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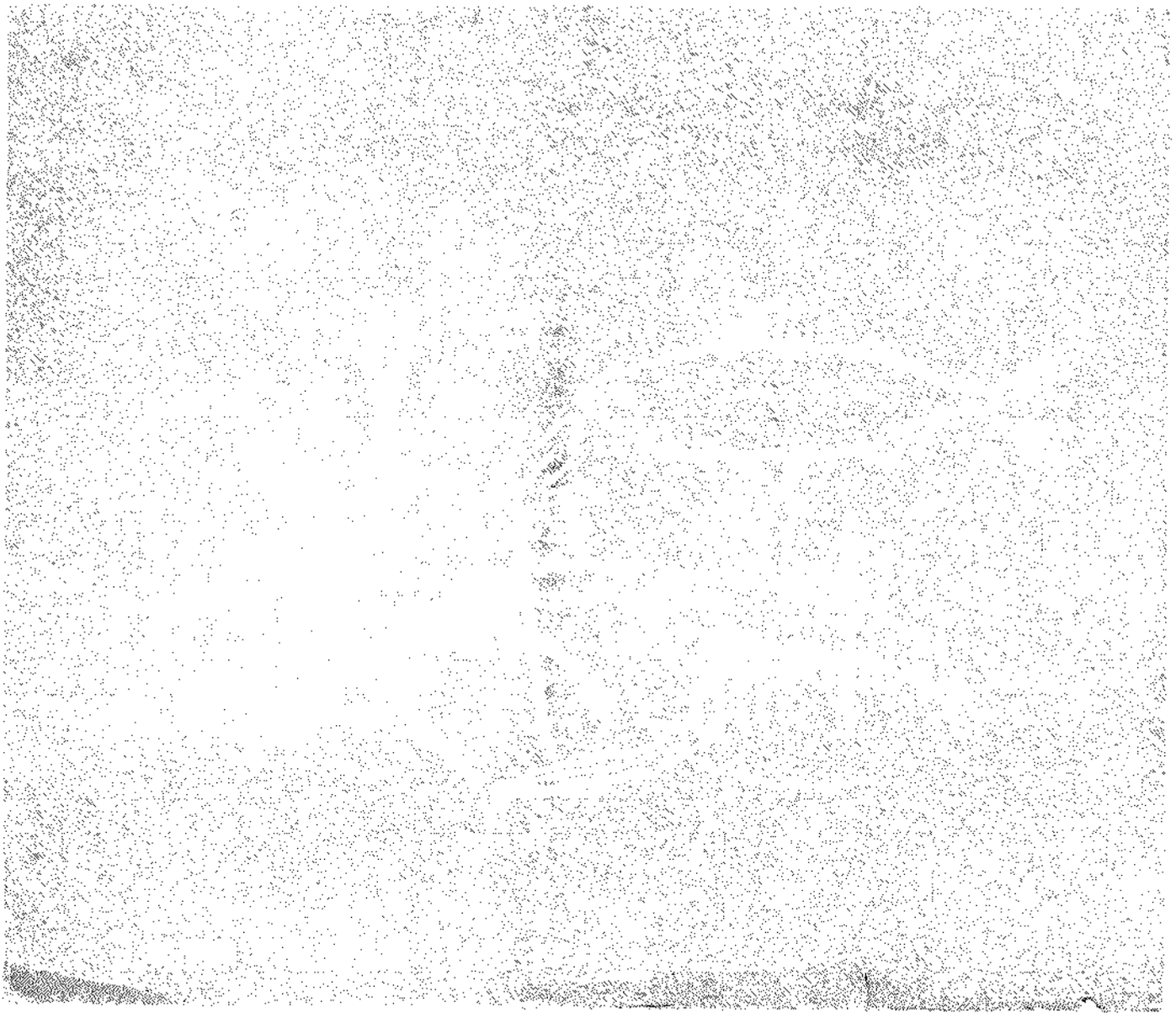

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SCIAENID FISHERY RESOURCES OF THE GULF OF MANNARAND PALK BAY

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ABSTRACT

The Gulf of Mannar–Palk Bay area, forming the southern sector of the east coast of India, harbours many species of sciaenids, including some commercially valuable forms like *Pseudosciaena diacanthus*, *P. aneus*, *Otolithes argenteus*, *Johnius maculatus*, etc. Until a decade ago, this resource remained poorly tapped due to lack of fishing facilities proper for its capture. Since the establishment of the Government of India Offshore Fishing Station at Tuticorin and Indo-Norwegian Project at Mandapam, trawling grounds for sciaenids off the Pinnakayal estuarine region in the Gulf of Mannar and Vaigai reverine area in the Palk Bay have been charted. Catch trends by indigenous and mechanised crafts in centres like Sippikulam-Vaipar, Vembar and thakarai indicate the presence of good fishing grounds for the sciaenids. Further work of charting these grounds in the Gulf of Mannar-Palk Bay area, particularly off river mouths and estuaries, remains to be carried out in order to have an adequate knowledge on the distribution and abundance of this resource. The indication is that the present level of exploitation can be increased further without fear of depletion.

