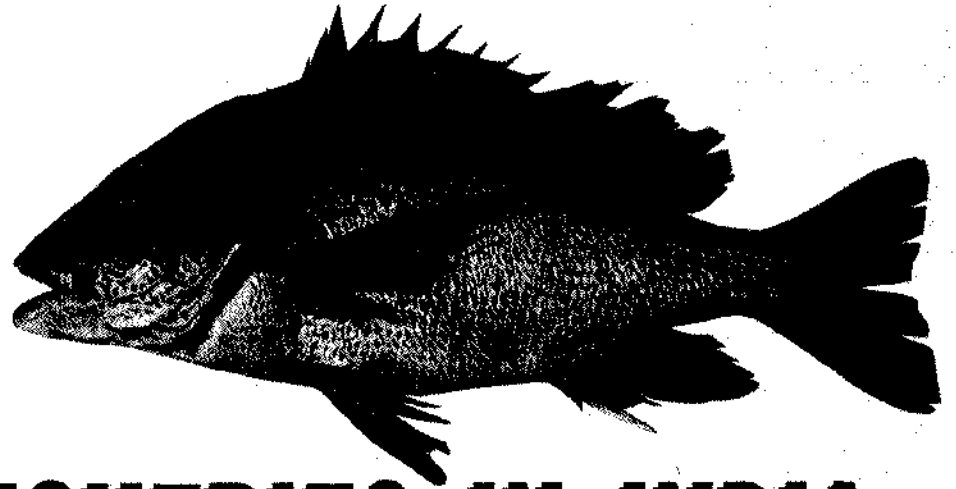
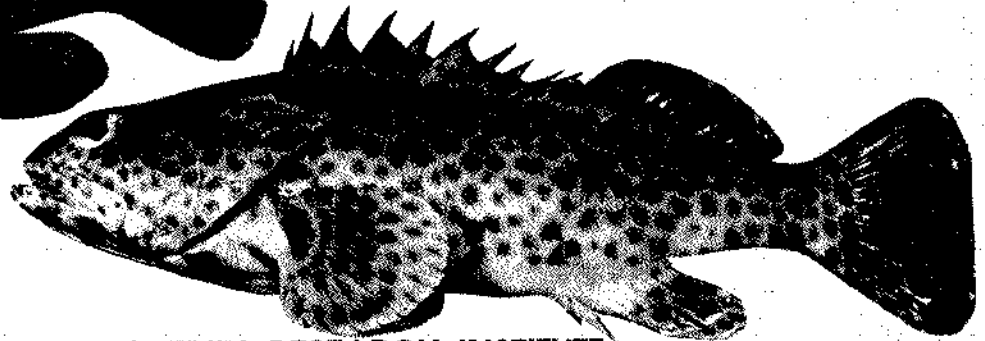
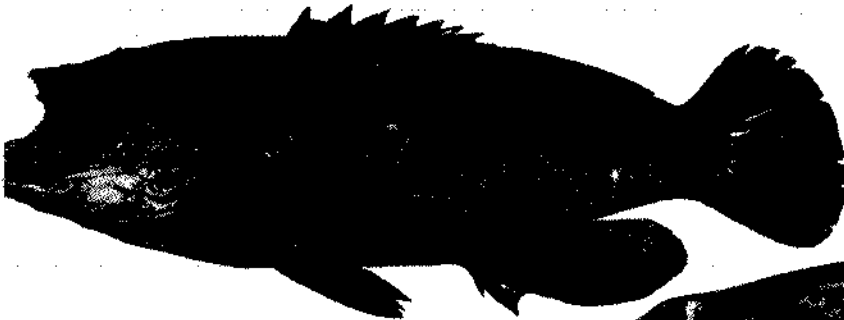


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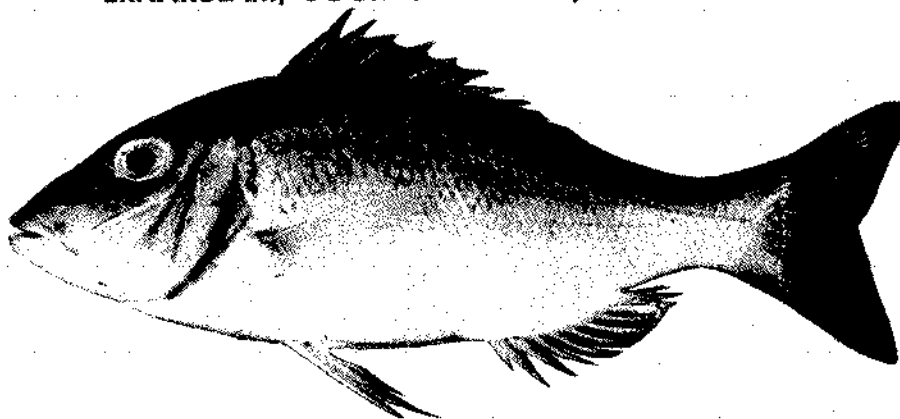


