

## THE PRESENT STATUS OF FIN FISH AND CRUSTACEAN FISHERY OF PUTTALAM LAGOON

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### ABSTRACT

Status of the commercially important fin fish and shell fish fishery of the Puttalam Lagoon was investigated from August 1982 to September, 1983. Around fifty species of fin fish and shell fish were identified from these catches. Of these, *Mugil* spp., *Arius* spp. and *Lates calcarifer* formed the important fin fish species of the lagoon. The important shell fish species were *Penaeus indicus*, *P. semisulcatus* and *Scylla serrata*. The annual fin fish production was estimated to be 30 kg./ha. which is about twice the value that has been estimated by Wijeyaratne (1984) for Negombo Lagoon. The total annual production for the Puttalam Lagoon was estimated to be 49 kg./ha.

### INTRODUCTION

The brackish water lagoons are potential, sources of additional protein, income and employment for populations living adjoining the lagoon areas.

However for the achievement of the maximum potential, proper plans will have to be evolved for rational exploitation of the lagoon fishery. Information about the present status of the fish in lagoons will therefore be necessary if plans are to be drawn up for the proper development and management of capture and culture fisheries in these lagoons.

Information about the natural production from Sri Lanka brackish waters is scanty. Schuster (1951) estimated the average natural production of Sri Lanka lagoons to be around 22 kg./ha./annum. Pillai (1965) however estimated the natural production of Negombo lagoon to be 72.9 kg./ha./annum. More recently Wijeyaratna (1984) working on population of fish estimated the total annual production of all fin fish species of Negombo lagoon to be 14.74 kg./ha.

Studies that have been carried out on lagoons in Sri Lanka have been mainly concentrated on hydrobiology and biology of individual fish species (Sachithanathan, 1969); De Silva and Perera, 1976; De Silva and Silva 1979; Jayasinghe 1979; Costa and Fernando 1981; and Fernando 1981; Costa 1983; Wijeyaratne, 1984).

Puttalam lagoon is one of the largest lagoons in Sri Lanka and covers an area of 237 km<sup>2</sup>. Although a large number of fishermen operate in this lagoon there are only very few published data available (Durairatnam, 1960 and 1961; Ramanathan, 1969 Perera and Siriwardana 1982).

The present work is a part of an integrated project on the Puttalam lagoon fishery undertaken by the National Aquatic Resources Agency. The study was carried out for a period of one year beginning September 1982 to August 1983.

A feature of the Puttalam lagoon is that fish landing sites are dispersed all along the banks making it difficult to recognize distinct and separate landing sites.

For the present investigation however, five major landing sites were selected namely Kalpitiya, Kuringipitiya, Palaikudah, Mampuri and Puttalam (Fig. 1). Fishermen of this lagoon use seven types of crafts : mechanized fibre-glass boats, mechanized and non-mechanized orus, theppams and vallams. About ten types of gear are being used in this fishery viz. gillnets, valachal nets, kadippu nets, trammel nets, cast nets, crab traps, hand nets, mandal and bottom long lines.

