

# Fish Fauna of a Coastal Lagoon in Sri Lanka: Distribution and Seasonal Variation

By

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## Introduction

Sri Lanka is blessed with approximately 22,000 ha. of lagoons and subsistence fin and shell fisheries exist in almost all the larger lagoons. There is however, little known about fish and fisheries of these lagoons. Pillai (1965) reviewed the brackishwater fishery resources of Ceylon. De Silva and Wijeyaratne (1977) studied the food and feeding habits and De Silva and Silva (1979) the biology of young grey mullet, *Mugil cephalus* L., populations of the Negombo Lagoon.

In this paper results of investigations carried out over the period of September 1977 to August 1978 are presented. These data were collected in the course of a detailed investigation into the biology and the ecophysiology of the young grey mullet and the grey mullet fishery of the Negombo Lagoon (also see De Silva and Perera, 1976 ; Perera and De Silva, 1978 a, b). In this paper the distribution and seasonal variation of fin fish species within the Negombo Lagoon are presented.

## Materials and Methods

Fig. 1 shows the Negombo Lagoon and the inset its relationship to the rest of the Island. Also indicated in the map are the five sampling areas. Some physico-chemical features of the different areas are summarised in Table I.

All samples were obtained from the brushpile, or the locally known masathu, fishery. The fishery, mode of operation of the gear and its efficiency have been dealt with earlier by Ward and Wyman (1975). According to these authors the brushpile fishery accounts for more than 80% of the catch in the Lagoon and also appears to be a means of obtaining a good representative qualitative sample of the fin fish fauna of the lagoon.

A brushpile from each of the five areas was hired and all the fish caught in each pile was collected. The total catch was weighed and sub-samples of each species was brought to the laboratory for detailed analyses. In the laboratory fish were identified to the specific level, the total and standard length of individuals determined to the nearest mm. below their actual length. Fish were then degutted, weight determined to the nearest 0.1 g. and the gonads kept frozen for further investigations.

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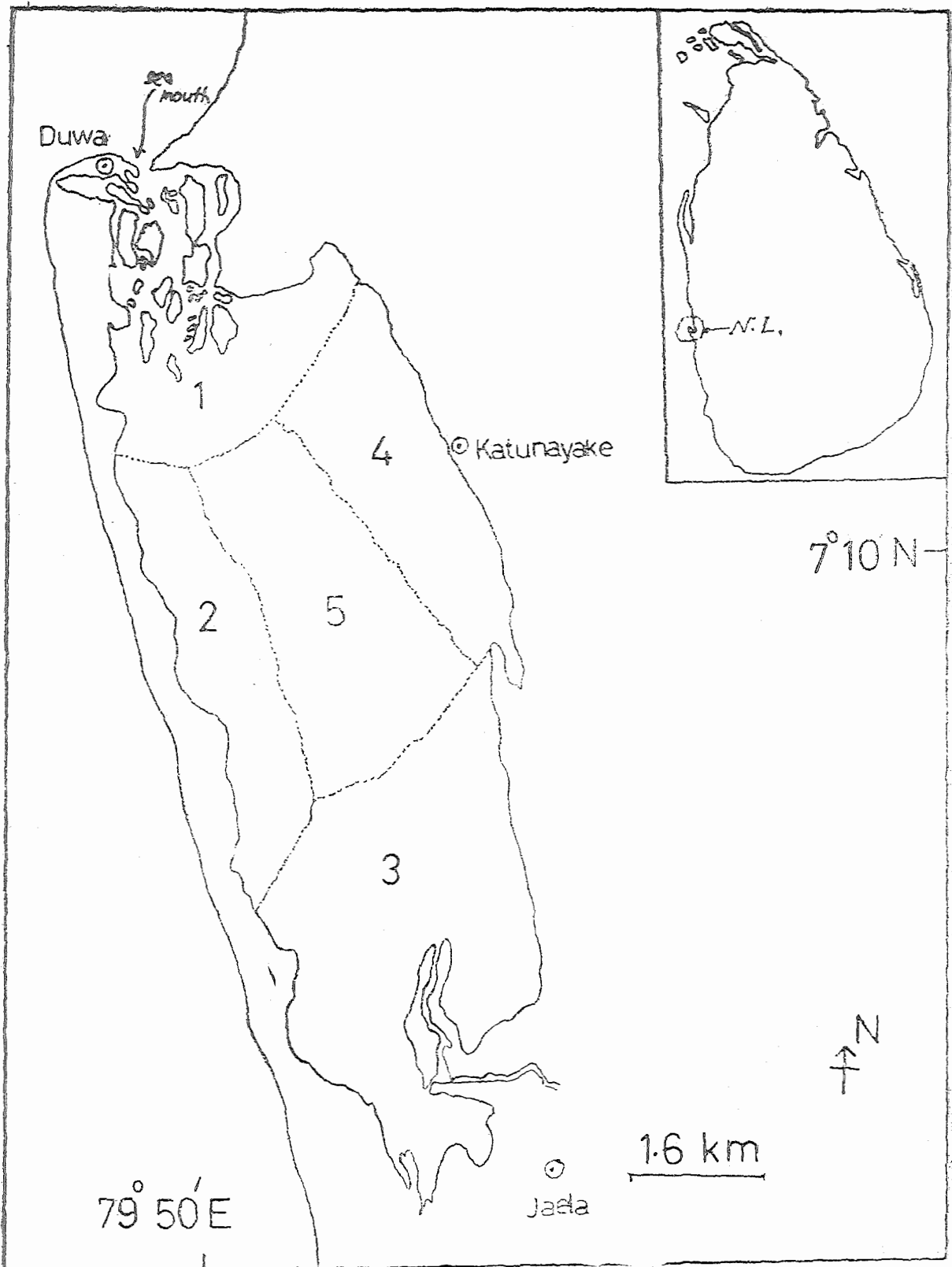


