 80°23'E, it was 288 kg/hr and at 12°41'N, 80°23'E, it was 288 kg/hr, also at 10°30'N and 80°14'E the catch rate recorded was 256 kg/hr. Off Paradeep in the depth zone 51-100 m, 76-78% of the trawl net catch was shared by this resource. In the Andaman Sea at 10°45'N, 92°19'E (Table 4) 98% of the catch was constituted by perches.

Depthwise distribution and abundance

From the present study, it could be discernible that 99.5% of the perch resources were obtained from 0-100 m depth strata. To be more precise, it was observed that catch was higher from the 51-100 m zone, than from the 0-50 m zone.

Along the southwest coast (Table 2) which includes the Wadge Bank and the Quilon Bank, 29.8% of the perch production was from the shallow regions of up to 50 m, 64.8% came from 51-100 m depth range and 6.2% from the deeper parts of the continental shelf. The highest catch rate of 900 kg/hr in the 0-50 m depth was obtained from the Wadge Bank; catch rates varying from 200 to 265 kg/hr were also obtained from depths 35 m and 45 m along the shallower parts of Quilon Bank and Wadge Bank. Yield was found to be better in the 51-100 m zone on the southwest coast (Table 2). The maximum catch rate of 850 kg/hr was observed in this depth zone on the Wadge Bank, from the Quilon Bank and from the rocky patches off Ponnani catch rates up to 420 kg/hr and 248 kg/hr respectively were obtained at the same depth zone. Off Karnataka, fairly dense concentrations of 300 kg/hr were noticed from depth up to 100 m.

On the northwest coast almost the entire catch came from the 51-100 m depth zone. The southeast zone showed fairly good catch (34.74%) from the shallower coastal waters up to 0-50 m. (Table 3) 64.8% was from 51-100 m beyond this depth the perch grounds were located in the shallow coastal waters up to 50 m depth off Cuddalore,

Table 2—Latitudewise abundance (in kg) of perches of the western half of Indian EEZ at different depth zones

Latitude	<i>Lutjanus</i> spp	<i>Lethrinus</i>	Serranids	<i>Plectorhynchus</i>	Other perches	Total
<i>Southwest coast</i>						
<i>Depth 0-50 m</i>						
7°	147	201	468	750	-	1566
8°	41	141	135	-	-	317
9°	41	-	-	2	-	2
13°	30	-	35	150	-	225
<i>Depth 51-100 m</i>						
7°	835	632	433	329	-	2229
8°	126	472	587	169	-	1354
9°	5	-	47	-	-	52
11°	-	-	300	-	-	300
12°	-	-	39	-	-	39
13°	25	-	35	-	-	60
14°	-	-	500	-	-	500
<i>Depth 101-150 m</i>						
8°	-	-	9	17	-	26
13°	18	-	6	-	-	24
15°	-	-	398	-	-	389
<i>Northwest coast</i>						
<i>Depth 0-50 m</i>						
18°	-	-	-	19	-	19
<i>Depth 51-100 m</i>						
15°	4	-	-	1	-	4
16°	-	-	254	1	-	255
17°	25	-	88	-	-	113
18°	-	-	241	-	-	241
19°	-	-	35	-	-	35
20°	-	-	-	-	47	47
21°	-	-	-	-	21	21
22°	-	-	60	-	-	60
23°	-	-	6	-	-	6
<i>Depth 101-150 m</i>						
16°	-	-	23	-	-	23

Table 3— Latitudewise abundance (in kg) of perches on the Eastern side of Indian EEZ at different depth zones

Latitude	<i>Lutjanus</i>	<i>Lethrinus</i>	Serranids	<i>Plectorhynchus</i>	Other perches	Total
<i>Southeast coast</i>						
<i>Depth 0-50 m</i>						
8°	18	10	46	1	-	74
10°	3	-	29	-	18	50
11°	70	350	40	-	-	460
12°	204	-	-	-	90	294
13°	16	25	1	30	-	72
14°	-	-	-	-	-	-
<i>Depth 51-100 m</i>						
7°	-	-	-	200	-	200
10°	93	193	17	264	270	837
11°	-	-	-	-	50	50
13°	106	18	4	-	18	146
14°	251	102	96	-	60	509
15°	-	32	-	-	-	32
<i>Depth 101-150 m</i>						
10°	14	-	-	-	-	14
<i>Northeast coast</i>						
<i>Depth 0-50 m</i>						
15°	2	3	-	-	-	5
16°	40	-	-	12	3	55
17°	-	-	-	-	17	17
18°	-	-	-	-	4	4
19°	120	-	-	72	-	192
20°	-	-	-	38	-	38
<i>Depth 51-100 m</i>						
16°	91	15	38	113	5	262
17°	16	-	-	102	-	118
18°	158	70	322	110	8	668
19°	1640	372	10	60	25	2107

Table 4— Latitudewise abundance (in kg) of perches in the Andaman-Nicobar region at different depth zones

