A STUDY OF THE FISHERIES OF THE VELLAR ESTUARY WITH SPECIAL REFERENCE TO THEIR CONSERVATION

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INTRODUCTION.

The Vellar river also known as the Vasistanadi, takes its origin from the hills of Uttangarai taluk of Salem district. After traversing through Attur taluk of the same district, it runs as the boundary between Tanjavoor and South Arcot districts; and finally drains into the Bay of Bengal at Porto Novo. The total course of the river is about 300 miles. The estuary of the river is connected with the sea throughout the year; and is subjected to tidal influence having a range of 1 to 3 feet extending to a distance of over ten miles. The low water level averages about 20 feet, and affords harbourage to sea-going merchant vessels. Near the sea, the estuary is about 700 yards in width.

MATERIALS AND METHODS.

Rao (1942) in his presidential address to the section of Zoology of the 29th Indian Science Congress, had pointed out the need for a small biological station on the banks of the Vellar river. The fishery of this river was since surveyed by Chacko (1949) who also indicated the suitability of the area for estuarine farming and for the establishment of an estuarine biological station. A knowledge of the census of the fisherfolk engaged in fishing in the Vellar estuary, their average earnings, the relative efficiency of their gears and the average daily fish landings from each type of tackle employed and their composition is necessary for taking steps to conserve the estuarine fishery without adversely affecting the economic conditions of the fishermen depending on it. With this object in view, a study of the Vellar estuary was made by us for a period of one year between May 1952 and April 1953. The results of this study form the basis of the present communication.

HYDROLOGICAL CONDITIONS.

As detailed and systematic hydrobiological study of the estuary was not contemplated in the present investigation, hydrological conditions were ascertained on three occasions only in May and September 1952 and in April 1953 are tabulated in Appendix I. It will be seen that the estuary water was alkaline with a pH ranging

from 8·0 to 8·4 and was free from free carbondioxide. At the mouth the pH appeared to be steady at 8·4 throughout the year whereas at the higher reaches of the estuary there was greater fluctuation in pH ranging from 8·0 to 8·3. The salinity varied from 15·0 °/00 in the higher reaches to 22·76 °/00 near the mouth in the flood season and from 25·5 °/00 in the middle region to 41.3 °/00 near the mouth in the summer months. The estuary was moderately rich in silicates throughout the year.

SHORE AND AQUATIC VEGETATION.

The shore of the estuary is sandy and open; and is sparsely vegetated by *Ipomea repens*, *Ipomea Pes-caprae*, *Spinifex squarrosus*, *Launaea pinnatifida*, *Sesuvium Portulacastrum*, *Heliotropium curassavicum*, *Lochnera rosea*, *Calotropsis gigantea*, *Opuntia coccoinellifera*, *Opuntia Dillenii*, *Bruguieria caryophylloides*, *Rhizophora mucronata*, *Thespesia populnea* and *Pandanus odoratissimus*. The aquatic vegetation consists of *Halophila ovata*, *Hypnea musciformis*, *Enteromorpha intestinalis*, *Enteromorpha compressa* and *Chaetomorpha linum*.

PLANKTON FLORA AND FAUNA.

The plankton flora during the non-flood period comprise mostly of diatoms which are typically marine and estuarine. Just near the tidal limit the green alga, *Pediastrum duplex* and the blue-green alga, *Microsystis aeruginosa* are present. The plankton is more in quantity and quality towards the mouth of the estuary, the peak period being from August to November (1952). Of the zooplankters, copepods (six species) are dominant throughout the year, and medusoids are common in July and August (1952). A systematic list of the planktonic organisms recorded from this estuary is given in Appendix II.

INVERTEBRATE MICROFAUNA.

Polychaete worms are few, represented chiefly by *Nereis chilkoensis* Southern, *Marphysa gravelyi* Southern and *Lumbriconereis polydesma* Southern. The shallow areas and shore region are covered with amphipods, *Grandidierella megnea* (Giles) and *Paracalliopse fluviatilis* (G. M. Thomas). *Balanus amphitrite* Darwin occurs in large numbers on wooden poles and dead molluscan shells. Among the larger crustaceans, the shrimps (*Acetes indicus*, Milne-Edwards and *A. erythraeus*, Nobilii), prawns like *Penaeus carinatus* Dana, P. *indicus* Milne-Edwards, P. *monodon* Fabricus, P. *semisulcatus* de Haan, *Parapenaeopsis stylifera* (M. Edw.) and *Metapenaeus monoceros* (Fabricius), and crabs like *Matuta victor* Fabricius, *Scylla serrata* (Forskal) and *Neptunus pelagicus* (L.) contribute to important fisheries. Shore crabs like *Ocypoda macrocora* Milne-Edwards and *Uca* (*Gelasimus*) *annulipes* (Latreille) and the hermit crabs, *Pagurus hessii* Miers and *Diogenes custes* (Fabricius) are common. Several

species of molluscs occur in the estuary. Of these, the edibleoyster, *Ostrea madrasensis* Preston is common and forms extensive beds in the adjoining backwaters. Other important forms are *Arca granosa* (L.), *Mytilus viridis* L., *Ostrea cuculatta* Born, *Cardita bicolor* Lamarck, *Meretrix casta* Chemnitz, *Mactra cuneata* Gmelin, *Cerithidea fluviatilis* (Potiez and Michaud), *Potamides cingulatus* (Gmelin), *Natica lineata* Lamarck, and *Oliva gibbosa* (Born). Most of these are collected by the local people for consumption and for manufacture of lime.

FISH FAUNA.

As already stated a preliminary survey of the fish fauna of this estuary has been made by Chacko (1949). Chacko and Krishnamurthi (1949) has noted the occurrence of *Hilsa kanagurta* and *H. toli* in this water. Since 1944 we have recorded 119 species from this estuary (*vide* Appendix III), including the occasional visitors. According to Hardenberg (1950) the occurrence of such a large number of species in an estuary of the tropical region need not be surprising. Many of the fishes are of euryhaline environment. Owing to the perennial connection with the sea there is a regular ingress and egress of coastal fishes into and from the estuary, governed by the diurnal tidal influence and the seasonal trend in the inshore fisheries. Sharks and rays enter the estuary now and then, particularly during the summer months. So also, carps and freshwater catfishes descend into the estuarine region of the river during the flood season. The only true migratory fish is the Indian Shad, *Hilsa ilisha* (Ham.), which swims upstream during this season for spawning purpose as mentioned by Chacko and Ganapati (1949).

The majority of the fishes obtained in the nets of the local fishermen are immature ones. Examination of stomach-contents of some of the species showed interesting results. Specimens of *Mugil borneensis* had their stomach filled with *Ceratium breve* and *Noctiluca miliaris* in the months of June and September 1952. This appears to be the first record of these peridinians and cystoflagellates from the stomach-contents of mullets. During other parts of the year their stomach contained mostly diatoms like *Melosira sulcata, Cyclotella Meneghianiana, Coscinodiscus lineatus, Pleurosigma directum, Gyrosigma balticum* and *Navicula gracilis*. *Sardinella gibbosa* had copepods (*Acrocalanus longicornis, Eucalanus subcrassus* and *Pseudodiaptomus annandalei*) and diatoms (*Sceletonema costatum, Coscinodiscus lineatus, Rhizosolenia alata, Chaetoceros peruvianus* and *Fragilaria oceanica*) in its stomach in July 1952. *Sardinella fimbriatus* showed larval bivalves, copepods (*Acartia erythreae*) and *Leucifer hanseni* in its stomach in January 1953. It was surprising to observe an entire specimen of *Engraulis malabaricus* (3 inches in size) in the stomach of a *Ilisha brachysoma* (8 inches in length) obtained from the estuary in January 1953. Copepods (*Acartia erythraea* and *Corycoeus venustus*) and larval bivalves formed the chief food of *Stolephorus malabaricus*. *Engraulis*

malabaricus and *Coilia ramcarati* had *Acetes indicus* in their stomach in July 1952 and January 1953. Mysids (*Rhopalopthalmus egregius* and *Mesopodopsis orientalis*) were the main items of food of *Ambassis commersoni*. *Lutjanus lineolatus*, *L. monostigma*, *Polynemus indicus* and *Eleutheronema tetradactylum* contained prawns in their stomach almost throughout the year.