Fig. 1.—Detailed map of the Negombo Lagoon and the sampling areas. The inset shows the relationship of the lagoon to the rest of the Island.

## Results

Over the twelve month period from September 1977 to August 1978 brushpiles were not operated in the Lagoon in May and November, due to heavy rainfall. A total of 62 species of fish belonging to 36 families were recorded from the fishery and are listed in Table II. Of the 62 species recorded only two were typically freshwater while 33 were marine (Table III).

All the species were also classified according to an arbitrary system based on the number of months of occurrence in the lagoon and the results are given in Table IV. It is seen that more than 50% of the species belong to category *a*, that is they occur in the lagoon for ten or more months of the year. Only three species were found to occur for less than three months.

Fig. 2 shows the seasonal variation of all species present in the lagoon and also in each area, separately. The number of species occurring in the lagoon tend to show two peaks, a higher one in February and a lower one in August. The same trends are apparent for each Station with minor variations, such as for example a decrease in the number of species occurring in Stn. V in August while the highest number of species in Stn. III was recorded in March. Fig. 3 gives the number of species present monthly at each Stn., expressed as a percentage of the total number in the lagoon in that particular month. Stn III is exceptional in that the number of species did not exceed 30% of the total in any one month. Similarly Stn. V also have a poor fish fauna and only in February did the number of species exceed 50% of the total. Monthly variation in the number of typically marine, freshwater and estuarine species together with the total number in the lagoon are shown in Fig. 4. Also included are those species which are not classified as typically belonging to any of the above habitats (Munro, 1955). It is apparent that the migration of marine species to the lagoon is primarily responsible for bringing about an increase in the number of species in the lagoon between December-April and June-August, reaching peaks in February and August respectively.

## DISCUSSION

Pillai (1965) listed 125 species from brackish waters of Ceylon, and classified these as allochthonous freshwater (7 species), autochthonous (38 species) and allochthonous fauna from the sea (80 species). In the present study six families and fifteen species were recorded for the first time from brackish waters of Sri Lanka (*see* Table II). The most significant difference being that only one species of the cat fish family Tachysuridae was recorded from the present study as against eleven by Pillai (1965).

The seasonal increase in the fin fish fauna of the lagoon is primarily brought about by an increase in the number of marine species migrating into the lagoon, which coincides with the increasing salinities, almost becoming equal to that of sea water (De Silva and Silva, 1979) in the lagoon. Similar increases in the species composition in estuarine waters have also been noted earlier (Remnae and Schlieper, 1971).

