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Fishery and bionomics of sciaenids of South Kanara coast

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Abstract

Fourteen species of sciaenids contribute to the fishery along the South Kanara Coast, of which *Johnius aneus*, *Otolithus ruber* and *O. cuvieri* are abundant. Trawl nets and shore-seines operated in the coastal waters at depths less than 50 meters account for the greater part of the catches of sciaenids along this part of the coast. Sciaenids are caught throughout the year except in June and July due to south-west monsoon when the sea becomes rough and no gear could normally be operated. However, in August and September sciaenids are captured in large quantities in coastal gear like 'Kairampani' (Small shore seine). This phenomenon is attributed to fall in dissolved oxygen values in the outer shelf area due to the effects of south-west monsoon and consequent crowding of these fishes in the coastal area. The high abundance of *O. ruber* in coastal waters during the south-west monsoon period indicates that it is a regulator from the stand point of oxygen concentration.

INTRODUCTION

Sciaenids, popularly known is jew fish, croakers or drums are one of the commercially important groups of marine fishes of India. They rank very high in abundance forming on an average, 7.04% of the total marine fish catch of the country (1974-76). The air-bladders of these fishes are converted to isinglass, a valuable commercial product. Inspite of the importance of this group of fishes in the national economy, information needed for efficient utilisation of this resource is meagre (Jacob, 1948; Karandikar and Thakur, 1959; Bensam, 1968; Rajan, 1968 and Bhusari, 1975). The present paper dealing with fishery and bionomics forms a part of a detailed study on the biology and fishery of sciaenids of South Kanara Coast carried out by the authors from April 1976 to March 1977.

MATERIAL AND METHODS

The fish landing centres at Mangalore (trawls), Thannirbhavi (encircling gill nets), Bikampadi, Kulai, Hosabettu and Suratkal (shore-seines), Malpe (trawls, gillnets, hand lines) and Gangolli (long lines) were chosen for collecting samples (Fig. 1). At each of these centres, data were collected regarding craft and gears operated, depth of operation of particular gear, fishing effort, total catch and catch of sciaenids. Number, weight and size range of each species of sciaenids were noted. Based on these data, percentage abundance in terms of number and weight was calculated for each of the species.

RESULTS

The sciaenids, locally known as Kallur (in Tulu) along the South

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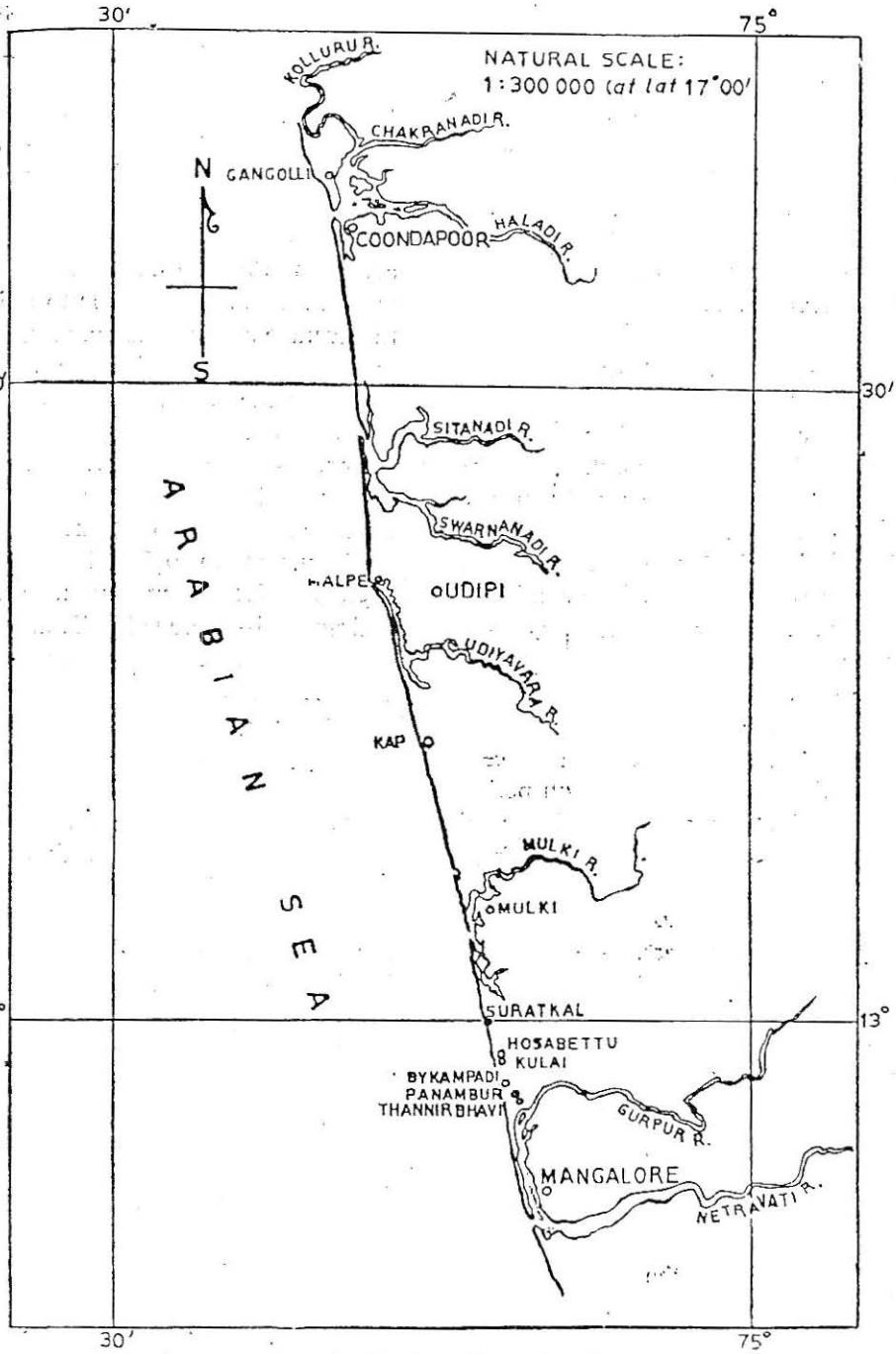