INTRODUCTION

FISHES belonging to the family Sciaenidae, popularly called "jew fishes" (also as "croakers" and "drummers" because of their ability to produce a croaking or drumming sound) are chiefly marine and generally live in the bottom areas of the nearshore waters where they feed on benthic organisms such as polychaetes, lamellibranchs, prawns, crabs and fishes. They rank fifth in the quantitative abundance of the sea fish resources of India and, apart from prawns, are economically the most valuable among the ground fishes. Although all the species are not considered high quality fish, the sciaenids are eaten by all people and, being abundant, cheap and easily available they are preferred by the middle class and lower middle class. Large fish are usually consumed fresh or transported to interior markets, but smaller ones, in excess of the local requirements are sundried on the beach. Sundrying of sciaenids is rendered easy by their low percentage of fat contents which usually ranges from 0·39 to 1·47. Probably the most profitable by-product of sciaenids are the airbladders, called *maws* in trade. These are removed from the fish before their disposal, split open, washed in seawater and sundried. The *maws* are used in the preparation of *isinglass*, a substance utilised in the clarification of wine and beer, as a substitute for gelatin in confectionary; for the preparation of certain cements; and as a constituent for special water proof composition. The airbladders of sciaenids are one of the best of their kind and are valued more than those of polynemids and cat fishes. Bulk of the better quality is exported and there are prospects of improving this trade by refining the product.

Tapping of the sciaenid fishery resources from along the Gulf of Mannar-Palk Bay area (extending between Cape Comorin in the south and Point Calimere in the north), where a number of sciaenid species have been known to occur, remained almost neglected till recently, although some attention has been paid to utilise these resources from elsewhere along the Indian coast. The information published so far on the sciaenid fishery resources of Gulf of Mannar and Palk Bay is scanty, fragmentary in nature and of little use in assessing and managing the resources. This is

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obviously due to the fact that since most of the species are not considered as of high quality fish, sufficient attention had not been paid to collect data on them. However, with the growing demand for fish protein in recent years, increased attention is being paid to manage and utilise the sciaenid resources also. The present paper makes an attempt to outline the present status of exploitation and further scope for increasing the production based on the data published hitherto and the unpublished information gathered during the past three years. It is needless to stress that for the scrupulous management of the fisheries in the years to come, adequate attention should be paid to gather data on the vital aspects of the resources.

Species Contributing to the Resources

Sciaenids are represented by five genera and seventeen species in the Gulf of Mannar—Palk Bay area (lying within Long. 77° 34′ to 79° 53′ E and Lat. 8° 5′ to 10° 17′ N) (Fig. 1). The smaller species are collectively called "panna" or "kathalai" in Tamil, while the large sized *Pseudosciaena diacanthus* (Lacépède), commercially the most important sciaenid occurring in this area is called "Kooral". It is usually caught in areas ranging in depths between 12 and 30 fathoms. Occasionally this species is reported to visit nearshore areas also (within 5–8 fathoms), particularly in the vicinity of muddy localities. The commercial sizes vary between 70 and 120 cm. total length, weigh between 8 and 18 kg. and are available almost throughout the year. The young ones of *P. diacanthus* ranging from 20–30 cm. are frequently met with in the catches from nearshore waters. The fish attains sexual maturity at about 70–80 cm.