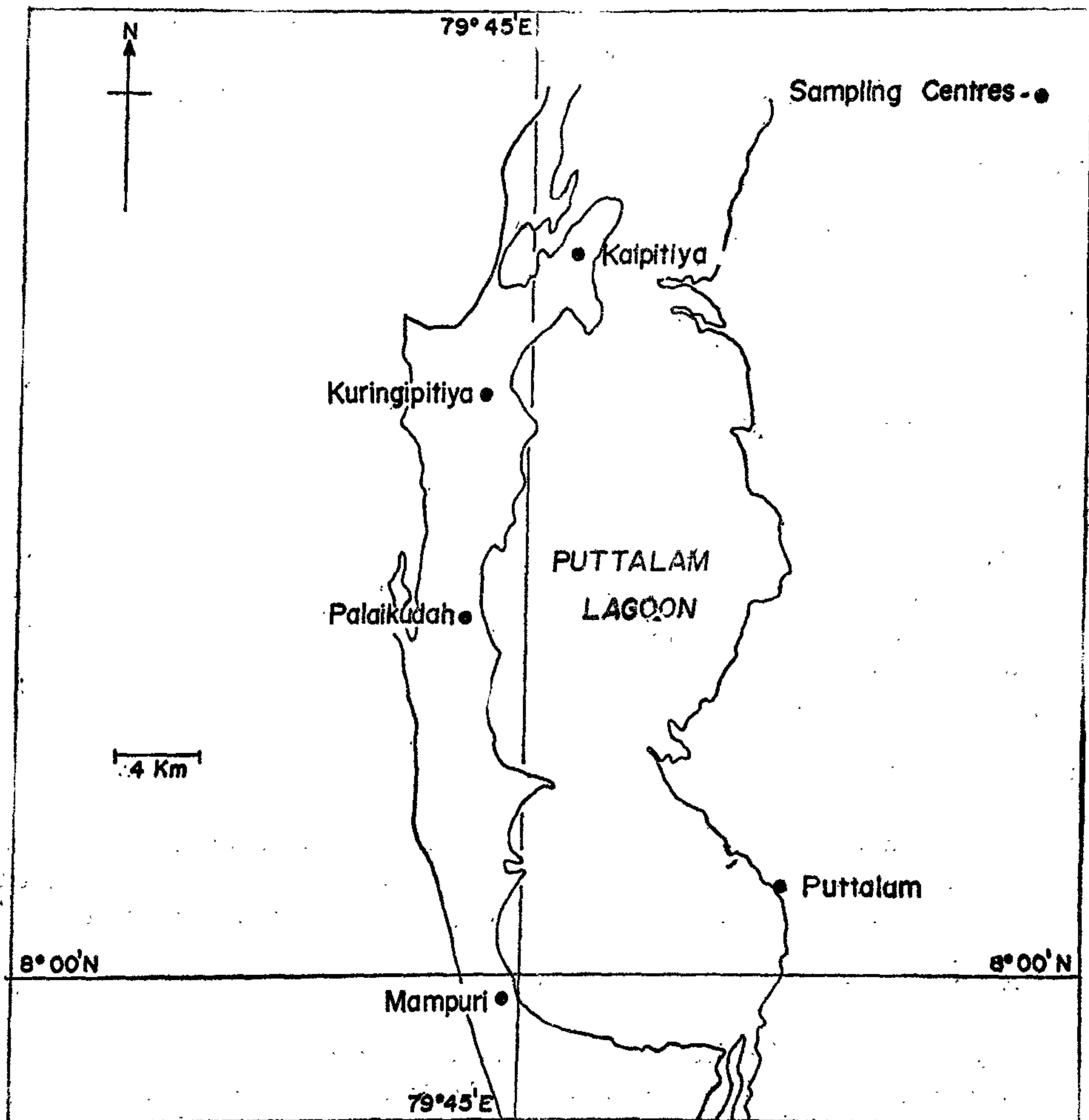


Fig. 1 : Sampling sites

## LANDING SITES (SAMPLING CENTRES)

### Station 1 — Kalpitiya.

This station is situated in the north western end of the lagoon. There are two major sites at this centre. One is at Wanimundal and the other one is at the western side of the town, Kalpitiya. The fishermen of these sites use three types of fishing craft: fiber-glass boats, vallams and theppams which carry gillnets, trammel nets and drag nets (kadippu).

### Station 11. Kuringipitiya

This site is also situated in the western coast of the lagoon. The landings of this area are brought to two major sites namely Narikudha and Kuringipitiya. Local fishermen at Kuringipitiya engage in fishing throughout the year. Fishermen from Thoduwawa area usually migrate to Narikudha once a year from July to September. The major fishing craft consist of theppams. Some fishermen use dug-out canoes (orus). From September to March most of the local fishermen indulge in prawn fishing twice a day, once early morning and once at night. They use gillnets and drag nets in this fishery.