The differences observed between stations are unlikely to be due to salinity and temperature because Stn V has a lower mean salinity while the salinity difference between Stns 3 and 4 are almost negligible. It may be that food availability or some other biological factor, not apparent from this study is responsible for the difference.

The present investigation, though of a preliminary nature, would be useful as a starting point for further investigations or for determining species availability for aquaculture practices.

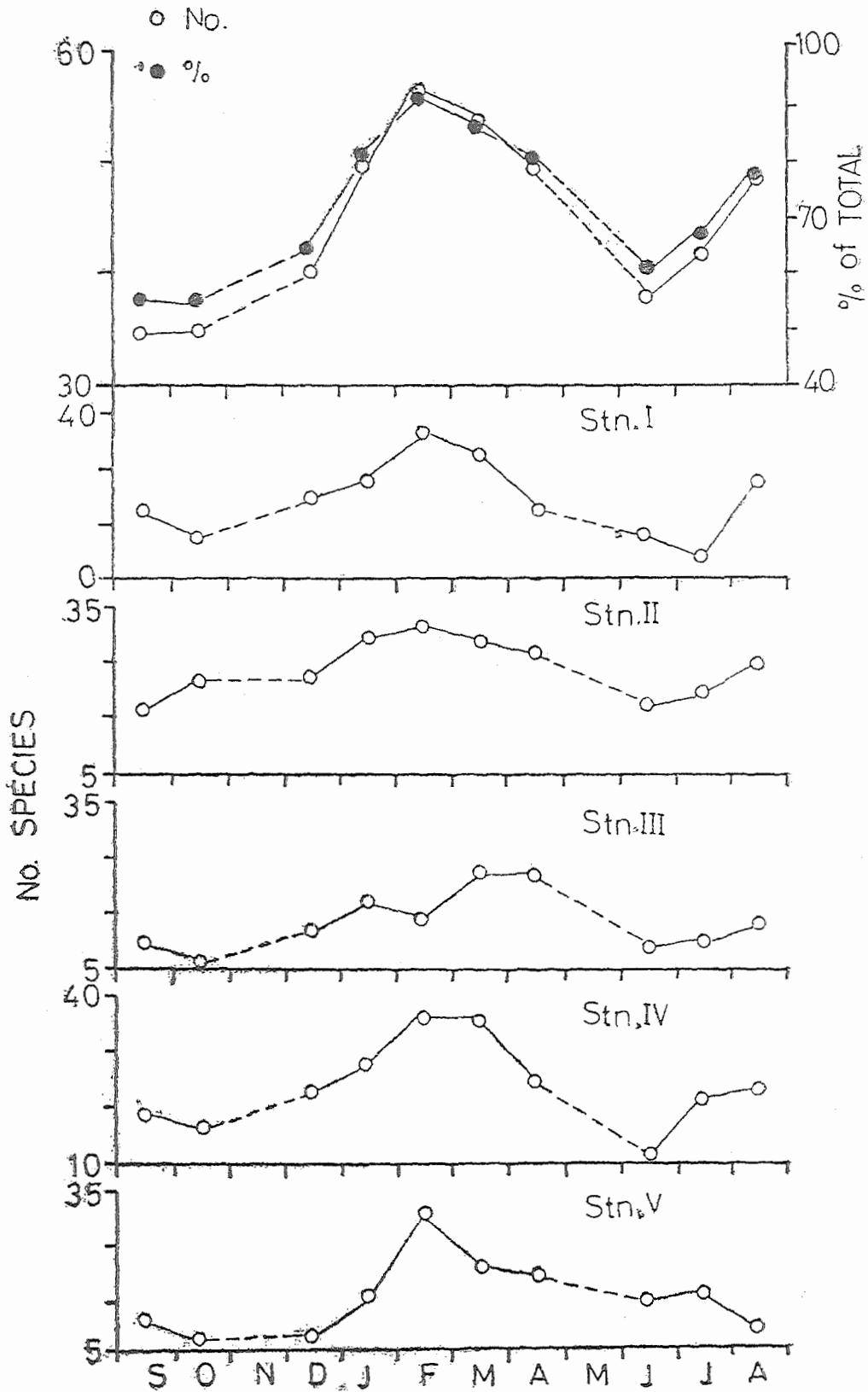


Fig. 2.—The seasonal variation in the total number of fin fish species in the lagoon and in each sampling area. Also indicated is the monthly variation in the number of species in the lagoon as a percentage of the total recorded.