CENSUS OF FISHERFOLK AND THEIR TACKLES.

A census conducted by us in 1952 has revealed that there are 438 fishermen of seven villages actually engaged in fishing in the Vellar estuary by employing seven thurivalai, 46 thoondivalai, 1,686 cast nets, 165 kovavalai, 94 kozuvalai, 121 kunnivalai and 10 sets (of 24 each) of kachavalai (vide Appendix IV).

FISHING METHODS.

As per G.O. Ms. No. 399, Development, dated 4th February 1952, the Madras Fisheries Department is regulating the fisheries of the estuary with effect from 7th March 1952 by a system of licensing the use of certain types of cast and drag nets, by the enforcement of a one inch mesh regulation, and by the prohibition of the operation of certain nets. The details of these measures are given in Appendix V. During the period, May 1952—April 1953, 805 cast net and 216 drag net licences were issued, realising a revenue of Rs. 1,420 for the department.

Of the tackles prohibited in the estuary, special mention may be made of the *agnivalai* (also known as *bodivalai*), a small type of shore seine net, used by the sea fishermen of Parangipettai village. This net is so efficient that it combs the estuary and captures almost all fish in its area of operation. The other fishermen, who know only of fishing in inland waters with other types of nets, have represented that the employment of *agnivalai* depletes the fish fauna of the estuary and thereby adversely affects their livelihood. The *thurivalai* is a small bag seine net operated by six fishermen with one canoe (boat). The *koduvalai* is a drag net 12 feet long and about 36 inches deep supported or crossed at intervals by stout sticks as spreaders, 28 inches in length. The mesh is 5—5½ inches, and is the largest of any used in the backwaters of Madras State. The netting is made of thick cotton rope, about 3/10 inch in diameter. For large scale operations, a number (about forty) of the 12 feet nets are joined together to form a large semicircle, and then set in shallow water 2 to 2½ feet deep. A number of boats then approach the net from a long distance making considerable noise and splashing, thus scaring and driving the *koduva* (*Lates calcarifer*) to get gilled in the nets. This operation is done more near the river mouth during the fullmoon and newmoon periods.

The cast nets (*manivalai* or *veesuvalai*) are of different mesh and thickness, the varieties having local designations as *kavuthuvalai* (3 inches mesh, 20 count cotton yarn), *madutherathuvalai* (0·75 inch

mesh, 40 and 60 counts cotton), *panthaperugavalai* (0·75 inch mesh, 40 and 60 counts), *sirupodisivalai* (0·5 inch mesh, 60 counts yarn) and *eravalai* (3/8 inch mesh, 40 counts yarn). These cast nets are shot either from the shore or from a craft in deeper waters. The *koonivalai* is a small bag type of net, about 12½ feet in length, with a mesh of one-seventh inch. It is either used as a drag net or is fixed to two stakes. It is operated by two men from March to May in the shallow regions of the estuary during the low tide periods during nights. Shrimps and young prawns (*Acetes indicus*, *A. erythraeus* and *Parapenaeopsis stylifera*) are captured in large quantities. The *kovavalai* is similar to *koonivalai* but with a mesh varying from 1 to 1½ inches; and is operated by two men. The *ranchuvalai* is a bigger drag net with a mesh varying from 1 to 2 inches; and is operated by four men. The *katchavalai* is a small crab-trap kept suspended in water by a float for entrapping crabs and is mostly operated before and after the new moon. Pieces of rays and other bigger fishes are used as bait: and ten traps form a set operated by a single fisherman. Angling rods and *ootha* (plunge baskets) are also used in this estuary. Long lines are also used by the local fishermen. The line is a long coir rope to which country hooks are attached by smaller ropes about 18 inches long at 12 feet intervals. Two small floats are attached at either end. Small prawns (sometimes small *Mugil* and *Therapon*) are used as bait. The lines operated for 5 to 6 hours; and cat-fishes (*Arius jella*, *Tachysurus sona*, *Plotosus anguillaris and Pangasius pangasius*), *Lates calcarifer*, *Johnius spp.*, and *Eleutheronema tetradactylum* are captured. Further details about the fishing methods employed for the backwater fisheries of this coast are given by Hornell (1925).

FISH LANDINGS.

The total landings from the estuary during the 12 months from May 1952 to April 1953 is estimated to be about 182,625 pounds, by the different tackles as shown below :—

Kind of tackle.	Landings in LB.	Kind of tackle.	Landings in LB.
1 Cast net (from shore).	22,275	4 Ranchuvalai ..	28,260
2 Cast net (from craft.)	114,710	5 Kovavalai ..	5,570
3 Koonivalai ..	11,660	6 Katchavalai ..	150

These details are graphically represented in Chart I from which it will be seen that the main landings are by cast nets and *ranchuvalai*. A month-war analysis of the quantity of eight kinds of fishes landed from the estuary during the period of study and the total annual landings are shown in Appendix VI. The bulk of the catches are formed by mullets (76,993½ pounds) and prawns and shrimps (48,342 pounds). Both these occur in the estuary throughout the year. The mullets have two peak periods in May–July and January–March. It is probable that this group breeds in the adjoining

inshore sea throughout the year with two peak periods mentioned above. Similar observations have made in the Masulipatnam and Srikakulam coastal areas in the Andhra area (Chacko and George, 1953). The prawns and shrimps also show two peak periods in April–June and in November as in the case of Masulipatnam coast (Chacko and George, *loc. cit.*). Young stages of the silver-bellies (*Leiognathus spp.*) also occur in the estuary throughout the year; and are third in importance in landings (18,850 lb.). Evidently the nearby coastal waters are favourable for the spawning of this group of fish, which appears to breed almost throughout the year with a peak period from November to February. In the inshore waters around Pamban and Rameswaram, the *Leiognathidae* have two spawning season, namely, November and December, and April and May (Chacko, 1944). The other shoaling clupeoids like *Sardinella gibbosa* and *Engraulis malabaricus* appear to have an important spawning period about the north-east monsoon. Young ones of the jew-fishes (*Johnius spp.*) contribute to a fair fishery almost throughout the year. *Eleutheronema tetradactylum* is also present during the major part of the year with a peak from January to March. Cat-fishes occur in the estuary during the two monsoon periods only.

ANALYSIS OF LANDINGS.

With a view to determine the efficiency of the different tackles, the percentage composition, weight and size , range of the catches of the different tackles during the twelve months from May 1952 to April 1953 were analysed as detailed below.

With cast nets shot from the shore 22,275 pounds of fish are obtained during the year of which above 80 per cent consisted of young prawns (1—5 inches), the rest being young stages of mullets (2—5 inches), *Sardinella gibbosa* (3–4½ inches), *Leiognathus spp.* (1—3 inches), *Engraulis malabaricus* (1 to 3½ inches), cat-fishes (4—6 inches), *Hemiramphus gaimardi* (5—6 inches), *Lutjanus spp.* (3—7 inches), *Ambassis commersoni* (1–2 inches), *Therapon spp.* (1½—3½ inches), *Gerres spp.* (2—4 inches), *Caranx spp.* (2—4 inches) and *Siganus vermiculatus* (1—5 inches). The monthly landings with this tackle varies from 990 pounds (April 1953) to 3,800 pounds (June 1952). Further analytical details are given in Appendix VII.