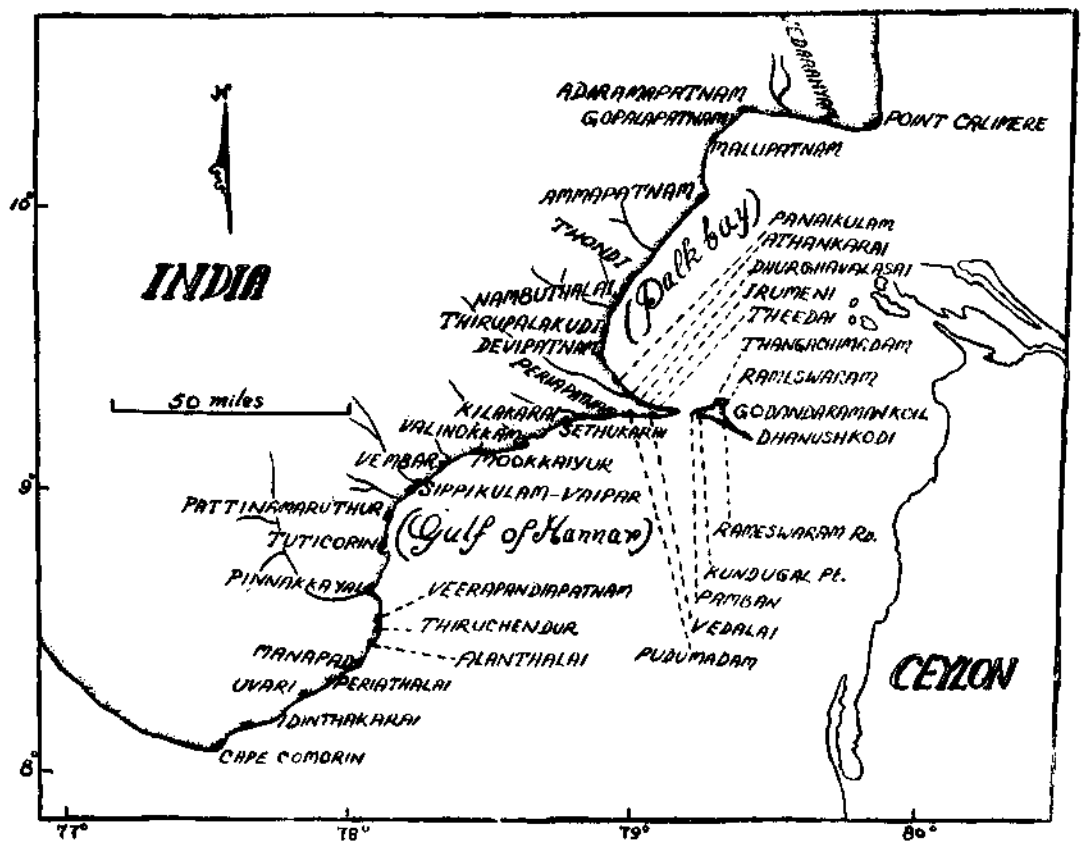

Fig. 1. Map of the Gulf of Mannar-Palk Bay Area showing the fishing villages where sciaenids are landed.

The smaller species occurring along this coast would not have been regarded as economically valuable but for their quantitative abundance. Of these, *Johnius maculatus* Bloch and Schneider, *Otolithes argenteus* Cüvier and *Pseudosciaena aneus* Bloch are more in demand than the others. The bulk of the catches of *J. maculatus* range in length between 12 and 23 cm., individuals weigh between 80 and 150 gm. and maturity attained at about 10–12 cm.; *O. argenteus* range between 12 and 28 cm., weigh between 90 and 150 gm. and maturity attained at about 13–15 cm.; and *P. aneus* range between 10 and 20 cm. and weigh between 60 and 130 gm. The other species contributing to the sciaenid fishery resources of Gulf of Mannar and Palk Bay are, *Johnius carutta* (Bloch), length 9–16 cm., weight 50–130 gm. and mature at about 12–15 cm.; *J. dussumieri* (Cüvier), length 10–20 cm. and weight 60–180 gm.; *J. osseus* (Day), length 8–17 cm. and weight 60–170 gm.; *J. semiluctuosa* (Cüvier), length 9–16 cm. and weight 60–140 gm. *Otolithoides microdon* (Bleeker), length 15–30 cm. and weight 100–1,500 gm.; *Pseudosciaena axillaris* (Cüvier), length 10–15 cm. and weight 50–110 gm.; *P. bleekeri* (Day), length 10–18 cm.; *P. coitor* (Hamilton), length 9–16 cm.; weight 60–150 gm. and mature at about 13–15 cm.; *P. sina* (Cüvier), length 8–15 cm. and weight 60–170 gm.; *P. soladado* (Lacépède), length 10–24 cm. and weight 80–200 gm.; *Sciaena dussumieri* (Valenciennes), length 10–22 cm. and weight 70–180 gm.; *S. macroptera* (Bleeker), length 8–12 cm. and weight 40–100 gm.; and *S. russelli* (Cüvier), length 10–18 cm. and weight 60–150 gm.