Fig. 1. Map showing the places of collection of samples of *J.aneus* and other sciaenids.

Kanara coast comprise of seven genera and fourteen species, namely—(*i*) *Otolithes ruber*, (*ii*) *Otolithes cuvieri*, (*iii*) *Johnius* (*Johnieops*) *aneus*, (*iv*)

Johnius (Johnieops) dussumieri, (v) Johnius (Johnieops) vogleri, (vi) Johnius (Johnius) elongatus, (vii) Johnius (Johnius) belangerii, (viii) Johnius (Johnius) macropterus, (ix) Johnius (Johnius) amblycephalus, (x) Protoni bea diacanthus, (xi) Paranibea semiluc tuosa, (xii) Kathala axillaris, (xiii) Pennahia macrophthalmus and *(xiv) Daysciaena albida.*

Methods of Fishing

No special net is used for the capture of sciaenids along this coast. They are caught in nets used for other fishes. The common gears in the region, in which sciaenids are caught are, *(i)* trawls, *(ii)* shore-seines (Rampani and Kairamapni), *(iii)* gill nets, *(iv)* long lines and *(v)* hand lines.

Trawl nets, Rampani (shore-seine), gill nets, long lines and hand lines are operated throughout the year except during the South-west monsoon period (June to September). Kairampani (small shore-seine) is operated from August to December. All these gears are operated in shallow coastal waters of less than 50 meters. Both mechanised and country crafts are used for operating various nets.

Particulars of Catch and Species Composition of Sciaenids in Different Gears

The percentage by weight of sciaenids in the total catch landed by different gears during the period April 1976 to March 1977 were as follows:

Trawls–85.37; gill nets–0.39; long lines–0.2; hand lines–0.32; Kairapani (small shore-seine)–13.53; and Pattabale (encircling gill net)—0.38. In Rampani (large shore-seine) only a few stray specimens of sciaenids were encountered. Species composition of sciaenids in different gears is given in table 1.

Though a lot of variation was found even in the day to day catch of sciaenids, an attempt was made to estimate the average and the maximum landings (percentage) of sciaenids in each of the gears for the whole period which are given below:

Trawls—average 7.51, maximum 30.96; gill nets—average 0.45, maximum 1.08; long lines—average 0.07, maximum 0.29; hand lines—average 7.57, maximum 15.00; Kairampani—average 31.43, maximum 35.00 and in Pattabale the maximum was 0.20%.