### Station 111 — Palaikuda

The landing site of Palaikuda is in the middle of the west coast of the lagoon. Almost all the fishermen at this site are migrants from the Thalawila area. They fish in the lagoon during the South West Monsoon season using plastic boats, theppams and orus. Some of the local fishermen carry out cast-netting to catch prawns, which also catches small Koiya (*Macrura kelle*) used as bait to catch *Atractoporus* sp. (Katumora) in the coastal deep-water fishery.

### Station IV — Mampuri

Mampuri is at the southern part of the west coast of the lagoon. Main fishery is carried out during the monsoon season at this site. The fishermen go for sea fishery during the intermonsoon period. Some of the people in the village do cast netting to catch prawns during the other days of the year. During the monsoon season about 15-25 plastic boats and few orus operate from this centre.

### Station V — Puttalam

This landing site is about two and a half miles long and is situated at the southern side of the east coast of the lagoon. Vallams are the only type of craft used by the fishermen and the gear consist mainly of gillnets, mandal and hand nets.

## MATERIALS AND METHOD

The five landing sites were selected by a frame survey (Fig. 1). The sites were visited fortnightly for a period of 4 days from September 1982 to August 1983. The total number of craft, gear and the weights of different species of fish were recorded for each landing site. The number of fishing gear involved in the non-selected landing centres were taken into account during the frame survey.

For each type of gear the monthly production was estimated using the following formula :

n out of N landing centers of the lagoon were selected at random.

$$\hat{Y}_i = \underline{D} \sum_{j=1}^d \frac{L_{ij}}{I_{ij}} \sum_{k=1}^{I_{ij}} Y_{ijk}$$

Where

$\hat{Y}_i$  = estimated monthly landings of one type of gear at the  $i^{\text{th}}$  center.

D = number of fishing days in a calendar month (excluding sundays).

d = number of days observed.

$L_{ij}$  = number of gear that actually landed at  $i^{\text{th}}$  center on  $j^{\text{th}}$  day.

$I_{ij}$  = number of sample gear from a craft or unit on the  $j^{\text{th}}$  day at  $i^{\text{th}}$  center.

$Y_{ijk}$  = Landings of  $K^{\text{th}}$  craft/unit on  $j^{\text{th}}$  day at  $i^{\text{th}}$  center.

$$\hat{Y} = M \times \frac{\sum_i^n \hat{Y}_i}{\sum_i^n M_i}$$

Where

$\hat{Y}$  = estimated monthly landings.

$M_i$  = number of gear in the  $i^{\text{th}}$  center.

M =  $\sum_i^n M_i$  total number of gear in the lagoon.

TABLE I.

## MONTHLY VARIATION OF % COMPOSITION OF THE FIN FISH VARIETIES CAUGHT IN PUTTALAM LAGOON

Species	1982 Sept.	1982 Oct.	1982 Nov.	1982 Dec.	1983 Jan.	1983 Feb.	1983 Mar.	1983 Apr.	1983 May	1983 June	1983 July	1983 Aug.
<i>Arius</i> spp.	4	13	8	10	5	4	24	14	9	7	4	7
<i>Gerres oblongus</i>	3	5	1	1	1	1	1	1	1	3	2	4
<i>Hemiramphus</i> spp.	2	1	1	1	11	1	44	3	6	6	5	4
<i>Lates calcarifer</i>	21	6	3	1	6	1	1	1	9	12	15	21
<i>Macrura kelee</i>	19	22	5	5	9	3	2	2	5	3	2	14
<i>Nematolosa nasus</i>	6	4	1	1	1	2	3	2	4	2	3	7
<i>Mugil</i> sp.	17	12	22	25	14	12	12	20	22	18	17	13
<i>Liza</i> sp.	6	8	7	5	9	12	11	14	15	12	11	17

TABLE II.