All these species are edible and a few like *J. maculatus, O. argenteus, P. diacanthus*, etc., are much relished table fishes. *P. diacanthus* costs about Rs. 2–5 per kg.; large specimens of *J. maculatus, O. argenteus, P. aneus*, etc., cost Rs. 1–3 per kg. and smaller sized specimens of these and the other species cost 50 ps. to Rs. 1–50 per kg.

Fishing Centres, Seasons and Gear

In the marine fisheries map of India, the Gulf of Mannar-Palk Bay area, sometimes referred simply as "Gulf of Mannar area" (probably because the Gulf of Mannar is more productive than the Palk Bay), is one of the important regions with some rivers opening into it. These are the Thampraparani, Vaippar and Vembar rivers on the Gulf of Mannar side and Vaigai, Kottakarai, Pambar, Vellar and Narasinga Cauvery on the Palk Bay side. The bottom of the nearshore areas is generally sandy and/or muddy, but rocky grounds are also present, notably the "paars" off Tuticorin region and the coral reefs off Mandapam area. The important fishing centres are (Fig. 1) from south, Cape Comorin (east), Idinthakarai, Uvari, periyathalai, Manapad, Alanthalai, Thiruvhendur, Veerapandiapatnam, Pinnakkayal, Tuticorin, Pattinamaruthur, Sippikulam-Vaipar-Vembar, Mookaiyoor, Valinokkam, Kilakarai, Sethukarai, Periyapatnam, Pudumadam, Vedalai-Pamban, Kundugal Point, Rameswaram Road and Dhanushkodi (south) in the Gulf of Mannar and Dhanushkodi (north), Godandaramankoil, Rameswaram, Thangachimadam, Theedai, Irumeni, Dhurgavalasai, Athankarai, Panaikulam, Devipatnam, Thirupalakudi, Nambuthalai, Thondi, Ammapatnam, Adiramapatnam, Gopalapatnam, Mallipatnam, Vedaranyam and Point Calimere (south) in the Palk Bay.

The fishing season for sciaenids extends almost throughout the year but for minor interruptions caused by turbulent weather conditions, particularly during rainy seasons. Almost all the species occur throughout unlike most of the other groups which have limited fishing seasons. In the Gulf of Mannar the period between May–June and November–December is good for fishing coinciding with the south-west monsoon winds and the subsequent transitional period to north-east monsoon. This part of the year is characterised by the existence of certain currents and drift systems in the Gulf of Mannar, which are considered to be indications of good catches. The intensive fishing season in the Palk Bay usually coincides with the summer and premonsoon months, between February–March and October–November.

The chief gears for smaller species of sciaenids, apart from trawl nets introduced rather recently are shore-seines ("karaivalai" and "olavalai" in Tamil), boat-seines ("madivalai"), drift-nets

("valavalai", "valivalai" or "silkvalai") and gill-nets ("pachuvalai"). Shore-seines are operated from dug-out canoes or plank built boats, while boat-seines, drift-nets and gill-nets are operated from plank-built boats or catamarans. These craft and gear generally venture up to 10–15 fathoms. Hooks and lines gear operated from plank-built boats or catamarans go up to 20–30 fathom areas and farther beyond to capture large sciaenids. Good trolling grounds for these and other large fish like scombroids are reported to exist beyond 15–20 fathom areas off Uvari, Manapad, Thiruchendur, Pinnakkayal and Tuticorin on the Gulf of Mannar side and Nambuthalai Gopalapatnam zone on the Plak Bay side.

Exploitation of the Resources

Exploitation of the sciaenid fishery potential of this coast may be considered to involve two phases, namely, (*a*) Fishing with indigenous craft and gear and (*b*) Fishing with mechanised craft and gear. At present these may be said to exist side by side.

Fishing with Indigenous Craft and Gear

Until a decade ago the utilisation of the fishery wealth from Gulf of Mannar and Palk Bay was restricted to pelagic fishes and exploitation of the bottom living groups such as sciaenids was not undertaken. This was chiefly due to want of fishing craft and gear suitable for their capture and also due to lack of adequate knowledge on the distribution, availability and abundance of the species constituting the resources. The indigenous craft and gear employed are not quite efficient to capture the fishes found at the bottom and in the offshore grounds and are able to net them only when they appear in the surface and subsurface waters of the inshore areas. For instance the shoreward migration of *Pseudosciaena diacanthus* is exploited by the fishermen at Valinokkam, Tuticorin and Nambuthalai who capture the species in hundreds by shore-seines operated in the shallow coastal regions.