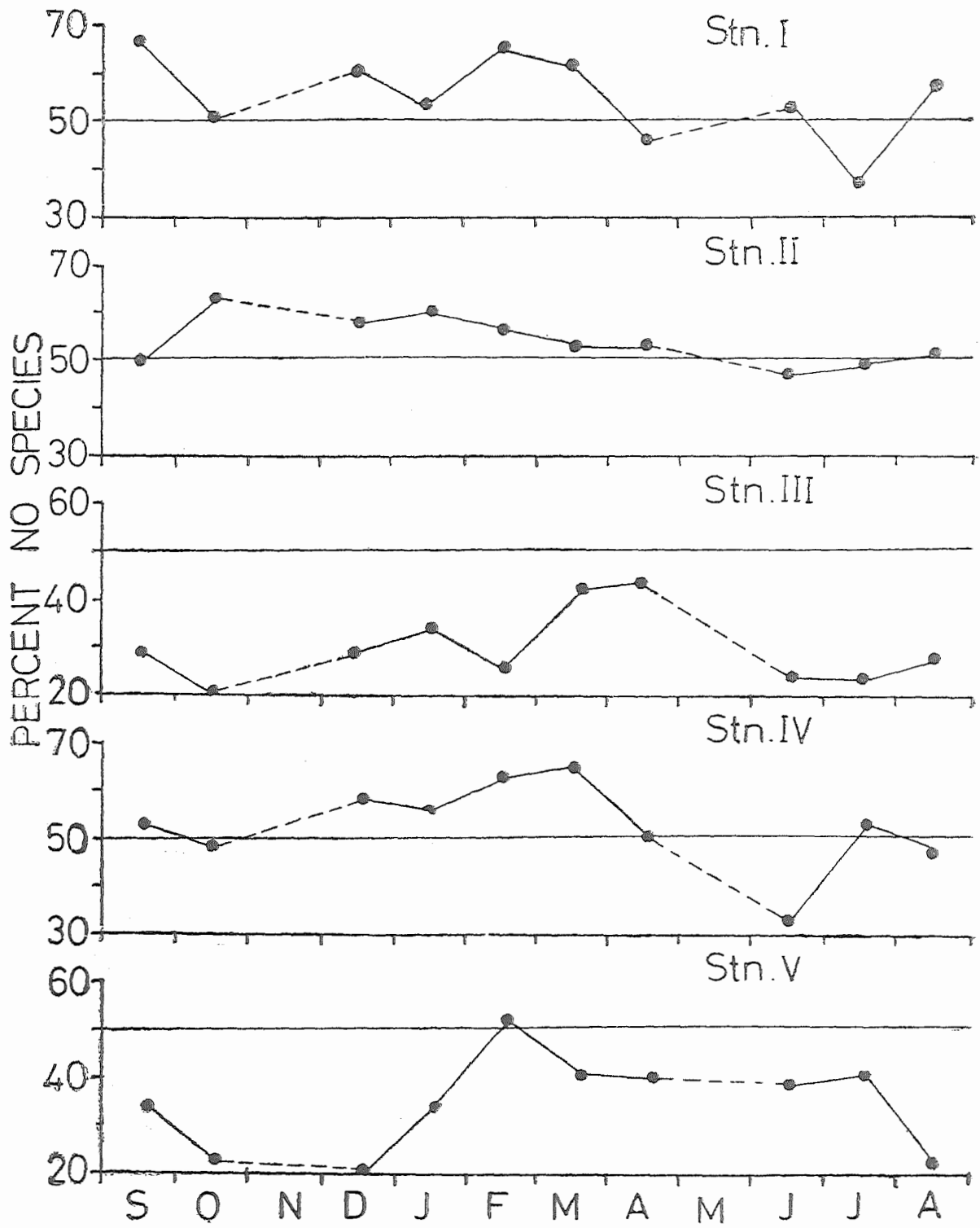


Fig. 3.—The seasonal variation of the number of species in each area as a percentage of the total in the lagoon in a particular month.

