OBSERVATIONS ON THE SUMMER FISHERY FOR THE INDIAN MACKEREL *RASTRELLIGER KANAGURTA* (CUVIER) IN THE GODAVARY ESTUARY.

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There are no reports of occurrence of the mackerel, *Rastrelliger kanagurta,* in estuaries along the east coast of India, but on the west coast, these fish are known to ascend the estuaries (Pradhan, 1956; George *et al.*, 1959 and George, 1965). The present account deals with the observations made on the mackerel fishery of the Godavary estuary near Yanam, a place situated about 20 km from the river mouth, in summers of 1968, 1969 and 1970.

The estuary is rich in fishery resources. In the monsoon season there is a good fishery for *Leander tenuipes* in the salt wedge area whereas the upper reaches of the river support good fishery for *Hilsa ilisha,* mullets and a variety of freshwater fishes and prawns. In the post-monsoon period with increased salinity more marine species enter the river. The incursion of marine species is maximum in summer. It is in this period that mackerel is found in commercial quantities in the estuary along with clupeids, carangids, sharks, soles, belonids, sciaenids, mullets and other scombroids.

During the summer the river is never deeper than 6 metres. The fishery for mackerel extends only up to Masakapalli (about 30 km upstream). This was confirmed by observing the landings at Kotipalle, a place 45 km from the river mouth. Although the tidal effect is felt at this place also, the incursion of marine species is negligible. However, penaeid prawns (*Metapenaeus monoceros, Metapenaeus dobsoni, Penaeus indicus* and *Penaeus monodon*), carangids, leiognathids, soles and clupeids were observed in the catches at this place. The magnitude of the mackerel fishery is not considerable beyond Yanam.

The net operated for mackerel is a gill net with mesh size (stretched) of about 5.5 cm. Fishing is done mostly at night and good catches of mackerel along with other marine species are obtained when the net is dragged on the bottom. About 15-20 boats (nava) are operated at Yanam daily in summer. Mackerel are found in the gill net catches only in May-July. The intensity of the fishery is more in the lower reaches of the estuary, particularly at Kothapalem, Balusutippa and Bhairavapalem. Data presented in Table 1 indicate that the catches are good in June. The mackerel fishery comes to a close when the monsoon begins.

TABLE 1. *Mackerel landings by gill nets at Yanam in* 1968, 1969 *and* 1970.

Year Months	E Total No. of units.	C Total catch in kg.	Y Mackerel catch in kg.	C|E in. kg.	C|Y in kg.	% of mackerel in the catch.	Average surface salinity.
1968							
May	423	3663	369	8.66	0.87	10.07	29.2
June	459	5256	990	11.45	2.16	18.84	29.7
July	336	3264	176	9.71	0.52	5.39	28.7
Total|Average	1218	11883	1535	9.71	1.26	12.92	...
1969							
May	441	4230	136	10.21	0.27	2.86	28.9
June	532	5425	665	10.39	1.25	12.03	29.8
July	387	3492	108	9.49	0.28	2.94	29.5
Total|Average	1360	11952	909	8.79	0.67	7.61	...
1970							
May	392	3560	144	9.08	0.37	3.83	29.4
June	507	5239	1066	10.33	2.10	20.35	30.2
July	336	3072	156	9.14	0.46	5.08	29.6
Total|Average	1235	11871	1366	9.61	1.11	11.51	...

A study of the fishery in relation to salinity indicates that the catches are good in the months when the salinity is high. In 1968, mackerel formed about 18.84% in the total landings of the gill nets with an average catch per unit of 2.16 kgs. The 1969 season was not very good for mackerel fishery, whereas the 1970 season was comparable to that of 1968 in many respects. Mackerel formed about 20.35% in the total landings of gill nets in June 1970 with an average catch per unit of 2.1 kg.

The estuarine catches of mackerel were composed almost entirely of juveniles in the length range of 118-183 mm (total length). The dominant size groups were 140-170 mm (Fig 1). The composition changed little from season to season. Only three specimens could be sexed and these are found to be males with testes in a very early stage of development.