Adequate information on the magnitude of the catches of various species of sciaenids along this coast is not published so far and the tendency has been to group all the species under a single head, such as "sciaenids", "jew fishes", "Sciaena", etc. Hornell (1917) has reported that "Sciaena miles" was caught in "offshore lining", "Sciaena maculata" in inshore lining and "Otolithus ruber" as being caught throughout the year. The average annual catches of jew fishes at Tuticorin for four years, from October 1911 to September 1915, given by Hornell (*loc. cit.*) is 59,049 maunds, valued at Rs. 5,115 at that time. Subsequent publications on catch statistics of fishes from the south-east coast of India including some of the recent reports such as by Chacko (1959), Chacko and George (1959 *a*, *b*, *c*, *d*), Government of Madras (1961, 1962, 1963, 1964), Ramandam and Chacko (1962), etc. have not thrown any more light on the quantitative abundance of the different species, but foi references that 358 maunds of *Otolithus* spp. and *Sciaena* spp. were landed at Rameswaram Island during 1957–58 (Government of Madras, 1962), 3,550 mt. of jew fish were caught during 1960–61 (Government of Madras, 1963) and 36·75 mt. of "Sciaena" were caught at Cape Comorin during 1961–62 (Government of Madras, 1964). However, one fact which has come to notice while perusing the literature is that centres from Gulf of Mannar have reported considerably more quantities of sciaenids than those from Palk Bay.

Fishing with Mechanised Craft and Gear

The early attempts to find out fishing grounds for sciaenids and other bottom fishery resources in the Gulf of Mannar-Palk Bay area, as well as in the adjacent regions, were made from the beginning of this century and some exploratory surveys had been conducted by the Steam Trawlers "Violet" (1906–07), "Lilla" (1920–23), "Nautilus" (1924) and "Lady Goschen" (1927–30) (*see* Chidambaram, 1952). From the published accounts of these surveys (Hornell, 1914; Gravely,

1929; Raj, 1930; Raj and Devanesan, 1942), it appears that the catches made were mostly of perches and that the bottom of the nearshore waters had not been sampled adequately for sciaenids.

Regular exploratory surveys for ground fishes occurring along the south-east coast of India have begun with the establishment of the Offshore Fishing Station at Tuticorin during 1958 by the Government of India (*see* Sheriff, 1968). Experimental fishing in some of the inshore and offshore localities between Cape Comorin and Vaipar (Lat. 8° to 9° N), such as off Cape Comorin, Manapad and Pinnakkayal-Vaipar sector was conducted during 1959–61 (Fig. 2) by using trawl nets, bottom set gill nets etc. (Anonymous, 1963). These and the subsequent trawling operations off Kilakarai, Vembar, Vaipar and Manapad have indicated the abundance of bottom fishes, particularly sciaenids. Thus, for instance, in the sub-area named 8–78/2A off Manapad (Fig. 2) trawled by M.V. "Meenalochani" during April 1962, about 50% of the catches were sciaenids and in the sub-area 8–78/6B and 6C off Vembar trawled by M.V. "Meenakshi" during February 1962, sciaenids contributed to more than 60% of the total yield. The annual contribution of sciaenids from the areas covered by all the vessels varied from about 20 to 30% of the total catches. Although these exploratory surveys are not yet completed, the available data point out to an appreciably high sciaenid fishery potential along this coast. These operations have also shown that the nearshore areas off Pinnakkayal (areas 8–78/4B, 4C, 4D and 5B) (Fig. 2) are one of the best grounds for bottom fishes including sciaenids. Thyagarajan and Mahadevan (1962) in an account of trawling off Pinnakkayal from July 1957 to December 1959 have arrived at a similar conclusion.