# **PERCH FISHERIES IN INDIA**



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## THE PRESENT STATUS OF 'MAJOR PERCH' FISHERIES IN INDIA

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### ABSTRACT

The fisheries belonging to Families Serranidae, Lutjanidae and Lethrinidae are popularly known as Rock-cods, Snappers and Pig-face breams respectively and are collectively termed as 'Major Perches'. They form about 12% of the perch catch with an annual landing of 10,336 tonnes constituted by rock-cods (41.3%), snappers (35.4%) and pig-face breams (23.3%). Bulk of the catch comes from Tamil Nadu (42.4%), Maharashtra (18.9%) and Kerala (14.8%). Gujarat and Andhra Pradesh support respectively 9.5% and 9.3% of the catch. The remaining catch is shared by Karnataka, Orissa, Pondicherry and Goa. Lethrinids do not form appreciable fishery in the northern States and in the southern States there exists a multispecies fishery for all the three major perch groups. Trawl net accounts for 42% of the catch and the rest of the quantity is contributed by 'other mechanised' and nonmechanised units equally. The peak fishery season is from October to April. The results of the studies particularly on fisheries and fishing grounds carried out during various exploratory surveys and other cruises are discussed in this account.

### INTRODUCTION

Perch-like fishes available in Indian waters are represented by more than 20 families. Commercially important ones come under the Families Serranidae, Lutjanidae, Lethrinidae, Nemipteridae, Priacanthidae, Sparidae, Acanthuridae and Siganidae. Of these, fishes belonging to the first three families, popularly known as rock-cods, snappers and pig-face breams, grow to large sizes and have good market both in India and abroad. Because of their economic importance they are being exploited intensively and their landings have shown marked increase in recent years. An attempt is made here to examine their present level of exploitation on all India basis to suggest ways to improve their production.

Literature so far available on this important resources in India is scanty and inadequate in general. They deal with some aspects of experimental fishing (John, 1948\*; Chidambaram and Rajendran, 1951; Gopinath, 1954; Silas, 1969; Bapat *et al.*, 1982; Anon., 1978), catch statistics (Chacko and Rajendran, 1955; Rao, 1973; Madan Mohan, 1983; Rao and Kasim, 1985; Kasim *et al.*, 1989) and perch-trap fishery (Prabhu, 1954; Lal Mohan, 1985).

\* For full reference, please see page 134.

### DATA BASE

Fishery data collected by the Fishery Resources Assessment Division of the Central Marine Fisheries Research Institute for the period 1985-89 were utilised for the present study. Even though the data collected is for the entire group; only rock-cods, snappers and pig-face breams are described here in detail. These three groups together are called 'Major Perches' in this account considering their large size and economic importance.

### PERCH FISHERY IN GENERAL

Average perch landings in India have been estimated at 89031.8 tonnes per year and they form about 5% of total fish catch of the country (Fig. 1 a). Bulk of the perch landings (60%) come from two southern States *viz.* Kerala and Tamil Nadu (Fig. 1 b) contributing respectively 37627.8 t (42.3%) and 15648.8 t (17.6%) to the perch fisheries. Among the other States perch landings are notably good in Maharashtra and Gujarat. They produce 10994.4 t (12.3%) and 7580.4 t (8.5%) of perches annually and occupy respectively third and fourth places. Of the remaining States, Andhra Pradesh and Karnataka have reasonable production of perch

and they take the fifth and sixth places by producing 6864.4 t (7.7%) and 6177.4 t (6.9%) respectively per year. The remaining perch catch of 4138.6 t is being shared by Orissa (1845.2 t). Statewise average perch landings and all fish landings are given in Table 1.

and Gujarat. East coast's contribution is only 37627.8 t annually.

Perch fishery in India is dominated by the group threadfin-bream with landings of 53365 t annually and forms 59.9% of the total perch catch

TABLE 1. Statewise average (1985 - '89) landings (tonnes) of perches and other fishes

	West Bengal	Orissa	Andhra Pradesh	Tamil Nadu	Pondicherry	Kerala	Karnataka	Goa	Maharashtra	Gujarat	Total
Rock cods	--	10.2	40.2	1427.2	4.0	783.6	311.6	42.2	1174.8	471.8	4265.6
Snappers	--	57.0	924.2	864.0	24.6	517.0	15.8	16.6	775.6	459.4	3654.2
Pig-face breams	--	0.8	--	2093.6	20.8	233.4	1.8	12.8	5.2	47.8	2416.2
Threadfin breams	--	400.0	1623.4	5287.8	410.0	30716.0	3617.8	800.6	6981.4	3527.2	53365.0
Other perches	100.2	1377.2	4276.6	5976.2	391.6	5377.8	2230.4	469.2	2057.4	3074.2	25330.8
Total perches	100.2	1845.2	6864.4	15648.8	851.8	37627.8	6177.4	1341.4	10994.4	7580.4	89031.8
Total fish catch	22238.2	51135.2	131368.4	264655.0	13912.2	425705.6	198423.0	76008.4	322835.0	263097.4	1769378.4