Six samples containing 58 specimens of mackerel were studied for food in 1968 and 1969. The major food items were diatoms, crab zoea, *Leucifer*, mysids, cypris larvae and digested matter of plant origin (Table 2). In one instance semidigested fish with scales and bones was observed. The food and feeding habits of the estuarine mackerel do not seem to differ much from the mackerel of inshore waters. The stomachs of all the observed mackerel were gorged with food. The present observations on food and feeding habits of mackerel confirm the studies of Rao and Rao (1957), Rao (1958), Kuthalingam (1959),

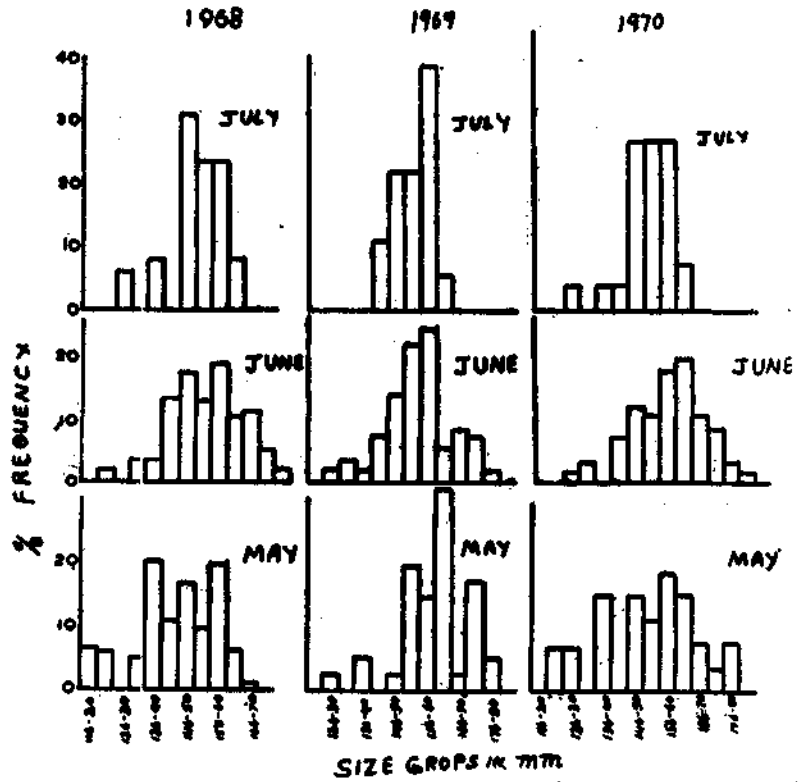

FIG. 1. Length frequency distribution of *Rastrelliger kanagurta* landed by gill nets at Yanam for the year 1968-70.

Rao (1964), Sastry (1970) and Venkataraman and Mukundan (1970). However, some items of food observed by earlier workers could not be found in the present studies.

The mackerel of the Godavary estuary is interesting because of its periodic occurrence and also because the size range and maturity condition of these fish differ from those of the Netravati estuary and the Cochin backwaters. The feeding activity of the mackerel of the Godavary estuary is good, as in the mackerel of the Netravati estuary. The mackerel of the Netravati estuary are reported to have sub-equal caudal fin lobes whereas those of the Godavary river do not show any such morphological malformations. George (1965) thinks that the mackerel enters the Cochin backwaters to avoid the congested inshore waters; but George *et al.* (1959) are of the opinion that the mackerel enter the Netravati estuary as a better feeding ground. The latter opinion seems to hold good for the mackerel of the Godavary estuary also as there is intensive feeding in the estuarine mackerel. The incidence of more mackerel in gill nets operated at bottom and presence of some amounts of sand in the gut contents indicate that the mackerel resort to bottom feeding in the estuary.

TABLE 2. *Percentage composition of food items of mackerel in* 1968 *and* 1969.

Date	25.6.68	29.6.68	6.6.69	12.6.69	29.6.69	9.7.69	
Size range in mm (total length)	136-168	156-185	130-181	140-164	145-176	143-162	Average
FOOD ITEMS							
Diatoms (pennate forms)	67.7	61.3	40.1	27.4	47.1	32.0	45.9
Diatoms (centric forms)	4.8	4.7	10.5	6.9	3.9	25.0	9.3
Copepods	13.7	11.3	34.3	36.0	21.4	10.8	21.3
Crustacean remains	2.3	3.4	1.5	...	5.0	5.6	3.0
Sand grains	2.9	7.7	3.1	6.9	4.3	7.6	5.4
Mysids	0.7	0.4	2.5	5.7	0.7	0.8	1.8
Crab zoea	0.9	...	2.0	2.3	0.7	2.0	1.3
Leucifer	4.5	...	1.6	4.6	1.0	0.6	1.4
Cypris larvae	0.5	...	0.4	0.6	1.0	2.4	0.8
Alima larvae	0.2	...	0.3	3.4	0.6	...	0.8
Nematode worms	0.9	...	...	0.6	0.4	1.0	0.5
Bivalve larvae	...	...	1.3	3.4	0.6	...	0.9
Gastropod larvae	...	...	1.5	1.1	0.4	...	0.5
Amphipods	0.5	...	...	...	...	...	0.1
Fish remains	...	...	...	...	5.1	...	0.9
Unrecognisable matter	0.5	11.1	0.9	1.1	7.7	12.2	5.6

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