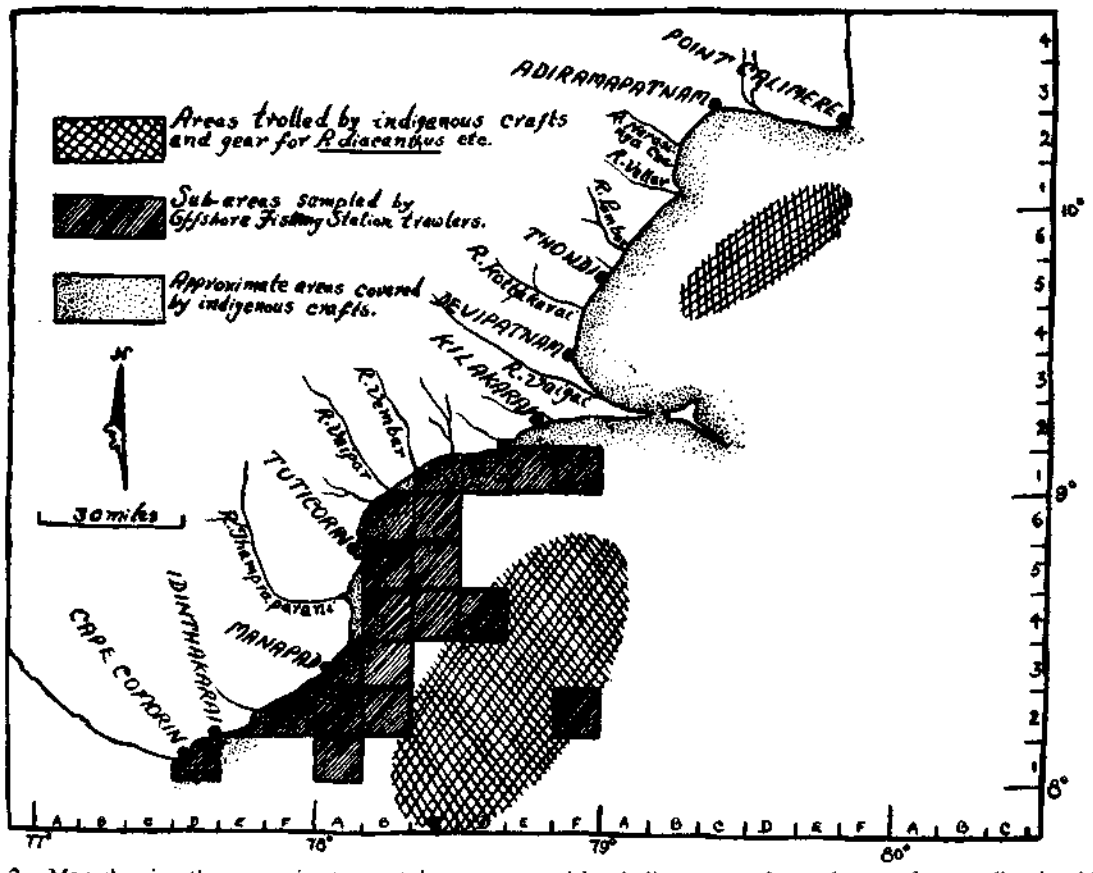

FIG. 2. Map showing the approximate coastal areas covered by indigenous crafts and gear for small sciaenids; sub-areas sampled by offshore fishing station trawlers; and areas trolled by indigenous crafts and gear for *Pseudosciaena diacanthus* and other fishes.

It was only after the establishment of the Indo-Norwegian Project at Mandapam during 1965 that systematic efforts of trawling in the Palk Bay area have begun. Fishing in the area within Long. 79° to 79° 30′ E and Lat. 9° 30′ to 9° 55′ N, particularly off the mouth of Vaigai river, is being conducted by operating mostly purse-seines and midwater trawls. The percentage composition of sciaenids caught by them is considerably lower when compared to the catches obtained from Gulf of Mannar. As may be seen from the scientific reports of the Central Marine Fisheries Research Institute since 1965, the bulk of the catches is made up of silver-bellies (*Leiognathus*, *Secutor*, *Gazza*, etc.) or cat-fishes (*Arius*, etc.) amounting to as high as 90–98%. The percentage of sciaenids usually ranges from 2 to 5 and frequently they are classified with "miscellaneous" owing to their negligible contribution. It may be recalled in this connection that Hornell (1914) has stated that "the trawling hauls in Palk Bay were very disappointing and .... the bottom too soft and without fish of any account—'either none or very few'." The occurrence of sciaenids in good quantities in the indigenous gear operated, particularly in the northern centres such as Thondi, Ammapatnam, Adiramapatnam, Vedaranyam, etc., point out that sciaenids are not scarce in the Palk Bay. Hence, it would be useful for the industry if exploratory surveys covering sufficient space and time are carried out in the Palk Bay also in order to chart fishing grounds for sciaenids.