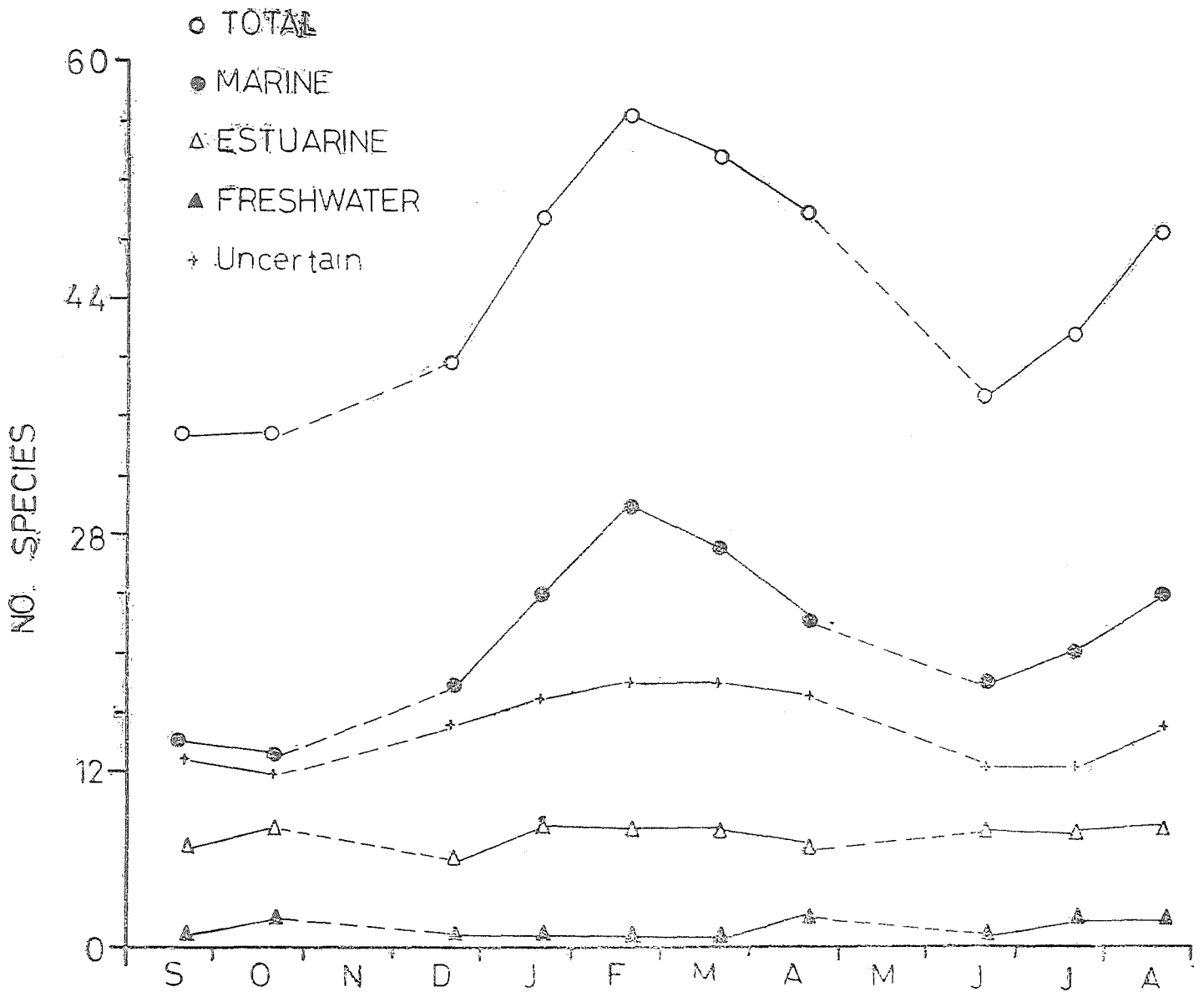


Fig. 4.—The seasonal variation of the number of typically marine, estuarine and freshwater species.