## MONTHLY VARIATION OF % COMPOSITION OF THE SHELL FISH VARIETIES CAUGHT IN PUTTALAM LAGOON

Species	1982 Sep.	1982 Oct.	1982 Nov.	1982 Dec.	1983 Jan.	1983 Feb.	1983 Mar.	1983 Apr.	1983 May.	1983 June.	1983 July.	1983 Aug.
<i>Penaeus</i> spp.	12	7	43	33	29	28	21	14	33	2	1	1
<i>Scylla serata</i>	1	1	1	1	8	3	5	8	4	5	6	3

## RESULTS

Tables 1 and 11 give the percentage composition of the ten major varieties of fin fish and shell fish caught in the Puttalam lagoon.

About fifty species of fin fish and shell fish were identified from the samples collected from the catches. However, only ten species of these could be considered as commercially important, as others do not make significant contributions to the total catch. These ten varieties were selected for detailed analysis.

Fig. 11 shows the seasonal variation of these ten major varieties. Most of the fin fish varieties show a peak period from May to July and a sharp drop in December to April; the prawn catches show a peak period in November coinciding with South west and North East Monsoons respectively.

Fig. III shows the monthly catches of prawns and other fin fishes at each landing centre. Except at Puttalam (station 5) the peak fish catch at all other centres, appears to be during the South West Monsoon period. The magnitude of the total fish catch in the Puttalam lagoon appears to be constant throughout the year.