Trawl Catches from Pinnakkayal

Exploitation of sciaenids and other bottom fishes occurring off Pinnakkayal, also called Punnaikayal (Fig. 2) is being carried out by the trawlers of the Offshore Fishing Station and analyses of the sciaenid component of the catches were in progress since 1965 at the Central Marine Fisheries Research Sub-station, Tuticorin. From Fig. 3 showing the contribution of sciaenids and other fishes brought by M.V. "Sagarsundari" (the only vessel trawling during all the three years, 1965, 1966 and

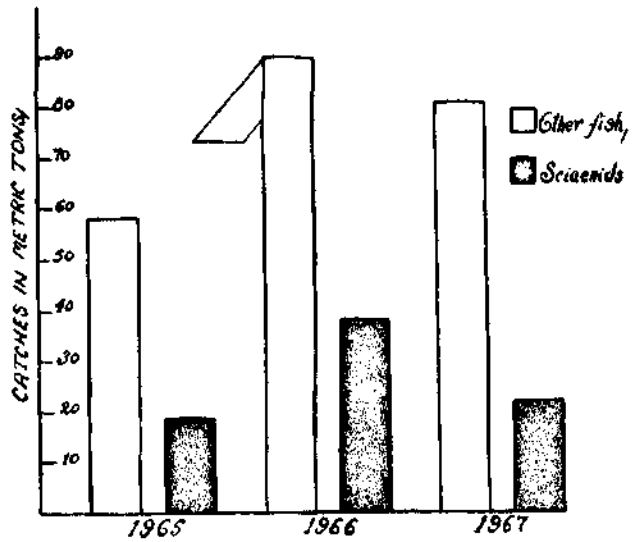

Fig. 3. Magnitude of the annual catches of sciaenids and other fishes (elasmobranchs, silver-bellies, clupeids, perches, polynemids, etc.. and parwns) brought by M.V. 'Sagarsundari' from Pinnakkayal are during 1965 1966 and 1967.

1967), it is apparent that a good proportion of the catches is made up of sciaenids (24% during 1965, 22% during 1966 and 28% during 1967). The average monthly percentage composition (Fig. 4) has been uniformly good. The catch per hour of sciaenids is also good, varying between 1/5 and 1/3 of the total catch per hour. The peak returns during the three years occurred in the months of

October 1966 (3,171 kg.), October 1963 (7,513 kg.) and May 1967 (3,650 kg.). From Fig. 5 giving the average monthly percentage composition of the various species, it is evident that *Pseudosciaena coitor* is the most abundant fish with maximum yield during October. *P. sina, Sciaena dussumieri, Johnius maculatus* and *S. macroptera* follow in the order of abundance with peak catches during March, February, November and August respectively. *Otolithes argenteus* has contributed to the maximum during March. The other species were of lesser abundance in the trawl catches.

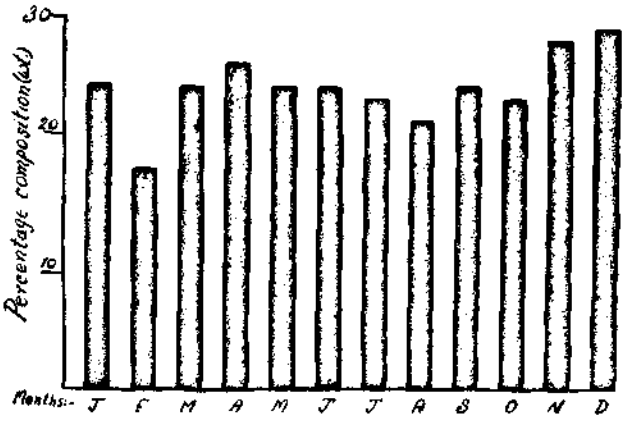

FIG. 4. Average monthly percentage composition of sciaenids (by weight) caught by M.V. 'Sagarsundari' from Pinnakkayal area during 1965–67.