By the operation of cast nets from crafts in deeper waters, the catches are better, the total for the twelve months period being 114,710 pounds, the maximum and minimum monthly landings being 26,970 pounds (May 1952) and 3,418 pounds (August 1952) respectively. The major part of the catches (about 80 per cent) are mullets of larger size (8—10 inches). In October 1952, however, *Sardinella gibbosa* contributed to 65 per cent of the landings. Young stages of other species formed the rest of the catches, the larger forms being cat-fishes (3—20 inches), *Polynemus indicus* and *Eleutheronema tetradactylum* (3—15 inches), species of *Johnius* (4—15

inches), *Sphyraena jello* (6—8 inches), *Dasyatis* (*Himantura*) *uarnak* (8—12 inches). Prawns are also obtained by this method of fishing. Detailed analysis is given in Appendix VIII.

In Appendix IX particulars of the catches obtained with the *ranchuvalai* are given. Larger forms of mullets (5—15 inches), cat-fishes (4—15 inches), *Polynemus indicus* and *Eleutheronema tetradactylum* (7—15 inches), species of *Johnius* (3—13 inches), *Lates calcarifer* (7—18 inches) and young prawns and clupeoids are obtained in more or less equal proportions. The total landings for one year is 28,260 pounds, the maximum being 5,361 pounds (June 1952) and 1,116 pounds (April 1953).

The landings with *koonivalai* are only 11,660 pounds during the year of study, and comprised almost wholly of shrimps (*Acetes indicus*, *A. erythraeus* and *Parapenaeopsis stylifera*), young stages of *Leiognathus edentula*, *L. insidiatrix* and *Engraulis malabaricus* forming 1 to 2 per cent. This net is operated only in the months of April, May and June when the shrimps are available, indicating thereby the definite season of migration of these forms into the coromandel coastal waters. The monthly catches are 7,440 in May 1952 (of which 74 pounds are young stages of *Leiognathus spp.*), 968 pounds in June 1952, and 3,250 pounds in April 1953 (of which 65 pounds are young stages of *Leiognathus spp.* and *Engraulis malabaricus*).

The *kovavalai* is employed for capturing prawns and crabs, and also young mullets, *Leiognathus spp.*, *Engraulis malabaricus and Johnius spp.*, from August to January. Analytical details of the catches are given in Appendix X. The total landings come to about 5,570 pounds in the year, the maximum being 2,160 pounds in September 1952 and minimum of 434 pounds in August 1952.

EARNINGS OF FISHERMEN.

The average daily earning of the fishermen operating different tackles are given in Appendix XI. A fisherman using cast net from the shore earns from 10 annas (December 1952) to Rs. 1–2–0 (July 1952); whereas the earning obtained by using the same net from a craft is from 13 annas (April 1953) to Rs. 4–4–0 (November 1952). With the *ranchuvalai* the daily earning of a fisherman ranges from 12 annas (April 1953) to Rs. 2–13–0 (November 1952). The *koonivalai* is used only in the summer months of April, May and June, giving an income of half to two rupees per head per day. The *kovavalai* brings a daily earning of 14 annas to Rs. 1–14–0 for a fisherman. By crab-fishing with the *katchavalai* Rs. 1–4–0 is obtained in a day by a single fisherman.

CONCLUSIONS.

The Vellar estuary is connected to the Bay of Bengal throughout the year, and is subjected to diurnal tidal variations which extend

to about ten miles upstream. Consequently there is a regular ingress and egress of planktonic organisms and fishes from the inshore region of the sea. Statistical studies show that the catches of the different tackles comprise mostly of immature young stages of prawns, mullets and other miscellaneous coastal fishes. Apart from few sharks and rays that enter the estuary occasionally during the summer months and few carps and fresh-water siluroids which descend into it during the flood season, large-sized fishes are almost absent. Even the supposed estuarine forms like *Mugil spp.*, *Lates calcarifer*, *Polynemus indicus* and *Eleutheronema tetradactylum* which occur in the estuary are either young ones or juveniles. As their adults or spawners are not found, it is obvious that these species breed only in the sea and the young ones enter the estuary with the tides and remain in it for sometime for feeding and then return to the sea. This is supported by the presence of large adult individuals of these species in the catches of the sea fishermen. In the case of the prawns also, spawning appears to be in the sea as only their young stages occur in the estuary throughout the year. The tides bring in a fair number of young ones of shoaling sea fishes like *Sardinella albella*, *S. fimbriata*, *S. gibbosa*, *Pellona elongata*, *Ilisha brachysoma*, *Engraulis malabaricus*, *Caranx hippos*, *C. sansun*, *Leiognathus edentula*, *L. insidiatrix* and *Johnius spp.*; and also drain them back into the sea during the ebb tide. This indicates that the nearby sea is a favourable area for the spawning of these marine fishes, and that many of the helpless young ones are carried away by the tides and currents. On the whole, the belief that the estuary is an important breeding ground and nursery area of several marine fishes appears to be exaggerated, though temporary shelter and facilities for acclimatisation and upward migration are no doubt afforded to some species. In all probability it is the coastal waters, especially those influenced by estuarine discharges, that are the favourable breeding and nursery areas of the marine shoaling fishes. The fecundity of the fishes mentioned above is very great, and only an insignificant fraction of their young ones enter or get drifted into the estuary. The capture of these young fishes within the estuarine area may not adversely affect the posterity of the species concerned. It is interesting to note here that since recently workers like Burkenroad (1948), Langlois (1948), Russell (1942), Blackburn (1950) and Thomson (1953) consider that the fluctuations in fisheries are attributable to fluctuating environmental conditions than to effects of fishing activity. For the proper exploitation of the natural fisheries of the Vellar estuary, therefore, the employment of all types of tackles has to be encouraged by issuing licences to those kinds which are not permitted now. The present mesh regulation with a minimum of 1 inch may however be applied to all nets except *Koonivalai* so that some of the young fishes may escape into the neighbouring Killai backwaters which are connected with the Vellar estuary and thus enrich their fish fauna and fisheries.

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APPENDIX I.—*Showing ranges of variations in hydrological conditions of Vellar estuary in May and September* 1952 *and in April* 1953.

Hydrological conditions.	Near mouth.	Middle region.	Upper end.
Temperature at 6 p.m., °C. ..	31·1 — 31·2	31·8—33·8	31·8— 32·6
Dissolved $^{o}_{2}$, p.p.m.	1·1 — 5·2	1·4— 5·9	5·4— 6·8
Free CO_2, p.p.m.	Nil.	Nil.	Nil.
Carbonates (CO_3), p.p.m. ..	15—21	21—27	25—27
Bicarbonates (HCO_3), p.p.m. ..	125·0—363.0	143·3—280·6	155·6—301·9
Salinity, $^{o}/_{oo}$	22·76—41·30	20·00—30·80	15·00—25·50
pH	8·4—8·5	8·4	8·0—8·3
Silicates, p.p.m.	4·5—6·4	7·0—9·6	6.0—7·2

APPENDIX II.—*Showing list of planktonic organisms recorded from the Vellar estuary*, 1952–53.

Cyanophyceae :

Oscillatoria princeps Vaucher.
Oscillatoria tenuis Agardh.
Microcystis aeruginosa Kutzing.

Chlorophyceae :

Chaetomorpha linum (Muell) Kutzing.
Enteromorpha intestinalis Link.
Enteromorpha compresa Grev.
Pediastrum duplex Meyer.