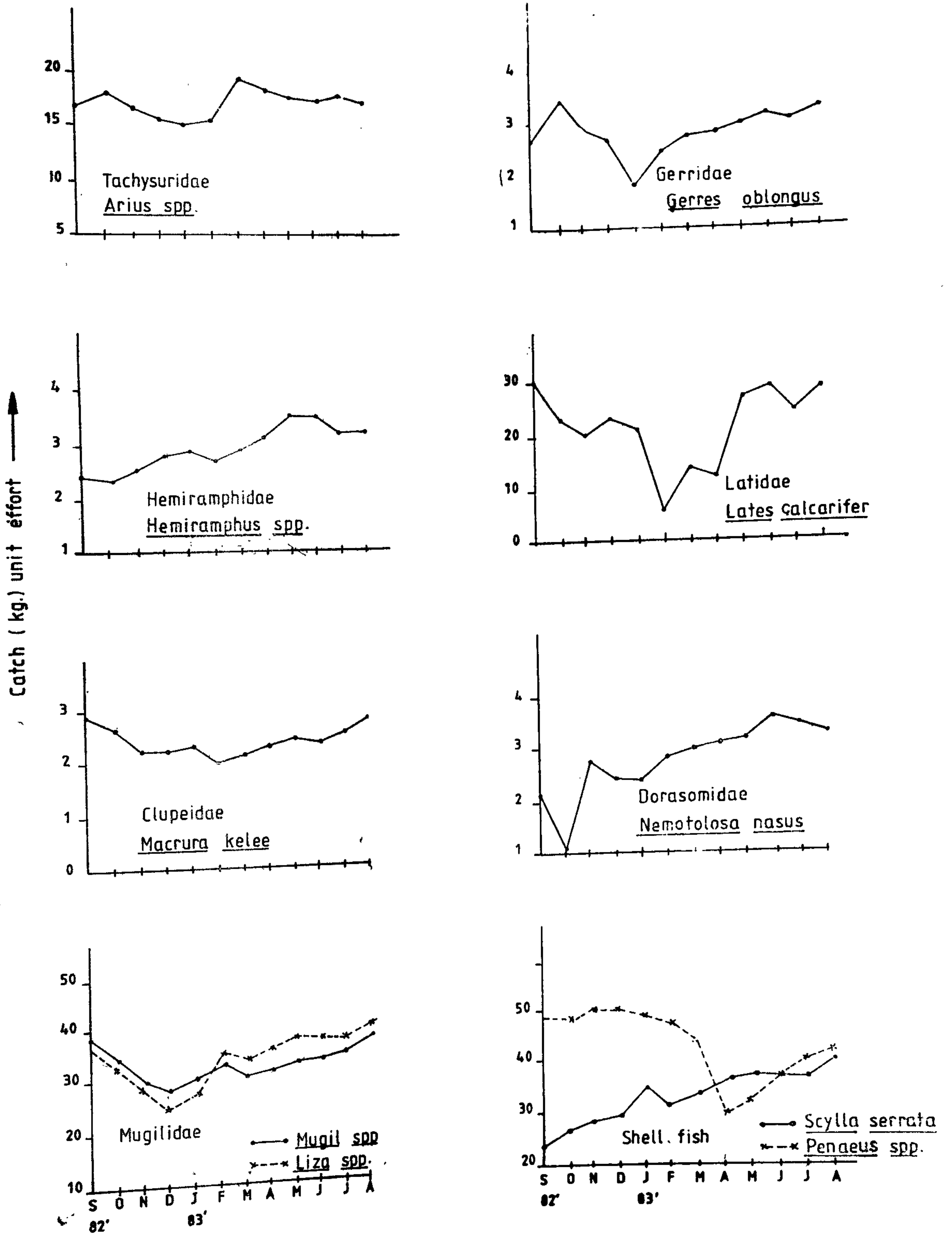


Fig. II: Seasonal variation of ten varieties of fin fish and shell fish.