TABLE 2. Statewise and quarterwise average landings (t) of perches (percentage in parenthesis)

States	I quarter	II quarter	III quarter	IV quarter	Total
West Bengal	32.2 (32.1)	3.0 (3.0)	5.8 (5.8)	59.2 (59.1)	100.2
Orissa	768.6 (41.6)	104.6 (5.7)	123.0 (6.7)	849.0 (46.0)	1845.2
Andhra Pradesh	2552.2 (37.2)	1940.0 (28.3)	1245.0 (18.1)	1127.2 (16.4)	6864.4
Tamil Nadu	3388.6 (21.7)	4220.8 (27.0)	5123.0 (32.7)	2916.0 (18.6)	15648.8
Pondicherry	209.0 (24.5)	217.0 (25.5)	287.2 (33.7)	138.6 (16.3)	851.8
Kerala	7318.0 (19.4)	3745.2 (10.0)	21566.0 (57.3)	4998.6 (13.3)	37627.8
Karnataka	3246.8 (52.6)	1732.6 (28.0)	143.0 (2.3)	1055.0 (17.1)	6177.4
Goa	872.8 (65.0)	322.0 (24.0)	45.0 (3.4)	101.6 (7.6)	1341.4
Maharashtra	3265.0 (29.7)	2948.0 (26.8)	929.4 (8.5)	3852.0 (35.0)	10994.4
Gujarat	3210.0 (42.3)	878.4 (11.6)	815.2 (10.8)	2676.8 (35.3)	7580.4
Total	24863.2 (27.9)	16111.6 (18.1)	30283.0 (34.0)	17774.0 (20.0)	89031.8

Among the two coasts, west coast produces 63721.4 t of perches amounting to 71.6 % of the total perch catch (Fig. 2 a). This is mainly due to good catch experienced in Kerala, Maharashtra

(Fig. 2 c). The 'other perches' representing sixteen families constitute about 28.5% of the catch. Remaining 11.6% of the catch relates to 'major perches' such as rock-cods, snappers; and pig-face breams.

TABLE 3. Statewise and quarterwise average landings (t) of 'major perches' (percentage in parenthesis)

States	I quarter	II quarter	III quarter	IV quarter	Total
West Bengal	---	---	---	---	---
Orissa	15.6 (22.9)	20.6 (30.3)	2.8 (4.1)	29.0 (42.7)	68.0
Andhra Pradesh	341.6 (35.4)	220.8 (22.9)	200.4 (20.8)	201.6 (20.9)	964.4
Tamil Nadu	1623.4 (37.0)	992.6 (22.6)	1011.4 (23.1)	757.4 (17.3)	4384.8
Pondicherry	26.2 (53.0)	6.0 (12.1)	14.6 (29.6)	2.6 (5.3)	49.4
Kerala	1176.4 (76.7)	36.8 (2.4)	48.2 (3.1)	272.6 (17.8)	1534.0
Karnataka	162.4 (49.3)	27.6 (8.4)	8.8 (2.7)	130.4 (39.6)	329.2
Goa	42.0 (58.7)	6.8 (9.5)	13.4 (18.7)	9.4 (13.1)	71.6
Maharashtra	397.2 (20.3)	240.4 (12.3)	217.8 (11.1)	1100.2 (56.3)	1955.6
Gujarat	367.4 (37.5)	75.4 (7.7)	11.0 (1.1)	525.2 (53.7)	979.0
Total	4152.2 (40.2)	1627.0 (15.7)	1528.4 (14.8)	3028.4 (29.3)	10336.0