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TABLE I

Mean and the Range in Depth, Salinity, pH and Dissolved Oxygen Content of the Five Stations

Stn.	Depth m	Temp. °C	Salinity Percentage	pH	Oxygen ppm.
1	1.0 (0.3–0.7)	29.7 (33.0–25.0)	26.3 (0.7–34.5)	8.1 (7.5–9.3)	6.90 (5.83–8.80)
2	1.3 (0.8–1.6)	30.1 (25.2–34.1)	25.8 (0.2–33.2)	7.9 (7.2–9.2)	7.01 (5.46–8.80)
3	1.3 (0.6–1.8)	29.8 (25.6–34.8)	24.2 (0.4–31.6)	7.6 (7.1–8.7)	7.32 (6.16–8.60)
4	1.1 (0.7–1.4)	29.2 (25.8–35.0)	24.0 (0.2–28.4)	8.8 (7.0–9.8)	7.21 (5.57–9.20)
5	1.7 (1.0–2.5)	30.0 (27.0–33.8)	18.0 (0.1–24.1)	7.6 (6.6–8.6)	7.30 (6.19–8.34)

TABLE II

## Check List of Fish Species and their Seasonal Occurrence

(\*Families and species not recorded from the brackishwaters of Sri Lanka)

Family	Species	S	O	N	D	J	F	M	A	M	J	J	A
*Acanthuridae	.. * <i>Acanthurus mata</i>	..	-	+	-	+	+	+	-	-	+	+	-
	.. * <i>Ctenochaetus strigosus</i>	..	-	-	-	+	-	+	-	-	+	-	+
Ambassidae	.. <i>Ambassis commersoni</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Ambassis urotaenia</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Ambassis gymnocephalus</i>	..	+	+	-	+	+	+	+	-	+	+	+
Anguillidae	.. <i>Anguilla bicolor</i>	..	-	-	-	-	-	-	+	-	-	-	-
Atherinidae	.. <i>Allanetta forskali</i>	..	-	+	-	+	+	+	-	-	-	+	+
Belontiidae	.. <i>Tylosurus strongylurus</i>	..	-	-	-	-	+	+	+	-	-	-	-
Carangidae	.. * <i>Caranx ignobilis</i>	..	-	-	-	-	+	+	+	-	-	-	+
Chanidae	.. <i>Chanos chanos</i> ..	..	+	+	-	+	+	+	+	-	+	+	+
Cichlidae	.. <i>Tilapia mossambica</i>	..	-	+	-	-	-	-	-	-	-	-	+
	.. <i>Etioplos maculatus</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Etioplos suratensis</i>	..	+	+	-	+	+	+	+	-	+	+	+
*Clupeidae	.. <i>Kowala coval</i> ..	..	-	+	-	+	+	+	+	-	+	+	+
	.. * <i>Opisthopterus tartoor</i>	..	-	-	-	-	+	+	+	-	-	+	+
	.. * <i>Pellona ditchoa</i>	..	-	+	-	-	+	+	+	-	-	+	-
Cyprinodontidae	.. <i>Panchax blochi</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Panchax melastigma</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Panchax panchax blochi</i>	..	+	+	-	-	-	-	+	-	+	-	-
Dussumeridae	.. <i>Ehirava fluviatilis</i>	..	+	+	-	-	+	+	+	-	-	+	-
Eleotridae	.. <i>Eleotris fusca</i> ..	..	+	+	-	+	+	+	+	-	+	+	+
Engraulidae	.. <i>Engraulis baelama</i>	..	-	+	-	+	-	+	+	-	+	+	-
Gobiidae	.. <i>Glossogobius giuris</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Mugilogobius valigouva</i>	..	-	+	-	+	+	+	+	-	+	+	+
*Labridae	.. * <i>Thalassoma umbristigma</i>	..	-	-	-	+	+	+	+	-	-	-	+
*Lagocephalidae	.. * <i>Amblyrhynchotes hypselogenion</i> ..	..	+	-	-	-	+	+	+	-	-	+	-
Latidae	.. <i>Lates calcarifer</i> ..	..	+	-	-	+	+	+	+	-	+	+	+
Leiognathidae	.. <i>Leiognathus fasciatus</i>	..	+	-	-	+	+	+	-	+	-	-	+
	.. * <i>Leiognathus splendens</i>	..	+	-	-	-	+	+	+	-	-	+	+
	.. <i>Leiognathus equulus</i>	..	-	-	-	-	+	+	+	-	-	-	+
Lutianus	.. <i>Lutianus argentimaculatus</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. * <i>Lutianus kasmira</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. * <i>Lutianus russeli</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. * <i>Lutianus johnii</i> ..	..	+	+	-	+	+	+	+	-	+	+	-
Mugilidae	.. <i>Mugil cephalus</i>	..	+	+	-	+	+	+	+	-	+	+	+
	.. <i>Mugil tade</i> ..	..	+	+	-	+	+	+	+	-	+	+	+
	.. * <i>Mugil kelaarti</i>	..	-	-	-	+	+	+	+	-	+	+	+
	.. <i>Mugil oligolepis</i> ..	..	-	-	-	+	+	+	+	-	+	-	+
	.. <i>Mugil parasia</i> ..	..	-	-	-	+	+	+	+	-	-	-	+
	.. <i>Mugil dussumieri</i>	..	-	+	-	-	+	+	-	+	-	+	+
	.. <i>Mugil borneensis</i>	..	+	+	-	-	+	+	+	-	+	+	+
*Mullidae	.. * <i>Upeneus vittatus</i>	..	-	-	-	-	-	+	+	+	-	-	+
Periophthalmidae	.. <i>Periophthalmus koelreuteri</i>	..	+	+	-	+	+	+	+	-	+	+	+
Plotosidae	.. <i>Plotosus canius</i> ..	..	+	-	-	-	+	-	-	-	+	-	-