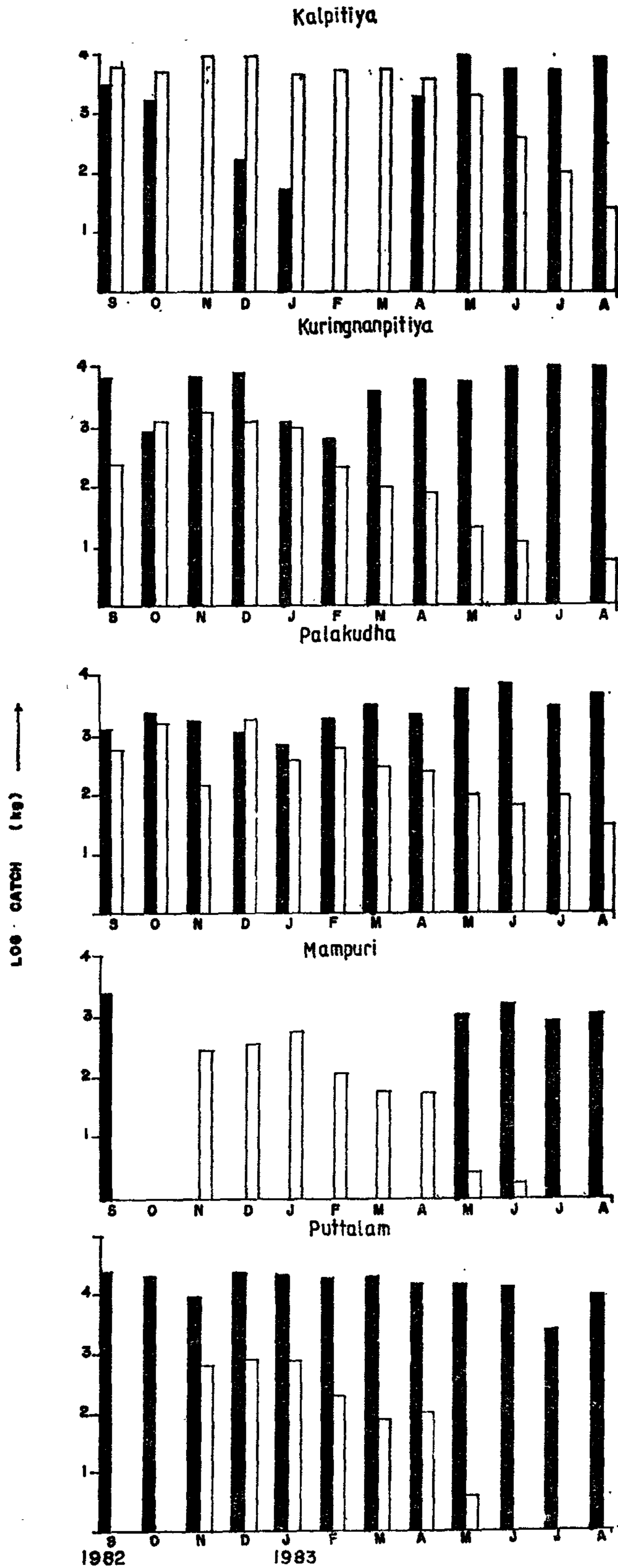


Fig. III: Monthly catches of the prawns & other fin fishes at five landing centres.