TABLE 4. Species of 'major perches' reported from different States

States	Family SERRANIADAE Rock cods, Groups, etc.	Family LUTJANIDAE Snappers, Sea perch, Bass, etc.	Family LETHRINIDAE Pig-face breams, Emperors Long eye, etc.
West Bengal	Species not known	Species not known	Species not known
Orissa	"	"	"
Andhra Pradesh	"	"	"
Tamil Nadu	<i>Epinephelus tauvina</i> , <i>E. malabaricus</i> , <i>E. undulosus</i> , <i>E. areolatus</i> , <i>E. merra</i> , <i>E. fasciatus</i> , <i>E. sonnerati</i> , <i>E. bleekeri</i> , <i>E. diacanthus</i> .	<i>Lutjanus rivulatus</i> , <i>L. malabaricus</i> , <i>L. fulviflamma</i> , <i>L. kasmira</i> , <i>L. arg-</i> <i>entimaculatus</i> , <i>L. waigiensis</i> , <i>L. lineolatus</i> , <i>L. decussatus</i> , <i>L. gibbus</i> , <i>Pristipomoides typus</i> .	<i>Lethrinus nebulosus</i> , <i>L. miniatus</i> , <i>L. mahsenoides</i> , <i>L. reticulatus</i> , <i>L. harrak</i> , <i>L. elongatus</i> .
Kerala	<i>Epinephelus diacanthus</i> , <i>E. chloro-</i> <i>stigma</i> , <i>E. boenack</i> , <i>E. areolatus</i> , <i>E. bleekeri</i> , <i>E. fasciatus</i> , <i>E. flavo-</i> <i>caeruleus</i> , <i>E. hexageenatus</i> , <i>E. merra</i> , <i>E. morrhua</i> , <i>E. tauvina</i> , <i>E. sonnerati</i> , <i>Plectropomus maculatus</i> , <i>Promicrops</i> <i>lanceolatus</i> .	<i>Lutjanus biguttatus</i> , <i>L. rivulatus</i> , <i>L. argentimaculatus</i> , <i>L. gibbus</i> , <i>L. johni</i> , <i>L. lineolatus</i> , <i>L. quinquei-</i> <i>lineatus</i> , <i>L. russelli</i> , <i>L. malabari-</i> <i>cus</i> , <i>Pristipomoides typus</i> , <i>P. fila-</i> <i>mentosus</i> , <i>Pinjalo pinjalo</i> .	<i>Lethrinus nebulosus</i> , <i>L. elongatus</i> , <i>L. reticulatus</i> , <i>L. lentjan</i> , <i>L. elon-</i> <i>gatus</i> , <i>L. microdon</i> , <i>L. ornatus</i> , <i>L. mahsenoides</i> .
Karnataka	Species not known	<i>Lutjanus argentimaculatus</i> , <i>L. rivu-</i> <i>latus</i> .	Species not known
Goa	"	Species not known	"
Maharashtra	<i>Epinephelus diacanthus</i> , <i>E. fasciatus</i> , <i>E. chlorostigma</i> , <i>E. areolatus</i> , <i>E. mala-</i> <i>baricus</i> , <i>E. caeruleopunctatus</i> , <i>Prom-</i> <i>microps lanceolatus</i> , <i>Serranus gram-</i> <i>mieus</i> .	<i>Lutjanus johni</i> , <i>L. argentimaculatus</i> , <i>L. lutjanus</i> , <i>L. malabaricus</i> , <i>L. sanguineus</i> , <i>L. waigiensis</i> .	Species not known
Gujarat	<i>Epinephelus diacanthus</i> , <i>E. salmnoi-</i> <i>des</i> , <i>E. fasciatus</i> .	<i>Lutjanus russelli</i> , <i>L. malabaricus</i> , <i>L. johni</i> .	Species not known

In general, peak landings of perch-like fishes in India are observed in the third quarter

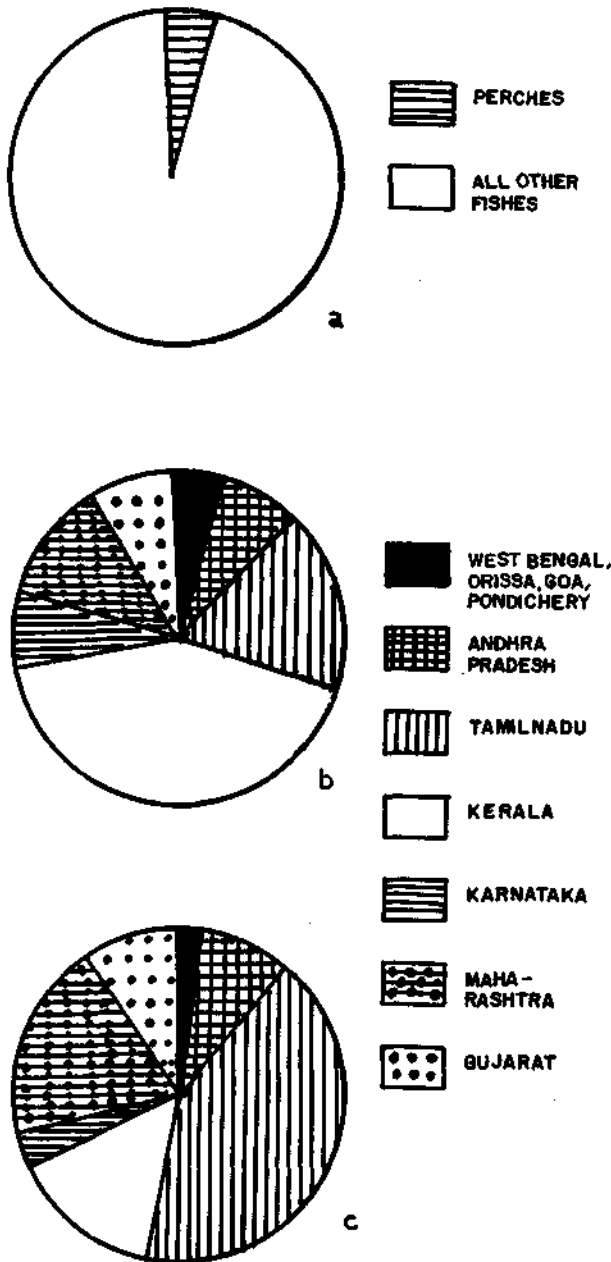


Fig. 1 a. Percentage of perches in the total fish catch of India (Average of 1985-'89), b. Statewise contribution (%) of the perches and c. major perches (%).