Latitude	<i>Lujanus</i>	<i>Lethrinus</i>	Serranids	<i>Plectorhynchus</i>	Other perches	Total
<i>Depth 0-50 m</i>						
12°	-	11	-	6	-	17
13°	9	24	38	1	0.5	72.5
<i>Depth 51-100 m</i>						
6°	7	271	-	48	3	329
8°	87	7	10	-	-	104
10°	242.5	427	-	22	6	697.5
11°	1480	24	-	5	80	1589
12°	115	-	168	-	27	310
13°	91	335	96	227	-	749
<i>Depth 101-150 m</i>						
12°	-	-	7	-	-	7

Pondicherry with catch varying from 250 to 460 kg/hr. Catch rates up to 350-400 kg/hr were obtained in 51-100 m depths off Point Calimer and off Madras.

From the northeastern region 91% of the total perches caught were from the 51-100 m. Stations with dense populations of perches were located in the depth zone 51-100 m off Gopalpur and Paradeep coasts. The maximum catch rate of 1640 kg/hr was located in this depth belt.

Along the Andaman-Nicobar Sea, dense populations of perches abounded in the deeper waters. A total perch production of 3.87 tonne was obtained from this region, of which 97.5% came from the 51-100 m depth zone. A very high catch rate of 1496 kg/hr was obtained from the 51-100 m zone off south Andamans. Dense perch populations abounded off Little Andamans, south Andamans and north Andamans.

Seasonwise abundance

The seasonwise distribution shows that (Table 5) along the southwest coast in the shallower depth of up to 50 m, perches were abundant during January to March and also during July to September. Dense populations occurred in the deeper waters of 51-100 m zone from July to December period. In the depth zone 101-150 m also this resource was present in fairly good quantity during October-December months. Along the northwestern region fairly good catches were recorded only from July up to December, in the 51-100 m depth zone.

On the southeastern parts of the Indian EEZ (Table 6) the distribution showed a different seasonal pattern. The resource was fairly abundant in the shallower waters

Table 5— Seasonal abundance (in kg) of perches along the western half of the Indian EEZ

	Southwest coast					Northwest coast						
	<i>Lut-janus</i> spp	<i>Lethrinus</i> spp	<i>Serranus</i> spp	<i>Plecto-rhynchus</i>	Other perches	Total	<i>Lut-janus</i> spp	<i>Lethrinus</i> spp	<i>Serranus</i> spp	<i>Plecto-rhynchus</i>	Other perches	Total
	0-50 m						0-50 m					
Jan-Mar	60	100	15	900	-	1075	-	-	-	-	-	-
Apr-Jun	-	-	-	2	-	2	-	-	-	-	-	-
Jul-Sep	117	201	621	-	-	939	-	-	-	-	-	-
Oct-Dec	41	41	12	-	-	94	-	-	-	19	-	19
	51-100 m						51-100 m					
Jan-Mar	5	10	467	-	-	575	4	-	1	-	-	5
Apr-Jun	33	-	84	35	-	152	-	1	-	-	-	-
Jul-Sep	45	35	1016	-	-	1096	25	-	484	1	-	510
Oct-Dec	908	1059	374	463	-	3900	-	-	199	-	68	267
	101-150 m						101-150 m					
Jan-Mar	18	-	9	-	-	27	-	-	-	-	-	-
Apr-Jun	-	-	-	-	-	-	-	-	-	-	-	-
Jul-Sep	-	-	20	-	-	20	-	-	-	-	-	-
Oct-Dec	-	-	375	17	-	392	-	-	-	-	-	-
	150 and above						150 and above					
Jan-Mar	3	-	-	-	-	3	-	-	23	-	-	23
Apr-Jun	-	-	-	-	-	-	-	-	-	-	-	-
Jul-Sep	-	-	-	-	-	-	-	-	-	-	-	-
Oct-Dec	-	-	-	-	-	-	-	-	-	-	-	-

Table 6— Seasonable abundance (in kg) of perches in the eastern Gulf of the Indian EEZ

	Southeast coast					Northeast coast						
	<i>Lutjanus</i> spp	<i>Lethrinus</i> spp	<i>Serranus</i> spp	<i>Plecto- rhyneus</i>	Other perches	Total	<i>Lutjanus</i> spp	<i>Lethrinus</i> spp	<i>Serranus</i> spp	<i>Plecto- rhyneus</i>	Other perches	Total
	Depth 0-50 m					Depth 0-50 m						
Jan-Mar	70	350	65	-	24	587	-	-	-	38	23	61
Apr-Jun	204	-	-	-	84	288	42	3	12	-	1	57
Jul-Sep	21	10	50	-	-	81	120	-	-	72	-	192
Oct-Dec	16	25	1	-	30	72	Depth 51-100 m					
	Depth 51-100 m					Depth 51-100 m						
Jan-Mar	37	-	100	-	18	155	126	387	49	281	33	376
Apr-Jun	240	150	17	240	110	757	-	-	35	40	-	75
Jul-Sep	110	105	-	200	201	616	1779	70	286	64	-	2199
Oct-Dec	63	90	-	24	69	246	Depth 101-150 m					
	Depth 101-150 m					Depth 101-150 m						
Jan-Mar	-	-	-	-	-	-	-	-	-	-	-	-
Apr-Jun	-	-	-	-	-	-	-	-	-	-	-	-
Jul-Sep	-	-	-	-	-	-	-	-	-	-	-	-
Oct-Dec	-	-	-	-	14	14	-	-	-	-	-	-