*Plectorhynchidae	..	* <i>Plectorhynchus griseum</i>	..	-	-	-	+	-	-	-	-	+	-	-
Scatophagidae	..	<i>Scatophagus argus</i>	..	+	+	+	-	+	+	+	+	-	+	+
Sciaenidae	..	<i>Johnius diaacanthus</i>	..	-	-	-	-	+	+	+	-	-	-	+
Serranidae	..	<i>Epinephelus tauvina</i>	..	+	+	+	+	+	+	+	+	-	+	+
Siganidae	..	<i>Siganus javus</i>	..	-	-	-	-	+	+	+	+	-	-	+
	..	<i>Siganus oramin</i>	..	-	-	-	-	+	+	+	+	-	-	+
Soleidae	..	<i>Brachirus orientalis</i>	..	+	+	-	+	+	+	+	+	-	+	+
*Sparidae	..	* <i>Sparis berda</i>	..	+	+	-	+	+	+	+	+	-	+	+
Sphyrinidae	..	<i>Sphyraena fello</i>	..	-	-	-	-	+	+	+	-	-	-	-
	..	<i>Sphyraena obtusa</i>	..	-	-	-	-	+	+	+	+	-	+	+
Tachysuridae	..	<i>Tachysurus caelatus</i>	..	+	+	-	+	+	+	+	+	-	+	+
Tetradontidae	..	<i>Chetonodon patoca</i>	..	-	-	-	+	+	+	+	+	-	-	+
	..	<i>Cheatodon fluviatilis</i>	..	-	-	-	-	+	+	+	+	-	-	+
Theraponidae	..	<i>Antisthes putia</i>	..	+	+	-	+	+	+	+	+	-	+	+
	..	<i>Therapon jarbua</i>	..	+	+	-	+	+	+	+	+	-	+	+
Tricanthidae	..	<i>Tricanthus biaculeatus</i>	..	+	-	-	+	+	-	-	+	-	-	+
	..	<i>Tricanthus beryrostris</i>	..	+	-	-	+	+	+	-	-	-	+	+
Trichiuridae	..	<i>Trichiuris savala</i>	..	-	-	-	-	+	-	+	+	-	-	-

TABLE III

Number of Species belonging to Different Environments

Environment			Number
Marine	..	..	32
Freshwater	..	..	03
Estuarine	..	..	08
Marine/Freshwater/Estuarine		..	02
Marine/Estuarine	..	..	10
Freshwater/Estuarine	..	..	05
Uncertain	..	..	02

TABLE IV

Classification of the Fish Fauna based on the Number of Months of Occurrence in the Lagoon

Category	Description	No. of Species
a	.. Occurs for ten or more months	.. 25
b	.. Occurs for 6-9 months	.. 19
c	.. Occurs for 3-5 months	.. 16
d	.. Occurs for less than 3 months	.. 02