(Fig. 2e). This trend is seen in Kerala, Pondicherry and Tamil Nadu where 57.3%, 33.7% and 32.7% of the perch catch are recorded respectively during the third quarter. In West Bengal and Orissa and in Maharashtra peak perch fishery is on the fourth quarter. In the other States it is seen in the first

quarter. Second quarter appears to be a lean season for this resource in West Bengal, Orissa and Kerala and third quarter for Karnataka, Goa, Maharashtra and Gujarat. In Andhra Pradesh, Tamil Nadu and Pondicherry the lean period is the fourth quarter (Table 2).

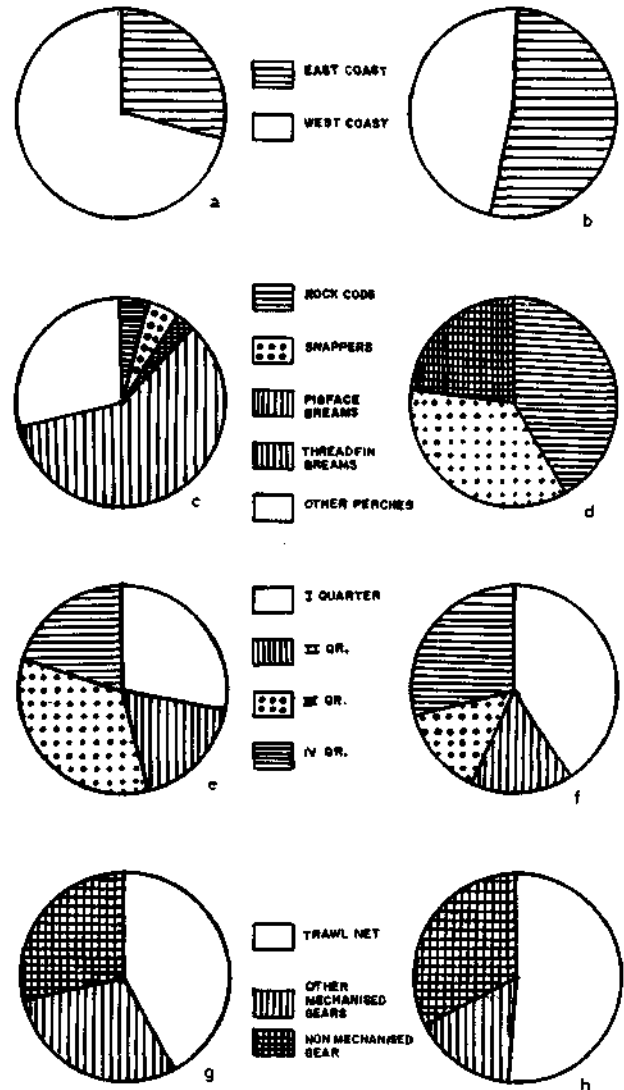


Fig. 2. Average (1985-'89) landings (%) of perches and major perches : a and b. Contribution by east and west coasts - a. perches and b. major perches; c and d. Groupwise contribution - c. perches and d. major perches; e and f. Quarterwise landings - e. perches and f. major perches; g. Gearwise contribution of major perches and h. Catch per effort of major perches.

### MAJOR PERCHES

The average annual production of major perches during 1985-89 period has been esti-

mated at 10336.0 t and it formed 11.7% of the total perch and 0.6% of the total all fish catch of the country (Fig. 3). Their representation to

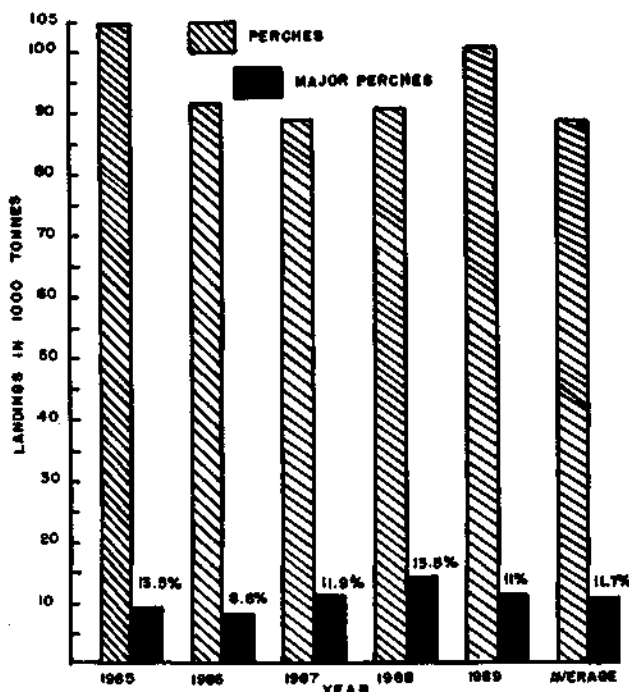


Fig. 3. Annual landings (1000 t) of perches and major perches in India during 1985 - '89 with percentage contribution of major perches.

the perch fishery is more in the east coast than in the west coast. Major perches formed 21.6% (4466.6 t) of the total perch catch in the east coast and 7.6% (4869.4 t) in the west coast (Fig. 2 b). The three groups, rock-cods, snappers and pig-face breams form respectively 41.3%, 35.4% and 23.3% of the total major perch landings of the country (Fig. 2 d). In general the peak landing falls during the fourth and first quarter periods when the sea is comparatively calm with good clarity of water (Fig. 2 f).