Table 7— Seasonal abundance (in kg) of perches on the Andaman-Nicobar area

Months	<i>Lutjanus</i> spp	<i>Lethrinus</i> spp	<i>Serranus</i> spp	<i>Plectorhynchus</i> spp	Other perches	Total
0-50 m						
Jan-Mar	-	-	-	-	-	-
Apr-Jun	9	35	38	7	0.5	88.5
Jul-Sep	-	-	-	-	-	-
Oct-Dec	-	-	-	-	-	-
51-100 m						
Jan-Mar	174	46	10	4	78	312
Apr-Jun	93.5	342	96	232	6	769.5
Jul-Sep	211	-	-	22	-	233
Oct-Dec	1544	676	168	44	44	2464
101-150 m						
Jan-Mar	-	-	-	-	-	-
Apr-Jun	-	-	-	-	-	-
Jul-Sep	-	-	-	-	-	-
Oct-Dec	-	-	7	-	-	7

of up to 50 m during the first half of the year. Fairly dense populations of perches were available during April-September period in the 51-100 m depth zone. In the north-eastern region resource abundance was noticed in January-March and October-December months. The same trend in seasonal abundance was observed in the Andaman region also (Table 7). In the depth zone 51-100 m fairly high density of population of perches was observed in the months January-March and October-December.

Species composition

The major species of perches in the present study included *Lutjanus johri*, *L. guikheri*, *L. rivulatus*, *L. lineolatus*, *Lutjanus* sp. *Lethrinus nebulosus*, *Lethrinus* spp, *Pristipomoides types*, *P. multidens*, *P. filamentosus*, *Epinephelus diacanthus*, *E. tauvina*, *E. chlorostigma*, *Epinephelus* sp. *Argyrops spinifer*, *Plectorhynchus lineatus*, *P. diagramme*, *P. cressipinna*, *Diagramma pictum* etc. In the southwestern region in the depth zone 0-50 m, *Plectorhynchus* spp were abundant during January-March, which migrated to the deeper realms of 51-100 m during October-December. In the depth zone 0-50 m *Lutjanus* spp, *Lethrinus* spp and

Serranus spp though present in good quantity during July-September, these occurred in fairly dense proportions in the deeper zone of 51-100 m during the October-December.

Along the southeast coast, perches of family Serranidae were comparatively less. *Lethrinus* spp and *Lutjanus* spp were abundant in the shallower depths of 0-50 m during January-March and April-June, whereas fairly good quantities were obtained during April-June and July-September in the 51-100 m depth zone. Along the north-east coast *Lutjanus* spp occurred in the 0-50 m depth zone during October-December. In the Andaman Sea, 51-100 m depth zone had good concentrations of *Lutjanus* spp during October-December.

Standing stock

Standing stock of perches estimated by the swept area method for the entire EEZ was 6870 tonne/km² in the present study. It was 2090 tonne/km² in the 0-50 m depth zone, 4400 tonne/km² in 51-100 m-depth whereas this was only 330 tonne/km² in depths beyond 100 m. West coast had the maximum standing stock of perches compared to the other four regions in the entire EEZ.

DISCUSSION

Exploratory surveys conducted earlier have indicated the existence of underexploited resources of perches in the middle and outer shelf along both Arabian Sea and Bay of Bengal (Silas, 1969; Menon & Joseph, 1969; Joseph et al. 1987; Sudarsan et al. 1989). As observed by Joseph & John (1986) and James et al. (1986) perches offer immense scope for increased exploitation along both east and west coasts.

An evaluation of the relative abundance of perches in the different depth zones indicate the availability of this resource in fairly dense quantities in the 51-100 m depth zone in the EEZ of India. The same pattern was observed by Sudarsan et al. (1989) and Ninan et al. (1992) during the survey conducted by the Fisheries Survey of India vessels in the EEZ up to a depth of 300 m. The present study shows that along the southeastern parts of the Indian EEZ the resource was abundant in the shallower waters up to 50 m during January-June months. They seem to migrate into deeper waters of 51-100 m during April-September months. As observed by Joseph & John (1986) in the present study also it was observed that dense populations of perches occurred in the 51-100 m depth zone along the southwestern region during July-December months. Along the Andaman region the resource was abundant during January-March and October-December period. Similar pattern of abundance was noticed along the northeastern parts also. Very high density pockets were located along the northeastern parts and in the Andaman area during the present study. In many of these areas, the catch constituted exclusively of perches. This resource with judicious management policies offer very good scope for exploitation.

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