Biongmics

During the course of the present study, the following observations on the bionomics of some important species were made. Details regarding the size range of each of the species caught in different gears are given in table 1.

Otolithes ruber: An important species captured in trawls and shore-seines. A maximum catch of 96.81% by weight was recorded in the month of September in shore-seines (Kairampani). Gill net catches of the species comprised mostly of larger individuals in the size range of 250–300 mm.

Oozing males of this species were encountered in shore-seine catches in August and October, and juveniles in January (26 mm)*.

*Size of the juveniles. The demarcation of juveniles in different species is purely arbitrary based on the maximum size of the species.

TABLE 1. SPECIES COMPOSITION OF SCIAENIDS IN DIFFERENT GEARS

Gears	Depth (mts)	*O.ruber*	*O.cuvieri*	*J.aneus*	*J.dussumieri*	*J.elongatus*	*J.belangerii*	*P.diacanthus*	*P.semiluctuosa*	*J.amblycephalus*	*J.macropterus*	*K.axillaris*	*P.macrophthalmus*
Trawls	4-52	26.580* (110-280)	24-332 (150-250)	21-195 (130-150)	22-209 (130-160)	36-205 (100-150)	59-188 (100-150)	60-700 (60-250)	—	27-207 (100-200)	35-145 (90-120)	40-146 (100-140)	49-200 (100-160)
Gill nets	16-48	230-427 (230-350)	173-315 (180-240)	137-195 (130-150)	152-198	—	—	310-1265 (600-750)	—	195	—	—	157-195
Encircling gill nets (Pattable)	14	139-408	195-227	187	—	—	—	—	—	—	—	—	184-200
Long lines	16-30	255	210-238	170	—	—	—	—	—	—	—	—	—
Hand lines	6-10	—	—	—	158-196	—	132-199 (140-180)	—	120-310 (190-290)	—	—	133-151	—
Shore-seines (Kairampani)	6-8	116-417 (110-280)	94-270	73-190 (130-150)	—	140-180	—	390	—	148-201	90-120	95-99	110-155
Shore-seines (Rampani)	10	117-260	117-210	130-188 (130-150)	—	140-207	—	—	—	—	135	153	—

*Total size range., Figures in parenthesis indicate common size ranges.

TABLE 2. DISSOLVED OXYGEN (ML/L) CONTENT OF SEA WATER OFF MANGALORE AND SURATKAL

Station	Station at 20 m depth			Station at 30 m depth				Station at 40 m depth					Station at 50 m depth					
Depth (mts) Period	0	10	20	0	10	20	30	0	10	20	30	40	0	10	20	30	40	50
Mangalore																		
March/April 1976	4.886	4.188	4.886	5.026	—	4.746	4.467	4.900	—	4.698	—	3.518	5.465	—	4.739	—	—	3.434
September	4.434	3.285	0.657	5.387	5.051	1.684	0.9240	5.769	4.327	1.154	1.154	1.009	1.192	3.864	3.173	1.442	1.154	1.298
October	4.529	5.062	2.931	4.512	4.512	2.654	1.5920	4.563	4.430	4.430	3.527	2.923	4.626	4.760	4.221	3.820	2.882	1.568
November	4.783	4.653	3.361	5.251	4.814	3.501	2.4070	4.783	4.518	4.518	4.011	3.195	4.829	4.609	4.390	3.512	2.634	1.976
December	4.274	4.274	4.274	4.638	3.607	3.719	3.8650	4.423	4.347	4.101	3.833	3.519	4.663	4.653	4.219	3.753	3.527	2.751
January 1977	4.444	4.444	4.183	4.706	3.921	3.921	4.4440	4.144	4.144	3.914	3.786	3.547	4.444	4.706	3.921	3.921	3.921	3.921
February	4.609	4.609	4.280	4.830	4.468	4.347	3.6230	4.270	4.027	3.823	3.716	3.425	4.400	4.249	4.249	3.945	3.642	3.642
March	4.1583	4.158	4.158	4.436	4.436	4.436	4.2890	4.361	4.623	4.097	3.651	3.532	4.625	3.971	3.644	3.644	3.925	3.644
Suratkal																		
March/April 1976	6.267	4.867	3.988	4.558	—	4.867	4.273	5.592	—	5.580	—	3.817	5.581	—	5.581	—	—	3.817
August	5.960*	5.390	—	6.000*	3.270	—	—	6.000	3.560	2.990	—	—	—	—	—	—	—	—
September	4.434	2.299	0.123	4.741	4.041	3.261	0.674	5.346	4.904	1.009	0.577	0.000	4.904	3.217	1.730	0.577	0.866	1.154
October	4.529	4.529	2.664	4.777	5.043	2.654	1.592	4.027	4.563	4.295	3.355	1.879	4.493	4.760	4.362	3.987	2.911	1.185
November	4.912	4.395	2.585	4.814	4.814	3.501	2.188	4.393	4.253	3.516	3.045	2.297	4.829	4.609	4.390	3.512	2.634	1.976
December	4.748	4.274	3,799	3.736	4.122	4.122	3.865	4.216	3.751	3.540	2.871	1.954	4.516	4.438	4.429	3.518	2.741	2.537
January 1977	4.444	4.444	4.183	4.967	4.183	4.183	4.183	4.129	4.042	3.417	2.961	2.216	4.444	4.444	4.751	3.736	3.027	3.421
February	4.609	4.609	4.280	4.830	4.347	4.830	4.347	4.251	4.042	3.627	3.147	2.485	4.400	4.552	4.552	3.945	3.642	3.338
March	4.158	3.861	3.861	4.732	4.732	4.141	2.662	4.509	4.253	3.786	3.328	2.727	4.625	4.714	5.008	4.776	4.205	3.644