Bacillarieae :

Melosira sulcata (Ehrenverg) Kutzing.
Sceletonema costatum (Greville).
Cyclotella Meneghianiana Kutzing.
Coscinodiscus lineatus Ehrenberg.
Coscinodiscus Rothii (Ehrenberg) Grunow.
Rhizosolenia alata Brightwell.
Bacteriastrum cosmosum Parillard.
Chaetoceros peruvianus Grunow.
Chaetoceros Lorenzianus Grunow.
Ditylum sol Grunow.
Hemidiscus Hardmannianus (Greville) Mann.
Fragilaria oceanica Cleve.
Synedra formosa Hantzsch.
Thalassiothrix frauenfeldii Grunow.
Asterionella japonica Cleve.
Pleurosigma directum Grunow.
Gyrosigma balticum (Ehrenberg) Rabenhorst.
Navicula gracilis Ehrenberg.
Bacillaria paradoxa Gmelin.

Peridiniaceae :

Peridinium ovatum Schutt.
Peridinium depressum Bailey.
Ceratium breve Schmidt.
Ceratium massiliense Gourrett.

Cystoflagellata :

Noctiluca miliaris (MaCartney).

Oligotrichaceae :

Tintinnus borealis Hensen.

Charybdeidae :

Charybdoe marsupialis Peron & Lesueur.

Pleurobrachilidae.

Pleurobrachia globosa Moser.

Copepoda :

Acrocalanus longicornis Giesbrecht.
Eucalanus subcrassus Giebrecht.
Pseudodiaptomus annandalei Sewell.
Acartia erythraea Giebrescht.
Corycoeus venustus Dana.
Harpacticus littoralis Sars.

Mysidacea :

Rhopalophthalmus egregius Hansen.
Mesopodopsis orientalis (Tattersal).

Decapoda :

Leucifer hanseni Nobili.

APPENDIX III.—*Showing systematic list of fishes recorded from the Vellar estuary, Porto Novo, 1944–1953.*

The arrangement is according to "A Classification of Fishes" by D. S. Jordon, Stanford University Publication, Biological Sciences, VOL. III, No. 2, 1923.)

Family Galeidae :

Carcharinus melanopterus (Quoy and Gaim.)

Family Sphyrnidae :

Sphyrna zygaena (Linnaeus).

Family Dasyatidae :

Dasyatis (*Himantura*) *uarnak* (Forsk.)
Dasyatis (*Pastinachus*) *sephen* (Forsk.)

Family Elopidae :

Elops saurus (L).

Family Megalopidae :

Megalops cyprinoides (Broussonet).

Family Chanidae :

Chanos chanos (Forskal).

Famil Clupeidae :

Sardinella albella (C. & V.)
Sardinella fimbriata (C. & V.)
Sardinella gibbosa (Bleeker).
Pellona elongata (Bennett.)
Ilisha brachysoma (Bleeker).
Hilsa ilisha (Ham.)
Hilsa kanagurta (Bleeker).
Hilsa toli (C. & V.)
Kowala coval (C.)

Family Dussumieriidae :

Stolephorus malabaricus (Day).

Family Dorosomidae :

Anodontostoma chacunda (Ham.)

Family Engraulidae :

Engraulis malabaricus (Bloch).
Coilia ramcarati (Ham.)
Coilia borneensis (Bleeker).
Anchoviella indica (v. Hass.)
Anchoviella tri (Bleeker).
Thrissocles Hamiltonii (Gray).

Family Synbranchidae :

Synbranchus bengalensis (McClell.)

Family Amphipnoidae :

Ophichthys boro (Ham.)

Family Mastacembelidae :

Mastacembelus armatus (Lacep.)

Family Anguillidae :

Anguilla bengalensis (Gray & Hardw.)

Family Muraenidae :

Muraena punctata (Bl. Schn.)
Gymnomuraena marmorata (Lacep.)

Family Cyprinidae :

Labeo fimbriatus (Bloch).
Labeo kontius (Jerdon).
Barbus sarana (Ham.)
Barbus dorsalis (Jerdon).
Barbus stigma (Cuv. & Val.)
Cirrhina cirrhosa (Bloch).
Cirrhina reba (Ham.)
Chela sardinella (Cuv. & Val.)
Danio aequipinnatus (McClell.)
Esomus danricus (Ham.)
Catla catla (Cuv. & Val.)
Rasbora daniconius (Ham.)

Family Ariidae :

Arius jella (Day).
Tachysurus sona (Ham.)
Osteogeneiosus militaris (Linn.)

Family Plotosidae :

Plotosus anguillaris (Bloch.)

Family Siluridae :

Callichrous bimaculatus (Bloch.)
Wallago attu (Bl. Schn.)

Family Bagridae :

Macrones aor (Ham.)
Macrones seenghala (Sykes.)
Macrones gulio (Ham.)
Macrones cavasius (Ham.)
Macrones vittatus (Bloch).

Family Schibeidae :

Silundia sykesii (Day).
Pseudeutropius atherinoides (Bloch.)

Family Pangasiidae :

Pangasius pangasius (Cuv. & Val.)

Family Synodontidae :

Synodus indicus (Day.)

Family Cyprinodontidae :

Oryzias melastigma (McClell.)

Family Belonidae :

Tylosurus strongylurus (van Hassolt).
Xenentodon cancila (Ham.)

Family Hemiramphidae :

Hemiramphus jaimardi C. & V.

Family Holocentridae :

Holocentrum rubrum (Forskal).

Family Anabantidae :

Anabas scandens (Daldorff).

APPENDIX III.—*Showing Systematic list of fishes recorded from the Vellar estuary, Porto Novo,*1944–1953—cont.

The arrangement is according to "A Classification of fishes" by D. S. Jordan, Stanford University Publication, Biological Sciences, Vol. III, No. 2, 1923.)—*cont.*

Family Mugilidae :

Mugil klunzingeri (Day).
Mugil jerdoni (Day).
Mugil dussumieri (Cuv. & Val).
Mugil cephalus (L.)
Mugil borneensis (Bleeker).
Mugil oilvaceus (Day).
Mugil oligolepis (Bleeker).

Family Sphyraenidae :

Sphyraena jello (C. & V).

Family Polynemidae :

Eleutheronema tetradactylum (Shaw.)
Polynemus indicus (Shaw).

Family Trichuiridae :

Trichuirus savala, (Cuv. & Val.)

Family Carangidae :

Caranx hippos (L.)
Caranx sansun (Forskal.)
Chorinemus moadetta (Cuv. & Val.)

Family Leiognathidae :

Leiognathus edentula (Cuv. & Val.)
Leiognathus insidiatrix (Bloch.)

Family Ambassidae :

Ambassis nama (Ham.)
Ambassis ranga (Ham.)
Ambassis commersoni (Cuv. & Val.)

Family Latidae :

Lates calcarifer (Bloch.)

Family Epinephelidae :

Cephalopholis boenack (Bloch.)

Family Lutianidae :

Lutjanus lineolatus (Rupp.)
Lutjanus monostigma (C. & V.)

Family Pomadasidae :

Plectorhinchus nigrus (Cuvier.)

Family Theraponidae :

Therapon jarbua (Forskal.)
Therapon puta (Cuv. & Val.)

Family Lethrinidae :

Lethrinus nebulosus (Forskal.)

Family Sparidae :

Chrysophris datnia (Ham.)

Family Gerridae :

Gerres filamentosus (Cuv.)
Gerres oyena (Forskal.)
Gerres abbreviatus (Bleeker).