#### State-wise landings of major perches

Tamil Nadu ranks first in the production of major perches when compared to other States (Table 3). It produces 4384.8 t annually forming 42.4% of the major perch landings of India. There is fishery throughout the year with peak landings during first quarter forming 37.0% of the year's catch. Same trend is seen for individual groups also. There is fishery for all

the three groups in this State and their landings are estimated at 1427.2 t, 864.0 t and 2093.6 t respectively for rock-cods, snappers and pig-face breams.

Maharashtra comes second by producing 1955.6 t of major perches annually and it forms 18.9% of the group's landings (Table 3). About 56% of the catch are landed in fourth quarter and the rest during the other three periods. Rock-cods form 60% of the catch by landing 1174.8 t which is followed by snappers amounting to 775.6 t (39.7%). About five tonnes of pig-face breams are landed in Maharashtra annually (Table 1). Peak landing is observed in the fourth quarter for rock-cods (55.4%) and snappers (58.8%) and in the third quarter for the pig-face breams (57.7%).

By producing 1534 t of major perches annually, Kerala occupies the third place and its contribution forms 14.8% of the total catch. Like Maharashtra, in Kerala also rock-cods dominate the catch (51.1%). Snappers and pig-face breams constitute respectively 33.7% and 15.2% of the catch of major perches. January to March period records about 77% of the year's catch and the fourth quarter has about 18% of the catch. The lean period is from April to September and lands 5% of the catch. Almost the same seasonality is observed for all three groups in Kerala (Table 3).

Fourth and fifth places are held by Gujarat and Andhra Pradesh by producing respectively 979 t (9.5%) and 964.4 t (9.3%) of the major perches annually. In Gujarat the season extends from October to March for all groups, whereas in Andhra Pradesh it is first quarter for snappers (36.3%) and third quarter for rock-cods (35.3%). Fishes from all three groups form fishery in Gujarat. But in Andhra Pradesh main fishery is by snappers (95.8%) and the rest (4.2%) by rock-cods.

Karnataka's share to this resource is only 3.2% with annual average landings of 329.2 t. Perch season extends from October to March contributing 89% of the year's catch. Rock-cods are dominant in Karnataka (Table 3). Snappers deviate from the other two groups in their season of occurrence. While for rock-cods and pig-face breams the season extends from October

to March, for snappers it is in the fourth quarter. The other periods witness only stray landings.

States, it is not advisable to attempt on the distribution of each species on an all India basis. However, with the available information it is

TABLE 5. Gearwise contribution (%) of 'major perches'

State	Rock cods			Snappers			Pig-face breems		
	TN	OM	NM	TN	OM	NM	TN	OM	NM
Andhra Pradesh	41.9	--	58.1	5.4	10.7	83.9	--	--	--
Tamil Nadu	10.8	51.8	37.4	8.6	24.5	66.9	23.3	18.8	57.9
Kerala	4.5	91.5	4.0	4.4	92.4	3.2	--	91.2	8.8
Karnataka	98.3	0.2	1.5	89.5	10.5	--	--	--	100.0
Maharashtra	94.5	4.1	1.4	94.2	5.4	0.4	--	50.0	50.0
Gujarat	79.8	18.9	1.3	83.1	12.5	4.4	96.6	3.4	--
Average	55.0	27.8	17.2	47.5	26.0	26.5	20.0	27.2	36.1

TN = Trawl net; OM = Other mechanised unit; NM = non-mechanised unit.

About 2% of the catch representing all the groups come from Orissa (0.7%), Pondicherry (0.5%), Goa (0.7%) and West Bengal's contribution is nil to this resource. The season being October to December for Orissa and January to March for Pondicherry and Goa (Table 3).

#### Species composition

Some information is available on the species composition of major perches from Kerala, Tamil Nadu, Maharashtra and Gujarat (Table 4). In general the areas between

seen that lethrinids do not form appreciable fishery in the northern States and in the southern States there exists a multispecies fishery for all three major perch groups.