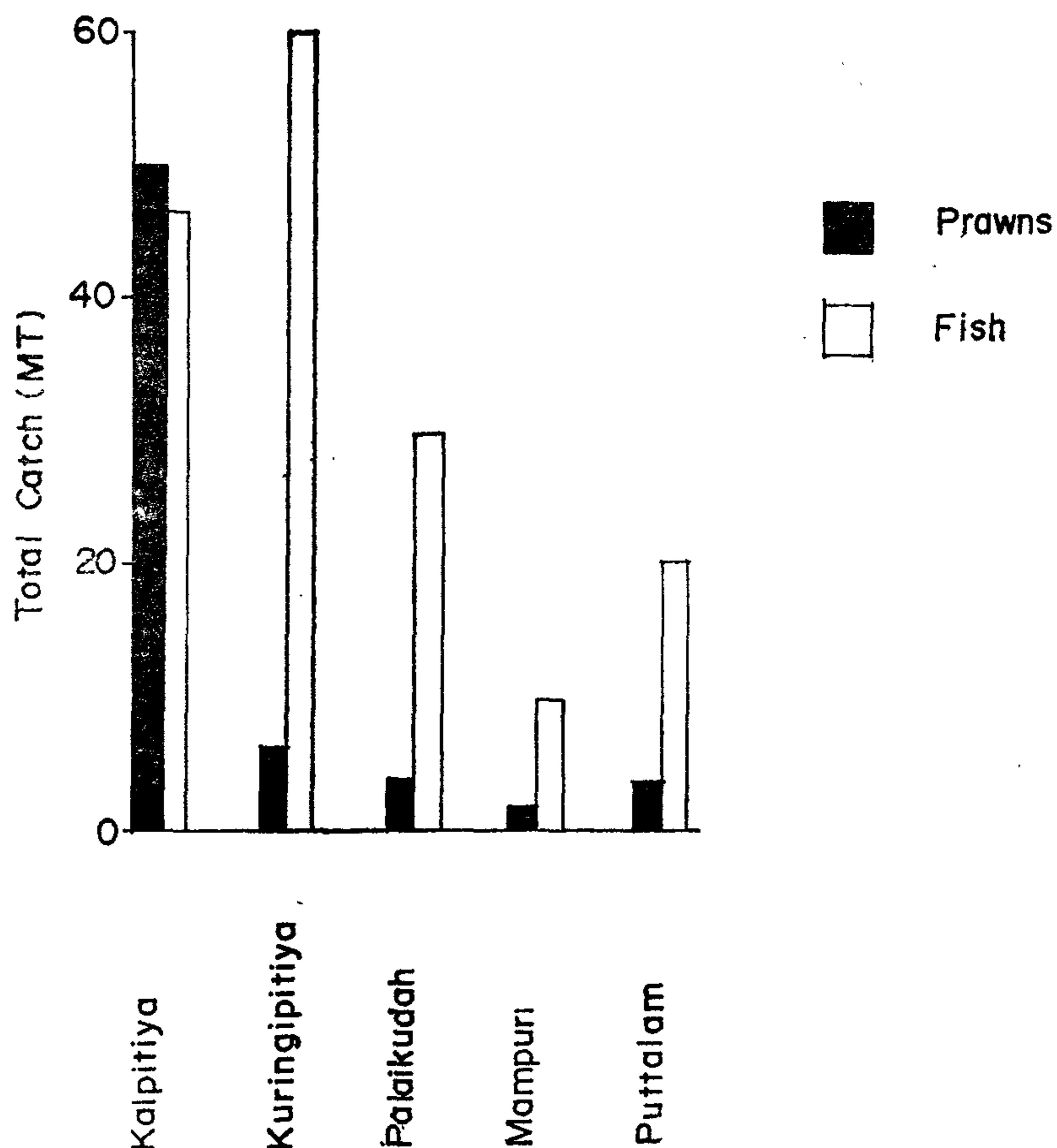


Fig. IV: Total annual catch of Prawns and Fin Fishes at each Landing Centre.

Fig. IV shows the total annual catch of prawns and other fin fishes at each landing centre.

TABLE III.

NO. OF FISHING GEAR UNITS AND THEIR TOTAL ANNUAL PRODUCTION

Fishing gear	Gill net	Trammel net	Kadippu net	Valachal net	Cast net	Hand net	Mandal Crab traps	Bottom long line	
No of fishing gear units present in the selected center	410	100	83	29	832	65	104	833	2400 hook
No. of fishing gear units in the non selected center	254	457	275	—	369	—	21	850	—
Observed production of fin fish (kg.)	270065.97	9808.60	31662.43	55038.71	4118.99	2963.21	1245.66	—	5620
Total production of fin fish (kg.)	450331.22	54633.90	136568.07	55038.71	5945.80	2963.21	1497.18	—	5620
Observed production of shell fish (kg.)	34617.97	59659.88	11557.66	223.90	6487.62	687.50	—	2775.7	—
Total production of shell fish (kg.)	56064.22	332470.05	49851.11	223.90	9364.94	687.50	—	3587.50	—



Table III gives the units of fishing gear at the different landing centres and the estimated fish production for each type of gear. The production values for fin fish and prawns are given separately.

TABLE IV

## TOTAL ANNUAL PRODUCTION OF FIN FISH AND SHELL FISH

Total fin fish production in 1982 mt	Total prawn production in 1982 mt	Total shell fish production in 1982 mt	Annual fin fish production (kg/ha <sup>-1</sup> /yr <sup>-1</sup> )	Annual production of fin fish and shell fish (kg/ha <sup>-1</sup> /yr <sup>-1</sup> )
712.59	448.66	452.24	30.07	49.15

Table IV gives the total annual production values for the Puttalam lagoon.

## DISCUSSION

Approximately 2000 fishermen are engaged in different types of fishing in the Puttalam lagoon. The fishery in the lagoon shows a distinct seasonal pattern. Intensive fishing occurs during the South West Monsoon period (May to August). The fishermen from adjoining coastal areas migrate to the lagoon during the monsoonal season since rough weather affects fishing in the sea, but not the lagoon fishery. When the South West Monsoon period terminates migratory fishermen revert to sea fishing. The local fishermen however remain and engage in the lagoon fishery during the inter-monsoon period (September to April). During this period the fishermen in the west coast of the lagoon do not go to catch fin fish since the demand for lagoon fish is low due to the availability of marine fish. Because of this reason their efforts are diverted to the capture of prawns for which they use castnets, kadippu nets and trammel nets.

There is a natural management of fish resources in the lagoon because of the seasonality in fishing. During the off season the fish can multiply and grow without interference since the fishermen at this time mainly indulge in the capture of prawns. However in the east coast of the lagoon this does not usually happen because the fishermen in this area continue to fish throughout the year.