Family Sciaenidae :

Johnius coibor (Ham.)
Johnius belengeri (Cuv. & Val.)
Johnius dussumieri (Cuv. & Val.)
Johnius carutta (Bloch).
Johnius osseus (Day.)

Family Otolithidae :

Otolithes argenteus (Cuv. & Val.)

Family Sillaginidae :

Sillago sihama (Forskal.)

Family Ephippidae :

Ephippus orbis (Bloch.)

Family Scatophagidae :

Scatophagus argus (L.)

Family Chaetodontidae :

Chaetodon (Chaetodontops) collare (Bloch.)

Family Teuthidae :

Siganus vermiculatus (Cuv. & Val.)

Family Platycephalidae :

Platycephalus insidiator (Forskal.)

Family Cichlidae :

Etroplus maculatus (Bloch.)

Family Eleotridae :

Eleotris macrodon (Bleeker).
Eleotris fusca (Bl. Schn.)

Family Gobiidae :

Gobius griseus (Day.)
Gobius criniger (Cuv. & Val.)
Gobius zonalternanus (Day.)
Gobius madraspatensis (Day.)
Gobius striatus (Day.)
Apocryptes serperaster (Richards).

Family Periophthalmidae :

Periophthalmus koelreuteri (Pall.)
Boleophthalmus viridis (Ham.)

Family Gobioidiae :

Goboides caeculus (Bl. Schn.)

Family Tetraodontidae :

Tetradon patoca (Ham.)

APPENDIX IV.—*Showing census of fishermen of seven villages actually engaged in fishing in the Vellar estuary and of their tackles* (1952).

Name of village.	Number of fishermen.	Thurivalai.	Thoondivalai.	Castnet.	Kovavalai.	Kozhuvalai.	Koonivalai.	Kachavalai (sets of 2½).
1 Manmpadi (Porto Novo).	28	..	..	107	..	..	..	..
2 Pudupetai (Porto Novo).	29	..	..	190	..	..	8	..
3 Mulukuthurai (Killai),	41	1	6	69	16	9	9	..
4 Pullumedai ..	14	..	..	48	9	..	6	..
5 Modasa vodai thittu.	37	1	..	121	47	19	28	..
6 Aryanattu thuravai (Killai).	239	5	..	941	93	66	58	..
7 Parangipettai ..	50	..	40	210	..	..	12	10
Total ..	438	7	46	1,686	165	94	121	10

APPENDIX V.—*Showing G.O. Ms. No.* 399, *Development, dated 4th February* 1952, *containing the rules and conditions pertaining to regulation of fisheries in the Vellar Estuary.*

(1) His Excellency the Governor of Madras accepts the proposal of the Director of Fisheries to introduce the licencing system of fishing in the portion of the Vellar River from the Porto Novo bridge up to the sea in South Arcot district.

(2) Sanction is accorded to the employment of an Overseer on Rs. 45—2—85 per mensem, for a period of one year from the date of appointment, for work connected with the licensing system referred to in paragraph (1) above.

(3) The expenditure should be debited to "43. Industries and Supplies—Fisheries—I. General—F. Inland Fisheries."

(4) The Superintendent, Government Press, is requested to publish the notification in Appendix I to this order in the *Fort St. George Gazette* and in the *South Arcot District Gazette.*

(5) The draft form of licence submitted by the Director of Fisheries is approved and is given in Appendix II to this order.

Appendix I.

NOTIFICATION.

In exercise of the powers conferred by section 6, sub-sections (1), (4) and (5) of the Indian Fisheries Act, 1897 (Central Act IV of 1897), His Excellency the Governor of Madras hereby makes the following amendment to the rules published with Development Department Notification No. 138, dated the 16th April 1929, at pages 746–748 of Part I of the *Fort St. George Gazette*, dated the 23rd April 1929, as subsequently amended, the same having been previously published as required by sub-section (6) of that section.

Amendment.

In the list of waters annexed to the said rules, under the heading "South Arcot District" after the entries relating to item 197, the following item shall be inserted, namely :—

"197-A. The portion of the Vellar River from Porto Novo bridge up to the sea in the South Arcot District".

Appendix II.

DRAFT FORM OF LICENCE.

Serial No.

Madras Fisheries.

Licence issued for fishing in the portion of the Vellar River from Porto Novo bridge up to the sea in the South Arcot district.

Name of licensee.

Address of licensee.

Mode of fishing.

Licence fees.

Period of licence.

Date of commencement.

Signature :

Designation : *Assistant Inspector of Fisheries, Lalpet.*

Conditions.

(To be printed on the reverse of the form.)

1. The licence is granted subject to the following conditions.

2. No fishing shall be permitted in the Vellar River except under and in accordance with a licence obtainable from the Assistant Inspector, Lalpet, on prepayment of the prescribed fees.

3. The nets used for fishing shall have a minimum mesh of 1 inch square when the net is wet.

4. The following fees shall be charged for licences :—

(i) Cast net (Manivalai and Vessuvalai) for one net Rupee 1 per month.

(ii) Drag net operated by one person, for one net Rs. 6 per year ; by two persons (Kunivalai, Ranchivalai, Kovavalai) for one net Rs. 2 per month or for one net Rs. 12 per year.

5. The licensee shall hand over to the Fisheries Department fingerlings of all fish below 6 inches if required or release them alive into the water.

6. The licensee shall on demand show his catches to the officers of Fisheries Department for inspection.

7. The licences issued are not transferable.

8. The licensees shall carry their licences along with them for fishing and shall produce them for inspection when demanded by any of the officers of the Fisheries Department.

9. The Assistant Inspector of Fisheries, Lalpet, may refuse to grant a licence under the rules to any person or cancel any licence already granted without assigning any reason. If the licence is cancelled, the fee paid for the licence shall not be refunded.

10. The conditions of this licence are liable to alterations during the period of its currency.

APPENDIX VI.—*Showing month-war quantity (in pounds) of eight kinds of fishes landed from the Vellar estuary from May 1952 to April 1953.*

Kind of fish.	1952.								1953.				
	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Mugil spp.	24,312	4,633	4,153	2,385	7,707½	611	1,644	2,988	12,350	8,469	7,071	660	76,993½
Prawns and shrimps ..	9,342½	5,991	2,966	2,308	2,338½	2,149	9,356	1,115½	2,626	1,311	1,216½	7,622	48,342
Leiognathus spp.	132	799	1,042	1,287	928½	1,242	3,428	2,628	3,380	2,249	1,156½	578	18,850
Sardinella gibbosa	673	325	238½	219	..	2,461	928	916	1,575	627	..	..	7,962
Johnius spp.	..	1,398	695	512	513	215	1,406	62	609	1,385	610	456	7,861
Eleutheronema tetradactylum.	..	657	126	51	122	..	442	186	1,150	1,127	956	..	4,817
Engraulis malabaricus ..	827	429	79½	791½	81	76	924	1,071	..	376	88	..	4,743
Cat fishes	292	536	346	102½	..	..	76	573	..	..	..	..	1,935½

APPENDIX VII.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with cast net (shore fishing) in the Vellar estuary from May 1952 to April 1953.*