#### Gear-wise contribution

Major portion of the catch of major perches in India is by trawl net. Trawl net accounts for 42% of the total catch (Fig. 2 g). It is predominant in Gujarat, Maharashtra and Karnataka (Table 5). The 'other mechanised' and non-mechanised fishing units contribute equally

TABLE 6. Catch (kg) per effort (unit) for the 'major perches'

States	Rock cods			Snappers			Pigface breems		
	TN	OM	NM	TN	OM	NM	TN	OM	NM
Andhra Pradesh	0.30	--	0.02	0.50	2.70	0.30	--	--	--
Tamil Nadu	0.24	1.13	0.12	0.11	0.32	0.15	0.91	0.72	0.32
Kerala	0.09	0.90	0.04	0.08	0.70	0.03	--	0.10	0.01
Karnataka	1.60	0.01	0.04	0.06	0.02	--	--	--	0.02
Maharashtra	6.7	0.10	0.10	4.40	0.09	0.02	--	0.03	0.01
Gujarat	1.6	0.08	0.03	3.00	0.06	0.02	0.70	0.06	0.05
Average	1.75	0.37	0.06	1.36	0.65	0.10	0.81	0.22	0.08

TN = Trawl net; OM = Other mechanised unit; NM = non-mechanised unit.

Vizhinjam and Kanyakumari in west coast and Kanyakumari and Rameswaram in east coast are known for their multispecies fishery of major perches. In the absence of a full list for all

(29% each) to the resource. Of these two categories of units the former's contribution to the catch is more in Kerala and the latter's in Tamil Nadu and Andhra Pradesh. About 55% of

rock-cods and 47.5% of snappers are landed by trawl nets. In the case of pig-face breams 43% and 33% respectively are landed by non-mechanised units and other mechanised units (Table 5). The data from Orissa, Pondicherry and Goa could not be compared, because of their inadequate nature.

'Other mechanised' and 'non-mechanised' units consist of a variety of gear such as handline, longline, bottom set gill net, drift gill net, boat seine, shore seine, baited basket traps, etc. and are known by a variety of local names. Among the indigenous gears, longline, bottom set gill net and traps play a major role in the exploitation of major perches in India especially in Tamil Nadu and Kerala. Though prohibited, dynamite fishing is attempted secretly in places like Vizhinjam when perches congregate near the shore in the rocky beds.

The catch per effort estimated for different categories of units for the three groups of fishes are given in Table 6. The catch per effort obtained now is not encouraging as it rarely crosses the 1 kg limit. The reason for this poor recording is due to the fact that in all the above categories of units perches occur as bycatch and effort given is for the whole year without considering the perch season. If the data for the perch season alone and the units exclusively used for the exploitation of major perches are calculated separately a better picture will emerge. Madan Mohan (1983) while describing the 'Kalava' fisheries of Pulluvilai in Kerala reports a maximum CPUE of 50.11 kg for hooks and line during January 1980.

#### MARKETING

At present there exists good export market for major perches. Because of this the practice of auctioning the catch in the landing centre has been stopped in many places. Like prawn and cuttlefish the perches are being weighed in the beach itself and sold at pre-fixed price. The price varies from Rs. 18 to Rs. 30 per kilogram depending on the demand. Fish weighing 1 kg and above are selected for export and below that size are sent to local markets. Perches are exported in the frozen form after removing the gut. Catches from bottom set gill nets are not

preferred for export since they invariably land in spoiled or semispoiled condition. These are salted, sun-dried and sold in interior markets. France appears to be the main market for Indian major perches.

#### DISCUSSION

There is vast scope for increasing the landings of this multispecies resource. Exploratory surveys and other studies conducted in the past have identified certain areas rich in perch stock. Hornell (1916) suggested the existence of rich hook and lines fishing grounds off Trivandrum Coast. John (1948) reported that the sea off Anjengo and Chavara near Quilon at 60 - 70 fathoms depth provides good perch fishing grounds. According to him these grounds are not suitable for trawling, because of rocky bottom. The existence of 'Kalava' (*Epinephelus* spp.) grounds in the rocky coastal areas of Quilon - Trivandrum belt has known for long time to the fisherman of these areas and they have been fishing in these grounds for decades during January - April every year. This type of fishing is known as 'Thankal fishing' locally.

Mother-ship operations conducted by the erstwhile Madras Government during February - March 1949 in the Wadge Bank region (Chidambaram and Rajendran, 1951) yielded 15 kg of fish per handline per hour consisting of *Epinephelus* spp. (69%), *Lutjanus* spp. (9%), *Aprion pristipoma* (11%) and others. In this *Epinephelus tauvina* alone constituted 50% of the catch by weight.

Mother-ship handline operations conducted by the Travancore presidency during January - April 1949 and January - March 1950 (Gopinath, 1954) off Kayamkulam - Anjengo belt of the Kerala Coast revealed the existence of very good perch grounds in the area. The catch consisted of *Epinephelus* spp. (73%), *Lutjanus* spp. (15%) and the rest other fishes by weight.

Major perches forming one of the important fisheries at Tuticorin and their exploitation by handlines from the rocky areas lying between 5 and 40 fathoms and deeper fishing banks providing more and larger fish are reported by Chacko and Rajendran (1955). The annual catch



given by them is 220 t and it contains species like *Serranus undulosus*, *S. miniatus*, *S. salmoides*, *Lethrinus nebulosus*, *L. miniatus*, *L. ornatus*, *Lutjanus malabaricus*, *L. lineolatus* and *L. rivulatus*. These species are reported to be more common on fishing grounds beyond the 18 m limit known as 'Lomian kadal'.