Unpublished data, Maliel (1977) and Suresh (1977)

*Station at 6 m depth; values at 0 and 6 m dept- respectively.

*Station at 12 m depth; values at 0, 6 and 12 m depth respectively.

*Station at 20 m depth; values at 0, 10 and 20 m depth respectively.

Otolithes cuvieri: Caught mostly in trawls and shore-seines. Though sciaenid catches were meagre on long lines, this species was dominant of the sciaenids caught. Large individuals of this species were caught in gill nets (173 to 315 mm) and on long lines (200 to 270 mm).

Oozing males of this species were encountered in August and October. Juveniles of this species were recorded in May (24 mm), November (35 mm) and January (33 mm).

Johnius (Johnieops) aneus: This species is the most abundant of the sciaenids caught in trawl nets both in terms of weight and number, constituting a catch as high as 79.80% by weight in November and 89.62% by number in January. It was also caught in good quantities in Kairampani coast constituting a maximum of 15.96% by weight in August. The species was better represented in depths less than 30 meters than in depths over 30 m.

Oozing males were encountered during August to October and juveniles in April (21 mm), November (31 mm), December 30 mm), January (21 mm), February (22 mm) and March (22 mm).

Johnius (Johnieops) dussumieri: A common species in trawl catches but abundant in depths greater than 30 meters.

Juveniles were recorded in January (26 mm), February (25mm) and March (22 mm).

Johnius (Johnius) elongatus: Highest catches of 58.44 % by weight and 52.12% by number were recorded for this species in Rampani nets in October. Large fish of 140 to 207 mm constituted such catches. Females were in V stage of maturity in October. Juveniles were observed in November (39 mm), January (44 mm) and February (36 mm).

Johnius (Johnius) belangerii: Common in catches from hand lines. A maximum catch of 70.00% by weight was recorded in December.

Juveniles were present in February (59 mm) and March (49 mm).

Protonibea diacanthus: Dominant of the sciaenids landed by gill nets constituting a maximum of 93.13 %by weight in February. Usually, larger fishes of more than 500 mm were recorded in gill nets. In trawls, only smaller individuals of the size range, 60 to 250 mm were common.

Juveniles were recorded in November (60 mm) and December (94 mm).

Paranibea semiluctuosa, Johnius (Johnius) amblycephalus, Johnius (Johnius) macropterus, Kathala axillaris and *Pennahia macrophthalmus* formed only a minor fraction of the sciaenids caught. *P. semiluctuosa* was recorded only in hand line catches, constituting a maximum of 30.95% by weight in November. The remaining species (mentioned above), though caught in various gears, were more common in trawl net and shore-seine catches.

Juveniles of *P. semiluctuosa* were not encountered in the present study. Juveniles of *J. amblycephalus* were observed in January (34 mm), February (27 mm), March (43 mm) and May (43 mm). Juveniles of *J. macropterus* were recorded in January 35 mm), February (39 mm) and March (37 mm). Juveniles of *K. axillaris* were recorded in December (40 mm) and those of *P. macrophthalmus* in February (51 mm) and March (49 mm).