Month.	May 1952.			June 1952.			July 1952.			August 1952.		
Number of nets operated per day.	25			31			20			22		
Average catch per net per day, pounds.	3			4			4½			4		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mugil spp.	1½	35	3–4	4	152	3–5	4	106	2–3	10	241½	3–3½
Sardinella gibbosa	..	..	..	..	..	..	1	26½	3–4½	2	48	3–4
Leiognathus spp.	2½	58	1½–2	..	..	..	2	53	2–3	5	120	2–3
Engraulis malabaricus	¾	18	1–2½	..	..	..	3	79½	3–3½	3	72½	3–3½
Cat fishes	1	23	4–6	..	..	..	..	..	..	..	..	..
Hemiramphus gaimardi	½	6	5–6	..	..	..	..	..	..	..	..	..
Lutjanus spp.	1	23	3–7	3	114	3–5	..	..	..	..	..	..
Ambassis commersoni	½	11½	1–1½	..	..	..	..	..	..	..	..	..
Therapon spp.	½	11½	2–2½	..	..	..	..	..	..	..	..	..
Gerres spp.	..	..	..	..	..	..	..	..	..	..	..	..
Caranx spp.	..	..	..	..	..	..	2	53	3–5	..	..	..
Siganus vermiculatus	5	116	3–5	2	76	3–4½	..	..	..	..	..	..
Prawns	85	1,976½	1–3	90	3,420	2–4	88	2,360	3–4	80	1,936	3–4
Crabs	2	46½	3–4	1	38	3–4½	..	..	..	..	..	..
Total monthly landings, pounds		2,325			3,800			2,678			2,418	

APPENDIX VII.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with cast net (shore fishing) in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	September 1952.			October 1952.			November 1952.			December 1952.		
Number of nets operated per day.	13			12			13			18		
Average catch per net per day, pounds.	3			3			3			2½		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Mugil spp.	—	—	—	—	—	—	—	—	—	4	56	3–4½
Sardinella gibbosa	—	—	—	—	—	—	—	—	—	—	—	—
Leiognathus spp.	—	—	—	—	—	—	5	61½	1–3	—	—	—
Engraulis malabaricus	—	—	—	—	—	—	6	73	2–3½	—	—	—
Cat fishes	—	—	—	—	—	—	—	—	—	—	—	—
Hemiramphus gaimardi	—	—	—	—	—	—	—	—	—	—	—	—
Lutjanus spp.	—	—	—	—	—	—	4	48½	1–1½	6	84	1–2
Ambassis commersoni	—	—	—	—	—	—	—	—	—	—	—	—
Therapon spp.	—	—	—	—	—	—	—	—	—	10	139½	2–3½
Gerres spp.	—	—	—	—	—	—	—	—	—	—	—	—
Caranx spp.	—	—	—	—	—	—	—	—	—	—	—	—
Siganus vermiculatus	—	—	—	—	—	—	—	—	—	—	—	—
Prawns	100	1,077½	2–3	100	1,106	3–5	85	1,033	3½–4	80	1,115½	3–4
Crabs	—	—	—	—	—	—	—	—	—	—	—	—
Total monthly landings, pounds		1,077½			1,106			1,216			1,395	

APPENDIX VII.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with cast net (shore fishing) in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	January 1953.			February 1953.			March 1953.			April 1953.		
Numbre of nets operated per day.	22			16			15			11		
Average catch per net per day, pounds.	3½			3½			2½			3		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
Mugil spp.	..	..	..	..	..	..	..	..	..	5	49	2–3
Sardinella gibbosa	..	..	..	..	..	..	..	..	..	..	..	..
Leiognathus spp.	3	75	1½–3	4	58	2–3	5	53½	2–3	2	20	1–1½
Engraulis malabaricus	..	..	..	..	..	..	2	25	1–2	..	..	..
Cat fishes	..	..	..	..	..	..	..	..	..	..	..	..
Hemiramphus gaimardi	..	..	..	..	..	..	..	..	..	..	..	..
Lutjanus spp.	..	..	..	..	..	..	..	..	..	..	..	..
Ambassis commersoni	..	..	..	..	..	..	..	..	..	..	..	..
Therapon spp.	4	101	2–3½	..	..	..	..	..	..	..	..	..
Gerres spp.	2	51	2–4	6	87	2–3	3	38	3–3½	4	39	3–4
Caranx spp.	..	..	..	..	..	..	..	..	..	..	..	..
Siganus vermiculatus	..	..	..	..	..	..	..	..	..	..	..	..
Prawns	90	2,290	3½–4	90	1,311	3½–4½	90	1,154½	3–3½	85	882	1–2
Crabs	1	25	3–4	..	..	..	..	..	..	1	10	3–5
Total monthly landings, pounds		2,542			1,456			1,271			990	

APPENDIX VIII.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with cast net (with craft) in the Vellar estuary from May 1952 to April 1953.*

Month.	May 1952.			June 1952.			July 1952.			August 1952.		
Number of nets operated per day.	30			24			16			14		
Average catch per net per day, pounds.	30			9			10			8½		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mugil spp.	90	24,277	3–8	60	3,892	6–20	85	3,794	1½–12	60	2,041½	4–15
Sardinella gibbosa	2½	673	3–4	5	325	3–4	5	212	2– 3	5	171	2–3½
Leiognathus spp.	..	..	..	..	..	..	1	40	2– 2½	4	137	2–3
Engraulis malabaricus	3	809	2–3	..	..	..	..	..	..	15	513	2–3
Cat fishes	1	269	3–4	..	..	..	2	89	8–20	3	102½	3–8
Pellona and Ilisha spp.	..	..	..	..	..	..	..	..	..	..	..	..
Anodontostoma chacunda	..	..	..	..	..	..	..	..	..	2½	95	4–6
Hemiramphus gaimardi	2	539	5–6	..	..	..	..	..	..	..	..	..
Eleutheronema tetradactylum	..	..	..	4	260	5–10	..	..	..	1½	51	6–12
Ambassis commersoni	1	269	1–2	..	..	..	½	22	1– 1½	..	..	..
Johnius spp.	..	..	..	5	326	5–9	1½	62	8–14	6	205	8–10
Gerres spp.	..	..	..	..	..	..	..	..	..	..	..	..
Caranx spp.	..	..	..	10	649	2–3	2	86	1½– 2	..	..	..
Sphryaena jello	..	..	..	..	..	..	..	..	..	..	..	..
Dasyatis spp.	½	134	8–12	..	..	..	..	..	..	..	..	..
Coilia spp.	..	..	..	1	65	4–5	..	..	..	..	..	..
Prawns	..	..	..	15	973	4	3	133	2– 3	2	68	2–4
Total monthly landings, pounds	26,970			6,490			4,438			3,418		

APPENDIX VIII.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with cast net (with craft) in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	September 1952.			October 1952.			November 1952.			December 1952.		
Number of nets operated per day	18			15			13			20		
Average catch per net per day, pounds	15			8			34			10½		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Mugil spp.	88	7,153½	5–10	4	152	6–7	9	1,193	4–12	40	2,864	6–15
Sardinella gibbosa	..	..	..	65	2,461	2–4	7	928	3–6	12	860	5–7
Leiognathus spp.	2	162½	2–3	5	190	1½–2	6	795½	1–2	25	1,760	2–4
Engraulis malabaricus	1	81	2–3½	2	76	2–3	5	663	2–4½	15	1,071	3–5
Cat fishes	..	..	..	..	..	..	..	..	..	8	573	5–10
Pellona and Ilisha spp.	5	406	4–8	6	228	4–10	..	..	..	..	..	..
Anodontostoma chacunda	..	..	..	..	..	..	..	..	..	..	..	..
Hemiramphus gaimardi	..	..	..	..	..	..	1	132½	4–8	..	..	..
Eleutheronema tetradactylum	..	..	..	..	..	..	½	66	6–13	..	..	..
Ambassis commersoni	..	..	..	1	38	1–2	..	..	..	..	..	..
Johnius spp.	4	325	8–12	..	..	..	8	1,061	4–9	..	..	..
Gerres spp.	..	..	..	3	114	3–5	2	265	3–4	..	..	..
Caranx spp.	..	..	..	..	..	..	..	..	..	..	..	..
Sphyraena jello	..	..	..	2	76	6–8	..	..	..	..	..	..
Dasyatis spp.	..	..	..	..	..	..	..	..	..	..	..	..
Coilia spp.	..	..	..	2	76	5–6	..	..	..	..	..	..
Prawns	..	..	..	10	380	2–4	60	7,963	3–4	..	..	..
Total monthly landings, pounds		8,128			3.791			13,067			7,161	