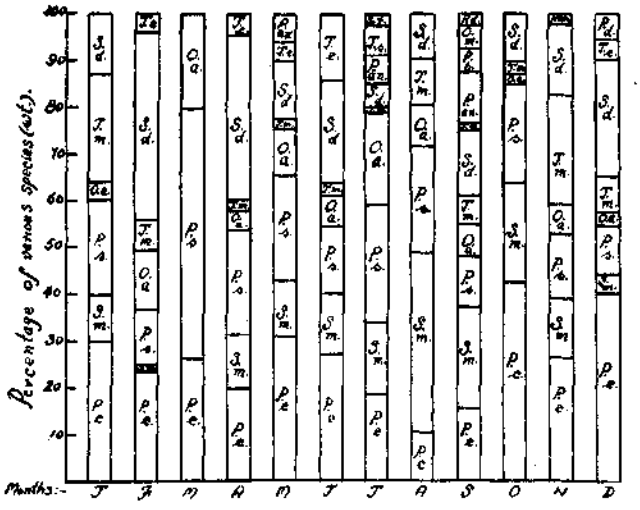

FIG. 5. Average monthly percentage composition of various species of sciaenids (by weight) caught by M.V. 'Sagarsundari' from Pinnakkayal area during 1965–67. J.c. *Johnius carutta*; J.m. *Johnius maculatus*; J.s. *Johnius semiluctuosa*; O.m., *Otolithoides microdon*; O.a., *Otolithes argenteus*; P. an., *Pseudosciaena aneus*; P. ax.. *Pseudosciaena axillaris*; P.b., *Pseudosciaena bleekeri*; P.c.. *Pseudosciaena coitor*; P.d., *Pseudosciaena diacanthus*; P.s., *Pseudosciaena sina*; S.d., *Sciaena dussumieri*; S, m., *Sciaena macroptera*; S.r., *Sciaena russelli*.

Towards the end of 1967 two vessels, M.F.V. "Jheengha" and "Meenabharati" (larger and with more horsepower than M.V. "Sagarsundari") were trawling off Tuticorin-Pinnakkayal area, a little farther off the usual trawling areas. The trawl nets used by them have large mesh sizes and brought in large specimens of *O. argenteus*, *P. sina* and *S. dussumieri*. One fact that has come to notice while analysing the catches from Pinnakkayal area is that this region serves as a sort of nursery ground for many species as observed by the presence of very young specimens of many fishes; and that capturing them should be avoided (by using nets of larger mesh, thereby giving a chance for the young ones to escape fishing) in order to allow them to grow to the appropriate sizes for capture.

General Remarks

As may be seen from the foregoing account, apart from trawling in some of the nearshore areas, such as off Pinnakkayal, exploration of the truly offshore regions in distant areas beyond the 10–15 fathoms limit remains to be carried out sufficiently and the distribution and abundance of valuable species like *Pseudosciaena diacanthus* and *Otolithes argenteus* in different depth ranges are yet to be determined. Apart from its seasonal migration to coastal waters, *P. diacanthus* is frequently brought by fishermen from centres like Idinthakarai, Manapad, Pinnakkayal, Tuticorin, Vaipar, Gopalapatnam, Nambuthalai, etc., venturing to distant regions for trolling hooks and lines gear in indigenous crafts. This indicates that this species is common in the distant waters and that systematic exploration of these areas may throw light on prospective fishing grounds. It may be mentioned in this connection that exploratory surveys off north-west coast of India have indicated fishing localities for *P. diacanthus* (along with a few other fishes) (Rao, 1967) and it seems very likely that similar work along the south-east coast also may lead to fruitful results.

The inshore areas of the Gulf of Mannar-Palk Bay coast also have not been explored sufficiently to chart the fishing grounds in relation to time and space, although the indigenous crafts and gear with their limitations, are bringing good catches of sciaenids. Hornell (1914) in his report on a trawling cruise has drawn attention to the fact that the inshore areas within the 6 fathoms line, particularly off river mouths, are rich enough to sustain a profitable industry for ground fishes. The trawling operations of S.T. "Lady Goschen" (1927–30) have revealed some grounds considered to be superior in quality and value to those of the west coast of India. Thyagarajan (1959) has pointed out the existence of rich fishing grounds off river mouths and estuaries in the Gulf of Mannar. Prasad and Nair (1963) while dealing with productivity in the Gulf of Mannar, have stated that "the present yield could be easily stepped up with a little more effort". Catch trends of sciaenids by indigenous crafts and mechanised vessels operating along the coastal regions in both Gulf of Mannar and Palk Bay, particularly off river mouths and estuaries, where the bottom is generally muddy, being ideal to sustain bottom fishes, point out that the likelihood of the existance of rich trawling grounds for sciaenids is very much. It is obvious that with the availability of sufficient craft and gear for capturing the ground fish in the inshore and offshore areas, the utilisation of the sciaenid fishery resources from the Gulf of Mannar-Palk Bay coast can be increased considerably without fear of depleting the resources, since the area covered at present is much smaller than the areas to be explored. It may be mentioned in this connection that trawling operations off Bombay have resulted in tapping and utilising the resources of the smaller sciaenids which constitute the "dhoma" fishery there (Rao, 1967).

The sciaenids are abundant in the catches of both indigenous crafts and mechanised vessels throughout the year unlike most of the other groups like sardines, scombroids, etc., which have definite seasons of fishery. Hence the selection of suitable fishing crafts which can withstand unfavourable weather conditions and of efficient gear with maximum catch rate would prove valuable in ensuring regular supply to the need of the common man from the sciaenid fishery resources, throughout the year.

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