Among the prawn catches *Peneaus indicus* is the major species followed by *Peneaus Semisulcatus*. *P. semisulcatus* catches come only from kadippu nets (drag nets) as these prawns bury themselves deep in the soft mud. Both spp. spawn in the sea and the post larvae enter the lagoon with the influx of seawater. Since Kalpitiya is closer to the mouth of the lagoon most of the juveniles and sub-adults (migratory) of prawns are landed at Kalpitiya.

The fish caught are mostly estuarine species. The commonest varieties caught are *Liza* sp., *Mugil* sp., *Arius* spp. and *Lates calcarifer*. Of the fifty species of fin fish and shell fish collected from the catches only about ten species could be considered as major varieties as they form 80% of the catch. Most of the other varieties do not make significant contributions to the total catch.

Seventy five percent of the fin fish landings in the Puttalam lagoon come from the sites at Puttalam. The contribution to the total catch from Mampuri and Palaikudah areas are small since fishing here is carried out only during six months. Kalpitiya contributes about 75% of the total prawn catch of the lagoon (Fig. IV).

The total annual fish production in the Puttalam lagoon was calculated to be 49.1 kg./ha. of which the annual fin fish production is 30 kg./ha. This figure is higher than the value of fin fish production for the Negombo lagoon which has been estimated by Wijeyaratne (1984) to be 15 kg./ha.

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### REFERENCES

- COSTA, H. H., and E. C. M. FERNANDO, 1981.  
A comparison of the hydrobiological features and fish fauna of two lagoons in Sri Lanka. Proceedings of the International Symposium on coastal lagoons, Bordeaux France. Abstract.
- COSTA, H. H., 1983.  
Biological studies of the Pearl Spot *Etroplus suratensis* (Pisces, Cichlidae) from three different habitats in Sri Lanka. Int. Revue ges. Hydrobiol. Vol. 68, No. 4, 565 - 590.
- DE SILVA, S. S., and Perera, P. A. B., 1976.  
Studies on the biology of young grey mullet, *Mugil cephalus* L.I. Effects of salinity on food intake, growth and food conversion. Aquaculture, 7, 327-338.
- DE SILVA, S. S., and SILVA, E. I. L. 1979.  
Fish fauna of a coastal lagoon in Sri Lanka : Distribution and seasonal variation Bull. Fish. Res. Sta., Sri Lanka Vol. 29, pp 1-9.
- DURAIRATNA, M., 1960 - 1961.  
Studies on the seasonal cycle of surface temperature salinities and phytoplankton in Puttalam lagoon, Dutch Bay and Portugal Bay along the west coast. Bull. Fish. Sta. Ceylon Vol. 16, No. 1 pp 9 - 24.
- JAYASINGHE, J. M. P. K., 1979.  
Some aspects of hydrobiology of the Panadura river estuary. M. Phil Thesis, University of Colombo. 295 pp.
- PERERA, W. K. T., and SIRIWARDANA, P. P. G. S. N., 1982.  
Topography of Puttalam lagoon J. Inland Fish. Vol. 1, December 1982 pp 97 - 104.
- PILLAI, T. G., 1965.  
Brackish-water fishery resources of Ceylon. Bull. Fish. Res. Sta. Ceylon Vol. 18, No. 2, 75 - 86.
- RAMANATHAN, S., 1969.  
A preliminary report on Chanos fry surveys carried out in the brackish water areas of Mannar, Puttalam and Negombo. Bull. Fish. Res. Sta. Ceylon Vol. 20, pp. 79 - 85.
- SACHITHANANTHAN, K., 1969.  
Salinity and temperature variations of the surface waters in the Jaffna lagoon. Bull. Fish. Res. Sta. Ceylon, Vol. 20, pp. 87 - 99.
- SCHUSTER, W. H., 1951.  
Survey of the inland fisheries of Ceylon Government. Publ. Bureau, Ceylon Sess Paper No. XXIV, pp. 4 - 15.
- WIJEYARATNE, M. J. S., 1984.  
"Studies on the biology and fishery of grey mullets in Negombo lagoon (unpublished).