APPENDIX VIII.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with cast net (with craft) in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	January 1953.			February 1953.			March 1953.			April 1953.		
Number of nets operated per day.	22			19			21			16		
Average catch per net per day, pounds.	21			16			14			6½		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
Mugil spp.	75	11,720	5–8	70	8,280	6–10	80	6,945	5–15	15	611	3–12
Sardinella gibbosa	10	1,575	4–7	5	627	4–7½	..	..	..	..	..	..
Leiognathus spp.	1	157	1–3	..	..	..	4	347	1½–3	..	..	..
Engraulis malabaricus	..	..	..	3	376	3–4	..	..	..	..	..	..
Cat fishes	..	..	..	..	..	..	..	..	..	..	..	..
Pellona and Ilisha spp.	3	470	4	2	251	3–4	..	..	..	..	..	..
Anodontostoma chacunda	..	..	..	..	..	..	..	..	..	..	..	..
Hemiramphus gaimardi	..	..	..	..	..	..	..	..	..	..	..	..
Eleutheronema tetradactylum	4	730	3–12	6	752	6–13	10	868	6–15	..	..	..
Ambassis commersoni	1½	235	1½–2	..	..	..	..	..	..	..½	21	1½–3½
Johnius spp.	2	315	9–10	10	1,254	6–15	5	520	4–12	3	122	4–9
Gerres spp.	..	..	..	..	..	..	..	..	..	1½	60	3–5
Caranx spp.	3½	548	3–4	4	502	3–8	..	..	..	..	..	..
Sphyraena jello	..	..	..	..	..	..	..	..	..	..	..	..
Dasyatis spp.	..	..	..	..	..	..	..	..	..	..	..	..
Coilia spp.	..	..	..	..	..	..	..	..	..	..	..	..
Prawns	..	..	..	..	..	..	..	..	..	80	3,266	3–5
Total monthly landings, pounds	15,750			12,544			8,680			4,080		

APPENDIX IX.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish catch with Ranchu valai in the Vellar estuary from May 1952 to April 1953.*

Month.	May 1952.			June 1952.			July 1952.			August 1952.		
Number of nets operated per day.	..			7			4			4		
Average catch per net per day, pounds.	..			24			30			21		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mugil spp.	..	..	..	11	589	8–15	8	253	6–12	5	102	6–10
Leiognathus spp.	..	..	..	15	799	2–3½	30	949	1½–2½	45	922	1–3
Engraulis malabaricus	..	..	..	8	429	3–5	..	..	..	9	184	3–5
Cat fishes	..	..	..	10	536	4–15	8	257	8–10	..	..	..
Anodontostoma chacunda	..	..	..	..	..	..	..	..	..	..	..	..
Eleutheronema tetradactylum	..	..	..	7	397	8–13	4	126	12–15	..	..	..
Johnius spp.	..	..	..	20	1,072	5–12	20	633	4–12	15	307	3–10
Lates calcarifer	..	..	..	5	263	7–13	5	158	10–18	..	..	..
Gerres spp.	..	..	..	..	..	..	..	..	..	12	246	2–4
Caranx spp.	..	..	..	9	482	4–7	..	..	..	..	..	..
Prawns	..	..	..	10	530	3–4	15	473	3–5	4	84	2–4
Crabs	..	..	..	5	264	4–6	10	316	4–6	10	205	4–6
Total monthly landings, pounds	..			5,361			3,165			2,050		

APPENDIX IX.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish catch with Ranchuvalai in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	September 1952.			October 1952.			November 1952.			December 1952.		
Number of nets operated per day.	4			4			4			2		
Average catch per net per day, pounds.	17			15			45			20		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Mugil spp.	15	230	5–12	25	360	6–12	12	451	8–14	10	24	7–10
Leiognathus spp.	50	766	2–3½	30	432	1–2	60	2,256	1–3	70	868	1½–3
Engraulis malabaricus	..	..	..	..	..	..	5	188	2–4	..	..	..
Cat fishes	..	..	..	..	..	..	2	76	8–12	..	..	..
Anodontostoma chacunda	..	..	..	..	..	..	..	..	..	..	..	..
Eleutheronema tetradactylum	8	122	7–12	..	..	..	10	376	9–15	15	186	7–12
Johnius spp.	5	80	5–11	15	215	4–12	8	300	5–13	5	62	6–11
Lates calcarifer	..	..	..	..	..	..	..	..	..	..	..	..
Gerres spp.	..	..	..	..	..	..	..	..	..	..	..	..
Caranx spp.	..	..	..	..	..	..	..	..	..	..	..	..
Prawns	12	181	2–5	20	289	2–4	..	..	..	..	..	..
Crabs	10	153	3–6	10	144	2–2½	3	113	3–5	..	..	..
Total monthly landings, pounds	1,532			1,440			3,760			1,240		

APPENDIX IX.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish catch with Ranchuvalai in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	January 1953.			February 1953.			March 1953.			April 1953.		
Number of nets operated per day.	4			4			3			3		
Average catch per net per day, pounds.	35			28			14			12		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
Mugil spp.	15	630	8–12	6	189	9–11	10	126	9–15	..	..	..
Leiognathus spp.	65	2,730	2–3	70	2,191	2–3	60	756	1½–3	50	558	2–3
Engraulis malabaricus ..	..	..	..	..	..	..	5	63	2–5	..	..	..
Cat fishes	..	..	..	..	..	..	..	..	..	..	..	..
Anodontostoma chacunda ..	3	126	5–7	8	250	6	6	75	6	..	..	..
Eleutheronema tetradactylum	10	420	9–13	12	375	10–14	7	88	9–15	..	..	..
Johnius spp.	7	294	7–12	4	131	6–10	7	90	6–11	30	334	6–12
Lates calcarifer	..	..	..	..	..	..	..	..	..	..	..	..
Gerres spp.	..	..	..	..	..	..	..	..	..	..	..	..
Caranx spp.	..	..	..	..	..	..	..	..	..	..	..	..
Prawns	..	..	..	..	..	..	..	..	..	..	..	..
Crabs	..	..	..	..	..	..	5	62	3–4	20	224	3–4
	..	..	..	..	..	..	..	..	..	..	..	..
Total monthly landings, pounds.	4,200			3,136			1,260			1,116		

APPENDIX X.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with Kovavalai in the Vellar estuary from May 1952 to April 1953.*

Month.	May 1952.			June 1952.			July 1952.			August 1952.		
Number of nets operated per day.	..			..			..			2		
Average catch per net per day, pounds.	..			..			..			7		
Dtealls of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Mugil spp.	..	..	..	..	—	..	..	—	..	..	..	..
Leiognathus spp.	..	..	..	—	—	—	—	..	..	25	108	1–2
Engraulis malabaricus	..	..	—	..	—	..	—	—	..	5	22	2–4
Johnius spp.	..	..	..	—	—	—	—	—	..	..	—	..
Prawns	..	..	..	..	—	..	..	—	..	50	217	1–3
Crabs	..	..	..	—	—	..	..	—	..	20	87	2–3
Total monthly landings, pounds. .		..			..			—			434	

APPENDIX X.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with Kovavalai in the Vellar estuary from May 1952 to April 1953—cont.*

Month.	September 1952.			October 1952.			November 1952.			December 1952.		
Number of nets operated per day.	4			4			2			..		
Average catch per net per day, pounds.	8			10			15			—		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Mugil spp.	15	324	2–5	8	99	2–7	—	—	—	—	—	—
Leiognathus spp.	..	..	—	50	620	2–3	45	405	1½–3	—	—	..
Engraulis malabaricus —	—	—	—	—	.	—	—	—	—	—	—	—
Johnius spp.	5	108	4–6	..	—	—	5	45	5–8	—	—	—
Prawns	50	1,080	1–3	30	372	2–4	40	360	2–4	..	—	—
Crabs	30	648	2–4	12	149	2–8	10	90	2–4	—	—	—
Total monthly landings, pounds ..		2,160		..	1,240	..	..	900		..	..	..
.. .. ..	..	..	..	..	..	..	..	..	..	..	..	..
.. ..	..	..	..	..	..	..	..	..	..	..	..	..
.. ..				..	..	..	..	..	..	..	..	..
.. ..	..	..	..	..	..	..	..	..	..	..	..	..