The erstwhile Indo-Norwegian Project organised several trips in the late fifties to survey the 'Kalwa' grounds off the Kerala Coast. Their line fishing operations extended to almost all the rocky coastal areas lying in 73-110 m depth zone from Trivandrum to Cannanore. The catches from these grounds consisted of *Epinephelus chlorostigma* (80%), *E. areolatus*, *E. diacanthus* and *E. tauvina* (10%) and the rest by *Aprion microlepis* by number. Madan Mohan (1983) found a difference in the catch composition of 'Kalava' fisheries of the above area during 1980 - '81 season. According to him the catch consisted of Lutjanids (72%), Serranids (21.3%), Lethrinids (3.78%) and the rest by other species.

The Research vessel *Varuna* conducted handline operations during 1963 between Mangalore and Karwar in the west coast and reported good perch grounds, rich with species of *Epinephelus*, *Lutjanus* and *Lethrinus* (P. Sam Bennet, per. comm.). The same vessel conducted handline operations for rock-cods (Kalava) in the month of April to July 1977. During monsoon due to rough weather handline operations were difficult and collapsible traps were used thereafter (Anon., 1978). The same report gives details about the trap fishing conducted by the *M. V. Kalava II* also. The areas of operation were between 09° 00' - 12° 00' N and between Cochin and Chettua region respectively for the former and latter vessels. Trap fishing was done for 258.75 hrs and yielded 5717 kg of major perches consisting of *Epinephelus chlorostigma*, *E. areolatus*, *E. tauvina*, *E. merra*, *E. diacanthus* and *Pristipomoides argyrogrammicus*. The catch/hour for trap fishing worked out to 22.09 kg and for line fishing it was 33.67% kg and no species list was given.

The pattern of distribution of 'Kalava' grounds on the southwest coast has been described by Silas (1969) based on *R. V. Varuna*

collections. According to him the 'Kalava' grounds off Kerala Coast are different from the perch fishing grounds on the Wadge Bank where trawling for perches is possible for over a larger portion of the Bank. He has recorded a variety of major perches in good numbers from the 'Kalava' grounds. They include *Epinephelus chlorostigma*, *E. areolatus*, *E. diacanthus*, *E. morrhua*, *E. tauvina*, *Lutjanus gibbus*, *Pristipomoides typus* and *Argyrops spinifer*.

In the northwest coast good fishing for perches were located by M. T. Murena off Bombay, off Veraval and off Okha (Bapat *et al.*, 1982). Among the major perches only lutjanids and serranids were recorded during bottom trawl surveys. The catch of *Lutjanus* spp. was estimated at 999 kg with a catch rate 2.51 kg/hr and in the case of serranids it was 2406 kg with a catch rate of 6.05 kg/hr. Species such as *Epinephelus areolatus*, *E. fasciatus*, *E. malabaricus*, *E. diacanthus*, *Promicrops lanceolatus* and *Serranus grammicus* were reported under serranids from the above area.

Apart from these reports occurrence of different species of major perches in the EEZ of India and their depthwise distribution have been reported by Sivakami (1989) and Balachandran and Nizar (1989) based on the data collected by FORV *Sagar Samapda*.

Even after all these studies Kerala's share in the major perch landings seems to be only 14.8% (Fig. 1 c). At the same time Tamil Nadu ranks first with 42.4% among all these States. This may be due to the introduction of high opening bottom trawl for pair trawling operations as reported by Kasim *et al.* (1989). These units yield not only higher catch of about four times than the conventional trawler, but also fishes of large sizes. But in the case of all perch catch Kerala ranks first by producing 42.3% of the all India catch (Fig. 1 b) and this is attributed to the good catch of threadfin-breems in that State.

Jones and Benerji (1973) expressed the scope for the increase in perch production in view of the potential yield from Indian waters. Accordingly the landings have increased from 12865 t in 1969 to 49312 t in 1978 and to

101591 t in 1989. This is achieved mainly due to the mechanisation of fishing fleet, introduction of small scale mechanised trawlers and fitting outboard motors to country crafts. Mechanisation and motorisation have changed not only the fishing pattern, but the constituent fisheries also. The use of outboard motors in the country crafts in Kerala have brought new demersal resources, mainly perches to the artisanal sector. Expansion of this type fishing operations to other regions is expected to increase not only the general fish production, but perch production also considerably.

In the light of the above findings it is high time that serious steps are taken to exploit this

untapped resource by developing suitable techniques to suit the uneven shelf bottom of both the coasts. So far the experimental surveys were conducted mainly around the southern regions only. Steps to be taken to have some more surveys in the northern regions also to find out new perch grounds. At the same time care should be taken to protect the stock from over fishing also. Already *Lethrinus nebulosus* facing higher fishing pressure by gears like Podi valai, Olai valai, and Hooks and line at Tuticorin, has been indicated by Kasim *et al.* (1989). Such studies should be undertaken periodically on an all India basis atleast in some selected centres to conserve the stock.