Johnius (*Johnieops*) *vogleri* and *Daysciaena albida* also occur in the region.

Discussion

Based on the data collected, it can be said that though no gear is exclusively used for catching sciaenids, trawl nets and shore-seines (Kairampani) are the gears most efficient for catching sciaenids. Operations of these gears in depths less than 50 meters may prove to be more efficient for capturing sciaenids, since both adults and juveniles of species of sciaenids appear to be restricted to depths of less than 50 meters. Though bulk of the sciaenid catches are contributed by trawl nets, operation of Kairampani is of special significance in that, *Otolithes ruber* alone forms 96.81% by weight of the sciaenids landed in this gear and also because, the sciaenid catches in this gear are obtained in a period (August and September) which appear to be the off season for fishing.

Some observations were made on the relationship between the three important hydrographical factors *viz.*, temperature, salinity and dissolved oxygen and the catches of sciaenids from the area. During the months of August and September, sciaenids were captured in large quantities in Kairampani. At this period, there were no significant changes in salinity and temperature, but considerable variations were noticed in the values of dissolved oxygen (Table 2), especially at depths 20 to 40 m. This observation is interesting in the light of the findings of Banse (1968) who indicated in his work that cold deoxygenated upwelled water entering the shelf off the west coast of India during South-west monsoon can affect the distribution of bottom fauna, demersal fishes and prawns.

The high abundance of sciaenids in Kairampani catches in the coastal waters of South Kanara could be due to their crowding in inshore waters when conditions on the outer shelf are not favourable during the south-west monsoon period, especially in terms of low oxygen values. Further, high abundance (96.81%) of *O. ruber* in this gear perhaps suggests the avoidance behaviour of this species to oxygen depleted bottom waters. It is probable that this reaction indicates that *O.ruber* is a regulator from the stand point of oxygen concentration and that the decrease in the dissolved oxygen level is below the optimum range. However, this needs confirmation by controlled experiments.

According to Devadoss (1972), *O. ruber* spawns only once in a year, during July to October. Occurrence of oozing males in the months of August and October and the occurrence of juveniles only in the month of January observed in the present study, confirm the above observation.

Annigeri (1967) reported that *O. cuvieri* spawns only once in Mangalore waters from October to January. But from Bombay it was reported that this species spawns from May to August and that there is a possibility of another spawning between November and February (CIFE News Letter, 1976). In the present study, juveniles measuring 24 mm were recorded in May 35 mm in November and 33 mm in January. Besides, oozing males were encountered in August and October. These data indicated the possibility of this species spawning once from May

to August and again from October to January.

Occurrence of small juveniles of *J. aneus* as recorded in the present study, indicates continuous spawning throughout the year. This view is supported by the ova diameter studies and observations on maturity carried out by the authors.

Occurrence of individuals of *J. elongatus* of V stage of maturity in the Rampani catches in October indicates that this species also, like *O. ruber* and *O. cuvieri* might be entering shallow waters for spawning. The occurrence of juveniles of this species in the months of November, January and February in coastal waters supports this view. Jacob (1948) reported ripe specimens full in roe in the month of September at Calicut. In the present study, abundance of juveniles of this species was recorded in November (60 mm) and December (94 mm).

On September 27, 1977, a purse-seine captured about 18 tonnes of sciaenids at a depth of about 20 m off Bikampadi. (As reported in The 'Hindu' September 29, 1977), the catch consisted of 900 individuals of *P. diacanthus* each fish measuring about 1.5 m and weighing 20 kg. Dhawn (1971) reported a similar instance of capture of a large number of individuals of the same species off Goa all of which were females in mature condition. Venkatasubba Rao (1968) reported earlier that this species spawns during the period June to August. The above information indicates that schooling of *P. diacanthus* is associated with spawning. Normally, this species is captured along this coast only in stray numbers.

Based on occurrence of species of sciaenids in different gears, it can be said that *J. aneus*, *O. ruber* and *O. cuvieri* and *J. dussumieri* are mostly caught in trawls and *J. belangerii* and *Paranibea semiluctuosa* on hand lines. The remaining species occur in various gears only in small quantities.

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