APPENDIX X.—*Showing month-war percentage composition, weight in pounds and size-range in inches of fish captured with Kovavalai in the Vellar estuary from May 1952 to April 1953*—cont.

Month.	January 1953.			February 1953.			March 1953.			April 1953.		
Number of nets operated per day.	3			..			..			..		
Average catch per net per day, pounds.	9			..			..			..		
Details of catches.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.	Composition.	Weight.	Size.
	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)
Mugil spp.	..	..	..	..	..	..	..	..	..	..	..	..
Leiognathus spp.	50	418	2–3	—	..	..	..	..	..	..	..	..
Engraulis malabaricus ..	..	..	—	..	..	..	..	..	..	..	..	..
Johnius spp.	..	—	—	..	..	..	—	..	..	..	..	..
Prawns	40	336	3–4½	..	..	..	..	..	..	..	..	..
Crabs	10	83	2–3	..	..	..	..	..	..	~	~	~
Total monthly landings, pounds ..		837		..	..	..				..	..	..
	..	..	..	..		..	..	..	..	..	..	..
			..			..				..	..	..
	..						..	..	..	..	..	..

APPENDIX XI.—*Showing the quantity and value of fish caught and the average earning of fishermen in a day by using different tackles in the Vellar estuary during the twelve months from May 1952 to April 1953.*

Month.	Cast net without craft.				Cast net with craft.				Kooni valai.			
	Quantity in pounds.	Value.	Number of men operating.	Earning per head.	Quantity in pounds.	Value.	Number of men operating.	Earning per head.	Quantity in pounds.	Value.	Number of men operating.	Earning per head.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
		Rs. A.		Rs.	A.	Rs. A.		Rs.	A.	Rs. A.		Rs. A.
1952—												
May ..	3	0 12	1	0	12	30	5 0	2	2	8	40	4 0	2	2	0
June ..	4	1 0	1	1	0	9	2 4	2	1	2	10	1 0	2	0	8
July ..	4½	1 2	1	1	2	10	2 8	2	1	4	..	..	..		..
August	4	1 0	1	1	0	8½	2 2	2	1	1	..	..	..		..
September	3	0 12	1	0	12	15	3 12	2	1	14	..	..	..		..
October	3	0 12	1	0	12	8	2 0	2	1	0	..	..	..		..
November	3	0 12	1	0	12	8	2 0	2	1	0	..	..	..		..
December	2½	0 10	1	0	10	34	8 8	2	4	4	..	..	..		..
1953—						10½	2 10	2	1	5	..	..	..		..
January	3½	0 15	1	0	15	21	5 4	2	2	10	..	..	..		..
February	3½	0 13	1	0	13	16	4 0	2	2	0	..	..	..		..
March	2¾	0 11	1	0	11	14	3 8	2	1	12	..	..	..		..
April ..	3	0 12	1	0	12	6½	1 10	2	0	13	21	2 0	2	1	0

APPENDIX XI.—*Showing the quantity and value of fish caught and the average earning of fishermen in a day by using different tackles in the Vellar estuary during the twelve months from May 1952 to April 1953*—cont.

Month.	Ranchu valai.				Katcha valai.				Kova valai.			
	Quantity in pounds.	Value.	Number of men operating.	Earning per head.	Quantity in pounds.	Value.	Number of men operating.	Earning per head.	Quantity in pounds.	Value.	Number of men operating.	Earning per head.
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
		Rs. a.		Rs. a.		Rs. a.		Rs. a.		Rs. a.		Rs. a.
1952—												
May	..	..	..	..	..	..	..	..	..	..	..	..
June	24	6 0	4	1 8	..	..	..	..	..	..	..	..
July	30	7 8	4	1 14	..	..	..	..	..	..	..	..
August	21	5 4	4	1 5	..	..	..	..	7	1 12	2	0 14
September	17	4 4	4	1 1	8	1 4	1	1 4	8	2 0	2	1 0
October	15	3 12	4	0 15	7	1 2	1	1 2	10	2 8	2	1 4
November	45	11 4	4	2 13	..	..	..	..	15	3 12	2	1 14
December	20	5 0	4	1 4	..	..	..	..	..	..	..	..
1953—												
January	35	8 12	4	2 3	10	1 4	1	1 4	9	2 4	2	1 2
February	28	7 0	4	1 12	..	..	..	..	..	..	..	..
March	14	3 8	4	0 14	..	..	..	..	..	..	..	..
April	12	3 0	4	0 12	..	..	..	..	..	..	..	..

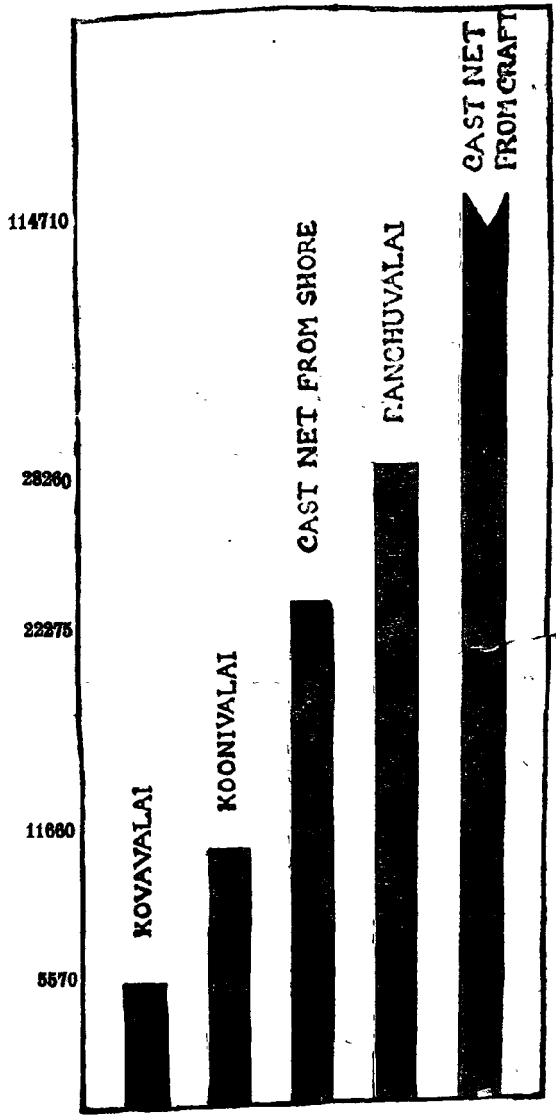

CHART SHOWING TOTAL LANDINGS MADE WITH FIVE TACKLES FROM VELLAR ESTUARY.